



# **TECHNOLOGY OF PUBLIC HEALTH SCIENCES**

# Primary Health Care

## Definition

PHC is the essential health care made of accessible to all individuals & families by being acceptable and appropriate, through their full participation and at a cost that the people and country can afford

## Levels of Care

### Primary health care

- The “first” level of contact between the individual and the health system.
- Responds for 80% of the community needs
- Urban & rural facilities
- Provide by general practitioners
- Essential health care (PHC) is provided.
- A majority of prevailing health problems can be satisfactorily managed.
- The closest to the people.
- Provided by the primary health centers.

### Secondary health care

- Higher level of curative care, Responds for 15% of the community needs
- Provided in public & district hospitals & polyclinics Provide by general specialist, More complex problems are dealt with, The 1st referral level

### Tertiary health care

- Provides advanced level of health care & technology
- Responds for 5% of the community needs
- Offers super-specialist care
- Provided by regional/central level institution.
- Provide training programs

## Principles of PHC

- 1- PHC is the **first line of contact** between the health sector & the public
- 2- **Essential Health Care:** preventive, curative & health promotion services
- 3- **Accessible:**
  - ✓ Geographic accessibility , Social accessibility, Financial accessibility
- 4- **Affordable:** people can pay for the cost
- 5- **Acceptable:** people feel the importance of PHC
- 6- **Appropriate:** meet the health need of the population

## The Eight Elements of PHC

1. Health Education
2. Promotion of food supply & proper nutrition

3. basic sanitation & safe water supply
4. Maternal & child health (MCH) including family planning
5. Immunization
6. Prevention & control of endemic diseases
7. Appropriate treatment of common diseases & injuries
8. Essential drug list to cover the local needs

## **Maternal Health Care**

### **Maternal Health Care Program**

**Component:** antenatal care, natal care, postnatal care, inter-pregnancy care

#### **Ante Natal Care**

#### **Components**

##### **1- Registration & record keeping**

- Booking for ANC should start within first 6 weeks after the last menstrual cycle
- Delay in registration would miss the period of organogenesis
- The mother should get the health card
- The time of initiation of ANC is influenced by women awareness

##### **2- ANC periodic visits & clinical Examination**

##### **Return Visits:**

- Once every month till 7th month.
- Once every 2 weeks till the 9th month
- Once every week during the 9th month, till labor. the mother should receive a minimum of 4 ANC visits
- 1<sup>st</sup> visit in the first 3 months of pregnancy : history, examination, Health education
- 2<sup>nd</sup> & 3<sup>rd</sup> visit in the 5<sup>th</sup> & 6<sup>th</sup> months : periodic examination , treatment, health education referral & tetanus toxoid vaccination
- 4<sup>th</sup> visit in the 8<sup>th</sup> month: periodic examination , treatment, health education referral, and sonar
- 5<sup>th</sup> visit in the 9<sup>th</sup> month: verify fetal presentation & lie and set the plan for delivery.

##### **Components of Care in the First ANC Visit**

##### **History**

- Personal history, Family history , Medical and surgical history
- Menstrual history , Obstetrical history

## **History of present pregnancy**

### **Clinical & Laboratory Examinations**

- Weight & Height measurement, clinical check up
- Urine should be tested for sugar, ketones and protein.
- Blood examination for blood group, RH, blood sugar, Hemoglobin
- Examination for fundal height after weeks of gestation
- Risk factors assessment

### **3- Health Education during ANC**

- Physiological changes during pregnancy ,Weight gain
- Fresh air and sunshine, Rest and sleep, adequate Nutrition , Daily activities ,Exercises and relaxation, Hygiene ,Smoking
- Teeth , Bladder and bowel, Sexual counseling, Medications
- Infection , Irradiation, Occupational and environmental hazards
- Travel, Follow up , Minor discomforts ,Signs of potential complications

### **4- Nutrition Assessment, Education and Supplementation**

#### **Nutrition assessment:**

- Measurement of body weight, Hemoglobin estimation
- Clinical examination, Dietary assessment

