The Health System and Public Health







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The Health System and Public Health

First Year

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Course Description

The main objective of this 36-hour course is to provide students with the background underlying health system structure concepts. The health system of Egypt will be outlined in terms of health-care providers, levels of health care, and the costs and financing of health care. An elaborate description of primary health care (PHC) and its functions both in preventive and curative domains will be outlined together with the specific PHC services for different sectors and groups in Egypt.

This course will introduce the concept of public health and its services to the students. Information on programs of disease prevention and control implemented in the country will give the student a foundation for what health education is needed and where and how it should be directed. Since Egypt is in a state of epidemiologic transition in which both infectious and noncommunicable diseases (NCDs) have high levels of morbidity and mortality, the discussion with the students will include both categories. The student will gain knowledge and understanding in key areas, including the infectious cycle and the role of the environment and personal behavior in the occurrence and prevention of diseases.

The course will also fully describe models of health problems and diseases of public health importance, including causes, risk factors, clinical picture, diagnosis, and preventive and control programs.

Core Knowledge

By the end of this course the students should be able to:

- Describe the basic organization of the health-care system
- List the package of services for health-care and payment mechanisms
- Understand the Egyptian health system and the role of the Egyptian Ministry of Health and Population (MOHP)
- Define the role of the preventive and promotive care sector
- Recognize the purpose of public health
- Describe health, disease, the spectrum of health, and patterns of care
- Recognize the core public health functions and services
- Discuss the basics of PHC
- Understand the role and referral mechanisms for secondary and tertiary care

- Discuss key programs and initiatives for health promotion and prevention of key illnesses during childhood in Egypt, such as the Integrated Management of Childhood Illness and the Accelerated Plan for Reduction of Maternal and Childhood Mortality
- Determine the contributions and roles of health professionals as well as the stakeholders
- Recall the chain of infection and define the role of each component
- Describe prevention and control programs for selected problems in Egypt, such as maternal and child mortality and the hepatitis B and C viruses
- Describe the national burden of disease of the four main NCDs
- Define key terms used in public health

Core Skills

By the end of this course the students should be able to:

- Differentiate between the three levels of health care
- Categorize the most common health issues in Egypt
- Critique the health-care system in Egypt
- Illustrate the public health importance of common health conditions—infectious diseases and NCDs
- Formulate simple health messages to enable caregivers to identify and cope with childhood illnesses

Course Overview

		Methods of Teaching/Training with Number of Total Topic Hours			g with Irs	
ID	Topics	Interactive Lecture	Fieldwork	Class Assignments	Research	Lab
1	General picture of health system components and levels of care	3		1		
2	2 The details of Egyptian health system delivery 2		2			
3	3 Introduction to public health 2			1		
4	 Preventive services definition, importance and levels with an overview on prevention and control programs in Egypt 			2		
5	5 The role of PHC services in Egypt		4			
6	6 Infectious disease background (cause, source, mode of transmission, etc.)					
7An overview of epidemiology of common infectious diseases in Egypt33		3				
8Public health importance of Egyptian NCDs and methods for their prevention and control32						
TOTAL HOURS (34)		19	9	6		

Chapter 1

Overview of Health System Components and Levels of Care

Introduction

The World Health Organization (WHO, 2007) defines a health system as follows:

"A health system consists of all organizations, people and actions whose primary intent is to promote, restore or maintain health. This includes efforts to influence determinants of health as well as more direct health-improving activities."

A health system is therefore more than the framework of publicly owned facilities that deliver personal health services. It includes, for example, a mother caring for a sick child at home; private providers; behavioral change programs; vector-control campaigns; health insurance organizations; and occupational health and safety legislation. It includes intersectoral action by health staff, for example, through encouraging the Ministry of Education to promote female education, which is a well-known determinant of better health.

Every nation must design and develop health systems in accordance with its needs and resources. The common elements in all health systems are primary health care and public health measures.

All health-care systems are composed of five main pillars:

- Providers
 - Institutions include hospitals, clinics, medical laboratories, and health training institutions. These may be operated by the government or by nonprofit or forprofit organizations.
 - Individuals include doctors, dentists, pharmacists, nurses, midwives, dietitians, paramedics, community health workers, and others.
- Finance
 - Sources of health funding/pay include national or private health insurance, outof-pocket payment, donations, or charity.
 - Salary for governmental or organizational providers allows funders to control health-care costs directly; however, it may lead to under-provision of services.
- **Information** plays an increasingly critical role in the delivery of modern health care and the efficiency of health systems. It includes clinical guidelines, medical terminology, patients' medical records, human resources information, and so forth.

- Management includes policies and plans adopted by the government.
- **Performance** depends on indicators adopted by the providers for both time and place comparisons, which enable monitoring of progress and differences.

Frameworks for Monitoring Health Systems Performance

The WHO (2010) framework describes health systems in terms of six core components or "building blocks": service delivery, health workforce, health information systems, access to essential medicines, financing, and leadership/governance.



The WHO Health Systems Framework

The monitoring and evaluation (M&E) framework shows how health inputs and processes (e.g., health workforce and infrastructure) are reflected in outputs (e.g., interventions and available services) that, in turn, are reflected in outcomes (e.g., coverage) and impact (morbidity and mortality). The added value of the framework is that it brings together indicators and data sources across the results chain in its entirety—from inputs/processes, outputs, and outcomes to impacts. The framework addresses monitoring and evaluation needs for different users and multiple purposes, including:

- **Monitoring** of program inputs, processes, and results, which is required for managing health system investments
- Health systems performance assessment as the key for country decision-making processes
- **Evaluation** of the results of health reform investments and identification of which approaches work best



Monitoring and evaluation of health systems strengthening

List of recommended core indicators

Building blocks and indicators	Data collection methods / Data sources
1. Health Service Delivery	
 Number and distribution of health facilities per 10 000 population Number and distribution of inpatient beds per 10 000 population 	District and national databases of health facilities. Special efforts — notably facility censuses — are often required to obtain the number of private facilities, especially if no registration system is enforced.
Number of outpatient department visits per 10 000 population per year	Routine health facility reporting system Population-based surveys
 General service readiness score for health facilities Proportion of health facilities offering specific services Number and distribution of health facilities offering specific services per 10 000 population Specific-services readiness score for health facilities 	Health facility assessments
2. Health Workforce	
 Number of health workers per 10 000 population Distribution of health workers by occupation/specialization, region, place of work and sex 	Routine administrative records, periodically validated and adjusted against data from national population census or facility-based assessments.
 Annual number of graduates of health professions educational institutions per 100 000 population, by level and field of education 	Routine administrative records from individual training institutions. In some cases, data may be validated against registries of professional regulatory bodies where certification or licensure is required for practice.
3. Health Information	
Health information system performance index	Review of national health information systems
4. Essential Medicines	
Average availability of 14 selected essential medicines in public and private health facilities	National (or sub-national when necessary) surveys of
Median consumer price ratio of 14 selected essential medicines in public and private health facilities	medicine price and availability conducted using a standard methodology developed by WHO and Health Action International.
5. Health Financing	
Total expenditure on health	National Health Accounts (NHA)
 General government expenditure on health as a proportion of general government expenditure (GGHE/GGE) 	
The ratio of household out-of-pocket payments for health to total expenditure on health	Household expenditure and utilization surveys.
6. Leadership and Governance	
Policy index	Review of national health policies in respective domains (such as essential medicines and pharmaceutical, TB, malaria, HIV/AIDS, maternal health, child health/ immunization).

Demographic and Socioeconomic Characteristics of Egypt

In 2016, Egypt had a population of over 90 million people, 44 million of whom were women. As of late 2014, the population was growing at a rate of 2.6 percent per year and had grown by 46 percent since 1994, from 60 million to around 88 million.

An increase in fertility levels enhanced the overall growth rate of Egypt's population. After decades of declining fertility rates, the number of births per woman were found to have risen to 3.5 percent per year in 2014. Certain health indicators, such as reduced infant mortality rates and increased life expectancy, also contribute to more rapid population expansion.

Currently, 31 percent of the Egyptian population is under the age of 15 years and 4.3 percent is over the age of 65 years, and these percentages are expected to increase in the coming years.

The country's dependency ratio is currently 55.2 percent, which means that during the next decade people of working age will continue to largely outnumber those of nonworking age. This "demographic dividend" is generally considered to be positive factor for economic growth.

However, dividends will be constrained if the population is underprepared and if every person particularly every girl—cannot pursue their education or navigate their transition to adulthood assured of their human rights. Such assurance includes the freedom to decide when and whom to marry, the timing and number of children, and the security to balance work and family life.



Population pyramid 2010

Population pyramid 2050



Source: World population prospects: the 2012 revision (DVD edition). New York: United Nations, Department of Economic and Social Affairs, Population Division; 2013.

Demographic Indicators Egypt 2014

Indicator	2014
Birth rate per 1000 population	31.2
Death rate per 1000 population	6.1
Rate of natural increase per 1000 population	25.2
Dependency ratio	55.2
Total fertility rate	3.5

Poverty, defined as people living on less than US\$1 per day, has diminished in Egypt in the last 10 years, although the 2010 levels are actually slightly higher than the levels in the second half of the 2000s. However, when the national poverty line is based on the cost of satisfying basic needs, poverty has risen steadily (currently 26 percent). This trend is driven notably by food price inflation. Poverty is closely associated with illiteracy and a lack of education. The overall illiteracy rate in Egypt is 28 percent, with the rate being nearly double in females compared with males.

Chapter 2 **The Egyptian Health System**

Introduction

Health services in Egypt are currently managed, financed, and provided by agencies in three sectors: governmental, parastatal (semi-governmental), and private. The government sector (MOHP) manages the PHC centers and units, general hospitals, district hospitals, and integrated hospitals. The governmental sector is composed of quasi-governmental organizations in which MOHP has a controlling share of decision making, and it includes the Health Insurance Organization, the Curative Care Organization, and the Teaching Hospitals and Institutes Organization. Although a distinction is made between the government sector and the semi-governmental sector in describing the Egyptian health sector, both sectors are run by the state. The private sector includes for-profit and nonprofit organizations and covers private pharmacies, private doctors, and private clinics and hospitals of all sizes.

The health-care delivery system provides different types of health care (preventive and curative) at three levels: primary, secondary, and tertiary.

- The MOHP provides about 40 percent of the health services delivered to the community.
- The Health Insurance Organization provides care to governmental employees, school children, and neonates. About 50 percent of the population is covered by the health insurance system.
- University, teaching, and research institutions provide 10 percent of health care.
- The private sector provides about 12 percent of health services.
- Health-care services may overlap, and an individual can receive services from more than one health-care sector.

Management Items	Governmental Sector	Semigovernmental Sector	Private Sector
Type of health facilities/ providers	MOHP facilities, university facilities, teaching hospitals and hospitals affiliated with the Ministries of Defense and Interior	Health Insurance Organizations, Curative Care Organization	Private practice doctors, pharmacists, nongovernmental organizations, clinics in mosques and churches
Source of funds	Ministry of Finance and self–funding from the economic departments	Ministry of Finance and cost-recovery	User fees
Served population	Low-and middle- income population	Middle- and high- income people	Low-, middle-, and high-income people
Registration	МОНР	МОНР	MOHP, Medical Syndicate, and Ministry of Social Solidarity

Health System in Egypt: Three Sectors in Health Services Delivery

Levels of Health Care

Primary health care

The PHC is the first point of contact between the community and the health-care sector. It covers almost 80 percent of the community needs. Health services are provided by general practitioners (new graduates) through urban and rural health facilities. The PHC is cost effective and is the least expensive level of health care.

Secondary health care

Secondary health care provides a higher level of curative care than PHC. It covers 15 percent of the community needs. Health services are provided by specialists in general and district hospitals and polyclinics. A referral system exists between primary care and secondary care facilities. Feedback of information and follow-up are essential elements of the referral system. Secondary level of care is more costly.

Tertiary health care

Tertiary health care provides an advanced level of health-care and technology through specialized hospitals and institutions and distinguished health-care specialists. It covers five percent of the community health needs. Tertiary level of care is expensive.

