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GOVERNMENT OF TAMIL NADU

HIGHER SECONDARY FIRST YEAR

HOME SCIENCE

A publication under Free Textbook Programme of Government of Tamil Nadu

Department of School Education

Untouchability is Inhuman and a Crime

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Government of Tamil Nadu

First Edition - 2018

Revised Edition - 2019, 2022

Reprint - 2020, 2021, 2023, 2024

(Published Under New Syllabus)

NOT FOR SALE

Content Creation

State Council of Educational Research and Training

© SCERT 2018

Printing & Publishing

Tamil NaduTextbook and Educational Services Corporation

www.textbooksonline.tn.nic.in

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How To Use The Book

Introduction

Motivate the students interest into the content.

Learning Objective

This gives an overview of the chapter.

Case study

Deeper understanding and knowledge application is enhanced.

Do you know?

To give the learner additional information related to that particular topic.

Activity

Activities are given to ellicit critical and creative thinking and develop independent learning skills.

QR Code

Enhances the visual knowledge, memory and presents the content in a interesting manner.

ICT Corner

References to the relevant website for further information on topics covered in that chapter.

Summary

Brief outline of the entire chapter is given in a nutshell.

Glossary

Gives detailed meaning of new technical terms.

Reference

All basic materials used for the development of contents.

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CAREER GUIDANCE

Professional Courses

- M.B.B.S
- B.D.S
- Pharm D
- B.Pharm
- B.A.M.S
- B.V.Sc
- B.Sc Agriculture

UG Degree Courses

- B.Sc Nutrition Food Service Management and Dietetics
- B.Sc Clinical Nutrition and Dietetics
- B.Sc Nutrition and Dietetics
- B.Sc Food Science and Nutrition
- B.Sc Home Science
- B.Sc Textiles and Fashion Design
- B.Sc Interior Design & Resource Management
- B.Sc. Human Development

PG Degree Courses

- M.Sc Food Science and Nutrition
- M.Sc Foods and Nutrition
- M.Sc Food Service Management and Dietetics
- M.Sc Textile and Fashion Apparel
- M.Sc Interior Design and Resource Management
- M.Sc Human Development
- M.Sc Extension and Communication
- M.Sc Bio-Textiles
- M.Sc Apparel and Fashion Design
- M.Sc Exercise Physiology and Nutrition

Higher Studies(M.Phil&Ph.D)

- Food Science and Nutrition
- Foods and Nutrition
- Food Service Management and Dietetics
- Textiles and Fashion Apparel
- Human Development
- Extension and Communication
- Resource Management
- Bio –Textiles
- Exercise Physiology and Nutrition

Diploma Courses

- Diploma in Food and Nutrition
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- Diploma in Early child hood care and Education
- P.G. Diploma in Dietetics
- Diploma in Dyeing and Printing

Diploma Paramedical Courses

- Diploma in Physiotherapy
- Diploma in Occupational Therapy
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- Diploma in Dialysis Technology
- DMLT (Diploma in Medical Lab Technology)
- Diploma in X-Ray Technology
- Diploma in Radiography
- Diploma in Medical Imaging Technology
- Diploma in Medical Record Technology
- Diploma in Nursing Care Assistant
- ANM
- GNM
- Diploma in Ophthalmic Technology
- DHLS (Diploma in Hearing Language and Speech)
- Diploma in Anaesthesia Technology
- Diploma in Dental Hygienist
- Diploma in Rural Health Care
- Diploma in Community Health Care

Certificate Courses

- Certificate in X-Ray Technician
- Certificate in Lab Assistant/Technician
- Certificate in Dental Assistant
- Certificate in Operation Theatre Assistant
- Certificate in Nursing Care Assistant
- Certificate in ECG and CT Scan Technician
- Certificate in Dialysis Technician
- Certificate in Home Based Health Care
- Certificate in Rural Health Care
- Certificate in HIV and Family Education
- Certificate in Nutrition and Childcare

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HOME SCIENCE

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Chapter 1 Concepts and Scope of Home Science

Learning Objectives

This chapter will help the students to:

- Know the importance about Home Science as a subject
- Understand the various components of Home Science
- Know how Home Science can improve the quality of life
- Gain insight into the educational and vocational scope of Home Science.

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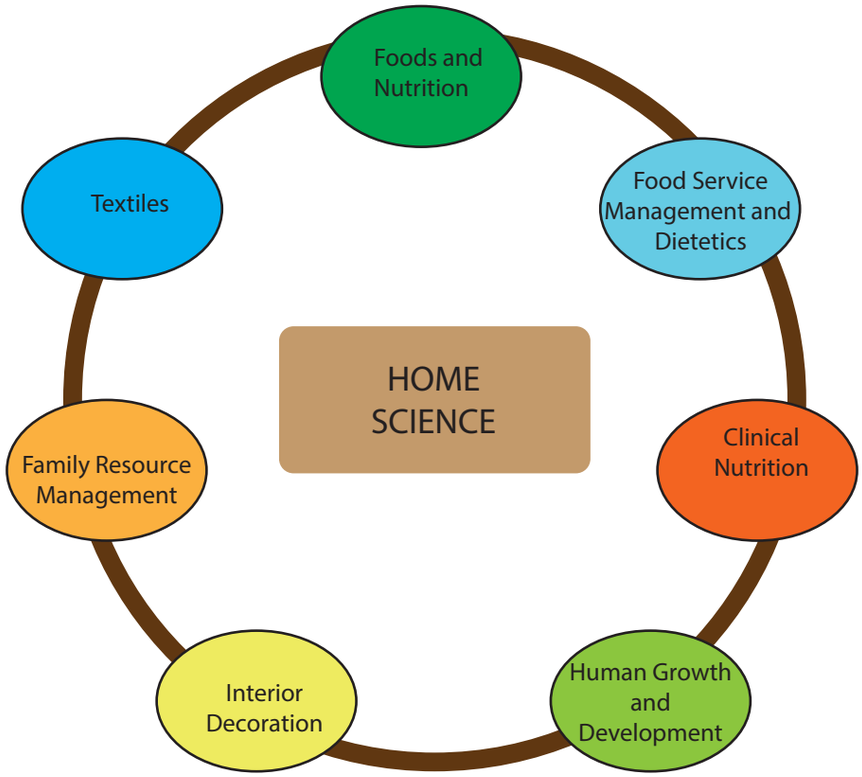
HOME SCIENCE AND ITS BRANCHES



▲ Fig. 1 Home Science- An art and science

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1.1 INTRODUCTION

Home Science or the science of managing a home, includes a study of all aspects related to our home. It is a study that focuses on family members and the achievement of satisfaction of each and every member through thoughtful effective and constructive use of resources.

Home Science is both an "art and science". This is because it teaches the art of using resources so that a harmonious whole someness is achieved and an overall pleasant effect is created. At the same time, it provides the scientific basis of techniques involved in making a home a happy healthy and beautiful place to live in. For example, the subject Home Science imparts knowledge about the different food groups, the nutrients present in them, the causes of nutrient deficiency and the dietary management of various diseases. This is the **'science'**. However, the ability to prepare various recipes with required nutrients for a particular age group and serve it in a very attractive manner in a pleasant environment so as to motivate consumption of healthy foods and feeling of wellbeing is an **'art'**.

Interdisciplinary Nature of Home Science

Home Science draws a major portion of its content from pure science disciplines such as physics, chemistry, biochemistry, physiology and biology. It also draws its content equally from economics, sociology, anthropology, psychology, community development, communication, media and technology. Hence, it is an interdisciplinary field with much scope as it encompasses the salient features and components of both science and arts courses.

1.2 EVOLUTION OF THE DISCIPLINE OF HOME SCIENCE

In India, the study of Home Science can be traced back to the British rule between 1920 and 1940. The rulers in that period introduced Home Science in some schools and colleges. It was initially known as "domestic science" and was first introduced in Maharani Girl's High School, Baroda. Later the Home Science subject was included in various other states such as Uttar Pradesh, Madhya Pradesh and some southern states and thus the curriculum underwent changes over the years.

Home Science has now been claimed to be an important subject in the school curriculum because it includes all significant areas of art and science which is crucial for the development of the individual, family and society.

Although Home Science paved its ways into many schools all over India it was not offered at the college level for a very long time. Hence, many students were unable to pursue the study of Home Science at an advanced level. Lady Irwin College, Delhi was the first to introduce Home Science as a degree programme at college level in 1932.From 1938 onwards, Chennai University offered Home Science at the degree level. Queen Mary's College and Women's Christian College at Chennai started Home Science in 1942. Since 1950, a degree programme in Home Science was included at Coimbatore (Tamil Nadu), Ludhiana (Punjab), Mumbai (Maharashtra), New Delhi, Udaipur (Rajasthan) and Tirupathi (Andhra Pradesh).

Under the leadership of Dr. Rajammal P. Devadass, Avinashilingam Homescience college has become a leading college in

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South Asia in the fields of Homescience and Nutrition

Initially there were few students who enrolled for the course. With the regular reconstruction of the curriculum based on the reforms in science, technology and art, there was found to be a steady increase in the number of students who enrolled for a degree in Home Science. At present thousands of post graduates and Ph.D degree holders are in prominent positions in prestigious institutions all over the country. Home Science has now been claimed to be one of the important subjects in the school curriculum because it offers fundamental opportunities to students to develop their potential for promoting the society and themselves.

1.2.1 Diploma Courses in Home Science

Diploma course in Home science was offered by the Agricultural Institute of Allahabad in 1935. In 1950, Baroda became a significant nucleus and epicentre of Home Science education. In the mid 1960's and 1970's more Agricultural Universities were established throughout the country and a diploma course in Home Science was included in most of the Agricultural Universities.

Eminent Pioneers in Home Science in India
Dr. Rajammal P. Devadass,
Dr. Flemmie.P Kittrell, Dr. Leela Shah and Ms. Dorothy Pearson.

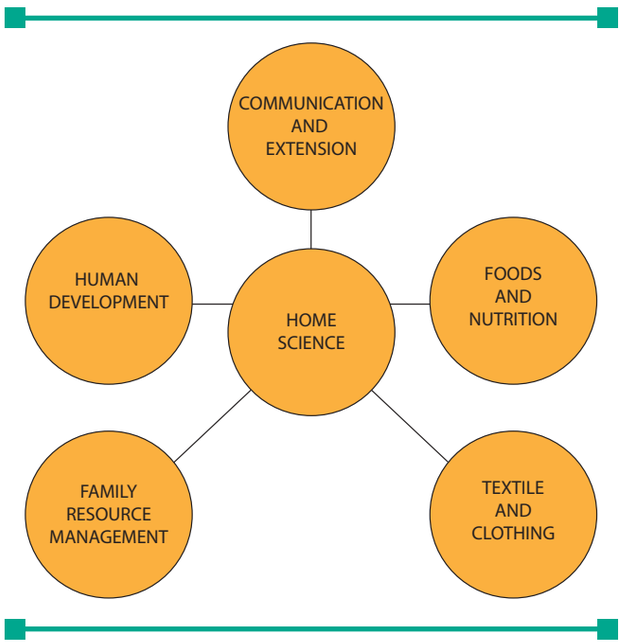
In 1951 the "*Home Science Association of India*" was formed. The constitution of the Home Science association was framed by Miss Dorothy Pearson of Women's Christian College, Chennai. Later the association became affiliated to the "*International Federation of Home Economics*".

1.3 COMPONENTS OF HOME SCIENCE

There are five major components or areas of specialisation in Home Science.

- Foods and Nutrition
- Family Resource Management
- Textile and Clothing
- Human Development
- Communication and Extension

The study of Home Science is so advanced that each specialization is a vast domain in its own ways with its areas of specialization and vocational/professional opportunities. Table- 1 emphasises the branches of Home Science along with specific areas dealt in each branch.



▲ Fig. 2 Five Major Components of Home Science

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Table 1 Branches of Home Science Along With Specific Areas of Specialisation In Each Branch

Main Branch	Areas of specialisation
Foods and Nutrition	Food Science and Food Safety Clinical Nutrition and Clinical Biochemistry Community Nutrition Therapeutic Nutrition Sports Nutrition Food Preservation
Family Resource Management	Fuel and Energy Management Family Finance Management Housing and Equipment Interior Decoration Consumer Education
Textiles and Clothing	Clothing Construction Concepts of Fibres and Fabrics Textile Designing Apparel Designing Care and Maintenance of Clothes
Human Development	Human Growth and Development Adolescence, Marriage, and Family Guidance Needs and Care of Elderly Needs and Care of Special Children
Communication and Extension	Modes and Significance of Communication Development Programmes- Planning and Evaluation Entrepreneurship- Training and Capacity Building Management of Community Service Organisation

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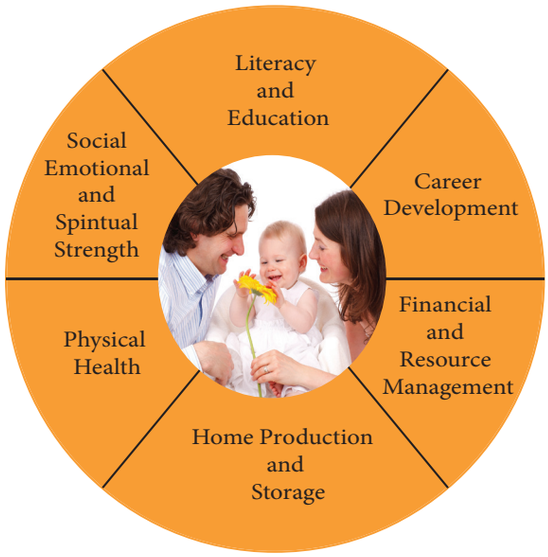
1.3.1 Foods and Nutrition

In this course, the chemical composition of food, the nutrients present in them, their bioavailability, functions of various nutrients, and loss of nutrients in cooking and processing, techniques in food safety and food security, nutritional deficiencies in the human body and its consequences are dealt with in detail.

1.3.2 Family Resource Management

The management of resources such as time, money, energy and space are the main topics for study under family and community resource management. The students gain knowledge about home scale budget preparation and work simplification techniques. Consumer education is also included under this subject in order to ensure that students become intelligent consumers who are aware of their duties, responsibilities, rights and privileges as consumers in the society. The students are provided information regarding food safety, safety against adulteration, common adulterants, health hazards and Consumer Protection Act. Major principles and basics of design and arts are also detailed in this area.



Various factors of FRM

1.3.3 Textile and Clothing

Textile science includes all details about various natural and synthetic fibres. The process involved in construction of fabric, apparel designing as well as fabric finishes are taught.

Yarns

Fabrics

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1.3.4 Human Development

Human development deals with the development of a child from conception to old age and the developmental task pertaining to each stage in life. Physical, motor, emotional, language, cognitive and social development of human beings are also included in this. Behavioural problems of children, special or differently abled children and specific problems and issues that hinder the development of human beings are also dealt. Geriatrics is also a part of the study.

1.3.5 Communication and Extension

Extension education includes the study of programme planning, preparation of audio visual aids, social work, applied nutrition and methods of communicating with the society.

Group discussion

1.4 RELEVANCE OF HOME SCIENCE IN IMPROVING QUALITY OF LIFE

The study of Home Science improves the quality of life of people through the following ways:

- Helps people lead a more satisfying personal, family and community life through the dissemination of knowledge and appreciation of cultural and spiritual values.
- Offers maximum opportunity to express one's ability to understand and manage their resources and develop leadership qualities.
- Develops qualities needed for responsible citizenship.
- Helps student to recognise the importance of food in ensuring health.
- Teaches about food safety that needs to be adapted right from farm to fork,
- Imparts knowledge about healthy food preparation techniques.
- Provides practical tips in preparing a balanced diet.
- Enables one to make good decisions,

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sort out family problems and find out solutions for them.

- Provides necessary guidelines about entrepreneurship so as to help young students identify and pursue income generating activities.
- Gains technical knowledge and information from various branches of Home Science for both personal and professional use.

1.5 EDUCATIONAL AND VOCATIONAL SCOPE OF HOME SCIENCE

At the College / University level, Home Science is offered as a Bachelor's Degree programme with a duration of three years and as a Master's Degree programme with a duration of 2 years. Master of Philosophy in Home Science is one year programme. The course offered in some of the reputed colleges and universities in Tamil Nadu are given in Table-2.

The future career prospects for graduates and post graduates in Home Science are as follows:

1.5.1 Clinical Dietician

- Hospitals and outpatient clinics.
- Work with chefs in hospitals, corporate sectors, hostel and day care centres.
- Consultants in diet and health.

1.5.2 Public Health Nutritionists

- Public health departments such as ICDS and Noon Meal Programme.
- Food experts and scientists in institutes such as Central Food Technological Research Institute and National Institute of Nutrition.

1.5.3 Academicians and Research Scholars

- Teaching in schools, colleges, universities, health professional colleges and culinary schools
- Manage or assist with clinical protocols, interventions or clinical trials.