#### **Nutrition Education**

- Focus on adequate diet
- Daily consumption of fresh fruits and vegetables
- Daily consumption of milk or milk product
- Avoid excessive salt

#### **Nutrition supplementation**

- Iron 60 mg of elemental iron once or twice daily for the non-anemic mothers at 24 weeks of gestation & extends 3-6 months after delivery
- Folic acid
- Calcium in 2<sup>nd</sup> trimester

**5- Tetanus Toxoid Immunization** : The first two shots are given at least four weeks apart, and the third shot is given six to 12 months after the second shot. After the initial tetanus series, booster shots are recommended every 10 years.

### **6- Risk Detection and Management**

- Identification of mothers **who are at risk** of mortality, morbidity
- Everyone is receiving a standard level of health care and more care is given to those at risk

## 7- Referral services:

- PHC physicians have to refer the identified at risk mothers at any time of pregnancy or labor to the hospital

## 8- Home visit:

- Follow up the dropouts from the MCH/ANC
- To provide health education

## 9- Social care

- Mother of low socioeconomic status, non-educated women
- Women living in rural areas

# Maternal Health Problems

## Causes of Maternal Mortality in Egypt

**Direct obstetric causes:** hemorrhage, hypertension, puerperal sepsis and post abortive, thromboembolism, rupture uterus

**Indirect causes:** resulting from diseases existing before or occur during pregnancy and aggravated by physiological changes of pregnancy as: cardiovascular diseases especially Rheumatic heart diseases, anemia, DM, hepatitis, cancer

- Maternal health problem related to/or aggravated by pregnancy, labour, and puerperium

## Maternal Malnutrition:

1. Iron deficiency anemia with or without folic acid deficiency
2. Wasting due to low energy and protein intake
- 3- Iodine deficiency
- 4- Osteomalacia: due to calcium deficiency
- 5- Obesity

## Maternal Mortality Indicators

**Maternal Mortality Ratio (MMR)= 67 deaths/100.000 live births**

No. Of deaths of mothers due to causes related to pregnancy, labour & puerperium in certain year & locality

X 100000

No. Of live births in the same year and locality

**Maternal Mortality Rate (MMR)**

No. Of deaths of mothers due to causes related to pregnancy, labour & puerperium in certain year & locality

X 1000

No. Of females in the child bearing period (15-49) in the same year and locality

# **Child Health Program**

## **Components**

### **1- Registration and record keeping**

- The 1<sup>st</sup> visit to MCH center is preferred to be at the age of 30-40 days
- A medical record is to be prepared for each child during the 1<sup>st</sup> visit
- A health card is prepared to be used as “medical record for the whole life”

### **2- Periodic medical examination**

#### **A- Full clinical and laboratory investigation:**

systemic clinical examination of the child

- Four times in the 1<sup>st</sup> year, twice in the second year, once every year till the school age

#### **B- Monitoring the growth and development of the child**

**A-** Development monitoring: monitoring of development services include periodic assessment for specific milestones compared to standard children development

#### **B- Growth monitoring**

- It is a visible display of a child's physical growth and development.
- Growth chart offers a simple and inexpensive way of monitoring weight gain.
- Any deviation from “normal” detected by comparison with reference curves. It has two reference curves.
- Upper reference curve -the median (50<sup>th</sup> percentile) for boys.
- Space between two growth curves called weight channel or road to health – zone of normality for most population.

#### **Step of Growth Monitoring**

- Anthropometric measurements
- Plotting/record the child data and measurements in the growth chart
- Interpretation of the growth curve to detect falter
- If there is deviation from the normal pattern, investigate the cause
- Management of the cause
- More frequent monitoring until the child is back to normal rate of growth

#### **Interpretation**

- 1<sup>st</sup> degree (grade 1) malnutrition- child's weight between 80% and 70% lines.
- 2nd degree (grade 2 or moderate) malnutrition –child's weight between 70% and 60% lines.
- 3<sup>rd</sup> degree (grade 3 severe) malnutrition weight below 60% line.
- Grade 4-weight below 50% line.
- Weight b/w top 2 lines –considered satisfactory.