National Health Insurance System and Services

Egypt is adopting a health insurance system that covers selected population groups. It is compulsory for the following populations:

- Governmental employees affiliated with the public sector
- Personnel affiliated with private organizations
- School children in the various types of schools
- Newborns

Private health insurance services target special groups, such as professional and syndicate members. Services provided through the National Health Insurance System include preventive, curative, and health promotion services. The health team is composed of general practitioners and specialists who provide services in the health insurance facilities.

The health insurance system is funded by beneficiaries and the government; funds from taxes on cigarette sales are directed to health insurance for students. Services for newborns include registration, recording of family data and domestic environment characteristics, and provision of health services, such as immunizations, micronutrient supplements, growth monitoring, integrated management of childhood illness, maternal counseling, and referral services. School children receive health appraisal services, screening for health problems, nutrition supplements, vaccinations, and curative services.

Organization of the Ministry of Health and Population

The organizational structure of the MOHP consists of the administrative structure and the servicedelivery structure.

Administrative structure

The administrative structure of the MOHP comprises the central headquarters and the governorate-level health directorates. The main functions of the central headquarters include planning, supervision, and program management.

Service delivery structure

The MOHP is the major provider of primary, preventive, and curative care in Egypt, with nearly 5,314 PHC facilities and 521 hospitals nationwide. The MOHP service delivery units are organized along a number of different dimensions. These include geographic (rural and urban), structural (health units, health centers, and hospitals), functional (maternal child health centers), and programmatic (immunization and diarrheal disease control). This PHC network allows for more than 95 percent geographical coverage of the population.

The MOHP is the largest provider of inpatient health-care services in Egypt, and services are provided through the following types of facilities.

• Integrated hospitals are small hospitals providing PHC and specialized medical services in the rural areas. Integrated hospitals contain well-equipped surgical theatres, X-ray equipment, and laboratories, and they are responsible for serving a catchment population of between 10,000 and 25,000 people.

- **District hospitals** are 100- to 200-bed hospitals that provide more specialized medical services and are available in every district.
- **General hospitals** contain more than 200 beds and contain all medical specialties. General hospitals are available in every governorate.
- **Specialty hospitals** are located in urban areas and have a particular focus, such as psychiatry, chest, fever, cardiology, ophthalmology, oncology, and gynecology and obstetrics. Specialty hospitals are available in all governorates.

Type of Facility	Categories	Number	
Primary	Urban health center	103	
	Family health center	350	
	Rural family health center/unit	4301	
	Child care	147	
	Comprehensive clinics	87	
Secondary	ndary MOHP and affiliated hospitals (Curative Care		
	Organization, leaching Hospitals and Institutes		
	Organization, nearth insurance Organization)		
	Other public hospitals	138	
Number of hospital beds/100,000 population			

Health-Care Facilities Affiliated with the Government in Egypt (CAPMAS, 2014)

Access and Coverage

Egypt has an extensive network of physicians and facilities, with 95 percent of Egyptians living within five km of a health facility. However, access to and utilization of the system is not equitable or conducive to generating the best possible health outcomes for all people. The current strategy aims at universal access to a basic primary care package.

The basic benefits package is designed to prevent and treat the most prevalent and pressing health problems among individuals in a population. The following four criteria are used to select the health services included in a basic benefits package for Egypt:

- The most common health needs of the population to reduce suffering and improve wellbeing
- The severity of the illnesses and diseases afflicting the population
- The cost-effectiveness of interventions to treat or cure those illnesses and diseases and attain the most for money spent
- The availability of resources

This package is a first step toward attaining universal health coverage for all Egyptians. With increased efficiency in the system, government allocations to primary care, and beneficiary copayments, the basic benefits package can be expanded to include more services and be adapted by health authorities to meet local needs in diverse governorates.

Access to Medicines and Health Technologies

The Egyptian government's list of essential medicines includes approximately 500 medicines, but reliable information about the availability of these medicines does not exist. National health accounts data for 2011–2012 show that 28 percent of total spending was on medical goods. Over half of out-of-pocket expenditure is for medicines, underlining the challenges in affordability of and access to medicines. The country has a robust local pharmaceutical industry that covers most pharmaceutical products, and the pharmaceutical sector includes a national WHO-qualified regulatory authority for vaccines and biologicals.

Health Information Systems

The national health information system relies on a fairly well-developed information technology and communication network through which data are collected using international standards at all levels of the system. However, the collected data are of low quality, and are rarely used in policy making at all levels of the system. Civil registration and vital statistics are strong components of the health information system, with over 90 percent of births registered and 100 percent of causes of death recorded. However, the quality of cause-of-death faces some challenges, with ill-defined causes of death being recorded on half of all certificates.

Expenditure on Health

The spending target for health in the fiscal year 2016–2017 is approximately three percent of gross domestic product (GDP), based on the requirements laid out in the 2014 constitution. This target compares with an average of approximately four percent of GDP in the MENA region, 12 percent in high-income nations and an international average of 10 percent. The current budget allotment for health of LE42.4 billion is up from the LE33.5 billion in the previous year's budget.

Household out-of-pocket expenditure on health comprises cost-sharing, self-medication, and other expenditures paid directly by private households, irrespective of whether the contact with the health-care system was through referral or the patient's own initiative. The out-of-pocket health payment for Egypt is the highest among the MENA countries. According to WHO, the out-of-pocket health payment for Egypt is about 56 percent of total health expenditure, compared with 46 percent for MENA in 2014.

Indicators2014Total health expenditure as % GDP6General government health expenditure as % of total health expenditure38Private health expenditure as % of total health expenditure62General government health expenditure as % of general government expenditure6Out-of-pocket expenditure as % of total health expenditure56

Egypt's expenditure on health for calendar year 2014

Chapter 3 Public Health Definition and Key Terms

Introduction

Definition of Health

Health is a state of complete physical, mental, social, and spiritual well-being. It is not simply the absence of disease or infirmity.

Quality of Life

WHO (1997) defines quality of life as "Individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."

The Determinants of Health

Many factors combine together to affect the health of individuals and communities. Whether people are healthy or not is determined by their circumstances and environment.

The determinants of health include the following:

- **Income and social status** Higher income and social status are linked to better health. The greater the gap between the richest and poorest people, the greater the differences in health.
- **Education** Low education levels are linked with poor health, more stress, and lower self-confidence.
- **Physical environment** Safe water and clean air, healthy workplaces, and safe houses, communities, and roads all contribute to good health.
- **Employment and working conditions** People who are employed are healthier, particularly when they have more control over their working conditions.
- **Social support networks** Greater support from families, friends, and communities is linked to better health.
- **Culture** Customs, traditions, and the beliefs of the family and community all affect health.

- **Genetics** Inheritance plays a part in determining lifespan, healthiness, and the likelihood of developing certain illnesses.
- **Personal behavior and coping skills** Healthful habits, such as balanced eating and physical activity; harmful habits, such as smoking and excessive drinking; and how life's stresses and challenges are handled all affect health.
- **Health services** Access to and use of services that prevent and treat disease influence health.
- Gender Men and women experience different types of diseases at different ages.

Determinants of Health: Life Skills

WHO (n.d.) has defined life skills as "the abilities for adaptive and positive behaviour that enable individuals to deal effectively with the demands and challenges of everyday life."

UNICEF, UNESCO, and WHO list the 10 core life skill strategies and techniques as follows:

- **Self-awareness** includes recognition of "self" and one's character, strengths and weaknesses, and desires and dislikes.
- **Empathy** is the ability to imagine what life is like for another person. To have successful relationships with our loved ones and society at large, we need to understand and care about other peoples' needs, desires, and feelings.
- **Critical thinking** is the ability to analyze information and experiences in an objective manner.
- **Creative thinking** is a novel way of seeing or doing things that has four components: fluency (generating new ideas), flexibility (shifting perspective easily), originality (conceiving of something new), and elaboration (building on other ideas).
- **Decision making** helps us to deal constructively with choices in our lives.
- **Problem solving** helps us to deal constructively with challenges in our lives.
- Interpersonal relationship skills help us to interact in positive ways with other people. These skills enable establishing and maintaining friendly relationships, which can support our mental and social well-being. Having these skills may also help in sustaining good relations with family members, which are also an important source of social support. They may also enable being able to end relationships constructively.
- **Effective communication** means that we are able to express ourselves, both verbally and nonverbally, in ways that are appropriate to our cultures and situations.
- **Coping with stress** means recognizing the sources of stress in our lives, recognizing how it affects us, and acting in ways that help us control our stress levels by changing our environment or lifestyle and learning how to relax.
- **Coping with emotions** means recognizing emotions within us and others, being aware of how emotions influence behavior, and being able to respond to emotions appropriately.

Public Health Approach

What is Public Health?

Public health refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole. Its activities aim to provide conditions to foster people's health, and they focus on entire populations, not on individual patients or diseases.

The **public health approach** consists of four steps:

- To **define a problem** through the systematic collection of information about its magnitude, scope, characteristics, and consequences
- To **establish why the problem occurs**, using research to determine its causes and correlates, the factors that increase or decrease risks for the problem, and the factors that could be modified through interventions
- To **find out what works** to prevent the problem by designing, implementing, and evaluating interventions
- To **implement effective and promising interventions** in a wide range of settings. The effects of these interventions on risk factors and the target outcome should be monitored, and their impact and cost-effectiveness should be evaluated.



The Public Health System

Public health systems are commonly defined as "all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction" (CDC, 2017). This concept ensures that all entities' contributions to the health and well-being of the community or state are recognized in assessing the provision of public health services.

The public health system includes the following:

- Public health agencies at state and local levels
- Health-care providers
- Public safety agencies
- Human service and charity organizations
- Education and youth development organizations
- Recreation- and arts-related organizations
- Economic and philanthropic organizations
- Environmental agencies and organizations

The public health core sciences include prevention, epidemiology, surveillance, informatics, and laboratory services.

The Public Health System



EMS= Emergency Service CHCs= Community Health Centers

The 10 Essential Public Health Services

The 10 essential public health services describe the public health activities that all communities should undertake, and they serve as the framework for the National Public Health Performance Standards instruments. Public health systems should:

- Monitor health status to identify and solve community health problems
- Diagnose and investigate health problems and health hazards in the community
- Inform, educate, and empower people about health issues
- Mobilize community partnerships and action to identify and solve health problems
- Develop policies and plans that support individual and community health efforts
- Enforce laws and regulations that protect health and ensure safety
- Link people to needed personal health services and ensure the provision of health-care when it is otherwise unavailable
- Ensure a competent public and personal health-care workforce
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services
- Conduct research to gain new insights and find innovative solutions to health problems

The 10 Essential Public Health Services



Partners in the Public Health System



Nongovernmental organizations (NGOs) play a key role in public health, especially at the community level. NGOs serve many different purposes, from advocacy or education to emergency relief and economic development.

Health Care as a Partner in Public Health

Public Health	Health Care
Population focus	Individual patient focus
Public-health ethic	Personal-service ethic
Prevention or public health emphasis	Diagnosis and treatment emphasis
Joint laboratory and field involvement	Joint laboratory and patient involvement
Clinical sciences peripheral to professional training	Clinical sciences essential to professional training
Public sector basis	Private sector basis

Other Partners in Public Health





Key Health Characteristics of the Egyptian Population

Life expectancy as of 2013 was 71 years (69 for males, 74 for females), an increase of nine years since 1985, according to the World Bank. The infant mortality rate (per 1,000 live births) has also plummeted from over 102.5 in 1982 to 20.1 in 2015, a number that is half the global average (World Bank, n.d.). At the same time, the maternal mortality ratio (per 100,000 live births) has declined significantly, from 106 in 1990 to 33 in 2015 (World Bank, n.d.).

Despite the gains made in reducing child and maternal mortality in recent years, significant regional disparities remain. The differential in under-five mortality between children living in rural Lower Egypt and rural Upper Egypt is particularly marked—28 and 42 deaths per 1,000, respectively, according to the 2014 Egypt Demographic and Health Survey (Ministry of Health and Population, El-Zanaty and Associates, & ICF International, 2015). Addressing these disparities requires a continued focus on primary health and preventive medicine.