1.5.4 Consultant / Private Practice

- Dietary consultants or Dietitians at hospitals after being certified as Registered Dietitians.
- Client counselling for weight management, eating disorders, sports nutrition, dietary management for various diseases
- Writing cookbooks, educational programs, articles for local newspapers or specialty magazines,

1.5.5 Business and Industry

- Careers in business and industry include jobs such as sales, marketing, public relations, research and development (labeling, recipes, product information and production, quality control)
- Food production (food products & preservation),
- Nutraceuticals.
- Hotel Industry.
- Fashion designing
- Establishing day care centres for babies and Pre-school children.

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Table 2 Home Science Course Offered In Various Colleges and Universities

Courses	
UG courses	B.Sc Nutrition Food Service Management and Dietetics B.Sc Clinical Nutrition and Dietetics B.Sc Nutrition and Dietetics B.Sc Food Science and Nutrition B.Sc Home Science B.Sc Textiles and Fashion Design B.Sc Interior Design & Resource Management B.Sc. Human Development B.Sc. (Hons.) Food, Nutrition and Dietetics
PG courses	M.Sc Food Science and Nutrition M.Sc Foods and Nutrition M.Sc Food Service Management and Dietetics M.Sc Textile and Fashion Apparel M.Sc Interior Design and Resource Management M.Sc Human Development M.Sc Extension and Communication M.Sc Bio-Textiles M.Sc Apparel and Fashion Design M.Sc Exercise Physiology and Nutrition
M.Phil and Ph.D.	Food Science and Nutrition Foods and Nutrition Food Service Management and Dietetics Textiles and Fashion Apparel Human Development Extension and Communication Resource Management Bio-Textiles Exercise Physiology and Nutrition

1.5.6 National and International Food Organizations

Based on the specialisation in various branches of Home Science a student may gain entry into

- Organizations such as World Health Organization, Food and Agriculture Organization.
- Public Policy / Government organisations.
- Public service through group service examination.

Activity 1

How will you motivate your friends in Junior school to enrol for the subject Home Science in higher education by highlighting the scope of Home Science

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SUMMARY

Home Science is a unique and interdisciplinary course covering a wide spectrum of areas including Foods and Nutrition, Family Resource Management, Textile and Clothing, Human Development as well as Communication and Extension.

This course which is unique blend of science and art has been developed to provide knowledge and skills. An individual can use in all areas of life including human growth and development, interior decoration, nutrition, family meal management and family resource management thus making it a course close to our hearts, home and health.

As a complement to the challenging but rewarding curriculum, it provides career opportunities and has opened its doors for new avenues in all possible ways which include hospitals, catering establishments, food production and preservation industries, communication technology, fitness centers, interior designing, textile and fashion industry as well as family housing.

Students can also pursue higher education in Home Science which is offered in various college and universities in TamilNadu and all over India.

GLOSSARY

Interdisciplinary – (பலதுறை) Involving two or more different subjects or areas of knowledge.

Sociology – (சமூகவியல்) It is the scientific study of society, including patterns of social relationships, social interaction, and culture.

Anthropology – (மானிடவியல்) It is the study of human beings and their ancestors through time and space and in relation to physical character, environmental and social relations, and culture.

Salient features – (முக்கிய அம்சங்கள்)- Pointing out facts about something.

Geriatrics – (ஜெரியாட்ரிக்ஸ்) The branch of medicine or social science dealing with the health and care of the elderly.

Nutraceuticals – (நியூட்ராசிடிகல்ஸ்) Products derived from food sources to provide extra health benefits.

Apparel – (ஆடை) Clothes worn daily and for important occasions.

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Questions

I. Choose the correct answer

1. Which state introduced Home Science in India?
   a. Baroda b. West Bengal
   c. Hyderabad d. Assam
2. Which college introduced Home Science in India?
   a. Lady Irwin College–Delhi
   b. Queen Mary's College–Chennai
   c. Jagruti Degree College–Hyderabad
   d. Goa College of Panaji
3. The Constitution of Home Science association of India was formed by?
   a. Dr.Flemmie P.Kittrell
   b. Miss. Dorothy Pearson
   c. Dr.Rajammal P.Devadoss
   d. Dr.Leela Shah

II. Very short answer (2 marks)

1. Define Home Science.
2. Give your view in 2 sentences about Home Science education in India?
3. What is the scope of Home Science?
4. Foods and nutrition play an important role in maintaining health of an individual. How?
5. In what way does Home Science help in the selection of apparel ?

III. Answer briefly (3 Marks)

1. List the various disciplines of Home Science?
2. How will the study of Home Science help in the development of an individual?
3. Mention the names of eminent personalities who contributed their service for the growth of Home Science?

IN5HC

4. How do families make a nation prosperous?

IV Write in detail (5 Marks)

1. Trace the history of Home Science in India.
2. Discuss the main branches of Home Science with reference to the specific areas dealt in each branch.
3. Give a detail account of job opportunities after completing a post graduate degree in Home Science?
4. Leela has completed her B.Sc. in Nutrition, Food Service Management and Dietetics. What are her future prospects?
5. Home Science is combination of science and art–Justify.

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Chapter 2 Human Development and its Challenges

Learning Objectives

This chapter will enable the students to

- Know about the various stages in life span, its meaning and subdivisions
- Gain knowledge about the characteristics of each stage in life span
- Understand the physical, social, emotional and cognitive changes in each stage
- Know the challenges faced by children with special needs
- Understand the challenges in adulthood and old age

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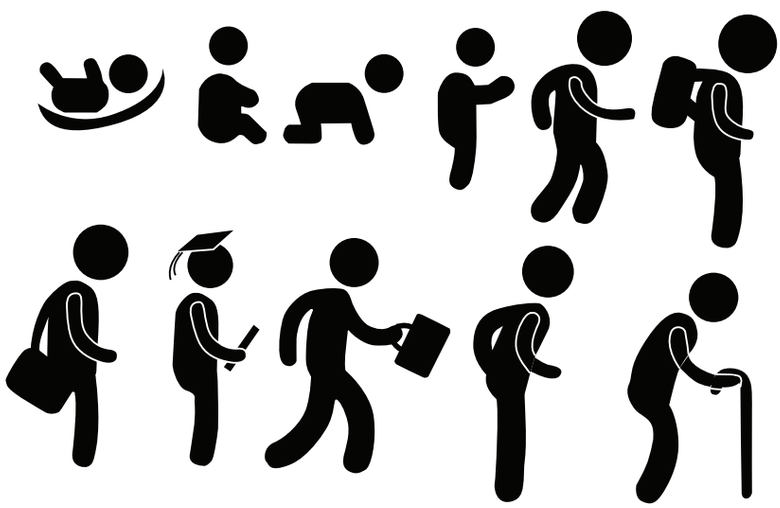

2.1 INTRODUCTION

The study of human development can be traced back to the 18th century. The first effort towards the study of the child based on direct observations were initiated by Darwin (1809-82) and Preyer (1841-97). They maintained careful notes on the development and behaviour of individual children over a period of years. Stanley Hall (1844-1924) in United States of America, and Alfred Binet (1857- 1911) in France carried out scientific investigation to understand the causes of human behaviour.

Hall studied the concepts of children and published his finding in the book "*The content of Childrens mind*" in 1883. The first intelligence scale was published in 1905 by Binet. A discipline

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IMPORTANT TERMINOLOGIES IN HUMAN DEVELOPMENT

Growth: It is defined as physical changes in body size, structure, bodily dimensions and increase in magnitude, muscular strength and organs.

Development: It is a progressive series of changes in an orderly, coherent pattern whereby an individual adapts to their environment. Development includes physical characteristics (height, weight), intellectual functions (creativity, performance of intelligence) and social characteristics (independence, aggressiveness).

Maturation: It is development of the organism as a function of time or age; it refers to neuro physiological and biochemical changes such as the time a child's teeth erupts, the child's developing ability to talk, walk etc.

Learning and Experience: It is any relatively permanent changes in thought, feeling and behaviour caused by interaction with the environment.

Maturation and Learning Interrelation: Learning and maturation cannot be isolated from each other. Development is the result of interaction of maturation and learning. This is clear in motor development especially in postural responses, locomotion and manipulation. In summary, development is a multifaceted and complex process, involving gains and losses, growth and aging and more are brought about by both maturation and learning.

of science called "Human Development" emerged in the twentieth century in order to understand the patterns of development from conception to the period of old age.

In this chapter on human development we will be able to understand the stages in the life span of a human being, the developmental changes and developmental tasks in each stage starting from prenatal stage to old age.

2.2 DOMAINS AND STAGES OF DEVELOPMENT

Physical Development: It includes the growth of the body and its organs during childhood, the appearance of physical signs of aging during adulthood, and the gains and losses in motor abilities that occur over the years.

Motor Development: Motor development refers to the development of a child's bones, muscles and ability to move around and manipulate his or her environment. Motor development can be divided into two sections: gross motor development and fine motor development.

- Gross motor development involves the movement of the large muscles in the child's body. This movement including sitting, walking, running and climbing stairs.
- Fine motor development are those that involve the small movements of the fingers and hands. They include picking

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up objects, using cups, knives and forks, pouring drinks, dressing, holding and using pencils, pens, scissors and keyboards.

Social Development: Social development refers to the process by which a child learns to interact with others around them.

Emotional Development: It refers to the ability to recognize, express, and manage feelings at different stages of life how and why they happen and to have empathy for the feelings of others.

Cognitive Development: Cognitive development involves changes and stability in mental processes.

Language Development: Language development is the use of arbitrary symbols in an orderly fashion to communicate verbally and individual's wants and needs.

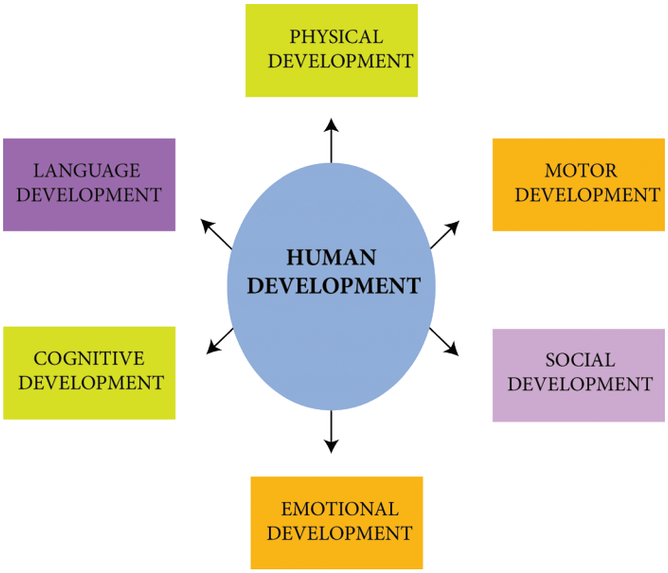
Activity 1

Observe your friends and write down their physical activities. Observe differences among them.

2.2.1 Infancy

Infancy is very critical and shortest of all developmental periods. Infancy is the second most rapid period of development and growth. Infancy begins with birth and ends when the infant in approximately two weeks old. This period is divided into two periods namely

i. Period of the Partunate – from birth to fifteen to thirty minutes after birth. The infant continues to be a parasite until the umbilical cord has been cut and tied.



▲ Fig. 1 Domains of development in the human life cycle

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Table 1 Stages in the Human development

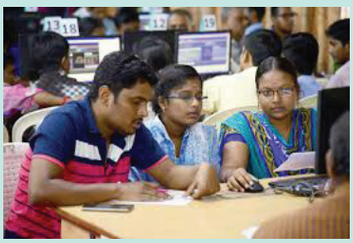
	Prenatal period	Conception to birth
	Infancy	Birth to the end of the second week
	Babyhood	End of the second week to end of the second year
	Early childhood	Two to six years
	Late childhood	Six to twelve years
	Adolescence	Twelve to Eighteen years
	Early adulthood	Eighteen to forty years

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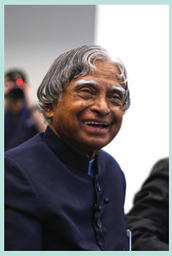
Table 1 (continued)

	Middle age	Forty to sixty years
	Old age	After sixty years

Activity 2

Collect photos/ Pictures of each stage of the life span and paste them on a chart. Observe and record pattern of development.

ii. Period of the Neonate – from cutting and tying of the umbilical cord to approximately the end of the second week of postnatal life. During this period, the infant must make adjustments to the new environment.

a. Physical Development

Infants differ greatly in appearance and physiological functions at birth and in their early adjustments after birth.

- **Body Length and Weight**
  At birth, the average infant weighs 3 to 3.5 kg and measures 50 cms (20 inches) in length. Weight in relation to height is less at birth. The muscles of the newborn are soft, small and uncontrolled.

- **Physical Proportions**
  Babies have a large head and prominent forehead, chubby cheeks and the chin is much too small. The nose is small and flat. The neck is short and almost invisible.
  The shoulders are narrow, while the abdomen is large and bulging. Hands and feet are miniature. With the birth cry, the lungs are inflated and respiration begins. Neonatal heart beat is more rapid. Elimination of waste products begins in a few hours after birth. The relative proportion is shown in figure 2.

b. Motor Activities

The first activities of human infant are random, imperfect and uncoordinated. The most common of these include visual fixation of light, spontaneous eye movement, sucking, swallowing, lifting the head, hand movements, leg and foot movements and body jerks.

c. Sensory Abilities of the infant

i. **Sight**

- At birth, the retina has not reached its full development. There is no coordination between both eyes. At about thirty hours, the papillary

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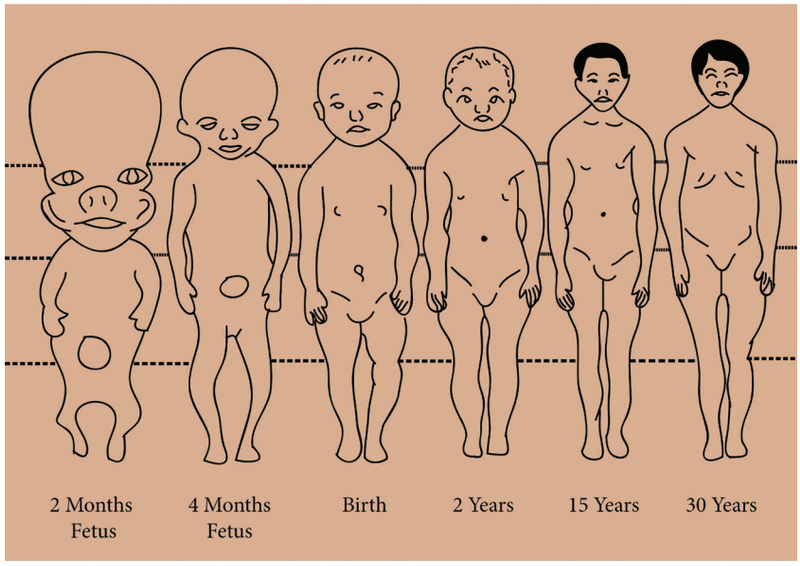
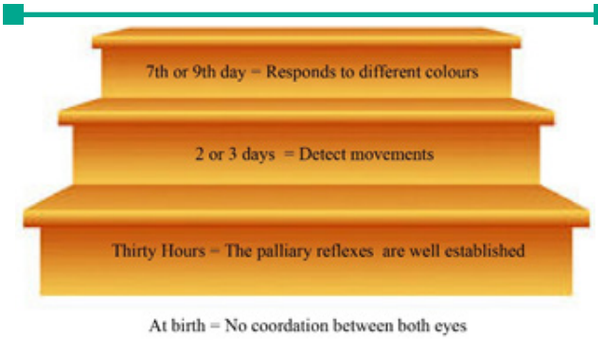


▲ Fig. 2 Relative Proportions of a human being



▲ Fig. 3 Sensory abilities of infants

reflexes are well established. They can detect movement as early as two or three days after birth. At seventh or ninth day of life, they respond to different colours.

ii. Hearing

- At birth, hearing is low because the middle ear has amniotic fluid.

iii. Taste

- During the first week of life infants react differently to different tastes.

iv. Smell

- Infants are able to sense the odours that adults can sense.

v. Skin Sensitivities

- The skin sensations of touch, pressure, temperature and pain are present at birth.

d. Adjustments during Infancy

Every new born infant's adjustment to postnatal life is difficult at first. They must make 4 major adjustments before they can resume their developmental progress.

i. Breathing

During prenatal stage, the fetus is supplied oxygen through the umbilical cord. When the umbilical cord is cut after birth the infants must begin to breathe on their own. The infants take their first breath immediately after birth as they cry since their lungs are filled with oxygen.

ii. Temperature Changes

Before birth, the infants are in temperature of 98°–100°F in the uterine sac, while temperature in

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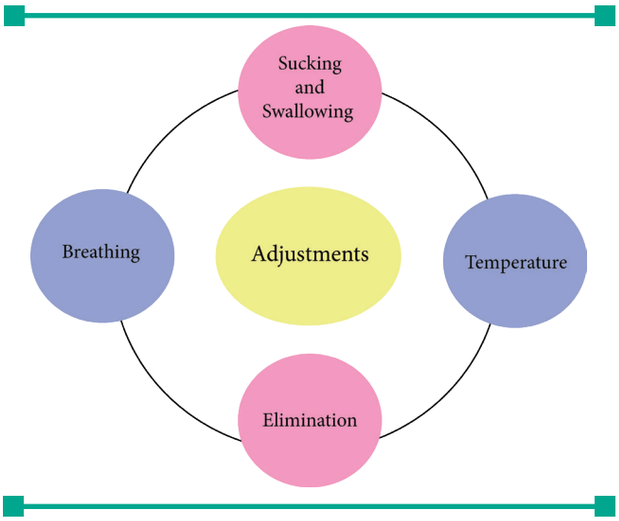

▲ Fig. 4 Adjustments during infancy

the hospital or home may vary from 60 to 70°F. Newborns are usually kept warm by providing suitable warm clothing, warm bedroom or placed next to the mother's warm body.

iii. Sucking and Swallowing

Infant must now get nourishment by sucking and swallowing. These reflexes are perfectly developed at birth and are increased along with development.

iv. Elimination

The infant's organs of elimination begin to work soon after birth. After birth, defecation occurs at an average of 4 to 7 times and urination at an average of 18 times.

d. Emotional Development of Infancy

At birth, the emotions consist of only pleasure and pain. Pleasantness is expressed by relaxing of body and is elicited through patting, rocking, warmth and sucking. Unpleasantness is expressed by tensing of the body, kicking, wriggling and crying.

e. Cognitive Development

Newborns interact with their environment entirely through reflexive behaviours. They follow their instincts and involuntary reactions to get what they need: food, air, and attention. Babies begin to grow and learn about their environment through their senses.