### 3- Health Education

### 4- Nutrition care

#### Nutrition supplementation to children:

- **Vitamin A** at age 9 months and 15, or 18 is given with the vaccines (the recommended dose in Egypt is 100,000 IU ,after 1 year the dose 200.000 IU
- **Vitamin D** at the age of 2 months once at a dose of 200.000 IU intramuscular
- **Iron supplementation**

### 5-Immunization

Infants and Preschool	Vaccine Dosage & Route of administration	
After birth	Sabin, OPV BCG	Zero dose, 2 drops on tongue 0.1ml, intradermal upper left arm no tuberculin
2,4,6 months	Sabin, OPV pentavalent vaccine (DPT, Hepatitis B, Haemophilus Influenza type B)	2 drops on tongue 0.5 ml, IM Outer left mid-thigh
9 months	Sabin, OPV	2 drops on tongue
12 months	Sabin, OPV MMR + Vitamin A	2 drops on tongue Primary, one dose, 0.5 ml SC right arm
18 Months (booster dose)	Sabin, OPV DPT MMR + Vitamin A	2 drops on tongue 0.5 IM Outer left mid-thigh 0.5 ml SC right arm

### 6- Management of sick children

- Early detection & management of sick children
- The integrated Management of Childhood Illness (IMCI) services include control of diarrheal diseases , ARI, malnutrition

**7- Referral services:** Child care clinic staff should identify children who need to be referred to higher levels of care to get specialized services

#### 8- Out-reach services include:

- Providing services to people through home visiting ( for health education, immunization).
- MCH services provided in the remote services deprived areas by mobile clinic

#### 9- Social Care:

- To deal with the socioeconomic factors contributing to child morbidity & mortality

# **Rural Health**

Where the agriculture is the main occupation of the population forms 58% of the total population.

## **Problems of the rural communities**

### **1- Socioeconomic Problems**

### **2- Educational Problems**

### **3- Cultural Beliefs that Contradict Good Health Behavior**

### **4- Medical Services**

### **5- Environmental Sanitation**

a- Village Planning

b- Housing:

c- Water supply

d- Waste Disposal

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e- Insects & Rodents

f- Food Sanitation

### **6- Urbanization Problem**

Urbanization is the process of migration of people from rural to urban areas

#### **Causes:**

- Limited rural resources
- Better chance for work in the rural areas
- Better standard of living
- Students & their families migrate to urban areas

#### **Hazards:**

- Development of the slum areas
- Spread of communicable diseases (T.B., streptococcal infections)
- The social & psychological problems
- Deprive the village from the productive adults with subsequent failure of rural community development

#### **Control:**

- Rural community development
- Motivation of educated adults to work in their native villages
- Motivate the providers of social , educational, & health services to live in rural areas
- Set laws and regulations that control the migration process from the rural to urban areas



# **Environmental Health**

## **Air**

### **Outdoor Air Pollution**

#### **Source in Egypt:**

- Dust and sand , Power plants, Industrial wastes as the cement plants of Helwan, , Motor vehicles, Garbage incineration and burning

#### **Health Hazards:**

Immediate or short term effects:

- Acute symptoms: eye irritation, respiratory irritation, bronchitis
- Headache, fatigue, nausea, allergic reactions, asthma

Long term effects:

- Respiratory morbidities: chronic bronchitis, asthma, emphysema
- Carcinogenic effects
- Abortion, congenital anomalies
- Psycho-somatic diseases & depression

### **Global Warming**

- It has been recognized recently as a hazard to human health, it refers to the gradual steady increase in the average temperature of the earth's surface over the past 100 years
- It is due to continuous buildup of greenhouse gases in the atmosphere (carbon dioxide, methane, nitrogen oxide)
- These gases enhance the troposphere's heat trapping capacity by allowing incoming solar radiation , which heats the earth to pass & traps some heat that is being radiated back to space from earth

#### **Global warming can be reduced by:**

- The use of more efficient energy technologies
- Limiting population growth
- Conserving energy
- The kyoto protocol (1997): which is an international and legally binding protocol, the purpose of which is to reduce emissions of greenhouse gases, was signed in 2005 by about 140 nations. The protocol requires developed countries to reduce emissions by targeted amounts.