Communicable Diseases

The country has strong vertical programs for many priority communicable diseases, such as tuberculosis and the Expanded Programme on Immunization (EPI). The Plan of Action for the Prevention, Care, and Treatment of Viral Hepatitis, Egypt: 2014-2018 (MOHP, 2014) is an example of a recent strategy in which the health system response is strongly emphasized in both prevention and in the care and treatment of patients.

Hepatitis

Liver diseases, specifically cirrhosis and cancer, are the second most common cause of death after cardiac diseases in Egypt. The prevalence of the hepatitis C virus among people aged 15 to 59 years has declined from 9.8 percent in 2008 to 7 percent in 2014. Among the population aged one to 59 years, hepatitis C virus prevalence is 4.4 percent (2014) and hepatitis B prevalence is one percent (2014).

To address this issue, the MOHP worked with WHO and the U.S. Centers for Disease Control and Prevention (CDC) to develop the above-mentioned action plan. The plan is comprehensive and addresses both prevention and treatment, focusing on surveillance, infection control and prevention, injection and blood safety, vaccination against hepatitis B, communication, research, and care and treatment of patients (MOHP, 2014).

Vaccine-Preventable Diseases

Immunization coverage among one-year-olds improved between 1990 and 2013 for tuberculosis (bacille Calmette-Guerin [BCG] vaccine) from 89 to 98 percent; diphtheria, tetanus, and pertussis (DTP3 vaccine) from 87 to 97 percent; measles from 86 to 96 percent; and poliomyelitis from 87 to 97 percent. Neonatal tetanus coverage increased during the same period from 74 to 86 percent. In 2013, hepatitis B vaccine (HepB3) coverage among one-year-olds was 97 percent.

The EPI program has achieved several successes in controlling vaccine-preventable diseases through continuously monitoring their incidence. For example, the last wild polio case was reported in 2006, and WHO has certified the country as polio-free. The country also successfully eliminated maternal and neonatal tetanus, as certified by WHO in 2007.

The program continues to introduce new vaccines to reduce childhood morbidity and mortality. Recently, the EPI has introduced the Haemophilus influenzae type b vaccine as a component of a pentavalent vaccine to reduce bacterial meningitis and bacterial pneumonia. It also introduced a birth dose of hepatitis B vaccine in three governorates in October 2014, and this vaccination will be expanded in phases to reach all governorates. Additionally, one dose of inactivated polio vaccine will be introduced to all children at four months of age, and plans are underway to switch from a trivalent oral polio vaccine to a bivalent vaccine.

Noncommunicable Diseases

Noncommunicable diseases (NCDs) cause 84.7 percent of all deaths: cardiovascular diseases account for 46.2 percent; cancers, 13.8 percent; respiratory diseases, 4.2 percent; and diabetes mellitus, 1.4 percent. As a result, 25 percent of adults aged 30 and 70 years are expected to die from one of these four main NCDs. Ten of the 11 essential medicines for treatment of NCDs are available in the public health sector.

The prevalence of insufficient physical activity in adolescents ages 11 to 17 years is 87.3 percent (80.6 percent of boys and 92.9 of percent girls) and the age-standardized prevalence is 31 percent (23.4 percent of men and 38.6 percent of women).

High blood pressure, in adults above 18 years of age, affects almost a quarter (24.6 percent) of the population (24.5 percent of men and 24.7 percent of women), while obesity affects a third (33.1 percent, 21.4 percent of men and 44.5 percent of women).

Tobacco control is a major challenge in the country, with around a quarter of adults currently using tobacco products and an estimated half of the population exposed to secondhand smoke in their own homes. In addition, uptake of tobacco is increasing among young women, and waterpipe (shisha) use is rising overall. Tobacco is a driving force in the country's rising epidemic of chronic diseases, particularly lung disease, lung cancer, ischemic heart disease, and stroke.

Preventive Medicine

The goal of preventive medicine is the absence of disease, either by preventing a disease from occurring or by halting disease progression and averting complications after its onset. Preventive medicine can be practiced by governmental agencies, primary care physicians, and individuals themselves. In the past, many diseases have been conquered by the actions of individuals. The present challenge of preventive medicine is to motivate individuals to practice prevention.

Definition of Prevention

Prevention is defined as "actions aimed at **eradicating**, **eliminating**, or **minimizing** the impact of disease and disability, or if none of these is feasible, retarding the progress of disease and disability" (Porta et al., 2014)

- **Control** Disease incidence is reduced to a minimal level, acceptable at the country/ region level, at which the disease is no longer considered a public health problem, although infection may still occur.
- **Elimination** Reduction to zero of the incidence of a specified disease in a defined community or in a country or region as a result of public health actions.
- **Eradication** Worldwide disappearance or permanent reduction to zero level of a disease. The organism may be present only in laboratories, but public health actions are not needed; for example, smallpox was eradicated in 1979, although two secure laboratories still have stocks of the virus (WHO, 2016).

Levels of Prevention

A major goal of public health practice is to intervene to alter the adverse consequences of the natural history of disease and health-related events. This intervention can occur at any time during the natural history of the disease or health-related event.

Three levels of prevention have been identified:

- Primary prevention
- Secondary prevention
- Tertiary prevention

The following table illustrates the relationship between the stages of the natural history of a disease and the three types of prevention:

Stage	Susceptibility	Subclinical	Clinical	Recovery, Disability, or Death	
Characteristics	Risk factors and disease in the population	Exposure of individual to risk factor, or disease and early pathological change	Signs and symptoms noted in individuals	Outcomes of clinical disease— death, disability, or recovery	
Levels of Prevention	Primary prevention	Secondary prevention	Tertiary prevention		
Modes of Intervention	Health promotion Specific protection	Screening Early diagnosis	Treatment and rehabilitation		
Examples	Immunization; family lives in adequate, affordable housing	Pap smear; measurement of blood pressure in clinic	Prompt administration of thrombolytic therapy following myocardial infarction	Speech therapy following a cerebrovascular accident	

Adapted from CDC, 1998

Primary prevention measures are aimed at individuals in the susceptibility stage. These activities or measures, both individual and communal, are directed at reducing exposure to a risk factor or health determinant in an individual or the population. Measles immunization is an example of a primary prevention measure.

Secondary prevention measures focus on the subclinical stage and the early clinical stage. These measures enable early detection and prompt, effective intervention to correct departures from a state of health. Screening allows early detection of the disease. Various screening programs—such as Papanicolaou smears for early diagnosis of cervical cancer, the detection of asymptomatic HIV and the subsequent treatment of patients with antiviral drugs to delay the onset of AIDS, and mammography for early diagnosis of breast cancer—are all examples of secondary prevention measures.

Tertiary prevention measures are directed primarily at the recovery, disability, or death stage, although they are used to some extent at the clinical stage. Their purpose is to reduce or eliminate long-term impairments and disabilities, minimize suffering, optimize function, assist in adjusting to limitations in health and function resulting from the event, and sometimes extend survival. In particular, recovery and disability endpoints are the focus of rehabilitation, which is increasingly important when chronic disease conditions are dominant.

Primordial Prevention—Another Level

Some authors have divided primary prevention into two levels, thus creating a fourth level of prevention. Primordial prevention is directed at curbing the establishment of risk factors, diseases, or other health-related events in communities where they do not currently exist. Alternatively, primordial prevention can be directed at completely eliminating risk factors, diseases, or health-related events where they currently exist.

Here are two examples:

- Asbestos exposure A primary preventive approach would be to wear protective respiratory equipment in occupational settings where the risk of exposure is high. A primordial preventive approach would be to substitute another substance for asbestos or to ban the use of asbestos in the country.
- Measles Primordial prevention could be the eradication of all measles virus from the globe, including laboratory stocks, while a primary preventive intervention would be immunizing individuals to control the last outbreak of measles.

Examples of Uses of Levels of Prevention

All three levels of prevention can be used to control a single disease process.

- BCG vaccination of newborns can prevent tuberculosis (primary prevention).
- Screening and early treatment of a person with active tuberculosis (secondary prevention) may prevent transmission to another person (primary prevention).
- In advanced cases of tuberculosis, occupational and social rehabilitation (tertiary prevention) by modification of working conditions may help a person regain the capacity to pursue a livelihood.

Screening

Screening is the search for unrecognized disease by means of rapidly applied tests.

Criteria to Justify Screening for a Disease

A disease that is suitable for a screening program should have serious consequences—such as fatal or severe/prolonged morbidity—to merit the time and cost of a screening program. It must have a treatment that, when applied to a case of the disease that is detected by screening, is more effective than treatment applied after symptoms are apparent and the case would be detected by usual means. Finally, the disease should have a high prevalence in the detectable preclinical phase.

Thus, criteria include the following:

- The disease must be an important public health problem.
- Tests must be available to detect the disease in the asymptomatic phase.
- Acceptable methods of treatment must be available.

The disease must have an asymptomatic phase during which treatment yields a result superior to that obtained by delaying treatment until symptoms appear.



Criteria of Good Screening Tests

- They should be simple and easy to conduct.
- They should not be time consuming, invasive, or painful.
- Testing should be relatively inexpensive in mass screening in survey studies.
- Tests should be precise and reliable.
- Results should be accurate and valid.

Evaluation of the Screening Test

Assessing a new diagnostic test begins by identifying the group of patients with the disease of interest, using an accepted reference test known as the gold standard.

		Disease (go	Total	
		+	_	
Screening	+	A	В	A+B
		True positive	False positive	
	_	С	D	C+D
		False negative	True negative	
		A+C	B+D	A+B+C+D

Sensitivity

- Sensitivity is the ability of the test to yield positive results for the truly positive cases of the disease.
- Some screening tests are highly sensitive, such as pap smears for cervical cancer.

Sensitivity =
$$\frac{\text{True positive}}{\text{Total patients}} \times 100 = \frac{\text{A}}{\text{A} + \text{C}} \times 100$$

Specificity

- Specificity is the ability of the test to yield negative results for the truly negative cases of the disease.
- Some screening tests are highly specific, such as the Wassermann test for syphilis.

Specificity =
$$\frac{\text{True negative}}{\text{Total free subjects}} \times 100 = \frac{\text{D}}{\text{B} + \text{D}} \times 100$$

Positive predictive value (posterior probability, post-test probability)

• Positive predictive value is the ability of the test to predict the true positive cases from the total positive subjects.

Positive predictive value = $\frac{\text{True positive}}{\text{Total positive subjects}} \times 100 = \frac{\text{A}}{\text{A} + \text{B}} \times 100$

Negative predictive value

• Negative predictive value is the ability of the test to predict the true negative cases from the total negative subjects.

Negative predictive value = $\frac{\text{True negative}}{\text{Total negative subjects}} \times 100 = \frac{D}{C+D} \times 100$

Choosing the right test

An ideal test with 100 percent sensitivity and 100 percent specificity does not exist. We generally have to choose from the available range of tests with varying sensitivities and specificities.

How does one choose the right test?

- When it is very important not to miss a disease that is serious and potentially treatable, it would be better to use a test that has greater sensitivity. The goal is to identify as many cases as possible using this test.
- On the other hand, if making a positive diagnosis would result in substantial worry, stigma, or cost, then it would be better to use a test that has high specificity.

Public Health Surveillance

Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementing, and evaluating public health practice. It is closely integrated with the timely dissemination of such data to those responsible for prevention and control. The purpose of public health surveillance, which is sometimes called "information for action," is to discover ongoing patterns of disease occurrence and disease potential so that investigation, control, and prevention measures can be applied efficiently and effectively.

Goal of Public Health Surveillance

The goal of public health surveillance is to provide information that can be used for health action by public health personnel, government leaders, and the public to guide public health policy and programs.