2.2.2 Babyhood

Babyhood continues from infancy to the second year. It is the true foundation age with rapid growth and development.

a. Physical Development during Babyhood

- **Height**

  During babyhood, changes in the overall size of the child's body are more rapid than any other time after birth. The baby measures between 23 and 24 inches at four months, by the end of one year the baby measures between 28 and 30 inches and between 32 and 34 inches at two years.

- **Weight**

  During the first year, weight changes are more than height changes. At four months the babies weight will double their birth weight and triple it at 1 year. At one year, babies weigh, on the average, three times as much as they did at birth, or approximately 10 kilograms. Increase in weight during babyhood comes mainly from an increase in fat tissue.

- **Physical Proportions**

  Growth of the head slows down in babyhood while the trunk and limb growth increases. Thus, the baby gradually becomes less top-heavy and appears more slender and less chubby by the end of babyhood.

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- **Bones**
  The fusion of bones increases during babyhood. Calcification begins in the early part of the first year but is not completed until puberty. The soft spot on the skull (tontanelle) will be closed by the end of two years.

DO YOU KNOW?

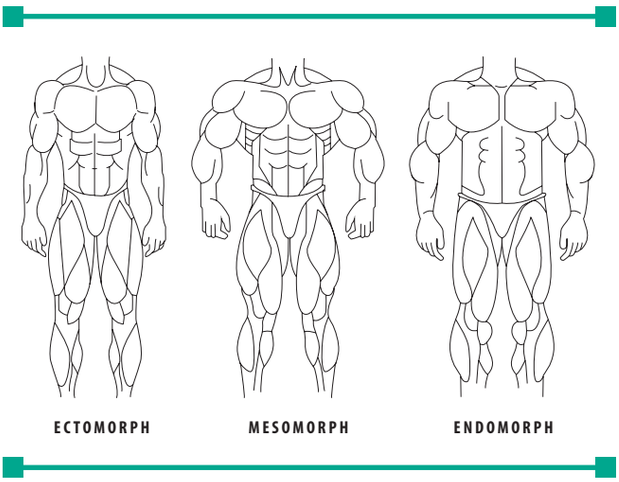
There are 270 bones at birth, but adult humans have only 206 bones.

- **Muscles and Fat**
  Muscle fibers are present at birth but in very under developed forms. They grow slowly during babyhood and are weak. The fat tissue develops rapidly during babyhood due partly to the high fat content of milk.

- **Body Builds**
  Babies begin to form characteristic body builds from during their second year of life. The three most common forms of body build are ectomorphic, which tends to be long and slender, endomorphic, which tends to be round and fat, and mesomorphic which tends to be heavy, hard and rectangular.

- **Teeth**
  By the end of one year the baby has four to six temporary teeth and sixteen by the age of two. The teeth present in the front will emerge first and the molars which are situated at the back appears last.

- **Nervous System**
  The brain weight is one-eighth of the baby's total weight at birth. During the first 2 years, brain weight is gained and this leads to the baby's top heavy appearance. The cerebellum and the cerebrum triple its weight in one year. Immature cells, present at birth, continue to develop after birth but relatively few new cells are formed.



▲ Fig. 5 Types of Body build

DO YOU KNOW?

By the end of 2nd year a baby will have more than 100 trillion synapses. Name the synapses present in the baby?

By three months, the eye muscles are well developed and babies can see things clearly. They can also see colours. Hearing develops rapidly during this stage. Smell and taste are improved during babyhood. Babies are highly responsive to all skin stimuli because all sense organs relating to touch, pressure, pain, and temperature are present in well-developed forms.

DO YOU KNOW?

At birth babies can taste sweet, bitter and sour, but cannot taste salt until they are 4 months old.

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b. Motor Skills Development during Babyhood.

After the fast growth spurt in infancy, the growth rate of the baby is slow. Motor development means the ability to control movement of several parts of the body through coordinated movement of muscles and limb. The sequences of postural control and locomotion among babies as reported by Schiamberg are as follows

Table 2 Postural Control and Locomotion during Babyhood

Age	Development
1st month	Holds chin up
2nd month	Holds chest up Rolls from side to back
3rd month	Reaches and misses object
4th month	Sits with support.
5th month	Sits on lap and grasp objects
6th month	Sits on high chair and grasp dangling object
7th month	Sits alone and starts to crawl
8th month	Stands with help
9th month	Stands holding furniture
10th month	Creep
11th month	walking with support
12th month	Pulls to stand by using furniture
13th month	Climb stairs
14th month	Stands alone
15th month	Walks alone

Source: Schiamberg L.B (1985) Human Development, II Edition, Macmillan Publishing Company, New York.

In this sequence of development it can noted that the development proceeds from head to foot as shown in figure 6

c. Social Development

The baby begins to communicate with others by gestures and also develops close relation with care givers like mother and father. At about five weeks of age, the baby smiles in response to patting. By the second month it recognizes his/her mother and by the third month the baby will turn its head in response to human voice. Once the babies get attached to their mother they show fear on separation.

d. Emotional Development

Until use of language begins, it is emotions that make adults know the needs of baby. As age increases, emotions become less diffused and more specific and differentiated in relation to cause, and they can be aroused by a wide variety of stimuli. It is shown in figure 7

e. Cognitive Development

According to Piaget's theory babyhood is the "sensory motor" stage. Babies understand the permanence of objects and people. They visually follow the displacement of objects and begin to use instruments and tools. They also understand discipline and what behaviour is appropriate and in appropriate. They also understand the concepts of words like "please" and "thank you".

f. Language Development

Language development is an important means of becoming independent for the baby. It gives him a new power to communicate their feeling to others.

- Before the baby speaks words, they show the ability to produce vowel and consonants sounds.

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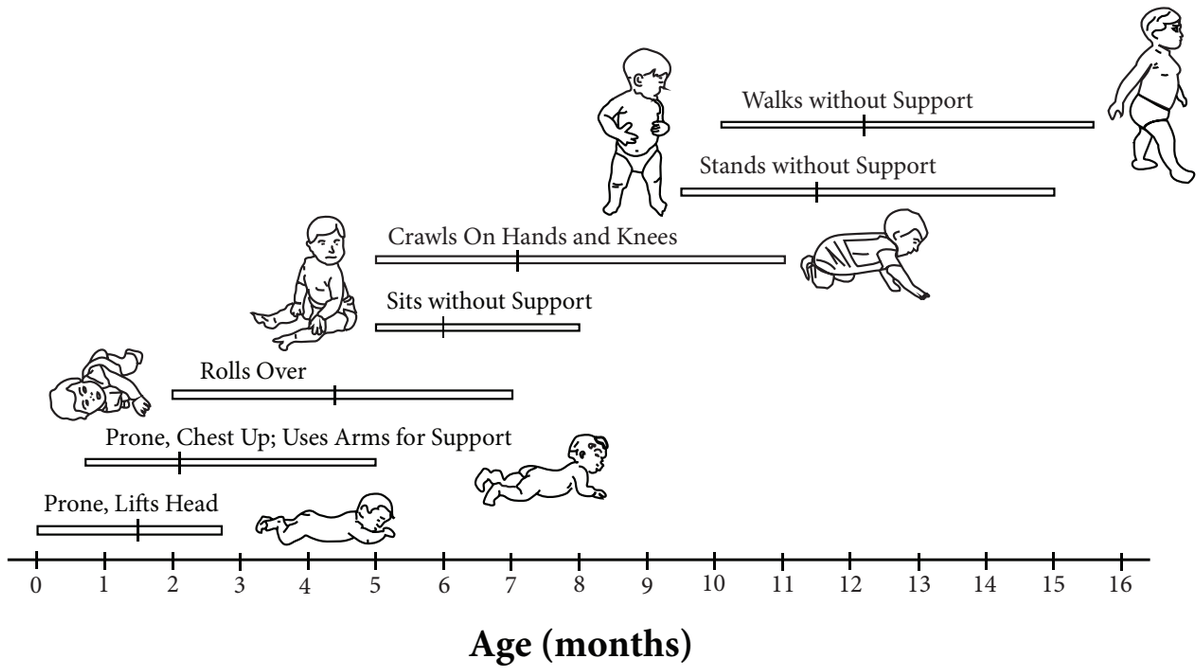

▲ Fig. 6 Postural control and locomotion development

▲ Fig. 7 Emotional development in babyhood

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DO YOU KNOW?

Two year old babies can understand 100 to 150 words and start to add about 10 new words per day

- By the third month the baby coos and babbles before he/she speaks words. These two along with gestures are known as pre -speech forms.
- By six months he/she produces most of the vowels and few consonants sounds.

Cooing – quick burst of squealing noise.

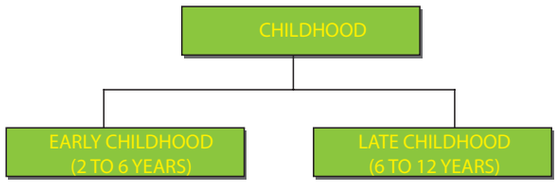
Babbling – production of inarticulate meaningless speech sounds which are sequences of vowels and consonants such as da-da-da.

g. Physiological Function

Babyhood is the time when the fundamental physiological patterns of eating, sleeping and elimination should be established, even though the habit formation may not be completed when babyhood ends.

2.2.3 Childhood

Childhood begins at the conclusion of babyhood and extends to the time when the child becomes sexually mature at thirteen years for girls and fourteen for boys. Childhood period is now divided into – early and late childhood.



2.2.3.1 Early Childhood

1. Pattern of Development in Early Childhood

Growth during early childhood proceeds at a slow rate when compared with the rapid rate of growth in babyhood.

a. Physical Development in Early Childhood

i. Height

The average annual increase in height is 2.5 inches. By the age of six, the average child measures 46.6 inches (118.36 centimeters).

ii. Body weight

The average annual increase in weight is around 1.6-2.3 kilograms. At age six, children should weigh approximately 7 times as much as they did at birth. An average girl weighs 25-30 kilograms and boy weighs 30-32 kilograms.

iii. Body proportions

Body proportions change markedly and the baby look disappears. Facial features look small but chin becomes more pronounced and neck elongates. The stockiness of the trunk is decreased and the abdomen appears flat. Chest and shoulder become broader and flatter. Muscle begins to form and growth of the head slows down. Arms and legs lengthen and hands and feet grow bigger.

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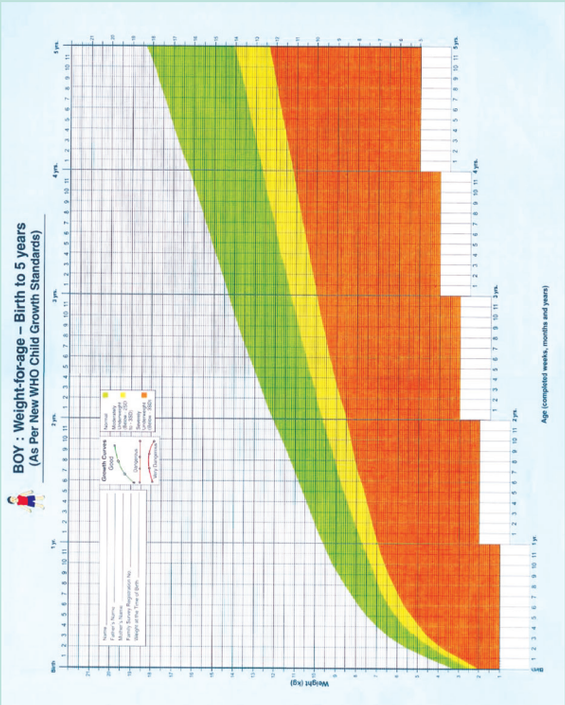
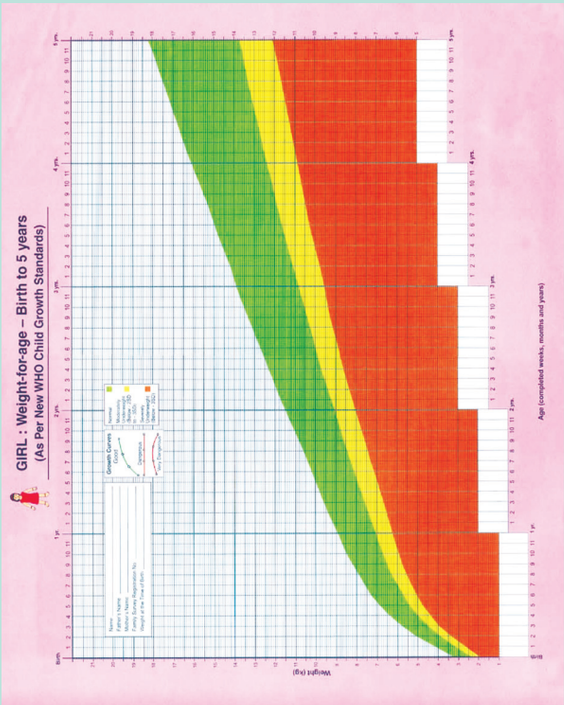
DO YOU KNOW?

The most important activity of Anganwadi Centre (AWC) under Integrated Child Development Services (ICDS) programme is growth monitoring of children from birth to five years. Growth monitoring means keeping a regular track of the growth and development of the child with the help of plotting the child's weight, taken every month or quarter, on the growth chart and joining these weight points with a line to form the growth curve. In the following chart green coloured zone denotes normal body weight, yellow coloured zone denotes moderately underweight and reddish orange coloured zone denotes severely underweight.





iv. Body build

Children have an endomorphic or mesomorphic or ectomorphic type of body build based on their gene make up, diet and physical activities.

v. Bones

Bone development consist of growth in bone size, change in the number of bones and composition. The bones calcify at different rates in different parts of the body. Bones become harder and stronger, giving the child a firmer shape and protecting internal organs.

vi. Teeth

At the beginning of early childhood the baby has all of their milk teeth. In the last year of early childhood

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the baby loses its milk teeth which are replaced by permanent teeth. The permanent teeth to appear first are the front central incisors. When early childhood ends the child has one or two permanent teeth in front and some gaps where permanent teeth will eventually erupt.

vii. Nervous and Muscular system

The growth of the nervous system is very rapid during babyhood and slows down at 3-4 years. Development of immature to mature cells occurs at this stage. These changes are coordinated by the maturing brain and the nervous system promotes the development of a wide range of motor skills. The brain is about 75 percentage of its adult weight at five years and is 90 percentage of adult weight at eight years.

viii. Sensory Organs

The growth of the eyeball is not complete until puberty so young children tend to be far sighted. Vision and focusing ability improves considerably as children grow through these years. The need for corrective lenses becomes more noticeable in early childhood.

b. Motor Development

During the first four or five years, the child gains control over gross and fine movement. Table 3 summarizes the development of motor skill.

Artistic expression seems to peak by the end of the early childhood period. During these years, children begin to paint and hold the brush with thumb and fingers. They give names to their drawings and begin to represent things.

c. Social development

This age is characterized by the widely expanding world and awareness of people and things.

They learn how to make social contact and get along with people outside the family, especially with peer group (children of their own age). Play is an important part of social development. By the age of 3-4 years they learn to adapt and cooperate in group play activities. This increases his/her social contact which increases the chances for social behaviour of others.

i. Social Behaviours

- **Imitation-** Children imitate the attitudes and behaviour of a person whom they especially admire and want to be like.

Table 3 Motor Development – Gross Skill and Fine Skill

Age	Gross Skills	Fine Skills
2 years	Hops, climbs stairs with altering feet, jumps from bottom step	Copies circle, opposes thumb to finger, scribbling continues to improve.
3 years	Runs well, skillful jumping, begins to skip, pedals tricycle	Hold pencil, walks balance beams
4 years	Hops about 50 feet, balance on one foot, can catch large ball, skipping	Colors within lines, forms letters, dresses and undresses self with help, eats more readily
5 years	Carries bundles, begins to ride bicycle, jumps rope, can catch tennis ball	Ties shoes, uses scissors, uses knife and fork, and washes self with help.