### **Ozone Depletion**

- O<sub>3</sub>:a gas composed of three atoms of oxygen
- bluish gas that is harmful to breathe

- Nearly 90% of the Earth's ozone is in the stratosphere and is referred to as the ozone layer
- Ozone absorbs a band of ultraviolet radiation called UVB

### **Effects**

- Skin Cancer (melanoma and nonmelanoma)
- Premature aging of the skin and other skin problems
- Cataracts and other eye damage
- Immune system suppression
- The ozone hole is defined as the area having less than 220 dobson units (DU) of ozone in the overhead column (i.e., between the ground and space).

## **Indoor Air Pollution**

### **Sources**

- There are many sources of indoor air pollution. Tobacco smoke, cooking, heating appliances, and vapors cause pollution inside buildings.
- Pollution exposure at home and work is often greater than outdoors. Both indoor and outdoor pollution need to be controlled and/or prevented

### **Effects of indoor air pollution**

- Different groups of individuals are affected by air pollution in different ways.
- Some individuals are much more sensitive to pollutants than are others.
- Young children and elderly people often suffer more from the effects of air pollution.
- People with health problems such as asthma, heart and lung disease may also suffer more when the air is polluted.

**Short-term effects** include irritation to the eyes, nose and throat, and upper respiratory infections such as bronchitis and pneumonia. Other symptoms can include headaches, nausea, and allergic reactions.

- Short-term air pollution can aggravate the medical conditions of individuals with asthma

**Long-term health effects** can include chronic respiratory disease, lung cancer, heart disease, and even damage to the brain, nerves, liver, or kidneys.

Continual exposure to air pollution affects the lungs of growing children and may aggravate or complicate medical conditions in the elderly.

### **Prevention:**

- Avoid the sources of pollution as possible
- Proper ventilation

# **Water Quality and Health**

## **Sources of water in Egypt**

### **Nile River**

- Main and almost exclusive resource of fresh water is the Nile River.

### **Rainfall and flash floods:**

### **Groundwater in the deserts and Sinai**

### **Possible desalination of sea water**

### **Purification of Water**

- It is a source of water that is not contaminated by dirt, bacteria, or chemicals

### **I-Steps of large scale water purification**

- Precipitation by using Aluminum sulfate which helps to get rid of suspended matter and 30% of the bacterial content
- Filtration get rid of 95% of the organisms
- Disinfection using chlorine : dose is 0.6 part per million to leave residual chlorine of 0.2 ppm

II- deep underground water: needs no treatment but recently in areas where iron & manganese are causing problems several methods used to precipitate these 2 elements

### **III- Shallow wells:**

- Located wells at least 30 meters away from sources of contamination as latrines, sheds
- Build a raised wall or a fence around the well to keep animals away

### **Other methods:**

- Bacterial filters
- Boiling water
- The zeer in rural areas if properly used act as a water filter

## **Hospital Waste**

## **Hospital Waste Management**

A waste management plan should address these components of waste management:

### **Waste Labeling**

- Should be established as part of a healthcare waste management plan
- Recommended waste label content:
  - Date      - Type of waste
- Point of generation (to allow tracking), Weight should be routinely recorded, where possible.