Uses of Public Health Surveillance

- Identify patients and their contacts for treatment and intervention
- Detect epidemics, health problems, and changes in health behaviors
- Estimate magnitude and scope of health problems
- Measure trends and characterize disease
- Monitor changes in infectious and environmental agents
- Assess effectiveness of programs and control measures
- Develop hypotheses and stimulate research

Types of Public Health Surveillance

- Active surveillance A system employing staff members to regularly contact heath care providers or the population to seek information about health conditions. Active surveillance provides the most accurate and timely information, but it is also expensive.
- **Passive surveillance** A system by which a health directorate receives reports submitted from hospitals, clinics, public health units or other sources. Passive surveillance is a relatively inexpensive strategy to cover large areas, and it provides critical information for monitoring a community's health. However, because passive surveillance depends on people in different institutions to provide data, data quality and timeliness are difficult to control.

Surveillance Process

- 1. Collection of data After the problem for surveillance has been identified and defined and the needs and scope determined, available reports and other relevant data that can be used to conduct surveillance should be located. Data collected for health-related purposes typically come from three sources: individual persons, the environment, and health-care providers and facilities. Several methods are used to collect the majority of health-related data, including environmental monitoring, surveys, notifications, and registries.
 - Environmental monitoring Monitoring the environment is critical for ensuring
that it is healthy and safe. Multiple qualitative and quantitative approaches are used to monitor the environment, depending on the problem, setting, and planned use of the monitoring data.

- Survey A survey is an investigation that uses a "structured and systematic gathering of information" from a sample of "a population of interest to describe the population in quantitative terms." The majority of surveys gather information from a representative sample of a population so that the results of the survey can be generalized to the entire population. Surveys are probably the most common method used for gathering information about populations.
- Notification A notification is the reporting of certain diseases or other health-related conditions by a specific group, as specified by law, regulation, or agreement. Notifications are typically made to the state or local health agency. Notifications are often used for surveillance, and they aid in the timely control of specific health problems or hazardous conditions. When reporting is required by law, the diseases or conditions to be reported are known as **notifiable** diseases or conditions.

2. Analysis of data

- o Descriptive analysis Time, person, place
- Analytic analysis Case-control study or cohort study, for example

3. Interpretation of data

4. Dissemination of data

- $\circ~$ To policy makers and administrators for action
- To media to avoid misinformation and misunderstanding
- 5. Link to action Action based on public health surveillance includes
 - o Describing the burden of or potential for disease
 - $\circ~$ Monitoring trends and patterns in disease, risk factors, and agents
 - o Detecting sudden changes in disease occurrence and distribution
 - o Providing data for programs, policies, and setting priorities
 - o Evaluating prevention and control efforts

Communicable Diseases under Surveillance in Egypt

Communicable diseases under surveillance were prioritized through a process that considered the following elements:

- Public health importance of the disease including morbidity, mortality, and the potential to cause a public health concern
- The existence of effective and feasible preventive measures
- The epidemic potential of the disease
- The existence of international or regional targets of eradication, elimination or control

Disease prioritization is a dynamic process, and the list of diseases under surveillance may change by decision of the advisory committee.

Recommended Frequency of Notifiable Diseases Reporting

Communicable diseases under surveillance have a recommended frequency of reporting. They are grouped according to the timing of reporting and the need for public health action. **Group A** diseases are conditions that require prompt public health action and should be immediately reported by phone or fax. Most of the conditions in **Group B** are diseases with epidemic potential that require more in-depth investigation and monitoring. **Group C** diseases are reported on a monthly basis.

Group A: Immediate Reporting

Disease	ICD-10	Disease	ICD-10
Bacterial meningitis	A93-G00-A87	Cholera	A00.1
Viral encephalitis	A86	Malaria	B50-B54
Acute flaccid paralysis/ poliomyelitis	A80	Plague	A20
Neonatal tetanus	A33	Avian influenzas	J09
Diphtheria	A36	Rift Valley fever	A92.4
Measles	B05	Viral hemorrhagic fever	A92-A99
Rubella	B06	Ebola-West Nile fever	A98.4-A92.3
Pertussis	A37	Crimean-Congo	A98.0-A95
		hemorrhagic fever	
		Yellow fever	
Mumps	B26	Lasa fever	A96.2
HIV/AIDS	B20-B24	Dengue fever	A97
Rabies/animal bite	A82	Novel Corona virus	B34.2
Acute food poisoning	A03/A05.0	Anthrax	A22
		Zika virus	U06.9
		Botulism	A05.1

Group B: Weekly Reporting

Disease	ICD-10	Disease	ICD-10
Viral hepatitis	B15-B19	Brucellosis	A23
Seasonal influenza	J10	Bloody diarrhea (dysentery)	A03-A04.0-
			A04.4-A06
Tuberculosis	A15-A19	Leprosy	A30
Typhoid	A01.0	Schistosomiasis	B65
Chicken pox	B01	Leishmaniasis	B55
Botulism	A0-05.1	Filariasis	B74
		Fascioliasis	B66
		Animal bite	T01.9

Source: Case definition booklet of notifiable communicable diseases and syndromes. MOHP Preventive sector, Central Administration for Preventive Affairs, General Directorate for Epidemiology and Surveillance. National Surveillance Program 2016.

Definition of Terms Used in Case Classification of Communicable Diseases under Surveillance

Case – A person who meets the case definition.

Case definition – A set of diagnostic criteria that must be fulfilled for a case of a particular disease to be identified. Case definitions can be based on clinical criteria, laboratory criteria, or a combination of the two.

Confirmed case – A case that is classified as confirmed usually on a laboratory basis for reporting purposes.

Epidemiologically linked case – A case in which the patient has had contact with one or more persons who either have or had the disease or have been exposed to a point source of infection (i.e., a single source of infection, such as an event leading to a food-borne disease outbreak, to which all confirmed-case patients were exposed).

Laboratory-confirmed case – A case that is confirmed by one or more of the laboratory methods listed in the case definition under laboratory criteria for diagnosis.

Probable case – A case that is classified as probable on clinical plus either an epidemiological or a laboratory basis for reporting purposes.

Suspected case – A case that is classified as suspected, usually on the clinical basis for reporting purposes.

Chapter 4 **Prevention and Control of Infectious Diseases**

Overview

Prevention can be achieved by general, specific, and international measures.

- General preventive measures
 - o Environmental health, that is, a sanitary, clean, and pollution-free environment
 - Health education of the public
 - Heath promotion to the public
- Specific prevention
 - Immunization active and passive (seroprophylaxis)
 - Chemoprophylaxis use of antimicrobials
- International prevention prevention of imported infection

General Preventive Measures

Sanitary Environment

The environment would be free of:

- Vehicles of infection, such as polluted air, water, milk, food, and soil
- Vectors of disease, including infection-transmitting arthropods (insects)
- Rodents (including rats), which are potential reservoirs of many infections
- Animal reservoirs, including cattle and other animals that may acquire infections from the environment and transmit them to humans
- Stray dogs and cats

Components of a sanitary environment – urban and rural:

- Proper town, village, or district planning and design
- Good housing, with suitable ventilation and crowdedness index
- Sanitary collection and disposal of community waste (refuse and sewage)
- Eradication or control of insects, rodents, and stray dogs and cats
- Food and milk sanitation

Health Education of the Public

- Health awareness
- Proper knowledge, attitude, and practice related to health, with special consideration of lifestyle, habits, and behaviors

Health Promotion to the Public

Healthy individuals are more resistant to infection. Health promotion ensures positive health that can be achieved by attending to:

- Physical, mental, and social health
- Prenatal, natal, and postnatal requirements

Specific Prevention

Specific protection encompasses guarding against causative agents—organisms and their products, such as exotoxin—of infectious diseases through active and passive immunization and chemoprophylaxis.

Immunization is available for some, but not all infectious diseases.

- Active immunization is attained through vaccines (antigenic preparations) that stimulate immune response and provide artificially induced active immunity.
- **Passive immunization** (seroprophylaxis) is provided by preparations (human or animal) of ready-formed antibodies for rapid protection of exposed susceptible people.

Chemoprophylaxis is the administration of antimicrobial drugs (antimicrobials) for the specific prevention of certain infectious diseases. The drugs are given to prevent the development of a disease and possibly a carrier state, either:

- Pre-exposure before expected (potential) exposure
- Post-exposure after exposure

For local chemoprophylaxis, the antimicrobial is applied to prevent potential local infection; for example, silver nitrate or antibiotic eye drops are used to prevent eye infection, especially ophthalmia neonatorum.

International Prevention

International regulations are followed on a national level to prevent transmission of certain infectious diseases, called "quarantine diseases," from one country to the other.

International Travelers

At present, quarantine measures are taken for cholera, yellow fever, and the plague. The measures are required for means of transport by air, sea, or land for travelers and carried vehicles, such as food and contaminated material, and vectors, such as mosquitoes or sand flies.

Valid international vaccination certificate is required for:

- Cholera for travelers from endemic or infected areas. Vaccination, however, is not reliable, and chemoprophylaxis is needed for these travelers.
- Yellow fever for travelers between endemic and receptive areas.

Imported Animals

Quarantine measures are taken for certain animals coming from endemic or infected areas to prevent transmission of particular zoonoses.

- Monkey for yellow fever
- Psittacine birds for psittacosis
- Cattle for Rift Valley fever and foot and mouth disease
- Dogs and cats for rabies
- Poultry and other birds when the spread of avian influenza is possible

Imported Goods

- Raw wool, hides (skin), and hair are quarantined for anthrax, where imported goods must have an "authorized disinfection certificate"; otherwise, they are not allowed into the country (must be returned to country of origin).
- Shaving brushes made of natural (not synthetic) bristles are quarantined for anthrax in a similar manner to raw wool.

Immunization Schedule of Egypt

Active Immunization of Infants and Children in Egypt

Scheme of Extended Immunization Program: Compulsory Immunization Program

Infants and preschool children

Age	Vaccine	Dosage
After birth	Sabin, Oral Polio Vaccine (OPV)	Zero dose, three drops on tongue
First three	BCG	0.1 ml, intradermally,
months		no tuberculin
Two months	Sabin, OPV	First dose, three drops on the tongue.
	Diphtheria, Pertussis, and Tetanus (DPT)	First dose, 0.5 ml, deep SC or IM
	Hepatitis B vaccine	First dose, 0.5 ml, IM

Age	Vaccine	Dosage
Four months	Sabin, OPV	Second dose, three drops on the tongue
	Salk DPT	First Salk, 2nd DPT, 0.5 ml, IM
	Hepatitis B vaccine	Second dose, 0.5 ml, IM
Six months	Sabin, OPV	Third dose, three drops on the tongue
	Salk DPT	Second Salk, 3rd DPT, 0.5 ml
	Hepatitis B vaccine	Third dose, 0.5 ml, IM
Nine months	Sabin, OPV	Booster dose, three drops on the tongue
	Measles vaccine, vitamin A	One dose, 0.5 ml, SC
18 months	Sabin, OPV	Booster dose, 0.5 ml, deep SC or IM
	DPT	Booster dose, 0.5 ml, deep SC or IM
	Measles, Mumps, and Rubella (MMR) vaccine, vitamin A	Primary, one dose, 0.5 ml SC

School children

Age	Vaccine	Dosage
	Sabin, OPV	Booster dose
Five to six years (school age)	DT (No p)	Booster dose
	BCG	Revaccination of tuberculin nonreactors or primary (first time), without tuberculin
		Single dose, 0.5 ml, SC
	Meningococcal	Booster dose, 0.5 ml, deep SC
Eight years	DT	Booster dose, for contacts and at- risk individuals
School children	Diphtheria toxoid	
	Tetanus toxoid	Booster dose, when injured, with
		risk of infection
Ally age, when necessary	Meningococcal	At-risk individuals, when cases
		appear.

Points to be taken into consideration

- When more than one parenteral immunization are given simultaneously (at the same time), such as hepatitis B vaccine and DTP vaccine at two months of age, each vaccine must be separately inoculated (and not mixed together) at different sites.
- Tuberculin testing before BCG vaccination

- Not needed for the first vaccination of infants, under three months, and children of school age.
- Needed to screen nonreactors in adolescents and adults, to be given BCG, and on revaccination.