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HANDEDNESS

Early childhood may be regarded as a critical period in the establishment of handedness. During this period, children shift from the use of one hand to the other and are asked to concentrate on learning skills with one dominant hand and other as the auxiliary or helping hand. For example in case of colouring, the dominant hand is used for colouring and the auxiliary to hold the paper.

Handedness

- **Rivalry-** Children feel an urge to out-do others at home and outside.
- **Co-operation-** Children at the end of the third year learn to socialize and co-operate with their peer group. Their inclination to play with other children increases.
- **Sympathy-** Play contacts develop sympathetic attitudes in children. This helps in understanding feelings and emotions of others.
- **Sharing-** Sharing and caring will win social approval. Children learn this while playing with friends.

ii. Unsocial Behaviors

- **Negativism-** The habit of contradicting elders starts between 3 and 4 years and then it declines.
- **Aggressiveness-** The physically aggressive behaviour that begins by the age of 2, normally declines by the age of 4 giving way to verbal attacks like name calling or blaming others.
- **Bossiness-** Children become more authoritative at the age of 3.
- **Destruction-** The children display their temper by destroying anything within their reach.

d. Emotional Development

The emotional expressions of children differ from those of adults. Emotions can be broadly classified as positive emotions (integrative) and negative emotions (disintegrative). Such emotions are joy, affection, curiosity and sympathy. Negative emotions on the other hand give an unpleasant feeling and disliked by others. The examples of such negative emotions are anger, fear, jealousy, envy, grief and anxiety.

e. Cognitive Development

The mental development that occurs in early childhood is exciting and dynamic as children explore their environment, develop ideas, learn solutions to problems, participate in imaginary play, and gain a unique understanding of the world and how it operates. Children make judgments based on a limited understanding of operations and rules and with minimal cues and information. Young children may have trouble telling

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the difference between what is real and what is fantasy. With increased ability to ask questions in words, they understand people, objects and situation rapidly. After this, the child obeys commands but does not understand why things are right or wrong.

f. Language Development

Early childhood is known as "the chatter box age" because children are able to speak with ease. They may use gestures but mainly as supplements to speech. During early childhood, there is a strong motivation to learn to speak. At approximately 2 years of age, their ability to use language suddenly increases rapidly. The formation of sentences follows a fairly definite and predictable pattern in early childhood. Two to three year old children usually use short sentences of three or four words. Many of the sentences are incomplete.

2.2.3.2 Late Childhood

Late childhood extends from the age of six years to the time the individual becomes sexually mature. This period is marked by conditions that profoundly affect a child's personal and social adjustment. The child enters school and experiences a major change in the life pattern.

CASE STUDY

Mary is 46 inches tall and weighs 18 kilograms at the end of six years. From these observations what is your inference about her weight and body type?

Answer: Mary is under weight and she has an ectomorphic body build due to being under weight

Physical Development

Late childhood is a period of slow and uniform growth until the changes of puberty begins.

Height and Weight- The child's height and weight approximately reaches 2/3rd of adult height. Both boys and girls can be expected to grow about two to three inches each year. The average height for boys is slightly greater than that of girls throughout this period. However a girl's average height between ten and twelve years exceeds that of boys. At the onset of puberty, an average 11 years old girl has a height of 58 inches while an average boy of the same age has little lesser than that.

By 6 years of age, most children are about seven times their birth weight. Weight increase is at the rate of 1.3 to 2.3 kg. The average 11 year old girl weighs 40.1 kg and an average boy of the same age weighs 38.7 kg.

Body proportions- Body shapes of individuals are characterized by a greater proportion of body fat to muscle among females, while the opposite is true for males. Facial disproportions disappear as the mouth and jaw become larger, the forehead broadens and becomes slimmer, the neck becomes longer, the chest broadens, the abdomen flattens, the arms and legs lengthen and hands and feet grow larger but at a slow rate.

Muscle development- The increasing level and desire for physical activity in middle childhood reflects the increasing size and strength of a child's muscle. Gain in weight is due to increase in size of skeletal,

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muscular systems and some organs. Muscle mass and strength gradually increases as "baby fat" decrease in middle and late childhood. Throughout the middle years muscle growth tends to be extremely rapid, and they are firmly attached to the bones. Eye-hand coordination also improves and by twelve years of age, most children have highly coordinated muscles.

Bone development- As the child approaches sexual maturity, the rate of bone development will quicken in response to stimulation due to sex hormones that are produced in large quantities. The length and width of the bones increase. In late childhood, bones are hardened and reach a final mature shape.

Development of Teeth- The primary teeth that erupted during infancy and early childhood are lost from the age of six up to thirteen years. All milk teeth are replaced with primary teeth. Girls are found to have permanent teeth earlier than boys.

Brain Development- About 90% of adult brain size is achieved by age six. During late childhood, brain development includes the organization of brain functioning and myelination. Functions of the right and left hemisphere become well established during this age group.

Myelination is the deposition of fatty substance around nerve cells which helps in conduction of electrical impulses.

2. Motor development during late childhood

Children are eager to participate in activities that require large muscle movements. They spend more time in free, unstructured activities, rough games and vigorous play such as wrestling, kicking and chasing. By 6 years, most children can skip rope and begin to ride a bicycle and by 7 years most begin to perfect the movement necessary for catching, throwing, swimming and hitting ball. They develop flexibility in different parts like wrists and legs.

3. Social development

A number of changes in social development occur in the late childhood years. Besides the parents and the family members, the peer group comes to take an important place in the child's life.

- **Creation of childhood gangs-** Upon beginning schooling, children enter the "gang age" when social consciousness develops rapidly. It is characterized by interest in peer activities and an increasingly strong desire to be an accepted member of a gang.
- **Over sensitiveness-** A common out-growth of susceptibility to social approval and disapproval is over sensitiveness. The tendency to be easily hurt by peers or siblings or parents and to interpret what others say and do as hostile, is a measure of the children's desire for social acceptance.
- **Responsibility-** Children who learn to assume responsibility at home not only make better adjustment with their peer group but also are likely to be selected for leadership roles.

4. Emotional development in late childhood

- **Temper Tantrum**

Tantrum or temper tantrum is an emotional outburst of children. It is typically characterized by crying and screaming.

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- **Anger**

Anger is expressed when needs are not fulfilled. It is expressed through screaming, withdrawal, destructive and disrespectful behaviour.

- **Fear**

Fear is still found in late childhood. A large proportion of the fears shown in childhood persist into the adulthood.

- **Anxiety**

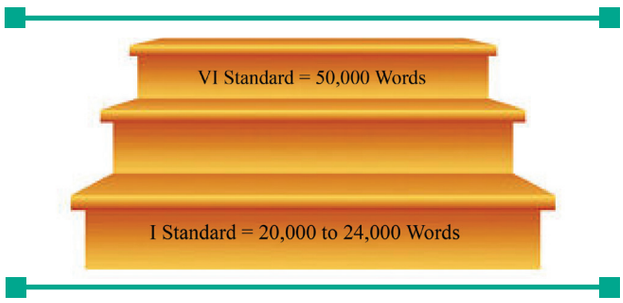
Children's anxiety increases somewhat with maturity. This anxiety makes children bored, restless and disturbed and they cannot concentrate. They feel insecure and show their anxiety by nervous mannerism and speech problems.

5. Cognitive Development

As a child develops there are considerable changes in his mental abilities which include imagination, memory, creativity, questioning and perception. They can also develop a plan to meet desired goal. They have a better understanding of spatial concepts of causality of categorization of inductive reasoning. Children begin to read and write and start gaining skills in reading and writing.

6. Language Development

Linguistic skills are improved or acquired by an individual with the help of parents and from the world outside the family such as television, radio, books and peers.



Children in the first grade, on average know about 20,000 to 24,000 words. By the sixth grade they will know about 50,000 words. Not only do older children learn new words, they also tend to learn new meanings for old words. The length of sentences increases from 6 years. The characteristic chatterbox stage of early childhood is replaces by more controlled and selective speech.

CASE STUDY

Harish has difficulty to do home work, cannot do quiet tasks or activities. He dashes around, touching or playing with anything and everything in sight and is very impatient. He also blurts out inappropriate comments, shows his emotions without restraint, and acts without regard for consequences.

From above case study what are your inferences about his condition? What is the specific name given to this condition?

Answer: Harish is hyper active and his condition is called as "Attention Deficit Hyperactivity Disorder".

2.2.4 Children Wth Special Needs

All children are 'unique' yet similar to one another in most aspects of growth.

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However, some children are very different from their age-mates that they 'stand out'. Such children have to deal with the normal/ usual problems of growth along with all those difficulties that may arise because of being 'different'. The child is unable to deal with the social and emotional problems associated with it. This has marked effect on the child's personal and social development.

Normal Child and Disabled/ Disadvantaged Child

A normal healthy child is able to grow and do things to equip him/her for future life. A child who is not able to withstand the challenges of day-to-day life is generally referred to as handicapped/disabled or disadvantaged children. They are also known as children who are 'differently abled '.

Baker, a well-known psychologist defines the disabled child as "one who deviates from what is supposed to be an average child in physical, mental, emotional and social characteristics to such an extent that the child requires special educational services to help develop to the maximum capacity".

Categories of Disabled/Disadvantaged Children:

The disabled children can be broadly grouped into three categories. These are:

a. Physically disabled children.
b. Mentally disadvantaged children.
c. Socially maladjusted children.

Causes of Disability among Children:

The various causes of physical disability are as follows:

a. Heredity
b. Unfavorable environment
c. Injury during child birth
d. Accidents during early childhood causing orthopedic problems.
e. Surgery requiring the amputation of the diseased part.
f. Mental and emotional problems in early childhood result in stammering, stuttering and speech defects.
g. Ear infections and injuries resulting in hearing defects.
h. Psychological, emotional problems and feelings of neglect result in behavioural problems.

2.2.4.1 Visual Impairment:

Vision is a critical tool that children use in obtaining information about the world in which they live. Impairment of vision can lead to partial or total blindness. The children with visual impairment will need

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special materials and attention to develop fully.

Causes of Visual Impairment

Visual impairment can be caused by the following factors:

a. Congenital Blindness:

It refers to a child being born blind.

b. Acquired Blindness:

In this case the child is not born blind. The child may lose eye-sight on account of some accident. The resulting eye-defect is called acquired blindness.

c. Nutritional blindness:

It is a result of prolonged absence of vitamin-A rich foods in the diet. Deficiency of vitamin-A causes dryness of eyes, (xerophthalmia) and impaired vision in dim light (night blindness).

Special Needs of a Visually Challenged Child:

Physical Needs:

Parents of a visually challenged children have to give special attention and train their children to do their daily routine jobs like toilet, bath, dressing and feeding etc. Special effort is needed to help them to move around the house without knocking things and hurting themselves.

Emotional and Social Needs:

Parents and siblings need to develop social contact and provide constant reassurance by hugging, petting and reassuring the handicapped child when scared and emotionally upset.

Educational Needs:

Books with big print and a desk with proper light and recorded tapes are of considerable help to the child with defective vision. The special tool called "Braille" is also helpful. The Braille dots are punched out one at a time from right to left. Children learn to use Braille with ease once coached properly.

DO YOU KNOW?

White cane day is celebrated worldwide on October 15th every year. This is celebrated to create awareness and celebrate the importance of the white cane used by visually challenged people.

2.2.4.2 Hearing Impairment

Definition

A child with hearing impairment is one who has lost the sense of hearing before learning the language. This means that the child is born without the ability to hear. Such children are often mute and silent.

Hard of hearing on the other hand is a defect that is acquired later in life. The child experiences varying degrees of hearing loss.

Causes of hearing impairment

Hearing impairment and loss can be due to the following factors:

(a) Conductive hearing impairment

The passage of air in the outer ear is called the 'Conductive Pathway'. The conductive pathway can get affected due to

i. Build up of wax in the ear,
ii. A foreign body in the pathway
iii. Any swelling of the outer ear.

These conditions can cause temporary hearing impairment that can be medically treated.

(b)*Sensory Neutral hearing loss* is due to the damage of the ear drum, cochlea, auditory nerve and the associated brain cells.

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(c)*Mixed Hearing Loss* is a result of hearing impairments arising due to a combination of conductive and sensory neural defects.

Characteristics of a Child with Hearing Impairment:

- The child may be speech impaired besides having hearing impairment.
- They may have difficulty in learning language/vocabulary. It is an enormous challenge to learn to communicate in a language one cannot hear.

Special Needs of a Child with Hearing Impairment

Hearing defects cause a lot of problems ranging from language and vocabulary to comprehension and communication. Physical needs can be effectively taken care of by providing physical comfort. Parents can use play way techniques to help child.

Emotional and Social Needs:

Suspicion is almost the second nature with deaf children. Their social behaviour also needs to be improved and refined. Love and affection provide emotional security besides the much needed encouragement for better learning.

Educational Needs involve child's ability to understand the language. They learn to communicate through visual and manual means.

i. **Oral Method or Lip-Reading** is a slow method involving a lot of patience for the learner as well as the educator.
ii. **Manual Method or Sign Language** helps the child to communicate with gestures, cues and finger-spellings.

2.2.4.3 Orthopedic Impairment

A child with an affected limb is not able to fully perform the activities involving the use of bones, muscles and joints. Similar handicap is experienced by children with

a missing limb. Such children are known to be orthopedically crippled.

Characteristics of A Child With Affected / Missing Limb

- Physical defect leads to inferiority complex among young children.
- The feelings of inadequacy result in self-pity.
- The child often goes through psychological trauma because of discrepancy between his/her aspirations and the ability to perform.

Special Needs of Children with Missing / Affected Limbs

Physical Needs consist of being able to cope with one's daily routine. The attitude of parents should help the child do his/her duties independently rather than "do things for them". Use of special contraptions like calipers, shoes and artificial limbs along with proper training has yielded very good results. Use of crutches and wheel chair improves the mobility besides boosting their confidence.

Social and Emotional Needs. Children with affected limbs are very often left out of social group activities. The child may feel frustrated, dejected and neglected. Loving care and proper training to be independent and self-reliant are the basic needs of all handicapped children.

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Educational Needs involve and include such activities that require 'doing'. Writing, playing, drawing, painting, knitting and even dancing are some much activities.

2.2.4.4 Children with Impaired Speech

The main purpose of speech is effective communication. When speech is defective communication is also defective.

Causes of Speech Defects

There are many causes for speech defects. They are as follows:

a. **Physiological causes**: Defects and deformities of the larynx and the vocal cords affect the speech produced. Incomplete development of the skull and head produces a cleft palate and cleft lip which produce speech defects

b. **Neurological causes**. When nerves connected with the areas of speech and learning process are impaired, some type of speech defect or disorder of articulation occurs

c. **Psychogenic Causes**. These are causes related to one's mind. Some types of stuttering are purely psychogenic in origin. General self consciousness added with speech defect may produce stuttering.

d. **(d) Sociological causes**. Some speech habits such as too rapid or too slow speech, or speaking in the low tones insisted by the parent may lead to speech defects.

Special need of children with speech defects

Physical needs

Surgery can correct some of the physiogenic causes like cleft palate, extremely enlarged tonsils, adenoids, etc. Motor activities, dramatic play of all kinds, excursions, discussing and planning group activities will help in developing correct speech patterns.

Educational Needs

Classes under special teachers will be useful for correction of pronunciation

Emotional needs

Children should be given opportunities to listen to stories. The teacher and parents should always make it a point to pronounce words clearly themselves.

2.2.4.5 Mentally Challenged Children

The intelligence possessed by a normal individual is said to be between 90 and 110 I.Q. Some children possess less than average intelligence and they are said to be mentally challenged or mentally handicapped.

Meaning of I.Q.

The letters IQ stand for Intelligence Quotient. It is a measure of intelligence. The formula used to calculate the I.Q. is $\frac{MA}{CA} \times 100$. MA stands for Mental Age and CA stands for Chronological Age. The mental age of a person is found out by intelligence tests. If the mental age corresponds with his chronological age or the physical age, then his mental growth is said to be normal. The mentally retarded children have a lower mental age than their chronological age.

Classification of mentally challenged people

Depending on the I.Q possessed, mentally challenged people/children are classified as slow learners, challenged, moderately challenged and severely challenged.

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Children who are mildly retarded are referred to as educable. Those who are moderately challenged are called trainable. Those who are severely and profoundly challenged are called totally dependent.

The characteristics of mentally challenged children

a. Physical traits- For majority of them, their height and weight is normal for their respective ages. Muscular control is fairly well developed. Senses are well developed but occurrence of speech defects such as stammering and lisping is fairly large among these children.
b. Other traits- Socially they are found to be less adjustable. Vocabulary is very much limited. They find adjustment to new situations difficult.

Causes of Mental Challenges in Individuals

The causes may be endogenous or exogenous.

Endogenous type mainly consists of hereditary conditions. Defect in the germ cell produces a retarded condition called microcephaly. Defects in the nervous system and weaker nerve potential inherited also lead to mental challenges. Marriage between men and women who are close blood relatives is said to lead to mental challenges in their children.