## **Waste Collection**

- Should be established as part of a healthcare waste management plan
  - Should ensure that waste from each area is collected at least daily (except for sharps)
  - Should ensure that containers are not overfilled
  - Should ensure segregation is maintained
- Sharp waste should be collected when the box is 3/4<sup>th</sup> filled

**Sorting:** separating waste by type into color coded bags at the place where it is generated

- Only a small % of the waste generated by a health care facility is medical waste that must be specially handled
- Sorting at the generation site can reduce the amount that needs special handling
- Separate containers should be used for disposing general and medical wastes
- Colored plastic bags should be used to help distinguish between general and medical wastes

A 3-bin system for waste sorting should be established as follows:

- Red bags used for infectious and pathologic waste that needs to be incinerated
- Yellow bags used for radioactive waste to be dealt with by atomic energy institutions
- Black bags are for general waste

## **Waste Handling**

- Should be established as part of a healthcare waste management plan
- Requires use of proper PPE
- Requires use of good body mechanics: the way we move when conducting activities
- Good body mechanics could protect the body from injury.

**Interim storage:** sorting waste within the facility until it can be transported for final disposal

**Final disposal:** elimination of solid medical waste, liquid medical waste, sharps.

Big hospitals may have their own system for incineration

Sharps disposal: sharps should be discarded in safety boxes

# Occupational Health

**Definition by WHO:** promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.

## Occupational Hazards

### 1- Physical Agents

#### 1- Heat

##### Heat cramps

**Etiology:** the body will lose water through evaporation of sweat, loss of fluid and sodium chloride, causing heat cramps

##### Manifestations:

- Severe intermittent cramps of voluntary muscles
- May be the visceral muscles causing nausea, vomiting and colic

##### Prevention:

- Ensure physical fitness of workers
- Cooling of work place
- Giving suitable dose of prophylactic sodium chloride tablets

**Treatment:** Adequate dose of sodium chloride oral

##### Heat exhaustion:

**Etiology:** heat loss by sweating and marked peripheral vasodilatation

**Manifestations:** wet skin due to sweating, collapse and circulatory failure

##### Heat stroke

**Etiology:** failure of the body to lose heat in hot humid air

**Manifestations:** hyperpyrexia 40°C or more, very hot dry skin, muscle cramps, irritability.

**Prevention:** fulfilling requirements of cooling power of air

**Management:** the case must be immediately removed from adverse environment and lowering body temperature by all means as ice bath give saline intravenously

**Sun stroke:** it is a form of heat stroke that results from severe exposure to sun rays

**Etiology:** action of sun rays, causing meningeal irritation, together with interference with heat loss from the body

#### 2- Cold: workers are exposed to low atmospheric temperature in cold storage rooms

**Chilling & predisposing to respiratory infection:** if body temperature reaches below 28°C confusion and loss of consciousness occur & death occurs when body temperature falls to 21°C

**Frost bite:** caused by freezing conditions which cut off circulation, usually in extremities (hands, feet, ears, nose), which may be permanently affected. Frost-

bitten areas are cold, pale or marbled-looking, solid to the touch, and painless (until circulation is restored).

**Prevention:** using suitable protective clothing & heating by radiators

### **3- High Pressure**

**Caisson workers and sea divers** are exposed to high pressure while staying deeply under water

If the process of decompression (returning to the surface) is rapid, they show manifestations of caisson disease

#### **Etiology:**

- On exposure to high pressure more oxygen and nitrogen gases dissolve in blood
- On rapid decompression there is rapid lowering of pressure causes bubbling of the more dissolved gases
- Oxygen is going to be utilized by the tissues while nitrogen bubbles cause embolic phenomena

#### **Manifestations:**

- **Mild:** skin manifestations, pain in the joints and muscles
- **Moderate:** meniere,s syndrome due to emboli labyrinth , manifested by headache, nausea, vomiting, nystagmus, staggering gait, deafness
- **Sever:** emboli in CNS, parenthesis & weakness to total paralysis of the lower extremities, monoplegia. Emboli in the heart & lung haemoptysis

**Prevention:** decompression of worker must be slow enough

**Treatment:** recompression where nitrogen bubbles re-dissolve, followed by slow enough decompression in special pressure regulated unit