Vaccines given

- **Poliomyelitis immunization** The aim is to upgrade humoral antibody immunity that protects the central nervous system against invasion by polioviruses if infection and viremia occur and to contribute toward eradicating poliomyelitis.
 - Sabin OPV
 - No dose is given after or shortly after birth, especially in less-developed areas to protect against early infection (practically, it can be given for hospital deliveries).
 - Booster dose of OPV at nine months of age to upgrade antibody level of early, less than six months, immunization.
 - Salk parenteral inactivated polio vaccine introduced, together with primary OPV, given as quadruple Salk DTP vaccine, in two SC or IM doses, at four and six months of age.
- **MMR vaccine** This triple avirulent vaccine of measles, mumps, and rubella viruses was first introduced for compulsory immunization of young children in January 1999. To be given in a single, 0.5 ml SC dose, at 18 months of age (together with booster doses of OVV and DTP vaccine). The benefits are that it:
 - Upgrades immunity level of compulsory measles vaccination at nine months of age since immune response may not be satisfactory if maternally acquired antibodies were not lost by that time. Such early measles vaccination is needed if early exposure to infection occurs.
 - Provides active immunization of children for two more viral diseases (mumps and rubella).
- **Meningococcal vaccine** This quadrivalent capsular polysaccharide vaccine, prepared from groups A, C, Y, and W135 of Neisseria meningitidis, is given in a single 0.5 ml SC dose. Meningococcal vaccine is intended to protect at-risk groups:
 - \circ Children of school age (five or six years), recently started in Egypt
 - o Certain camps of young adults, especially the military
 - Pilgrims, before leaving (required at present)

Vitamin A Supplementation

It is recommended to give two massive oral doses of vitamin A, required for healthy epithelial surfaces that protect against infection, especially measles.

Vitamin A is available in capsules of 100,000 IU, to be directly emptied in the mouth of the child.

First dose at nine months of age (when measles vaccine and OPV are given).

Second dose at 18 months (when MMR vaccine and boosters of DTP vaccine and OPV are given).

Active Immunization of Adolescents and Adults

BCG vaccine

The BCG vaccine is valuable for protecting tuberculin-nonreactor adolescents, young adults, and adults, especially those at risk of exposure to infection and active disease:

- Those living in slums and under poor socioeconomic conditions
- Confined groups of adolescents and adults, especially in military, work and refugee camps, and occupational groups
- Cases of chronic disease that may be more susceptible to pulmonary tuberculosis (e.g., diabetes and silicosis)

Tetanus toxoid

Immunization is recommended in high-risk areas where the soil is polluted with tetanus spores for adolescents and young adults who have not been previously immunized.

Scheme: Five properly spaced doses, then a booster dose every 10 years as long as exposure to infection exists.

Special consideration of immunization in high-risk areas is given to the following:

- Young females, so that active immunization during pregnancy would not be needed
- Pregnant individuals not previously immunized, according to a special dosage scheme to prevent tetanus neonatorum and the potential risk of puerperal tetanus (Immunization can be given either before or during pregnancy, according to circumstances.)
- At-risk military recruits and occupational groups

MMR vaccine

MMR vaccine is recommended for the following groups.

- Susceptible adult females, either premarital or postmarital, but never during pregnancy
- Susceptible adult males, given either MMR vaccine or mumps vaccine, according to need

Active Immunization of Occupational Groups

The following occupational groups should receive immunizations if their work exposes them to infection. This includes:

- Medical-care providers, especially in infectious disease hospitals, infectious disease control, chest clinics and hospitals, and laboratories
- Farm workers exposed to infected animals and birds, polluted soil and environment, and contaminated material
- Workers in collection and disposal of community wastes (refuse and sewage)

Work situations may expose others to infection through services provided by some occupational groups:

- Food handlers
- Medical-care providers
- Personnel serving children in nurseries, schools, and other institutions

Immunization of Some Occupational Groups

Immunizations that should be given to food handlers in endemic areas:

- TAB vaccine of enterica: compulsory, though of limited preventive value
- BCG vaccination of tuberculin nonreactors
- Hepatitis A vaccination, recommended

Immunizations that can be given to farmers and agriculture workers:

- BCG vaccination of tuberculin nonreactors
- Tetanus toxoid, in proper dosage
- Pre-exposure rabies vaccination, if necessary
- Influenza vaccination of at-risk workers

Immunizations for groups living in close proximity, especially the military:

- BCG vaccination of tuberculin nonreactors
- Tetanus toxoid
- Meningococcal vaccine
- Influenza vaccine, if necessary
- Hepatitis B vaccine

Immunizations recommended for medical and health-care providers:

- BCG vaccination of tuberculin nonreactors
- Hepatitis B vaccine
- Meningococcal vaccine

- Influenza vaccine
- Others, according to expected exposure

International Active Immunization

Yellow fever vaccine is recommended for international travelers going between—both coming from or going to—endemic areas and receptive areas where arthropod vector *Aedes aegypti* is present, but no reservoirs of infection exist. Egypt is a receptive area.

Cholera vaccine is required for international travelers going between endemic or infected areas and free areas. It is, however, of limited preventive value as

- the vaccine is prepared for classic cholera vibrios, while the causative agent of cholera at present is the El-Tor vibrio;
- the efficacy of the vaccine is moderate (around 60 percent); and
- oral tetracycline chemoprophylaxis has proved reliably effective for international travelers, at-risk individuals and groups in involved areas, and returning pilgrims, so it replaced vaccination.

Variola vaccine had long been required for all international travelers, and it proved preventive. It is no longer used after worldwide eradication of the disease.

Specific Protection of Pilgrims

Pilgrims are now required to receive a meningococcal vaccine before leaving because of the potential risk of exposure to infection. On their return, pilgrims are given a single dose of oral tetracycline chemoprophylaxis to:

- protect them from acquiring the disease, if they were exposed, and
- eliminate any infection and prevent them from becoming carriers, if they were infected.

Chapter 5 **Control of Infectious Diseases**

Overview

Control means measures are taken for existing infectious diseases, with the following objectives:

- Case-finding, which means the detection and diagnosis of cases
- Management of cases and protecting those affected against hazards, complications and sequelae of disease
- Measures for contacts and protecting susceptible and at-risk groups who may be exposed to infection
- Preventing or minimizing spread of disease in the involved community or group

Control measures are taken for:

- Reservoirs of infection humans (cases and carriers) and animals
- Contacts household (home, family), school, nursery, institute, work, or organization contacts
- Involved community

Control of Animal and Human Reservoirs

Animal Reservoirs

Control of animal reservoirs involves eradication, such as exterminating rodents. In addition, it includes control of farm and pet animals to prevent or minimize animal-to-animal and animal-to-human spread of infection. This control includes:

- Sanitary, clean and pollution-free animal environment
- Adequate feeding and avoiding overwork of animals
- Veterinary care
 - o Active immunization
 - o Regular supervision to segregate and manage diseased animals
- Protection of farm workers against occupational infection

Human Reservoirs/Carriers

Detection and treatment of carriers occurs in many ways. These may include laboratory tests, examination of affected patients and contacts of diagnosed cases, as well as through epidemiologic study to trace reservoirs of infection. Pre-employment and periodic medical examination of certain occupational groups, such as food handlers, medical care personnel, and personnel serving children can also help control some infectious diseases.

Control of Cases

Control of cases relies on case-finding, notification, isolation, disinfection, treatment, and release. Other measures for cases of some diseases, such as pulmonary tuberculosis, include follow-up, social service, and rehabilitation.

Case-finding: Clinical diagnosis, with laboratory confirmation if necessary, is best for cases, contacts, and the community, if achieved early. With diseases such as diphtheria and meningococcal meningitis, laboratory confirmation of cases is more valuable for epidemiologic study than for disease control because laboratory results are not necessary to start control measures.

Notification: Cases of definite or suspected diagnosis must be reported to the local health office (by the physician or medical care unit, usually). Notification is valuable to:

- Take prevention and control measures for cases and contacts as well as the community if necessary
- Help tracing sources and channels of infection in outbreaks or epidemics
- Collect significant statistical data

Isolation: Cases of infectious disease must be isolated, either at home, in the hospital, or another designated place, according to the nature of the disease and the home situation. The period of isolation varies (see release of case). Isolation is valuable to:

- Stop activity and movement of the case in the community and thus prevent spread of infection
- Protect the case against risk of secondary infection if exposed to contacts and visitors

Disinfection: The process of destroying pathogenic organisms outside the body through concurrent or terminal disinfection.

- Concurrent disinfection Disinfection and sterilization should be carried out as soon as possible after discharge or excretion of infectious materials from an infected person. Soiled articles and fomites used by the patient or any object or material used in nursing should be disinfected and sterilized as well.
- **Terminal disinfection** Disinfection occurs after the patient is discharged, or after transferring the case to hospital, or after the case's recovery or death.
 - For sporadic, home-isolated cases, this means cleaning and airing the room and boiling or using disinfectants on articles and fomites, such as clothing, bedding, and floors.

- During epidemics or outbreaks, articles and fomites are taken to a "disinfection station" of the district to be disinfected by pressure steam, formaldehyde gas or disinfectants according to their material. The local health office is responsible for the process.
- For hospitalized cases, disinfection is by steam disinfection unit, disinfectants and formaldehyde gas unit, according to type of material.

Treatment: Patients or cases are treated according to the type of infection.

- Bacterial diseases require chemotherapy for the causative organisms or antitoxins, proper nutrition and nursing, treatment of specific symptoms, and prevention and control of complications or sequelae such as:
 - Secondary bacterial infection
 - o Dehydration
 - o Rheumatic fever

Release of case: The patient can leave isolation and return to school, work, or other activities after:

- Clinical recovery becoming clinically free of disease
- Satisfactory general condition
- Becoming bacteriologically free (in diseases that have convalescent carriers)

Other measures for cases (applied for certain diseases)

- Social service when social support is needed (e.g., pulmonary tuberculosis).
- Tertiary prevention and rehabilitation for diseases that may cause disability (e.g., paralytic poliomyelitis, meningococcal meningitis, rheumatic heart disease after streptococcal pharyngitis, and tuberculosis).
- Follow-up of subjects at risk of (exposed to) reactivation, recurrent attacks, or complications:
 - To ensure maintained quiescence
 - To prevent reactivation
 - For early screening and management of hazards, if any

Control of Contacts

A contact is a person who has associated with the case at any time during the incubation period, until detected and isolated.

Types of contacts

- Household contacts those sharing the same house with the case who may or may not be "family contacts"
- School, nursery, or institute contacts (classmates)
- Contacts from any group settings
- Work contacts

Control measures for contacts

- Enlistment A special "list of contacts" with name, age, and other personal data
- **Examination** General health status, body temperature, and manifestations for casefinding, if any
- Should not be exposed to isolated case
- Surveillance, segregation, or isolation, according to disease
 - Surveillance In the majority of infectious diseases, contacts are put under supervision for the length of the incubation period of the disease (according to given table) for case-finding. Meanwhile, they can perform their usual activities (e.g., go to school or work).
 - **Segregation** Contacts of the following infectious diseases are excluded from school or work, but not isolated:
 - Diseases that have contact carriers, such as enterica and diphtheria Contacts who are food handlers or school personnel are excluded and bacteriologically examined until proven not to be carriers.
 - Diseases that are highly infectious in the early days, such as measles and pertussis – Susceptible contacts are excluded from school for the incubation period, so they will not be at school if they develop the disease. Otherwise, they would spread infection until detected and isolated.
 - Isolation Contacts of the following diseases are isolated, each for a certain period of time, because the diseases are serious. If any of the contacts is diseased, he or she will already be in isolation and not exposing others to infection.
 - Cholera in nonendemic areas
 - Pneumonic plague
 - Pneumonic anthrax
- Specific protection is available for some, but not all infectious diseases.
 - o Immunization
 - Seroprophylaxis commonly provides ready-formed antibodies.
 Immunoglobulins are preferred to animal antisera, if available, to protect susceptible contacts.
 - Active immunization is limited to postexposure application, especially booster diphtheria toxoid for contacts.
 - Chemoprophylaxis is for contacts of meningococcal meningitis (oral rifampin), cholera (oral tetracycline) and others.