Exogenous causes for mental challenges includes venereal diseases in the mother, brain injury at birth and various forms of anoxia at the time of birth. Toxic conditions in older mothers during pregnancy causes mongolism. Thyroid deficiency in children causes cretinism or dwarfism. Brain injury due to accidents, brain fever in the new born, also lead to mental challenges after birth.

Needs of Mentally challenged Children.

Proper prenatal care including immunization, good diet, and medical check-up delivery attended by a trained person, preferably hospital delivery and proper weaning foods for the baby will reduce the incidence of individual attention and instruction. In the case of slow learners they need more help and stimulation. The teacher needs to give clear direction and encouragement. The learning process must be made simple and more of concrete examples must be used.

2.2.5 Adolescence – Growth and Development

WHAT WILL YOU LEARN IN THIS LESSON?

- *Who is an adolescent?*
- *Classification and definition of the adolescent period*
- *Characteristic changes during adolescence*

Definition

Adolescence is derived from the Latin word "adolescere" meaning to grow into maturing. The World Health Organisation defines adolecence as any person between the age of 10 and 19. It is between childhood and adulthood and is closely related to the teen age years.

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ADOLESCENTS

Persons between 10and 19 years of age

Stages of adolescence in boys and girls

Adolescence may be divided into three stages namely pre adolescene, early adolescence and late adoelscence

Table 4 Stages in Adolescence

Stages in adolescence	Girls (years)	Boys (years)
Pre-adolescence	10-12	11-13
Early adolescence	12-16	13-17
Late adoelscence	16-21	17-21

The period of adolescence is extremely important in one's life because at this stage, one moves from childhood to the onset of maturity. In every period of development from birth onwards a person may face many challenges due to the changes that occur during that period. Each phase in life has distinct characteristics.

Characteristics of the Adolescent Period

(i) Transitional period

Adolescence is a period of transition. During this phase the individuals status is vague and there is a confusion about the roles they are expected to play as they are neither children nor adults.

(ii) Period of change

The stage of adolescence is characterized by changes in physical, cognitive, social and emotional areas of their lives. This sets them apart and uniquely distinguishes them from other stages

(a) Physical changes

During adolescence, primary sex characteristics (the reproductive organs) develop and mature and secondary sex characteristics appear.

Primary Sex characteristics- In males, the testes grow rapidly during the first year or two of puberty. After that, the penis starts to grow in length and the seminal ducts and the prostate gland enlarge. The female uterus, fallopian tube and vagina grow rapidly through puberty. The ovaries produce ova and secrete the hormones needed for pregnancy, menstruation and the development of secondary sex characteristics.

Table 5 Secondary sex characteristics in adolescent boys and girls

Secondary sex characteristics	
Girls	**Boys**
Breasts develop	Pubic hair appear
Pubic hair appear	Axillary hair appear
Axillary hair appear	Facial hair and body hair appear
Increased width and depth of pelvis	Voice change

Source: Lefton, 1985

The secondary sex characteristics are those which are not directly tied to reproduction yet distinguish the male from the female species. The secondary

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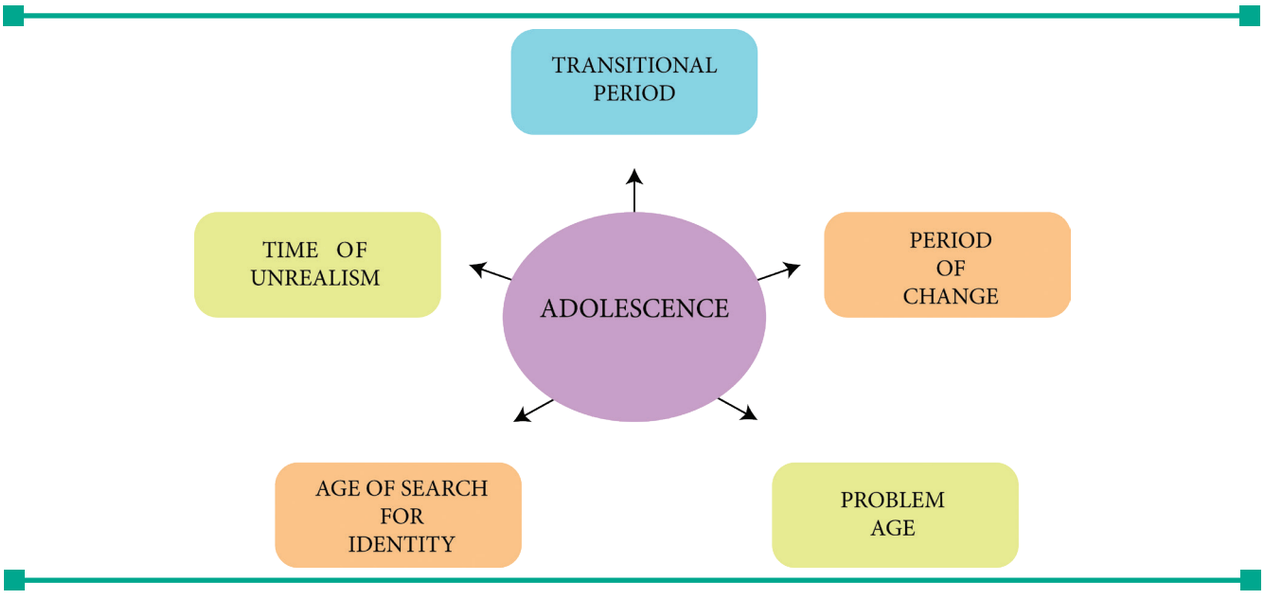

▲ Fig. 8 Characteristics of the adolescent period

sex characteristics between boys and girls are given in the table above:

(b) Cognitive changes in adolescents .

WHAT IS COGNITION?

It is the mental action or process of acquiring knowledge and understanding through experiences.

In this stage, adolescents develop the ability to process information, improve in areas of decision making, memory, critical thinking and self-regulatory learning. This is known as the 'Formal Operation Stage of Development'

(c) Social Changes and Development During Adolescence

Friendship during adolescence is based on similarities and interests . The common social groups in adolescence is as follows:

Chums- close friends – They are inseperable companions as confidants
Cliques – They are made up of groups of close friends

Crowds – they are made up of cliques and close friends
Organised groups – These groups are planned by orgainised sectors like schools, churches or community centres

Gangs- They are a group of boys and/or girls who are poorly adjusted to society

Individual activity 3

Who are your chums? – What criteria do you have to select your confidants?

How many members are there in your clique? What are your common interests?

Are you part of an organized group? List any three social causes addressed by your group.

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DO YOU KNOW?

Every 5th person in India is an adolescent – Hence adolescents are a very precious segment of the population.

Significant changes in the area of social development occur in the period of adolescence with regard to their peers and relationship with adults.

- **Relationship** with peers- Adolescents are very much influenced by their peer group. Their behaviour and attitude are affected by peers.
- **Relationship with adults**- Adolescents develop values different from the ones held by adults because the influence of peer group is more than that of adults. Hence the adolescent is torn between his loyalty to his parents and peers. Their values often clash with those of adults and many rebel against parental authority

Activity 4

Compare And Contrast Any Six Values Between Adults And Present Generation Adolescents

Values	Opinion of adults	Opinion of adolescents

(d) Emotional changes

Adolescence is said to be a period of heightened emotionality. Heightened emotionality is a state of more than normal emotional experience. This period is often known as the "period of storm and stress". The word storm and stress suggest anger and turmoil.

Causes for Heightened Emotionality

The major causes for heightened emotionality are as follows:

- **Psychological problems due to physical changes** – Sudden spurt in height, appearance of secondary sex characteristics, voice change, appearance of pimples and acne, on the face. etc. cause much embarrassment to them and they become worried about their physical appearances.
- **Social expectations**- Adolescents are treated neither as a child nor as an adult. The constant pressure to live up to social expectations causes a generalized state of anxiety in them.
- **Unrealistic aspirations**- Adolescent aspirations are sometimes unrealistic. When they are not able to attain them they feel inferior and frustrated.
- **Urge for sex**- Reproductive hormones are active and so there is the presence of sex urge. This may lead to anxiety.
- **Identity crises**- The adolescent is expected to form a realistic self-concept. They have to try out different roles and develop a holistic idea of their future role. Until they find their role they are often confused and anxious

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- **Unfavorable family relationships-** Conflicts often occur between adults and adolescents due to the generation gap between them.

(iii) Adolescence is a problem age

Adolescence is known as a problem age because they are faced with many challenges that arise due to the anatomical, psychological changes. This is further enhanced by peer pressure and conflicts with parents and elders. Most of these problems are aggravated due to misleading and misguiding parents, teachers and friends, ignorance of elders, being half informed or ill-informed about the realities in life and wrong messages and concepts depicted though the media

(iv) Adolescence is period when there is search for identity

Adolescence is the period of transition between childhood and adulthood. It is a stressful and confusing period because at times they are expected by the society to think and behave in mature manner. At the same time, they are often reprimanded for the same and are demanded to be meek and submissive as they are under the control of parents, elders and teachers. The conflicts that arise due to this, cause a lot of stress among adolescents as they are confused whether they should be like children or behave as adults.

(v) Adolescence is a time of unrealism

Many adolescents have unrealistic goals and aspirations. They live in an imaginary world. These unrealistic thinking pattern may often lead to anxiety and depression especially when they are not able to fulfill their goals. For this purpose, it is important for parents, teachers and elders to guide adolescents into identifying their strengths, weakness, opportunities and challenges and help them set realistic goals based on available resources

National Youth Day is celebrated in India on 12 January on the birthday of Swami Vivekananda. In 1984 the Government of India declared the day as the National Youth Day and since 1985 the event is celebrated in India every year. To quote from the Government of India's communication, 'it was felt that the philosophy of Swamiji and the ideals for which he lived and worked could be a great source of inspiration for the Indian Youth.'

JUVENILE DELINQUENCY

Delinquency is a problem associated with the period of adolescence. It is engaging in activities which are against law and are punishable. When a delinquent act is committed by a child or young person before the age of age of 18 it is called juvenile delinquency.

A list of delinquent act by minors include committing theft of valuables, burglary, looting, black mailing, murdering, raping, leading immoral life like prostitution, drinking, gambling, smuggling, drug addiction and anti-social acts like damaging public utilities etc.

Causes of delinquency

i. **Personal causes-** A person's physical defects, aggressiveness and low intelligence make a person prone to delinquency.

ii. **Family causes-** Children from broken homes lack love and affection and a feeling of security.

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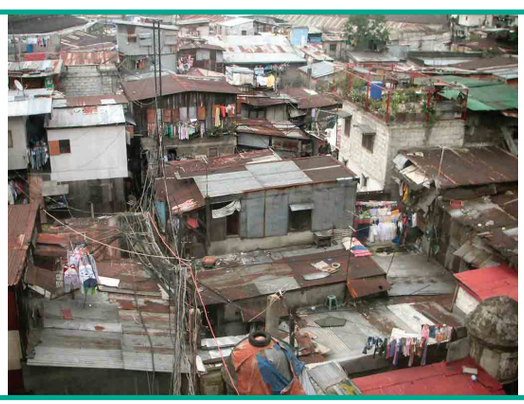
They tend to seek the comfort from peers involving antisocial activities

(iii) Community factors- Numerous of community factors are proved to instigate the adolescents towards delinquency. They are

a. **Poor housing –** Poor housing is a symbol of poor economic and social status. Overcrowding in poor houses and lack of privacy is said to be a cause for committing sex offences.



b. **Poor recreational facilities –** In absence of good recreational facilities, delinquency itself becomes a recreational activity.

c. **Poor schools –** Many factors in school contribute to delinquency. Nagging by peers, lack of understanding from teachers, unhappy home- school relationship make children dislike the school and engage in antisocial behaviour

d. **Unemployment** – Unemployment among school dropouts and those who have no secured jobs tend to cause delinquency.

e. **Movies and comic books-** Crime, gangster movies, glamour and sex movies stimulate young people to commit offences.

Prevention of delinquency

- Satisfactory adult-adolescent relationship, absence of feeling of rejection and presence of love and affection among members of the family will be of much help in preventing delinquency.
- Community efforts by parent teachers association, schools, religious institutions, social workers, counselors and voluntary organizations play a major role in guiding children.
- Mass media such as radio, television and newspaper should educate parents and the society on proper treatment of children.
- Educational Institutions can have programmes such as "Earn While You Learn" by engaging adolescents in useful activities.

2.2.6 Adulthood

Adulthood is usually divide into subdivisions or stages

Table 6 Classification of adulthood

Stages	Age
Early adulthood	18-40 years
Middle adulthood	41-60 years
Late adulthood or old age	61 years and extends until death

(Erickson ,1950)

Expectations and developmental tasks during adulthood:

- Achieving a measure of personal autonomy
- Molding an identity
- Developing emotional stability
- Establishing and consolidating a career
- Becoming a part of a social group or community
- Selecting a mate and adjusting to marriage

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- Establishing residence and managing a home
- Becoming a parent and rearing a child

Physical and Cognitive Changes during Adulthood

a. **Physical Changes** It has been found that the organ system of most persons show a 0.8 to 1 percent decline per year in functional ability after the age of 30. Major physical changes with ageing are described as (1) external changes (2) internal changes, and (3) changes in sensory capacities.

1. External Changes

External changes refer to the outward symptoms of growing old. The more observable changes are those associated with the skin, hair, teeth, and general posture.

- Skin also becomes thick, hard, less elastic, brittle and dry and wrinkled. With advancing age, the hair of the person continues to turn white and loses its luster and continues to thin.
- Baldness and loss of teeth is common for many, dentures become a way of life.
- Most weakening occurs in the back and leg muscles, less in the arm muscles.
- There is a progressive decline in energy production. Muscle tissue decreases in size and strength.

2. Internal Changes

Internal changes refer to the symptoms of growing old that are not visible or obvious.

The Respiratory System:

With increasing age, there is reduction in breathing efficiency. Decreased oxygen supply makes the old person less active, less aware and less strong.

The Gastrointestinal System:

With increasing age there is decreased capacity for biting and chewing, decrease in the production of digestive enzymes, decreased gastric and intestinal mobility and lack of appetite.

The Cardiovascular System:

With the aging process, there is a decrease in the elasticity of blood vessels and blood cell production as well.

The Central Nervous System (CNS): Beginning at about age 60, there is a reduction of cerebral blood flow. There is also a decline in oxygen and glucose consumption. The most definite change is the slowing down of responses.

3. Changes in Sensory Capacities

With advancing age, there is gradual slow down in the sensory abilities.

Vision:

- Increasing age brings in several problems in vision.
- The lens continue to lose elasticity.
- The pupils become smaller and irregular in shape.
- The eyelids have a tendency to sag.
- Colour vision becomes less efficient.

Cognitive Changes during Adulthood and Aging

The four major aspects of cognition includes memory, learning, attention and intelligence. Old persons are found to perform poorer than young ones on long-term memory tasks which require processing of information and organization of material. They are not in a position to learn skills. Attention span is also found to be lower than younger individuals. Intelligence tests indicate that old persons are slower on reaction time.

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Among the elderly, we often can find reduced abilities for complex decision making and slowing of performance.

2.2.7- Old age – Personal and social adjustments

The time at which old age begins is still ill defined. Sixty years is taken as the arbitrary dividing line.

Age divisions during old age:

- **The young -old (60-69 years)** This is a transition period marked by many adjustments such as retirement and declining strength, sharp reduction in expectation and behaviours.
- **Middle-aged old (70-79 years)** This period is characterized by increasing deaths of friends and spouse, reduced participation in home and community activities, increasing health problems, contracting social world.
- **Old (80-89 years)** In this period, assistance is needed in maintenance of social contacts, there may be many health problems and some may become institutionalized or may lead a very sheltered life.
- **Very old (90 years and above)** Health problems are more severe and serious with very limited activity in this period.

Challenging Areas That Require Adjustments during Old Age

There are several challenges in different areas of old age which require adjustments and intervention. For the purpose of better understanding it can be discussed at four levels- biological, psychological, sociological or psychological or behavioural.

Biological aging and its challenges– It includes changes in sensory- motor performance, muscle strength, brittleness of skeletal structure, visual acuity and decreased reaction time and balance. These are examples of biological aging which may influence attitude and behaviour.

Psychological aging and its adjustments – This consists of a general decline in the mental abilities that accompany old age.

Sociological aging and its challenges – It refers to changes in social roles- loss of spouse, vulnerability to disease, compulsory or voluntary retirement, loss of income and loss of status.

Psycho- social aging and its challenges – It refers to systematic changes in personality needs, expectations and behaviours as well as changes in roles and changes in relation to others.

Specific Psychological Problems Faced By Old People

a) Feeling of inadequacy.
b) Lack sense of belonging and acceptance.
c) Economic insecurity.
d) Changing social attitudes
e) Feeling of loneliness, uncertainty, restlessness.

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f) Feeling tired and depressed.
g) High on anxiety.
h) Low self-esteem and worthlessness

Adjustments in old age

Some of the adjustments people have to make as they move into old age include:

Health adjustment: One of the threats to the elderly is prolonged illness. The aging body is highly vulnerable to ravaging diseases and injury. The psychological stressors of old age can also provoke psychological disorders.