### **4- Low Pressure (high altitude sickness hypoxia) (mountain)**

**Hypoxia:** is due to decrease O<sub>2</sub> at high altitudes

#### **Mechanical effects:**

- Displacement of middle ear
- Abdominal distension by gases
- Dysnea & rupture emphysema
- Tooth ache

#### **Physical effects:**

- CNS: nausea, vomiting , mental confusion, disturbed speech
- GIT: nausea, vomiting , loss of appetite , abdominal pain
- CVS: tachycardia, increase in cardiac out put

**Respiration:** rapid deep respiration & periodic breathing

**Chronic Effect:** increase pulmonary ventilation, blood pressure, O<sub>2</sub> dissociation curve, decrease metabolism

**Prophylaxis:** pressurized aeroplanes, supply O<sub>2</sub> breathing apparatus, special training of pilot, never work above 4000 meter height

**5- Noise**

**6-Radiation**

**7-Poor lighting**

**8-Vibration**

## **1-Chemical Agents**

### **Pneumoconiosis**

**Silicosis:** is the most frequent and disabling pneumoconiosis caused by inhalation of silica dust that induces fibro-nodular reaction of the lung

**Exposure:** workers in the following industries are exposed to silica dust:

- Glass, pottery, ceramic, industries
- Sand blasting and mineral polishing
- Foundry workers

### **Manifestations:**

- The lung shows nodular fibrosis after years of exposure
- The case suffer from progressive dyspnea, cough
- Right heart failure & total incapacity
- Increase the susceptibility to pulmonary tuberculosis

**Asbestosis:** is a mixture of fibrous silicates about 20 microns long

- Asbestos is used for manufacture of fireproof, and insulation material

### **Etiology:**

- Inhalation of asbestos fibers causing diffuse fibrous scarring of lung, pleural thickening and emphysema
- Cases of asbestosis are more susceptible to lung cancer

**Byssinosis:** due to exposure to cotton dust during two processes:

- Opening cotton bales, and spreading compressed lint
- Ginning of cotton

**Etiology:** allergen found in cotton dust, producing bronchospasm

### **Clinical picture:**

#### **1- Monday fever:**

- It is the initial stage that appears after 10 or more years of exposure
- It is characterized by transient recurrent attacks of irritating cough and respiratory manifestations:

- Appear on returning to work after weekend or other leaves , for some days then disappear

Reappear after the next leave or rest and so on

## **2- Stage of asthma and bronchitis attacks**

**3- Stage of severe chronic bronchitis-emphysema syndrome**, after about 20 years of exposure: stage of complete disability

## **Bagassosis**

- Bagasse is the cellulose fiber of cane sugar after extraction of sugar
- It is dried to be used for manufacture of hardboard and insulating material
- Crushing bagasse in manufacture gives dust
- Inhalation of that dust causes bagassosis with acute respiratory manifestations , after weeks of exposure

**Farmers' Lung:** is a disease condition caused by inhalation of spore bearing dust , on handling mouldy hay and straw

- Shortly after exposure, the farmer shows general and respiratory manifestations (cough, dyspnea) , which are mild , temporary and self-limited
- Manifestations disappear on stopping exposure to reappear on re-exposure and so on

## **Benign pneumoconiosis**

- Dust of iron, calcium, tin, barium, and coal is inert “Benign pneumoconiosis”
- Anthracosis: coal miner's pneumoconiosis, coal dust disease: is caused by long exposure to high concentrations of coal dust, in coal mining.

## **Prevention of pneumoconiosis**

### **1- Dust control:**

- Extraction of dust once formed during industrial process by local exhaust ventilation system, the most effective measure
- Fine water – spray by special devices

**2- Segregation of dusty process** and automation of work if possible

**3- Personal protection** by masks or respirators

**4- Health appraisal** of exposed workers

- pre-placement medical examination
- Periodic medical examination
- Screened cases could either return to same work, with precautions and supervision or shift to other work , according to medical decision