Community Control Measures

Applied preventive measures

Measures of primary prevention related to a particular disease are important to protect individuals and communities. These measures may include:

- Control of environment control of vehicles and vectors
 - Adequate ventilation and spacing (no crowding) in confined places for respiratory infections, especially meningococcal meningitis.
 - Superchlorination of water supply and sanitary collection and disposal of community wastes for foodborne infections.
- Health education of at-risk groups or populations for the encountered disease, especially how it is transmitted and personal precautions to be taken to avoid infection
- Specific prevention, if available for encountered disease.
- Mass active immunization or chemoprophylaxis for at-risk groups

Control measures

- Case-finding and control of cases and contacts according to previously described guidelines
- Epidemiologic study and investigation to trace sources and channels of infection
- Drastic control measures, if necessary (e.g., closing schools, public places, and food markets)

Chapter 6 **Maternal and Child Health Care Program**

Overview

Goal of the Program

The maternal and child health (MCH) care program is designed to promote the health of mothers and children and to ensure future healthy generations.

Goal and Objectives of Maternal Health Care

Optimal maternal health care improves the health of mothers and reduces maternal morbidity and mortality rates and unfavorable pregnancy outcomes by ensuring that every expectant and nursing mother maintains good health, has a safe delivery, bears normal healthy children, and knows the art of child care.

Components of the Maternal Health Care Program

- Antenatal care (ANC)
- Natal care
- Postnatal care and inter-pregnancy care

Goal and Objectives of Child Health Care

Child health care promotes superior child health and reduces morbidity and mortality of children by ensuring that every child lives and grows up in a family unit with love and security in healthy surroundings; receives adequate nourishment, health supervision, and efficient medical care; and is taught healthy behaviors.

Components of the Child Care Program

- Neonatal care
- Child health care (immunizations, well-baby care, and sick child care)

Importance of Maternal and Child Health Care Services in Egypt

Mothers (pregnant and lactating) and children are vulnerable groups because they are undergoing physiological changes that make them more liable to have health problems if their physiologic needs are not adequately met. Mothers and children are at high risk for morbidity and mortality, but most of their health problems are preventable. Health problems in the fetal stage and early

years of life may have long-lasting effects and may result in lifelong disability. Investment in MCH services is highly cost-effective. Women of reproductive age form 25 percent of Egypt's population and the under-five children form 12 percent (11.7 percent) of the population. Therefore, MCH services are expected to cover more than one-third of the population.

Sources of Maternal and Child Health Services in Egypt

MCH services are provided by both the governmental (MOHP) and private sector health facilities. MOHP facilities include the following:

- In urban areas Maternal and child health centers and the general urban health centers
- In rural areas Rural health units, rural health centers, and integrated hospitals (rural health hospitals)

Family medicine units and centers provide MCH services in the urban and rural areas.

Maternal Health Care

The maternal health care program includes antenatal care (ANC), natal care, and postnatal care.

Antenatal Care Program

Objectives of ANC

- Assess the health status including risk detection for the mother and the fetus
- Determine the gestational age of the fetus
- Provide preventive health services
- Provide timely referral services
- Initiate a plan for continuing obstetric care

Components of ANC

- Registration and record keeping
- Periodic visits and clinical examination including laboratory tests
- Health education
- Nutrition education and care
- Tetanus toxoid immunization
- Risk detection and management
- Referral services (if needed)
- Home visits
- Social care

ANC periodic visits and clinical examination

The ANC visits follow a specific schedule: once a month in the first seven months, twice per month in the next two months, and once every week thereafter (for a total of 14 ANC visits). In general, the mother should receive a minimum of four ANC visits.

An at-risk approach during ANC should be followed:

"Follow the standard of care for every woman with more care for those who need this care." At-risk mothers are girls and women who have one or more risk factors that could negatively affect their heath and/or the outcome of pregnancy. At-risk factors can be detected during history taking, the first ANC examination, or through the occurrence of any complication during pregnancy. The aim of the at-risk approach is to provide high-quality, cost-effective care for each mother according to her needs.

Maternal care services are related to the gestation period and include four components of services:

- ANC care visits in the **first three months** of pregnancy History, examination, health education, management of any disease, and referral if needed
- ANC care visits in the **fifth and sixth months** Periodic examinations, treatment, health education, referral, and tetanus toxoid vaccination
- ANC care visits in the **eighth month** Periodic examinations, treatment of any health problem, health education, referral, and SONAR (if present in the health facility and there are indications for it) at the 34th week of gestation
- ANC care visits in the **ninth month** Verify fetal presentation and lie and set the plan for delivery: how, where, and who, and the expected time

Natal Care Program

Objectives of natal care

- Ensure a clean and safe delivery
- Preserve the health of the mother and the child
- Prevent delivery-related complications
- Ensure timely access to emergency care, when needed

Components of natal care

- **Birth attendants** Well-trained physicians or nurses should be the persons who assist the delivery. In communities that have a traditional birth attendant (TBA) as the only person who assists labor, the TBA should be trained for safe and clean delivery as well as risk detection and referral.
- **Place of delivery** Delivery should take place in a well-equipped health facility. Hospital deliveries are preferred. However, there are well-prepared delivery rooms in some PHC facilities that have medical transportation facilities for emergency cases. In Egypt (year

2005 data), 65 percent of deliveries take place in health facilities (83 percent in urban areas and 54 percent in the rural areas). Home delivery is acceptable provided that:

- Home delivery ensures safety and cleanliness.
- A well-trained birth attendant is present who can refer the case to the hospital if complications are suspected.

Postnatal Care (Postpartum Care)

The postpartum period refers to the 40 days or six weeks following childbirth. The postpartum period is composed of three phases:

- Immediate postpartum period (the first 24 hours after childbirth)
- Early postpartum period (the first week after childbirth)
- Late postpartum period (the second through the sixth week after childbirth)

Goals of postnatal care

- Ensure the good health of the mother
- Ensure the good health of the newborn
- Family planning for birth spacing

Specific objectives of postnatal care

- Helping the mother to maintain her physical and mental health through counseling
- Observing for obstetric injuries such as perineal tears for proper management
- Addressing health problems and pregnancy-associated complications, such as hypertension and diabetes mellitus, for proper management
- Detecting reproductive tract infections early for proper management
- Examining the newborn during the first 15 days of life
- Providing health education to the mother regarding personal hygiene, nutrition, child care, breastfeeding, child immunization and its importance, birth spacing, and family planning methods.

Maternal Health Problems

Maternal health problems include various morbidity problems and maternal mortality. Pregnancy and delivery can be associated with new health problems or with exacerbation of conditions that were present before pregnancy.

Maternal Morbidity

Maternal morbidity includes health problems related to or exacerbated by pregnancy, labor and puerperium, including the following:

• Maternal malnutrition – Malnutrition deficiency diseases among pregnant women include

- o Iron deficiency anemia with or without folic acid deficiency
- o Wasting due to low energy intake and low protein intake
- Iodine deficiency
- o Osteomalacia due to calcium deficiency, a problem associated with multiparity
- o Obesity
- **Hypertension with pregnancy** With hypertension, the blood pressure is 140/90 or more or there is a rise of 30 mmHg in the systolic and 15 mmHg in the diastolic blood pressure over baseline values or between two or more occasions (six hours or more in between).

Medical disorders with pregnancy

- o Diabetes mellitus
 - Diabetes can cause neonatal health problems (respiratory distress syndrome, hypoglycemia, congenital anomalies).
 - Diabetes predisposes to high maternal morbidity and mortality (pre-eclampsia and eclampsia, placenta previa/large placenta, polyhydramnios, pyelitis, moniliasis, preterm labor, prolonged labor, injuries of the birth canal, postpartum hemorrhage, and puerperal sepsis).
- Heart diseases
 - The prevalence of heart diseases (rheumatic heart and congenital heart diseases) is three percent of all pregnancies. Rheumatic heart/mitral stenosis is the most common type in Egypt.
 - Heart diseases with pregnancy are a risk factor for high perinatal mortality (prematurity, intrauterine growth restriction, intrauterine fetal demise due to fetal hypoxia).
- Urinary tract infections
 - Asymptomatic bacteruria, pyelitis, and pyelonephritis are important risk factors for maternal morbidity and unfavorable outcome of pregnancy.
 - Perinatal mortality can be due to prematurity and fetal infection.

• Puerperal sepsis (genital sepsis)

- Puerperal sepsis is an infection of the genital tract during or after delivery. The infection could be exogenous, endogenous, or autogenous.
- It is one of the important leading causes of maternal death in developing countries where safe obstetric care is not available.

Complications of delivery

- Mothers could have morbidities during pregnancy, such as hemorrhage due to abortion, placenta previa, or abruptio placenta.
- Hemorrhage can occur during delivery or postpartum. Hemorrhage can result in severe anemia.
- Other morbidities could occur during the puerperium or later. Examples include genital infections (vaginitis, cervicitis, saplingitis), urinary incontinence,

vesicovaginal fistula, urethrovaginal fistula, and rectovaginal fistula genital prolapse.

Maternal Mortality

Maternal mortality, as defined by WHO, is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or exacerbated by the pregnancy or its management but not from accidental or incidental causes.

Causes of maternal mortality

- Direct obstetric causes are related to pregnancy, labor or puerperium:
 - Hemorrhage: Bleeding in early pregnancy or in antepartum or postpartum periods
 - Hypertension with pregnancy
 - o Genital sepsis: Puerperal sepsis and post abortive
 - \circ Thromboembolism
 - Postpartum collapse: Hypovolemic shock, neurogenic shock, septic shock and amniotic fluid embolism
- **Indirect causes** result from diseases that exist before or occur during pregnancy and are exacerbated by the physiological changes associated with pregnancy. Examples of medical morbidity with pregnancy are heart diseases, kidney diseases, anemia, diabetes and so forth.

Factors contributing to maternal mortality

Factors related to the mother

- Poor living conditions (e.g., rural Upper Egypt)
- Low per capita income
- Illiteracy or low educational level, faulty traditional beliefs and habits
- High parity (more than five children)
- Extremes of age (less than 18 and more than 40 years old)
- Unawareness about the importance of using health services
- Unwanted pregnancy

Factors related to the health-care services

- Ineffective communication/health education programs that create demand for quality antenatal, natal, and postnatal care services
- No ANC or poor-quality ANC for early detection of at-risk cases
- Maternal care services providers: unavailability of trained service providers (obstetricians, general practitioners, midwives and TBAs [dayas])

• Shortage in health facilities' resources regarding accessibility; availability of equipment, drugs and supplies; anesthesia facilities; blood banks; and ambulance care/transportation

Maternal mortality indicators

The maternal mortality ratio in Egypt for 2014 was about 50 maternal deaths per 100,000 live births.

Causes of maternal mortality in Egypt

Direct causes

- **Hemorrhage** ranks as the primary cause (postpartum and antepartum).
- Hypertension with pregnancy is the second major cause.
- Other direct causes are puerperal sepsis, ruptured uterus, cesarean section, obstructed labor, anesthesia, pulmonary embolism, spontaneous abortion, induced abortion, and ectopic pregnancy.

Indirect causes

- Cardiovascular diseases, particularly rheumatic heart diseases, are the major indirect causes.
- Anemia ranks as the second indirect cause in maternal mortality.
- Other indirect causes for maternal mortality include endemic infectious and parasitic diseases, urinary system diseases, hepatitis, neurological disorders, gastrointestinal diseases, cancer, and diabetes.

How to reduce maternal mortality

- Improve performance of the health-service providers
 - Standards of practice need to be set for antenatal, natal, and postnatal care to ensure that all birth attendants have the knowledge, skills, equipment, and supplies to perform safe delivery and provide postpartum care to the mother and the baby as well as post abortion care.
 - The standards of practice should include guidelines for general practitioners regarding the referral mechanism and the proper use of uterine stimulants (ecbolics).
- Demand creation of quality antenatal, natal, and postnatal care
- **Conduct communication for health education programs** The health education message should aim at improving the ability of women and their families to identify risk signs and seek timely medical care.
- Improve the capacity of the health facilities to provide quality services
 - Improve the role of the PHC facilities in providing antenatal and postnatal care as well as referral services. Facilities for transportation should be available to respond to emergency cases.
 - Ensure the availability of quality **ANC** services to identify the at-risk cases as early

as possible and to manage/refer cases as needed. Adequate **supervision at the health facilities** is essential.