Adjustment to retirement – Retirement is separation from a sphere of activity that has provided special social order, economic remuneration, personal identity and prestige for many years. The abrupt termination of one's livelihood may be a great threat to the old people; a welcome relief to some from tedious thankless jobs or a natural conclusion of one's successful career. It may provide more time for some to pursue their dreams and pleasurable activities

1st October is celebrated as the International Day for Elderly People each year.

Coping with the Problems Faced During Old Age

Different people adopt different coping strategies to meet their life challenges. Some of the effective coping strategies may be summarized as follows:

1. The elderly need to develop an attitude of flexibility so that they may adapt to life's pressures and problems of old age.
2. They need to recognize that they have to explore new ways of coping with their life events.
3. The elderly need to make greater use of "information seeking" and of "problem solving" rather than withdrawing or isolating.
4. They need to enhance their self-confidence, self reliance, develop healthy attitude about their strengths and weaknesses as well as learning and maintaining effective coping skills
5. Participate in various group activities such as joining clubs and certain organizations for informal social interaction is very helpful for the aged.
6. Involvement in grand parenting helps the elderly satisfy many of their personal and emotional needs.

SUMMARY

- Human development and its challenges deals with the various stages of the life span a human being goes through from infancy to old age.
- It includes the changes (physical, emotional, social and cognitive) in the life cycle of an individual and the various developmental tasks in each stage.
- Specific areas of concern such as juvenile delinquency, its causes and rehabilitation measures have been addressed.
- Emphasis has been given to children with special needs including those who are visually challenged, mentally challenged, orthopedically challenged, hearing and speech impaired with specific reference to the various difficulties they face along with coping mechanisms.

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- Knowledge gained though the study of this lesson on human development and its challenges will motivate students to pursue higher education in human development or psychology.
- The information gathered through this chapter may foster an interest among students to address the specific needs of differently abled children either by pursuing research in this domain or by specially equipping themselves to provide support to these children .
- Besides addressing the challenges in the adolescent stage in which the students are , this chapter will prepare students to prepare for adulthood and its various development tasks.
- The needs of the elderly and challenges faced by them are discussed in detail. Such knowledge will prepare students about the changes that are likely to take place during old age and mentally prepare them for the same.
- Socio emotional skills, cognitive skills and language skills of children 0 to 8 years are given in the consolidated form in the appendix.

GLOSSARY

Hopping –(துள்ளல்) A short jump by a person on one foot

Scribbling - (கிறுக்கல்) To make meaningless marks or lines, with a pencil or pen

Grasp Objects –(பொருள்கள் பிடித்து வைத்திருக்க முயற்சி) a holding or griping of an object or toy with the hands or arms

Temporary Teeth - (தற்காலிக பற்கள்) Any of a set of early, temporary (milk) teeth in young children which fall out as the permanent teeth emerge

Calcifications – (கால்சியம்மூலம்எலும்பு கள்கடினமாதல்) Bones are hardened by the deposit of calcium salts

Behavior (நடத்தை) particular way of acting

Instinct- (உள்ளுணர்வு) The way people naturally react or behave, without thinking or learning about it

Involuntary Reactions - (தன்னிச்சையற்ற)Unintentional or unconscious action

Defecation - (மலம்கழித்தல்)waste matter remaining after food has been digested is discharged from the body through the anus

Prenatal Stage – (மகப்பேறுக்கு முற்பட்டகாலம்) Period from fertilization till birth

Amniotic Fluid -(ஆம்னியோடிக்திரவம்) *Fluid* in which the embryo or fetus is suspended with in the uterus

Postnatal - (பிரசவத்திற்கு பிறகு) Period of time immediately after a baby has been born

Umbilical Cord - (தொப்புள்கொடி) The long, tube-like structure that connects a fetus to its mother's placenta

Permanent Teeth - (நிரந்தர பல்) *Permanent teeth* (or *adult teeth*) come after the set of primary teeth

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and are normally intended to remain in the mouth for the whole lifetime

Dominant hand - (மேலாதிக்க கை) Hand which is used for performing fine motors skills or tasks (e.g., writing, holding etc)

Auxiliary hand - (துணை கை) Supportive hand which is used to support the dominant hand for performing fine motors skills

Heredity - (மரபுசார்ந்த)The passing on of physical or mental characteristics genetically from one generation to another

Orthopedic Problems - (எலும்பியல்–சிக்கல்கள்)Injuries of the skeleton or tendons and ligaments

Psychological – (மனோதத்துவ)Related to the mental and emotional state of a person

Swelling – (வீக்கம்) An abnormal enlargement of a part of the body

Crutches – (ஊன்றுகோள்) A supportive long stick with a cross piece at the top, used as a support under the armpit for use as an aid in walking

Wheelchair - (சக்கரநாற்காலி) A chair fitted with wheels for use as a means of transport by a person who is unable to walk as a result of illness, injury, or disability

Microcephaly - (சிறியதலை) It is a medical condition in which the brain does not develop properly resulting in a smaller than normal head

Transition - (மாற்றம்) Passage from one condition or one part to another

Distinguishes - (வேறுபடுத்திகாட்டுவதாக) recognize a difference

Menstruation - (மாதவிடாய்) The process in a woman of discharging blood and other material from the lining of the uterus at intervals of about one lunar month from puberty until the menopause

Juvenile Delinquency - (இளம்குற்றவாளிகள்) Criminal or unlawful acts committed by an individual below the age of 18

Economic Insecurity - (பொருளா–தார பாதுகாப்பின்மை) This is the condition of not having stable income or other resources to support a standard of living

Coping - (சமாளிக்கும்) To face and deal with responsibilities, problems, or difficulties, especially successfully in a calm manner

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Questions

I. Choose the correct answer

1. The prenatal period consist of _____ days
   a. 270 days to 280 days
   b. 200 days to 210 days
   c. 230 days to 240 days
   d. 180-200 days

2. Babies should stand with support by
   a. 6 months b. 8 months
   b. 1 year d. 15 months

3. Babbling denotes
   a. Production of inarticulate meaningless speech and sound
   b. Uttering meaningful words
   c. Production of sentences combining three or more words
   d. concrete sounds

4. Gang age is _____
   a. Preschool stage
   b. late childhood
   c. adolescence d. adulthood

5. Cliques are usually made up of
   a. Only close friend
   b. Group of close friends
   c. Crowds
   d. Organised groups

6. Deficiency of vitamin-A causes impaired vision in dim light known as
   a. night blindness
   b. colour blindness
   c. squint eyes
   d. d. keratoamalacia

7. IQ is
   a. Intelligence quota
   b. intellectual quota
   c. intelligence quotient
   d. information quotient

8. Gerontology is related to _____
   a. Babyhood b)adulthood
   b. old age d) infancy

9. Old age is termed as _____
   a. Age of increased individuality
   b. Second Childhood period
   c. Period of storm and stress
   d. Age of temper tantrums

10. ------- is a sensory motor stage
    a. Adulthood b. Childhood
    b. Infancy d. Babyhood

11. At one year babies will weigh -----as much as their birth weight
    a. Twice b. Thrice
    b. Four times d. five times

II. Very short answer (2 marks)

1. Define period of the Partunate.
2. Define endomorphic body form.
3. What do you mean by temper tantrum?
4. Who is a special child?
5. How can you motivate the self-esteem of a child who is visually impaired?
6. Suggest two ways of preventing juvenile delinquency?
7. What is the difference between gross motor skills and fine skills?
8. What could be the reasons for over sensitivity among 12 year old children?
9. Define handedness.
10. Why is adolescence called a period of transition?
11. Define juvenile delinquency.

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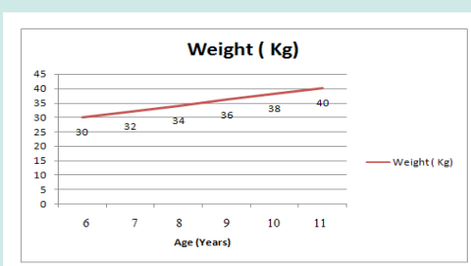
III Answer briefly (3 marks)

1. List the gross motor skills of a 5 year old child.
2. What are the types of visual impairment?
3. Kal who is a two year old baby has only one temporary teeth- Is this normal development ? Give reason.
4. What is the difference beteen cliques, crowds and chums ?
5. Abdul can jump in place by the end of two years. Is his growth normal. How?
6. List the characteristics of the adolescent period.
7. Lucy can catch a large ball while skipping by end of 4 years. State the type of skill involved.
8. Mohan who is 12 years old has trouble telling the difference between what is real and what is a fantasy and does not obey commands. What could be the reasons for his behaviour?
9. Retirement is a challenging period in the life of an individual –Justify

10



From above graph it is observed Anita was weighing 30 kilograms at 6 years. Her weight is increasing at the rate of 1.3 to 2.3 kg per year. By the end of 11 years she is observed to weigh 40 kilograms. Is this observation normal?

IV Write in detail (5 Marks)

1. Explain the physical and emotional development that takes place during babyhood.
2. Describe the emotional expressions during early childhood.
3. Describe the postural and locomotion changes during baby hood?
4. Sketch the emotional development of an individual from infancy to old age.
5. Elaborate on the physical development during late childhood
6. Suggest suitable ways in which you will help a person with orthopedic disability.
7. What are the special needs of the visually and hearing impaired children?
8. Babyhood is a period of adjustments – Explain.
9. Is adolescence a period of storm and stress? Explain.
10. Trace the changes in developmental tasks among adolescents and adults.
11. Juvenile delinquency can be avoided if suitable preventive measures are taken and addressed- Explain.
12. Adult hood is the period in which one has to make several crucial decisions- Elaborate
13. Describe the psychological changes during old age .
14. What are the various changes during old age that make this period a challenging phase in a person's life?

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Chapter 3 Food Science

Learning Objectives

In this chapter the student will

- Understand the diverse functions of food
- Gain knowledge of the various food sources and the different nutrients present in them
- Understand concepts of the basic four food groups, food guide pyramid and "my plate"
- Get familiar with the different cooking methods
- Learn the methods of enriching food
- Learn about various kitchen equipment required for cooking
- Know about techniques that would ensure safety in the kitchen

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3.1 INTRODUCTION

Food has been a necessity for human survival since the very beginning of the world. Food is required for every living creature. Good food is reflected by optimum health and wellbeing. In early times man ate food most naturally. Fruits, vegetables, cereals, pulses, fats, oils or sugars were all consumed as they were available without any refinement or processing. Later man discovered methods of cooking and also preserving food according to his need. By accident man discovered fire and then experimented and began to cook non-vegetarian foods like fish, meat etc. by direct roasting on fire. This was followed by salting food and dehydration of foods as preservation techniques.

The first wealth is health.

— Ralph Waldo Emerson

The importance of food gave rise to a science called "food science". This is "a discipline in which the engineering, biological and physical sciences are used to study the nature of foods, the causes of deterioration, the principles underlying

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food processing, and the improvement of foods for the consuming public".

Food has been a basic part of our survival. Next to air and water, food is the utmost important thing for survival. Food is essential for growth, development, active and healthy life of an individual. Through, centuries, food has also been used, as an expression of love, friendship and social acceptance.

Food refers to anything, which nourishes the body. It would include solids, semi-solids and liquids which when consumed help to sustain the body and keep it healthy. Food is a substance, which after ingestion, digestion and absorption is capable of being utilized by the body for its various functions.

3.2 FUNCTIONS OF FOOD

Food is classified according to their functions in the body as shown in Figure 1.

3.2.1 Physiological Functions of Food

The physiological functions of food can be further sub divided as follows

a. Energy yielding foods
b. Body building foods
c. Protective and regulatory food.

a) Energy Yielding Foods

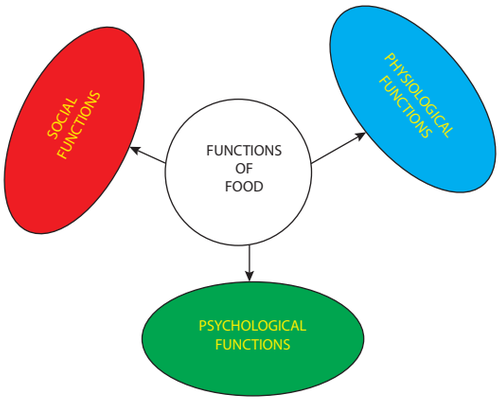
Food Sources: Cereals, millets, roots and tubers, sweets, jaggery, sugar, fats and oils.

Energy is mainly provided to our body through carbohydrates and fats in the food. Carbohydrates and fats provide energy to sustain involuntary processes in the body for continuous life, to carry out voluntary activities like professional, household and recreational activities and to convert food ingested into usable nutrients in the body. The energy needed is metabolized by oxidation of foods consumed.

b) Body building foods

Food Sources: Pulses, legumes, meat, fish, poultry, egg, milk and milk products.

In our body there is continuous breakdown of old tissues and building up of new tissues going on at all ages irrespective of the apparent growth thus maintaining a need for body building nutrients.



▲ Fig 1 Functions of food

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For the body building purpose, the major nutrients are proteins and minerals. Foods rich in protein are called body building foods. Milk, meat, egg and fish are rich in proteins of high quality due to the presence of essential amino acids. Pulses and nuts are good sources of protein but the protein is not of good quality because they lack some of the essential amino acids which are rich in cereals.

c) Regulatory and protective function of foods

Food Sources: Vegetables and fruits.

These foods regulate the activities of the body such as beating of the heart, maintenance of body temperature, muscle contraction, control of water balance, clotting of blood, removal of waste products from the body, etc.

Our body uses water in all its cells, organs and tissues to help regulate its temperature and maintain other bodily functions. Our body loses water through breathing, sweating and digestion, It is important to rehydrate our body by drinking fluids and eating foods that contain water.

Dietary fibers found mainly in fruits and vegetables, wholegrains and legumes provide health benefits such as relieving constipation, maintaining healthy weight lowering the risk of diabetes and heart diseases.

Apart from regulating our body processes, food also protects us from various infections, diseases and injuries.

For example consumption of vitamin A & vitamin C rich food help in building resistance in the body to fight against invading organisms

3.2.2 Psychological Functions of Food

The second major function of food is psychological function. Food also satisfies certain psychological needs of human beings. Foods indirectly helps to provide a sense of security, love and acceptance.

Every one grows in a particular culture with its own unique food habits. The person begins to associate the food habits and foods commonly consumed as it gives a sense of security and satiety. Even a nutritionally balanced meal may not be satisfying to the individual, if food included is unfamiliar or distasteful.

3.2.3 Social Functions of Food

Food is also a symbol of social life. When a meal is shared with anyone else, the acceptance of friendship and respect for that person are expressed.

Earlier only persons enjoying equal status in society ate together. A person would never share a meal with someone inferior to him in social terms.

Food is a medium through which happiness is expressed. For example feasts are given at specific states of life such as birthday, marriage etc. Sweets are also distributed and exchanged to mark certain auspicious occasions like festivals. Such gatherings bring people together and help to strengthen mutual friendship.

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3.3 BASIC FOUR FOOD GROUPS AND ITS SIGNIFICANCE

Food groups have been classified according to various methods from time to time. ICMR (2011) has classified the different foods items into four food groups as listed in Table 1. They are

1. Cereal, millets and pulses
2. Milk, and animal products
3. Fruits and vegetables
4. Fats, oils and nuts

Significance of the Four-Food Group System

The four food group system can be used for the following purposes:

i. Planning wholesome balanced menus to achieve nutritional adequacy.
ii. Assessing nutritional status – a brief diet history of an individual can disclose inadequacies of food and nutrients from any of the four groups.

Based on the assessment, nutrition education can be imparted to the individual.

The quantity of the meals can be improved or is said to be optimum when the diets are complete. Every meal should have foods providing energy, protein, vitamins, minerals, fibre and adequate amount of water.

Table 1 Basic Four Food Groups

	Food Groups	Main Nutrient
1	Cereal Millets and Pulses: Rice, wheat, ragi, bajra, maize, rice flakes	Energy, protein, invisible fats, vit B1, B2, folic acid, iron, fibre
	Pulses and legumes : bengal gram, black gram, green gram, red gram, rajmah	Energy, proteins, invisible fats, vit B1, B2, folic acid, calcium, iron fibre
2	Milk and Animal products: milk, curd, skimmed milk, cheese, chicken, liver, fish, egg, meat	Protein, fat, vit B2, calcium
3	Fruits and Vegetables : Mango, guava, tomato, papaya, orange, etc Green leafy vegetables: amaranth, spinach, coriander leaves, fenugreek leaves, drumstick leaves Other vegetables: carrot, brinjal, beans, Onions, etc	 Carotenoids, vitamin C, vit B2, iron, folic acid, fibre Carotenoids, vitamin B2,folic acid, fibre Carotenoids, folic acid, calcium
4	Oils, Fats and nuts Fats, butter, ghee, hydrogenated fat, cooking oil like groundnut, mustard, sunflower sugar, jaggery, sugar,Cane Almonds, walnuts, and gingelly seeds	Energy, fat, essential fatty acid Energy Protein, Omega 3 fatty acid

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Colourful rainbow of fruits and vegetables presents you with following health benefits.

Balanced diet can be defined as one which contains different types of foods in such quantities and proportions that the need for all the nutrients are adequately met and a small extra provision is made for nutrients as a margin of safety.