- Improve quality of the **blood banks** to provide safe blood transfusion in proper time.
- Ensure the **availability of essential and emergency obstetric care services** especially for the high-risk pregnancies.
- Ensure the availability of **high-quality family planning programs** to provide couples with the information and services to decide on the time, number, and spacing of births.

Child Health Care

Key Definitions

Infant – A child in the first year of life, from birth to less than 12 months old

Neonate - A child in the first four weeks of life

Post-neonate – A child at the age of 28 days to 12 months old

Child, one to four years – A child from the age of one completed year to the age less than five years

Under-five child – A child from birth to less than five years old.

Summary of definitions during childhood (0–5 years)

First four weeks	28 days to 12 months	Second year	Third year	Fourth year	Fifth year
Neonate					
	Post-Neonate				
	Infant				
		Child one to four years			
Under-five ch	Under-five child				

Child Health Problems

Child health problems, expressed as morbidity and mortality, vary according to the age category: neonates, post-neonates, child one to four years, and under-five child.

Neonatal Health Problems (Neonatal Morbidity)

Neonatal morbidity includes prematurity, congenital malformation, infections, and injuries, including birth injuries.

Prematurity/preterm and low birth weight

A **preterm baby** is born before the completion of 37 weeks of gestation. Term delivery is between 38 and 42 weeks of gestation.

Low birth weight is defined as a baby weighing less than 2,500 g at birth. A full-term baby may have low birth weight due to intrauterine growth restriction, placental insufficiency, or fetal malformation. Neonates born to diabetic mothers have high weight due to macrosomia.

The **incidence** of prematurity is the percentage of premature infants among total births. It is estimated to be 15 percent in Egypt.

Causes of prematurity/preterm labor:

- Idiopathic
- Induction of preterm labor
- Premature rupture of membranes, polyhydramnios, placenta previa, and accidental hemorrhage
- Maternal causes include genitourinary infection, pyelonephritis, hypertension, diabetes, anemia, and uterine abnormalities
- Twins
- Congenital anomalies
- Intrauterine fetal demise
- Erythroplastosis fetalis
- Fetal infection

Health problems related to prematurity

The maturation and function of fetal organs, development of body stores of nutrients, and transfer of antibodies from the mother to the fetus (maternally acquired natural passive immunity) take place during the last trimester. Therefore, preterm babies have inadequate development of physical, physiological, and biological functions, leading to various health problems.

Preterm babies have the following problems that should be considered in their care:

- Immaturity of the heat-regulating center leads to impaired regulation of body temperature.
- Immaturity of the immune system and deficiency of the naturally acquired maternal immunity can lead to increased risk of infection, especially pneumonia and septicemia.
- Deficiency in body store of nutrients and poor suckling lead to malnutrition.
- Increase in the capillary fragility and improper function of the coagulation mechanisms increase the risk of hemorrhage.
- Immaturity of the liver function and hemolysis increase the risk of kernicterus.
- Immaturity of the lungs leads to respiratory distress syndrome.

• Improper management of respiratory distress with a highly concentrated oxygen supply leads to retrolental fibroplasias and blindness.

Congenital anomalies and malformation

Malformation can be a cause of perinatal mortality. Children having a congenital malformation that is incompatible with life will die during infancy or early childhood. Congenital anomalies may be mild or severe. They could be compatible with life, or they may lead to disability or death.

Congenital malformations are due to gene mutations or chromosomal abnormalities. One example is Down's syndrome (chromosomal abnormality), which becomes more common with advanced maternal age (more than 35 years). Mutagens can cause damage or alter DNA (the genetic material) of the cells during the embryonic life. When damage occurs in the reproductive cells (ova and sperm cells), the effect will pass to future generations. Exposure to teratogens in the first trimester, including infection, irradiation and drugs, can damage cells during embryonic growth.

Causes of congenital malformation

The causes of congenital malformations are related to **genetic factors and/or adverse** intrauterine environment.

Genetic factors include gene mutations and chromosomal aberrations that may be inherited, familial or acquired through exposure to mutagens.

Adverse intrauterine environment includes infections, teratogens, radiation, drugs, malnutrition, environmental pollution, and others.

- Infections Maternal rubella in the first trimester, syphilis, toxoplasmosis, cytomegalovirus, and other viral infections.
- Malnutrition lodine deficiency causes cretinism, folate deficiency can cause neural tube defect, and zinc deficiency causes central nervous system malformation.
- Diabetes mellitus early in pregnancy.
- Drugs and live vaccines are potentially dangerous, especially in the first trimester.
- Radiation at therapeutic level is teratogenic.
- Smoking is hazardous due to the effect of carbon monoxide on the intima of the placental and fetal blood vessels.

Neonatal infections

Neonatal infections can be acquired during gestation, birth, or after birth (first month after birth). Neonatal infections are illustrated in the following table:

Congenital infections	Infections acquired after birth
Congenital syphilis, AIDS, rubella, toxoplasmosis	Tetanus neonatorum, omphalitis, ophthalmia neonatorum, diarrhea, and acute respiratory tract infection (ARI)

Tetanus neonatorum is due to infection of the umbilical stump from clothing and dressings contaminated with tetanus spores. It is more common in rural areas, where facilities for safe delivery are lacking.

Omphalitis is due to infection of the umbilical stump by staphylococci, streptococci, and other organisms. It can lead to septicemia and death. It is due to unclean delivery and use of contaminated instruments and dressings for the umbilical stump.

Ophthalmia neonatorum is infection of the conjunctiva, which occurs during birth from the birth canal. The most common causative agents are Chlamydia trachomatis, which causes inclusion conjunctivitis with manifestations appearing five to 15 days after birth and could have a chronic course. The most serious is gonococcal infection, with manifestations appearing one to five days after birth.

Diarrhea and *ARI* are acquired after birth. They are more serious, but less frequent in the neonatal period than in the post-neonatal period.

Infant and Childhood Infections

Diarrhea

Diarrhea is the major cause of post-neonatal morbidity and mortality.

Acute respiratory infection

ARI (upper and lower respiratory tract infections) is the second major cause of infant and child morbidity and mortality. ARI has several causative agents; therefore, prevention and control are difficult issues.

Neonatal, Post-neonatal, and Child Mortality

Factors Contributing to the Under-Five Health Problems

Several factors play specific roles in placing a child at risk for high morbidity and mortality. Those factors are related to the socioeconomic status of the community, family life, and a child's individual factors.

Socioeconomic status of the community

Child morbidity and mortality are influenced by the status of the community development at both the national and community levels.

- The availability and accessibility to quality health services, especially an MCH program
- Sanitation and access to safe water supply
- Adequate food supply
- Literacy rate

- Income level
- Access to information through mass media
- GDP per capita (GDP is an indicator measuring the economic status of the community.)

Family factors

- Housing conditions (sanitation and the immediate environment)
- Family size
- Crowding index (average number of individuals per room)
- Socioeconomic condition of the family (education, occupation and income of the parents)
- Food availability and habits
- Cultural factors and habits
- Health awareness and lifestyle
- Health condition of the different family members
- Previous infant and child death in the family
- Maternal age or maternal death

Child factors

At-risk children have one or more of the factors related to the family or the child and require need special care.

- Sex of the child In developing countries, including Egypt, females are at higher risk than males for morbidity and mortality because of gender inequality that is especially notable with lower socioeconomic class.
- Serial order The first child is at higher risk than the second (due to a mother's lack of experience), and the risk is higher after fifth-order children (due to constraints on resources, time, and other finite factors).
- Birth spacing The risk is higher when birth spacing is less than two years.
- Health problems of the mother during pregnancy
- Condition of the newborn The risk increases among children who are preterm, have low birth weight, are a multiple (e.g., twin, triplet), have a congenital malformation or birth injuries, and so forth.
- Non-breastfed children
- Improper weaning practices and malnutrition
- Repeated infections

Child Health Care Program

Child health problems include various **morbidity problems** and **child mortality.** Child health care promotes child health and reduces childhood morbidity and mortality by ensuring that every child lives and grows up in a family unit with love and security in healthy surroundings; receives adequate nourishment, health supervision and efficient medical care; and is taught healthy behaviors.

Components of the Child Health Care Program

- Neonatal care
- Child health care (immunizations, well-baby care, and sick child care)

Components of the Child Health Care Program

- Registration and record keeping
- Periodic medical examination including growth and development monitoring
- Health education
- Nutrition care
- Immunization
- Management of sick children Special care programs include the control of diarrheal diseases and ARIs and the integrated management of childhood illness (IMCI)
- Referral services (as needed)
- Outreach services
- Social care

Periodic Medical Examination

Periodic medical examination includes two items:

- Full clinical and laboratory investigations include a systemic clinical examination of the child:
 - o Four times in the first year
 - Twice in the second year
 - o Once every year till school age

Clinical and laboratory examinations have to be done to detect congenital anomalies, hearing and/ or vision defects and so forth.

• Monitoring the growth and development of the child – Children of the same age do not grow or develop at a same rate; however, the rate has a normal range. The rate at which the child grows and develops is considered a sensitive indicator that reflects the health status of the child. Monitoring a child's growth and development is considered a basic screening tool for early detection of any deviation from good health.

Monitoring the Development of the Child

Monitoring of development services include periodic assessment for specific milestones compared to standard child development. In case of suspicion of any deviation from the standard, more advanced tests could be done and actions taken for correction.

Growth monitoring services

- The growth monitoring process follows a child's growth by repeated anthropometric measurements to assess the rate of growth to check that it is within normal limits and to allow for early detection of deviation from normal limits.
- Anthropometric measurements include repeated measurement of the weight, height/ length, and head circumference. The growth chart is used to record the anthropometric measures during each visit to the child clinic (see the MOHP form used in growth monitoring).



Schedule of Growth Monitoring of Children Attending the PHC facilities

Life table of the child	Weight	Length/height	Head circumference	
First year	Monthly	Every two months	Monthly	
Second year	Every two months	Every four months	Every two months	
Third year	Every three months	Every six months	Head circumference is measured until	
Age three to six years	Every six months	Every year	fontanelle at the age of 18 months.	

The growth chart

- The growth chart is used to record the values of the anthropometric measurements over time and to develop an individualized **growth curve** for the child. The **plotted curve** is to be used to interpret the pattern of growth overtime.
- **The growth chart** routinely used in the health centers plots weight against age of the child.
- The growth chart displays curves for weight-by-age at 5th, 50th, and 95th percentiles.
 Recent growth charts show two curves presenting weight by age at +2 SD and -2 SD from the WHO reference values for weight for age.
- The growth chart pattern is considered normal/acceptable growth when the child's weight curve lies parallel and between the 95th and 5th percentile curves on the growth chart.

How to use the growth chart

- Record the child's birth month in the first box in the age axis, then complete the agenda by putting the names of the subsequent months. This facilitates calculation of the age of the child during any visit to the center.
- During the child's monitoring visit to the health center, the weight is plotted against the date of examination. The age of the child could be immediately estimated from the growth chart during each visit to the center.
- Interpretation of the growth curve is done to determine whether the child is gaining weight as expected or if he or she is growing slowly or is losing weight. Monitoring the child's growth according to the schedule facilitates early detection of delays before the occurrence of manifested malnutrition.

Nutrition Care

Nutrition care for the preschool child includes the following items:

- Growth monitoring
- Nutrition education
- Promotion of breastfeeding
- Proper weaning practices
- Feeding the sick child during and after illness
- Nutrition supplementation
- Early detection and correction of malnutrition
- Indirect interventions to improve the nutrition status

Nutrition supplementation to children

• Vitamin A at the age of nine and 15 (or 18) months is to be given with the scheduled vaccine. The recommended dose (in Egypt) is 100,000 IU, orally. After the age of one year the dose could be 200,000 IU. Vitamin A is recommended to be given to mothers during

the first eight weeks after delivery (better within 10 days) at a dose 200,000 IU to increase vitamin in the breast milk.