REAL FOOD IS THE KEY TO HEALTH

What do we mean by real food?

Eating fruits, vegetables and whole grains that haven't been overly processed will keep you healthy. By eating whole food, you can avoid over-processed foods that are packed with sugar, sodium, carbohydrates and fats.

Millets

Millets are small – seeded grasses that are hard and grow well in dry zones as rain-fed crops under marginal conditions of soil fertility and moisture. Millets are one of the oldest foods known to humans and possibly the first cereal grains to be used for domestic purposes. They are highly nutritious, gluten free. Hence they are soothing and easy to digest. They are considered to be the least allergic and most

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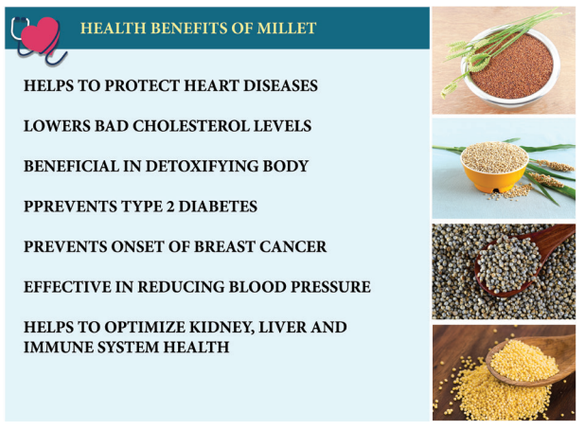
digestible grains available. Compared to rice, polished rice, millets release lesser percentage of glucose and over a longer period of time this lowers the risk of diabetes.



3.3.1 Types and Importance of Millets

Millets are particularly high in minerals like iron, magnesium, phosphorous and potassium, finger millet (ragi) is richest in calcium content.

Kinds of millets:

1. Barnyard Millet – Kuthiravali
2. Finger Millet – Ragi
3. Foxtail Millet – Thinai
4. Kodo Millet – Varagu
5. Little Millet – Samai
6. Pearl Millet – Kambu
7. Proso Millet – Panivaragu
8. Sorghum – Cholam

- Millets can be incorporated in our daily diet for almost all the meals and dishes. Breakfast items like porridge, dosa, idli, uppuma, puttu,ragi kali,-doughnuts, vadas, bonda, chapathis, pooris etc are some of the commonly prepared items.

Activity 1

List the Different kinds of millets available in the market

Activity 2

Formulate a recipe using millets

- Main meal items like ragi kali is highly nutritious.
- Millets can also lend themselves to the baking of cakes and biscuits as a 20% to 50% level of the cereal flour is being used and therefore enhance the nutritive value of the product. The nutritional content of millets is given in Table 2.

3.4 FOOD PYRAMID

Food pyramid is a visual tool that is used as a guide in designing diet. It is developed as a guide to provide a frame work for the types and amounts of food that can be eaten in combination to provide a healthy diet.

The Indian adaption of the food pyramid is divided into four levels

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Table 2 Nutritional Content in Millets

Millet	Iron (in mg)	Calcium (in mg)	Minerals (in mg)	Fibre (in g)	Protein (in g)
Pearl millet	16.9	38	2.3	1.3	10.6
Finger millet	3.9	344	2.7	3.6	7.3
Foxtail millet	2.8	31	3.3	8.0	12.3
Proso millet	0.8	14	1.9	2.2	12.5
Kodo millet	0.5	27	2.6	9	8.3
Little millet	9.3	17	1.5	7.6	7.7
Barnyard millet	15.2	11	4.4	10.1	11.2

Source: Millet Network of India

of foods according to recommended consumption.

1. Cereals, legumes / beans, dairy products at the base should be eaten in sufficient quantity.
2. Vegetables and fruits on the second level should be eaten liberally.
3. Animal source foods and oils on the third level to be eaten moderately
4. At the apex highly processed foods that are high in sugar and fat are to be eaten sparingly.

▲ Fig 2 Food Pyramid

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One peculiarity of the Indian adaptation of the food pyramid is the recommendation to do regular physical activity. The pyramid provides information on the food types and amount necessary to meet daily dietary requirements. Each food group is represented by a band or level. Narrow bands at the apex indicate lower quantities, while wider bands at the base means that more from that food group needs to be consumed.

Most important is to include 2 to 3 litre of water each day as it's the most important nutrient constituting 70% of our body weight and helps to maintain our health.

It is very important that an individual incorporates the principles of good nutrition such as variety, a balanced intake of nutrients and moderation. The best way to meet the daily requirements is to eat a diet that combines cereals, fruits, vegetables, meat, fish, poultry legumes and dairy products. Eating a variety of foods daily as guided by the "Food Pyramid" will help to provide all the nutrients needed by the body.

3.5 METHODS OF COOKING

Cooking has been practiced since times immemorial. The ancient man ate only raw food.Once a piece of meat fell into the fire accidentally and got roasted. The ancient man ate this piece of roasted meat and liked it. Thus began the process of cooking. It has evolved a lot since then.

Cooking offers a wide variety of foods. For example food items like roti, puri, paratha, rice, pulao, pulses, vegetable, salad, chutney, pickle, curd, butter milk, fruits, etc.are prepared from different food.

Boiled rice tastes different from jeera rice or pea pulao because these are cooked differently. Similarly, a chapatti tastes different from a puree or paratha, again because all these are cooked differently. Generally, vegetables like tomatoes, cucumber and fruits are best eaten raw while wheat, rice, pulses, potatoes and other vegetables must be cooked. Main objectives of cooking:

- Improves the taste and food quality.
- Cooking food to the required temperature for a required length of time can destroy all harmful microorganisms in food.
- Cooking improves digestibility.
- Cooking increases variety.

3.5.1 Moist Heat Methods

i) Boiling: Boiling is cooking foods by just immersing them in water at 100°C and maintaining the water at that temperature till the food is tender. It does not require special skill and equipment. It is time consuming.

Merits:

1. Simple method, does not require skill or any particular equipment.
2. Uniform cooking can be achieved.

Demerits:

1. Continuous boiling damages the structure and texture of food.
2. Vitamins B and C is lost if the cooking water is discarded.
3. It is time consuming and may lead to increased use of fuel.
4. Loss of colour —Water soluble pigments may be lost during cooking.

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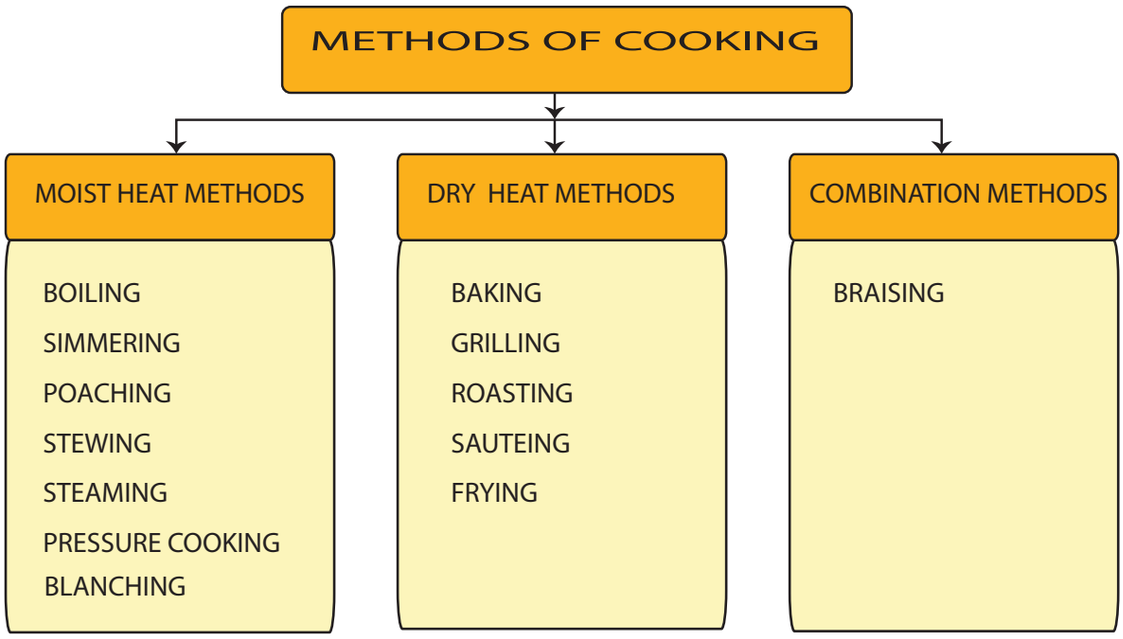

▲ Fig 3 Methods of cooking

Activity 3

You must have eaten potatoes cooked in different ways. Can you name some?

ii) Simmering

When food is cooked in a pan with a well fitted lid at a temperature just below the boiling point 82°–99°C, it is known as simmering. It is a useful method when foods have to be cooked for a long time to make it tender. (eg) vegetables.

Merits:

1. Food can be cooked with less chances of burning.
2. The flavour of the food can be enhanced.

Stewing

Steaming

Pressure Cooker

Poaching

Boiling

Simmering

Blanching

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3. Does not require any skill or specific equipment.

Demerits:

1. Takes a long time for cooking the food.
2. Precaution must be taken to ensure that the food does not get burnt.

iii) Poaching

This involves cooking in the minimum amount of liquid at a temperature of 80°–85°C. Foods generally poached are eggs and fish.

Merits:

1. No special equipment is needed.
2. It is a quick method of cooking and thus saves fuel.
3. Poached foods are easily digested as no fat is added.

Demerits:

1. Poached foods may not appeal to everybody as they are bland to taste.
2. Foods can get burnt if not monitored closely.
3. Water soluble nutrients may be lost if they are leached into the water.

iv) Stewing

This is a gentle method of cooking in a pan with a tight fitting lid, using small quantities of liquid to cover only half the food. The liquid is brought to a boiling point and then the heat applied is reduced to maintain the cooking at simmering temperature ie., 98°C. Apples can be cooked by this method.

Merits:

1. Loss of nutrients is avoided as the water used for cooking is not discarded.
2. Flavour is retained.

Demerits:

1. The process is time consuming and there is wastage of fuel.

v) Steaming

This method requires the food to be cooked in steam. This is generated from vigorously boiling water or liquid in a pan so that the food is completely surrounded by steam and not in contact with the water or liquid. Here the food gets cooked at 100 degrees.

Merits:

1. Less chances of burning.
2. Texture of food is better, as it is made light and fluffy.
3. Saves time and fuel.
4. Steamed foods like idli and idiappam have very negligible fat and are easy to digest, and are good for children, elderly and therapeutic diets.

Demerits:

1. Steaming equipment is required.
2. This method is limited to the preparation of selected foods.

vi) Pressure cooking

In pressure cooking escaping steam is trapped and kept under pressure so that the temperature of the boiling water and steam can be raised above 100°C thus reducing cooking time. Foods cooked in pressure cooker are rice, dhal, vegetables and meat.

Merits:

1. Cooking time is less compared to other methods.
2. Nutrient and flavour loss is minimized.
3. Conserves time, fuel and different items can be cooked at the same time.
4. Less chance of burning.
5. Constant monitoring is not necessary.

Demerits:

1. The initial investment cost may not be affordable by everybody.

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2. Knowledge of the use, care and maintenance of the cooker is required to prevent accidents.
3. Careful watch on the cooking time is necessary to prevent over cooking.

vii) Blanching

In meal preparation, it is often necessary only to peel off the skin of fruits and vegetables without making them tender. This can be achieved by the method of blanching. In this method food is dropped in boiling water for 5 seconds to 2 minutes depending on the texture of food. This helps to remove the skin without softening the food.

Blanching can also be done by pouring enough hot water on the food to immerse it for some time or subjecting foods to boiling temperatures for short periods and then immediately immersing them in cold water. This process causes the skin to become loose and then can be peeled off easily.

Merits:

1. Peels can easily be removed to improve digestibility.

2. Destroys enzymes that bring about spoilage.
3. Texture can be maintained, while improving the colour and flavor of the food.

Demerits:

1. Loss of nutrients if cooking water is discarded.

3.5.2 Dry Heat Methods

In this either air or fat is used as the medium of cooking.

3.5.2.1 Air as a Medium of Cooking

i) Grilling

Grilling consists of placing the food below or above or in between a red-hot surface. This results in the browning of the food.

Merits:

1. Quick method of cooking.
2. It improves the appearance, texture and flavour of the food.
3. Minimum oil is used.

Demerits:

1. Foods can be burnt due to carelessness.
2. Grilling denatures the proteins reducing their availability.

ii) Pan broiling or roasting

When food is cooked uncovered on heated metal or a frying pan, the method is known as pan-broiling, (e.g) chapathis.

Merits:

1. Quick method of cooking.
2. It improves the appearance, texture and flavor of the food.
3. Minimum oil is used.
4. Spices are easily powdered if they are first roasted.

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Deep Frying

Shallow Frying

Grilling

Sauteing

Baking

Roasting

Stir Frying

Barbecuing

Pan Frying

Demerits:

1. Foods can be burnt due to carelessness.
2. Grilling denatures the proteins.

iii) Baking

Here food gets cooked by hot air inside the oven. Foods baked are generally brown and crisp on the top and soft and porous in the centre, (eg) cakes and breads. The temperature that is normally maintained in the oven is between 120°C–260°C.

Merits:

1. It gives a unique flavour to food.
2. Foods are made light and fluffy – cakes, rolls, custard, bread.
3. Certain foods can be prepared only by this method – bread, cakes.
4. Uniform and bulk cooking can be achieved.
5. Flavour and texture of the food is enhanced.
6. A variety of dishes can be made.

Demerits:

1. Special equipment like oven is required.
2. Baking skills are necessary to obtain a product with ideal texture, Flavour and colour characteristics.
3. Careful monitoring needed to prevent scorching.

3.5.2.2 Fat as a Medium of Cooking

i) Sauteing

This method involves cooking in just enough of oil to cover the base of the pan. Foods cooked by sauteing are generally vegetables used as side dishes in a menu.

Merits:

1. Takes less time.
2. Simple technique.
3. Minimum oil is used.
4. Constant monitoring is needed to prevent scorching.

Demerits:

1. Constant monitoring is needed to prevent scorching.

ii) Shallow and deep fat frying

Here food is cooked on a tava with little oil (eg) chapathi, cutlets, etc. Deep fat frying food

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is totally immersed in hot oil and cooked. The temperature maintained is 180°–220°C (eg.) Samosa, Bajji, etc. The taste of the food is improved along with texture.

Merits:

1. Very quick method of cooking.
2. The calorific value of food is increased as fat is the medium of cooking.
3. It gives a delicious flavour and appearance to the food.
4. Taste and texture are improved.

Demerits:

1. Constant monitoring is needed to prevent scorching.
2. The food may become soggy due to too much fat absorption.
3. Fried foods are not easily digested.
4. Repeated use of heated oils will have ill effects on health.

3.5.3 Combination Method

i) Braising

Braising is a combined method of roasting and stewing in a pan with a tight fitting lid. Meat is cooked by this method.

Examples of foods cooked by braising are:

1. Uppuma : Roasting and boiling
2. Cutlet : Boiling and shallow frying.
3. Vermicelli payasam : Roasting and simmering.

3.5.4 Innovative Methods

i) Microwave Cooking

Electromagnetic waves from a power source called magnetron are absorbed by the food and food becomes hot at once. Microwave cooking enhances the flavour of food because it cooks quickly with little or no water and thus preserves the natural colour of vegetables and fruits.

▲ Fig 4 Microwave oven

Merits:

1. Quick method – 10 times faster than the conventional method. So loss of nutrients can be minimized.
2. Only the food gets heated and the oven does not get heated.
3. Foods get heated uniformly.
4. Leftovers can be reheated without changing the flavor and texture of the product.
5. Microwave cooking enhances the flavor of the food because it cooks quickly with little or no water.

Demerits:

1. Baked products do not develop a brown surface.
2. Microwave cooking cannot be used for simmering, deep frying or stewing.
3. Flavour of all ingredients do not blend well as the cooking time is too short.

ii) Solar Cooking

Solar cooker works on solar energy. Solar cooker consists of well insulated box, the inside of which is painted dull black and

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▲ Fig 5 Solar cooker

is covered by one or more transparent covers, the purpose of which is to trap the heat inside the solar cooker. The temperature maintained is around 140°C. Cost of the cooker and the maintenance cost is low. It takes longer time and special vessels need to be used

Merits:

1. Simple techniques – requires no special skill.
2. Cost effective as natural sunlight is the form of energy
3. Original flavour of food is retained
4. There is no danger of scorching or burning
5. Loss of nutrients is minimum as only little amount of water is used in cooking

Demerits:

1. Special equipment is needed
2. Slow cooking process
3. Cannot be used in the absence of sunlight-rainy season, late evening and night

Activity 4

Observe and list the changes in the colour, texture and taste of the following food items after they are cooked. Also note the method used for cooking them.

- Spinach
- Rice
- Toor dhal
- Potato
- Egg

3.6 STEPS IN MINIMIZING LOSS OF NUTRIENTS DURING COOKING

Some nutrients are lost when foods are cooked. Nutrients like vitamin B and C are lost when foods are boiled or soaked in water and the water is thrown away. Nutrients like vitamin A are lost when fats are used for cooking foods. Therefore we must think of ways of saving these nutrients.