- Vitamin D could be given at the age of two months, once only, at a dose of 200,000 IU intramuscular.
- Iron supplements could be given orally at a dose of 6 mg/kg body weight/day for a period of two months at the age of seven months and the age of 15 (or 18) months.

Indirect interventions to improve the nutrition status include health education, immunization, birth spacing, prevention and control of parasitic infestations, and prevention and control of infectious diseases especially diarrhea and ARI.

Interventions to the community include supervision of the environment and environmental sanitation, prevention and control of communicable diseases in the community, and improvement of the nutritional status of the community.

Immunizations

MCH centers follow the quality standards regarding immunization services, especially the cold chain and infection control. The vaccination schedule in Egypt is displayed in the following table. OPV is to be given during the vaccination campaigns every year to all the under-five children.

Vaccination and Vitamin A Supplementation Schedule		
Vaccine	Time	
BCG	One month (40 days)	
OPV, DPT, HBV	Two months	
OPV, DPT, HBV	Four months	
OPV, DPT, HBV	Six months	
Measles, OPV, vitamin A 100,000 IU	Nine months	
OPV, DPT, MMR, vitamin A 200,000 IU	18 months	

Management of Sick Children

MCH centers are responsible for early detection and management of sick children. The IMCI service includes control of diarrhea diseases, ARI, malnutrition, and measles (in some countries IMCI includes malaria as well).

Achieving Millennium Development Goals Four and Five

In the years following 2005, the country achieved an under-five mortality rate below the MDG4 target of 29 under-five deaths per 1,000 live births. Even after achieving MDG4, Egypt has sustained a declining trend. The average annual rate of reduction of under-five mortality between 1990 and 2011 was 6.7 percent. However, disparities exist in the achievement. By 2008, all regions had achieved MDG4 in terms of a two-thirds reduction in under-five mortality rate except for the urban and frontier governorates. The baseline (1990) ranged from 182 per 1,000 live births in rural Upper Egypt to 72 per 1,000 live births in the urban governorates—Cairo, Alexandria, Port Said, and Suez—and in urban Lower Egypt.

The annual percentage decline in maternal mortality in Egypt was six percent between 1990 and 2010. With the current rate of reduction, Egypt will likely reach the required target for reduction of maternal mortality ratio set by MDG5, which is 57.5 per 100 000 population.

Accelerated Maternal and Child Health Plan: Response to the Situation

In response to the initiative of saving lives of mothers and children, Egypt has decided to develop an MCH acceleration plan to speed up the progress for further reduction of maternal and child deaths.

The overall goal of the plan is to accelerate progress in improving maternal, newborn and child health in the most disadvantaged areas of Egypt.

- For maternal health Achieve a level of 43 per 100 000 live births of maternal mortality ratio by 2015.
- For child health Further reduce under-five child mortality to reach a level of 19 per 1,000 live births—to reach an overall reduction of 77.8 percent from the rate in 1990.

The goals will be achieved by increasing the implementation of the above packages by an additional 27 percent of health facilities (1,402 health facilities) and 30 communities.
Chapter 7 Noncommunicable Diseases

Overview

NCDs, also known as chronic diseases, are not passed from person to person. They are of long duration and generally progress slowly. More than three-quarters of global deaths from NCDs come from low- and middle-income countries (WHO, 2017).

Chronic conditions are characterized by the following:

- Do not result from an (acute) infectious process and are not communicable
- Cause premature morbidity, dysfunction, and reduced quality of life
- Usually develop and progress over long periods
- Often are initially insidious
- Once manifested, they usually cause a protracted period of impaired health

In some definitions, NCDs also include:

- Chronic mental illness
- Injuries, which have an acute onset, but may be followed by prolonged convalescence and impaired function

Types of NCDs

- Cardiovascular disease (coronary heart disease, stroke)
- Cancer
- Chronic lung disease
- Diabetes
- Chronic neurologic disorders (Alzheimer's, dementias)
- Arthritis/musculoskeletal diseases

Risk Factor: Definition

The CDC defines **risk factor** as "an aspect of personal behavior or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition" (CDC, 2012). There are three types of risk factors: modifiable, nonmodifiable, and metabolic.

Modifiable risk factor

A modifiable risk factor is a behavior or habit that can be reduced or controlled by intervention, thereby reducing the probability of disease. WHO has prioritized the following four factors:

- Physical inactivity
- Tobacco use
- Alcohol use
- Unhealthy diets (high fat and sodium intake, low fruit and vegetable intake)

Nonmodifiable risk factor

A nonmodifiable risk factor is one that cannot be reduced or controlled by intervention; these include, age, gender, race, and family history (genetics).

Metabolic risk factors

"Metabolic" refers to the biochemical processes involved in the body's normal functioning. Behaviors, modifiable risk factors, can lead to metabolic changes. WHO has prioritized the following four metabolic risk factors:

- Raised blood pressure
- Raised total cholesterol
- Elevated glucose level
- Overweight and obesity

Epidemiology of NCDs

- Demographic transition
- Epidemiologic transition
- Nutrition transition
- Multifactorial nature of the risk factors
- Migration of the population across different cultures
- International communication
- Environmental changes
- Epidemiological differences between countries
- Epidemiological changes through time
- Limited use of scientific progress in management of NCDs

The demographic transition

Decreases in fertility and mortality result in increases in the life expectancy with a subsequent increase in the proportion of elderly populations. NCDs are usually associated with aging.

The epidemiologic transition

Mortality is shifting from communicable diseases (due to the use of immunizations and antibiotics, etc.) to NCDs, which have specific genetic, environmental, and behavioral risk factors.

Nutrition transition

A shift has occurred from famines to increased production and consumption of fruits, vegetables, and protein. However, another large shift has occurred in the pattern of nutrition to a diet high in total fat, sugar, and other refined carbohydrates and low in polyunsaturated fatty acids and fibers. Dietary changes are often accompanied by an increasingly sedentary lifestyle. Such patterns have resulted in increased prevalence of obesity and contribute to degenerative NCDs.

Transition Items	Demographic Transition	Epidemiologic Transition	Nutrition Transition
Past Situation	High fertilityHigh mortality	High prevalence of infectious diseases	High prevalence of under-nutrition
Interventions	 Family planning Prevention and control of infectious diseases 	 Environmental sanitation Immunization Antibiotics Insecticides 	Food productionReducing famine
Shift to	 Reduced fertility Increase in life expectancy Aging 	 Low incidence and prevalence of infectious diseases Low mortality from infectious diseases 	 Nutrition-related NCDs
Present Situation	 NCDs associated with aging 	NCDs predominate	Nutrition-related NCDs

Demographic, Epidemiologic and Nutrition Transition

The multifactorial nature of the risk factors for the NCDs

Compared to communicable disease, NCDs are difficult to link to specific causes (cause–effect relationship). The multiplicity of the risk factors associated with a specific disease limits the opportunities to define specific interventions for prevention and control. The types of the risk factors are difficult to control by technology. (For communicable diseases, immunizations and antibiotics are used for prevention.) The risk factors are related to genetics, environment, culture, and behavior, which represents a challenging issue for public health programs.

Migration of population across different cultures

Individuals who migrate from a low-risk culture (e.g., rural areas) to a high-risk culture (e.g., urban areas) will follow the lifestyle of the new culture and develop increased risk for NCDs. Due to progressively increasing urbanization, NCDs have increased in prevalence.

International communication

International communication, multinational business and new food technologies have resulted in introduction of new lifestyles and new food products in communities and increased predisposition to NCDs. Communication through the mass media/satellites/Internet, overseas travel, and international food business and marketing facilitate the introduction of different concepts and dietary patterns that increase exposure to the risk factors for NCDs.

Adolescents and youth are population segments that are exposed to such modernization in concepts and behavior. Consequently, the exposure to the risk of the NCDs early in the life cycle will result in development of a large cohort with health problems during adulthood and older age.

Epidemiology of the NCDs differs across countries

Due to differences in the prevalence of various risk factors (genetic, environmental, cultural, and behavioral) for the NCDs across countries, limitations exist for the use of universal information. Public health specialists in each country should have a specific surveillance system for the different NCDs. For example, in countries where people typically consume spicy foods, peptic ulcers, and stomach neoplasm are more common than in other countries.

Epidemiology of NCDs is continuously changing

Some countries have succeeded in improving the pattern of certain NCDs (e.g., reduction in the incidence of coronary heart diseases through extensive anti-smoking programs). However, other NCDs could emerge at any time because of new risk factors. Therefore, public health specialists should be ready to study the new emerging health problems.

Limited use of scientific progress in managing NCDs

Rapid and successful achievements have occurred in the science of risk detection, and in the use of medication and technologies to prevent and control NCDs. However, public health specialists in developing countries face challenges related to the high cost of the NCD prevention and control programs.

Burden of NCDs

Globally, NCDs are the leading cause of premature death and chronic disability and are responsible for almost 70 percent of all deaths worldwide. Almost three-quarters of all NCD deaths and 82 percent of 16 million premature deaths (before reaching 70 years of age) occur in low- and middleincome countries. The rise of NCDs has been driven by primarily four major risk factors: tobacco use, physical inactivity, the harmful use of alcohol, and unhealthy diets.

NCDs are the current leading cause of mortality in Egypt, with NCDs accounting for an estimated 85 percent of all deaths. Cardiovascular diseases accounted for the most deaths of all NCDs (46 percent), followed by cancer (14 percent), chronic respiratory diseases (four percent), and diabetes (one percent). Alarmingly, NCD-related premature mortality (between ages 30 and 70 years) accounts for 25 percent of all deaths.

Use of tobacco, consumption of alcohol, unhealthy dietary practices, and physical inactivity are the leading behavioral risk factors for NCDs. The STEPS survey (MOHP and WHO, 2012) showed that 46 percent of males and 45 percent of females are current smokers. Thirty-one percent of the Egyptian population is physically inactive. A survey in 2014 found 60 percent of adults had excess weight (overweight plus obesity, 55.2 percent of males and 70.2 percent of females), and 36 percent of this group had high blood pressure. Additionally, the prevalence of raised blood glucose is estimated to be 9.2 percent.

Global Response, WHO Global NCD Strategies

In May 2000, the World Health Assembly reaffirmed the global strategy for prevention and control of NCDs in which four diseases were defined as major NCDs: cardiovascular disease, diabetes, cancer, and chronic respiratory diseases.

These conditions share modifiable risk factors, including tobacco use, harmful use of alcohol, unhealthy diet, and physical inactivity. Prevention, health care for NCD management, and surveillance were identified as three key pillars for NCD prevention and control.

The WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 provides member states and international partners with a map and menu of policy options that will contribute to progress on the nine global NCD targets.

Additionally, the WHO "Global Monitoring Framework on NCDs" tracks implementation of the NCD global action plan through monitoring and reporting on the attainment of the nine global targets for NCDs by 2025 against a baseline in 2010.

Mortality **Risk factors National systems response** • Harmful use of alcohol (10% reduction) • Drug therapy and • Premature mortality counseling (50% coverage) Physical inactivity (10% reduction) reduction from Essential NCD medicines • Salt/sodium intake (30% reduction) NCDs (25%) and technologies (80% reduction) • Tobacco use (30% reduction) coverage) • Raised blood pressure (25% reduction) Diabetes/obesity (0% increase)

The Nine Voluntary Global NCD Targets

In September 2015, the global NCD movement gained further momentum after the adoption of sustainable development goals that included specific targets on NCDs to be achieved by 2030:

- Reduce by one-third the premature mortality from NCDs
- Strengthen responses to reduce the harmful use of alcohol
- Achieve universal health coverage

- Strengthen the implementation of the WHO Framework Convention on Tobacco Control
- Support the research and development of vaccines and medicines for NCDs that primarily affect developing countries
- Provide access to affordable essential medicines and vaccines for NCDs

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