- Wash vegetables before cutting them so that minerals and vitamins are not destroyed. Do not wash the foods more than necessary.
- Peel vegetables thinly as vitamins and minerals are found just under the skin.
- Cut vegetables into large pieces just before cooking. Small pieces mean greater loss of nutrients.
- If vegetables are to be cooked in water, put them into boiling water. Scrape the peels very thin.
- Use just enough water for cooking. Do not throw away the extra water. Use this

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extra water to cook some other food.

- Do not use cooking soda. Use of tamarind or lemon juice helps to conserve the vitamins.
- Cook rice in just enough water which gets absorbed during cooking.
- Cook in a pan which has a well fitting lid. When you cook in an uncovered pan most nutrients are lost.
- Do not overcook the food as many nutrients will be destroyed.

Activity 5

You love to eat boiled rice and dhal. Rice has to be boiled with lots of water and the extra water is thrown away. You know that throwing this water means we throw away the soluble nutrients present in rice.

Why is it necessary to break this habit?

How can this problem be solved?

3.7 FORTIFICATION AND ENRICHMENT

Fortification is adding nutrients to the food even though the nutrient is already present in food. Fortification is done to improve the nutritive value whereas the process of improving the nutrient levels of nutrients which might be lost during processing in foods by special methods is called Enrichment.

Importance of Enhancing Nutritive Value of Food

- To meet the nutritional requirements of the body.
- To make proper selection and preparation of foods.
- To consume food in a balanced manner.
- To improve the flavour and texture of the food.
- To get variety in food.
- To assist in planning the daily menu, keeping in view the nutrient content of the food.
- To prevent deficiency diseases in the body.
- To develop good food habits.

Methods of Enrichment of Nutrients

There are three methods by which one can enhance or increase the nutrients present in food.

i) Combination
ii) Fermentation
iii) Germination

i) Combination

Combination is the process of combining cheaper and commonly available foods from different food groups to improve the quality of nutrients.

Combining of foods from different food groups is the easiest way of eating all nutrients.

Combination of foods

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Combination of foods improves the quality of nutrients. Cereals lack certain essential amino acids and these are present in dhals. On the other hand dhals lack some other essential amino acids that are present in cereals. The quality of proteins becomes as good as that of milk. The combination of a variety of foods ensures better availability of nutrients.

Combination helps to

i) Eat a diet that has good quality nutrients.

ii) Use cheaper and easily available foods that enhance the nutrient content of food considerably.

iii) Provide balanced diet to the family.

ii) Fermentation

Fermentation is a process in which some micro-organisms are added to the food. They change nutrients already present in the foods into simpler and better forms and also make other new nutrients.

Fermentation makes the dough rise and become almost double in quantity. During fermentation the microorganisms use up some of the nutrients present in the dough and change them into other better quality nutrients. They also make some new nutrients.

Curd, bread, dhokla and idli are all examples of fermented foods.

Advantages of fermentation

a) Fermentation improves the digestibility of foods. The microorganisms which cause fermentation break the proteins and carbohydrates into smaller parts, which are easier to digest.

b) During fermentation of cereals and foods like peas, beans etc. the minerals, calcium, phosphorus, and iron are changed into better quality ones. These are then easily absorbed by the body.

c) Fermented foods become spongy and soft and are liked by children and adults.

iii) Germination

Germination is a process in which small shoots come out of the dhal or cereal when these are kept with small amount of water. The grains and pulses to be sprouted need to be soaked in just enough water so that all of it is absorbed. If the extra water in which they are soaked is thrown away, a lot of nutrients are lost.

Grains like wheat, bajra, jowar, etc. can also be sprouted. These grains

Curd

Germination

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can then be dried in shade and roasted lightly on a tawa. They can be ground and used in many dishes. Pulses are also sprouted first and then steamed and consumed. The time and water which each grain or pulse needs for soaking and sprouting is different. Normally 8–16 hours are needed for soaking and 12–24 hours for sprouting. The cloth in which the soaked dhal is tied should be kept moist all the time.

Germination helps

i) Increase the digestibility of food
   a) Some carbohydrates and proteins are broken down into smaller and easily digestible forms.
   b) Grains and pulses become soft after sprouting, so they take less time for cooking and are easy for you to digest.

ii) Increase the nutritive value of food with no additional cost

Some vitamins and minerals become more when foods are germinated Vitamin B becomes almost double in quantity while vitamin C increases almost 10 times.

3.8 KITCHEN EQUIPMENT

Knowing the names and uses of equipment is as important as knowing where to find them in a kitchen.

Minor Equipment: The small equipment that we use in the kitchen for food are known as minor equipment.

Measuring equipment

- dry measuring cups for solid ingredients
- measuring spoons for small amounts
- liquid measuring cup with space at top
- spatula to level off dry ingredients

Slicing and Cutting Tools

- paring knife cleans/pares fruits and vegetables
- utility knife for all cutting purposes
- butcher knife-heavy duty for large cuts of meat
- bread knife has serrated edge
- chef's knife/French knife for slice, dice, chop a triangle blade
- slicing knife has a long narrow blade used for meat and cabbage
- carving knife for meat
- peeler for peeling fruits and vegetables
- kitchen shears
- cutting board
- grater
- mixing tools
- baking tools
- cooking tools
- kitchen aids
- cookware
- cleaning equipment

The minor kitchen equipment is used mostly for prepreparation of foods.

Major Equipment: The major kitchen equipment that are used for everyday cooking would include a food processor (mixee cum grinder/blender), refrigerator, microwave oven and even a small non-commercial oven cum toaster and grill.

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Minor Equipments

Food processor (mixer)

Refrigerator

Oven Cum Toaster and Grill

These major equipment are very essential for daily use.

The refrigerator is used for storing food and keeping it fresh free from spoilage. These foods include vegetables, fruits, eggs, milk and milk products and leftover cooked food also. The freezer helps to store and preserve foods, especially raw food items like non-vegetarian foods such as fish, meat and chicken and their products at a much lower temperature (at zero degrees centigrade and below).

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Activity 6

Identify the given kitchen equipment used at home and mention their uses

Cooking pot

Strainer

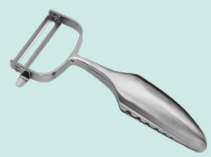
Frying pan

scissor

Thermos

Tongs

Cutting board



(Potato) peeler

3.9 BASIC RULES OF KITCHEN SAFETY

Cooking is fun, but kitchen safety is a priority. There are many types of equipment in the kitchen and environmental hazards that can be extremely dangerous. Sharp objects like knives, open fire by the oven, electrical appliances, and even bacteria around the kitchen.

Observing basic rules of kitchen safety is a good habit to develop. To prevent serious injuries or accidents: always pay attention to what you're doing, adopt a plan for kitchen cleanliness, and have necessary safety equipment at your disposal.

- Store knives in a wooden block or in a drawer
- Never cook with loose clothes on and keep long hair tied back.
- Never cook while wearing dangling jewellery
- Keep pot holders nearby and use them
- Turn pot handles away from the front of the stove.
- Don't let temperature-sensitive foods sit out in the kitchen.

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- Wipe up spills immediately.
- Separate raw meat and poultry from other items whenever you use or store them.
- Wash your hands before handling food and after handling meat or poultry.
- Get a fire extinguisher for the kitchen.

Follow these steps to keep cuts clean and prevent infections and scars.

- **Wash your hands.** First, wash up with soap and water so you don't get bacteria into the cut and cause an infection. If you're on the go, use hand sanitizer.
- **Stop the bleeding.** Put pressure on the cut with a gauze pad or clean cloth. Keep the pressure on for a few minutes.
- **Clean the wound.** Once you've stopped the bleeding, rinse the cut under cool running water or use a saline wound wash. Clean the area around the wound with soap and a wet washcloth. Don't get soap in the cut, because it can irritate the skin. And don't use hydrogen peroxide or iodine, which could irritate the cut.
- **Remove any dirt or debris.** Use a pair of tweezers cleaned with alcohol to gently pick out any dirt, gravel, glass, or other material in the cut.

Generally a good antiseptic cream (silverex or burnol) should be kept handy. It is advisable to have a small first aid kit readily available in the kitchen.

FIRST AID BOX CONTENTS

First aid manual	Syringes
Band aid	Guaze (different sizes)
Scissors (small)	Thermometer
Lotion	Contact lenses
Roll Bandages	Gloves
Antiseptic wipes	

▲ Fig 6 Contents of a First Aid Box

DO YOU KNOW?

Alloxen, a byproduct of bleaching white flour which is often found in junk food, leads to diabetes by destroying pancreatic beta cells

SUMMARY

1. Having learnt about the functions of food, the different food groups and their nutrients, one would understand the importance of a balanced diet and would also be able to plan a balanced diet from the locally available foods .
2. Knowledge of the different methods of cooking along with their merits and demerits enables one to choose the best method of cooking for any given food, so as to ensure the availability of maximum nutrients .
3. A study on the different kitchen equipment and appliances helps in familiarizing the same. The chapter also throws light on simple first aid measures and different methods of improving the nutritional quality of common foods like cereals and legumes.

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ICT CORNER

Step 1:

Scan the QR code from your mobile and download 'Food Science' app.

Step 2:

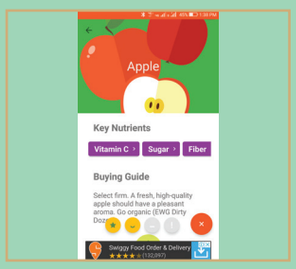
Select 'Fruits' tab and explore the list of fruits with its nutritional values.

Step 3:

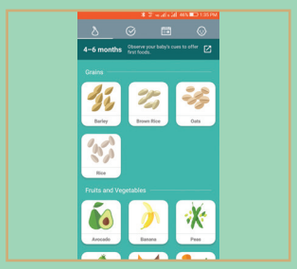
Select 'Vegetables' tab and explore the list of vegetables with its nutritional values.

Step 4:

Try to calculate and balance nutritional values of our daily needs with the food items.



Step1



Step2

Step3

Step4

Food Science App's URL:

https://play.google.com/store/apps/details?id=com.dhiraj.foodscience&hl=en

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ICT CORNER

Step: 1

Type URL or scan the QR code. 'Talking food pyramid' web page will open.

Step: 2

Click on the picture to start 'Talking food pyramid.

Step: 3

Place the mouse over the different parts of the food group to hear from the chef. At the same time healthy tips will appear in the text box.

Step1

Step2

Step3

URL:

http://www.nourishinteractive.com/kids/healthy-games/13-interactive-food-pyramid-five-food-groups

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GLOSSARY

Existence - (இருப்பு) Maintenance of life

Physiological - (உடலியல்) Relating to physiology

Regulatory - (ஒழுங்குமுறை) To control or direct

Antioxidants - (ஆக்ஸிஜனேற்ற) A substance that inhibits oxidation

Degenerative - (சிதைவு) Progressive loss of function (of organs or tissue)

Palatability - (ஏற்புத்தன்மை) appetizing

Marginal - (சிறிய) small

Domestic - (உள்நாட்டு) family/home/ private

QUESTIONS

I. Choose the correct answer

1. _____ is the combination method of cooking
   a. Braising
   b. Boiling
   c. Blanching
   d. Sautéing
2. _____ is an example of minor equipment
   a. Mixie
   b. Grinder
   c. Cooker
   d. Knife
3. A method of cooking where food is cooked without coming in contact with water is called _____.
   a. steaming
   b. boiling
   c. stewing
   d. pressure cooking.
4. The moist heat method which preserves the maximum nutrients is called _____.
   a. steaming
   b. boiling
   c. stewing
   d. pressure cooking
5. _____ is a poor source of iron.
   a. green leafy vegetables
   b. liver
   c. milk
   d. jaggery
6. The process of adding microorganisms to food is called
   a. germination
   b. fermentation .
   c. fortification
   d. additional cooking
7. The base of the food pyramid comprises of
   a. Fruits
   b. sugar
   c. Meat
   d. Cereals

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II. Very short answer (2 marks)

1. Define the food guide pyramid?
2. What is "colour my plate"
3. List any 10 articles that should be present in the first aid box.
4. List the important nutrients present in millets
5. What is fortification? Give an example.
6. Which method of cooking is most effective in conserving nutrients in rice ?

III. Answer briefly (3 marks)

1. What are the functions of food?
2. Define germination and its benefits?
3. What are the merits of steaming foods?
4. List the basic four food groups?
5. Compare the merits and demerits of pressure cooking and microwave cooking.
6. What is the difference between germination and fermentation
7. List three minor equipments.
8. What are the do's and don't's to be carried out immediately in case of cuts and bruises.
9. Draw the food pyramid
10. Suggest three ingredients in a health drink for school children

IV. Write in detail (5 marks)

1. Discuss the importance of the food pyramid.
2. What are the moist heat methods of cooking – Explain in detail
3. Elaborate on the kitchen equipment used in day to day cooking
4. Rita suffers from protein energy deficiency. Suggest three recipes to enhance her health status
5. Is there a loss of nutrients during cooking? How can nutrient losses be prevented
6. Food is not only a source of nutrients – explain.
7. In what way does the intake of 4 food groups serve as an important measure to prevent nutrient deficiencies ?

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Chapter 4 Food Preservation Methods

Learning Objectives

This chapter will enable the students to

- Know the importance of food preservation
- Enhance their knowledge of different preservation techniques
- Know the difference between traditional techniques and modern industrial techniques
- Understand the steps to be taken before freezing vegetables, fruits, meat and poultry
- Know the different methods of food preservation
  - *Using low and high temperature*
  - *Use of chemical preservatives and high osmotic pressure*
  - *Dehydration*
  - *Irradiation*
  - *Vacuum packaging*

Q4YKV

4.1 INTRODUCTION

Millions of fruits and vegetables are produced each year and they are lost due to poor processing and preservation. Fresh fruits are abundant during the season and are not available during off season. Due to this the food has to be stored until the next season. Fish and meat too have to be preserved as all that is killed or caught cannot be eaten at one time. Bacteria, fungi and yeasts tend to decay the food and render it unfit to eat. Hence all fresh foods have to be preserved if it is to be used after a period of time.

Besides when food spoils, they undergo physical and chemical changes that results in the food becoming inedible or hazardous to eat. The chief *causes of food spoilage* are;

- *The growth of microorganisms like bacteria, yeast and moulds.*
- *The action of enzymes that normally occur in the food.*
- *Other causes of spoilage are non enzymatic reactions in food such as oxidation and mechanical damage such as bruising and damage from rodents and insects.*

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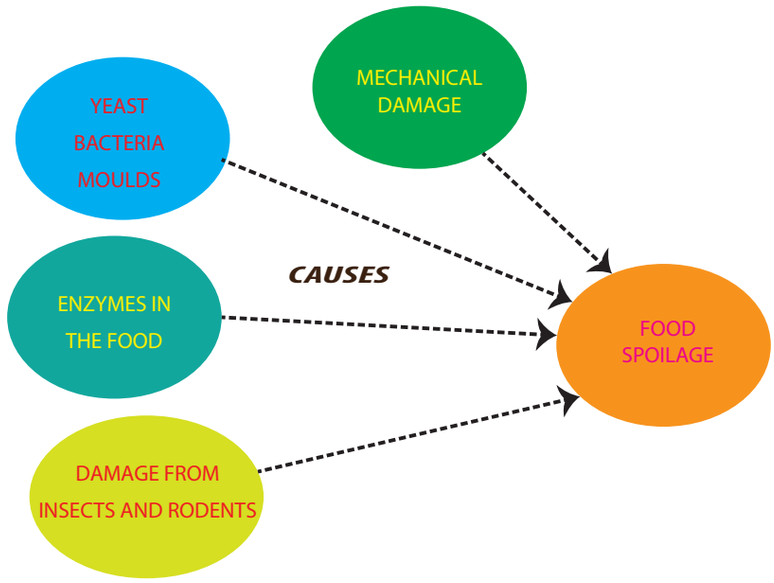

▲ Fig. 1 Causes of food spoilage

In order to prevent food spoilage and ensure food security and availability, various food preservation techniques have been used over the several years. The earliest steps in *food preservation* are *drying* of grains and nuts. Later *salting, smoking and drying* were applied to preserve the food.

4.1.1 Definition of Food Preservation

Food preservation is known as *"the science which deals with the process of prevention of decay or spoilage of food thus allowing it to be stored in a fit condition for future use"*.

Preservation also can be defined *as "the state in which any food may be retained over a period of time without being contaminated by pathogenic organisms or chemicals, without losing optimum qualities of colour, texture, flavour and nutritive value"*.

Importance of food preservation

Food production and supply does not always tally with the demand or needs of the people. In some places, there is *surplus production* of food product, whereas in some other place there is *inadequate supply*. It is therefore important to improve and expand *facilities for storage* and preservation of food to ensure its availability and acceptability at all times.

Preservation ensures:

- *Increase in shelf life of foods.*
- *Availability of seasonal foods throughout the year.*
- *Stability in prices of food as there will not be a deficit in supply.*
- *Good quality*
- *Edibility – texture and flavour*
- *Retention of nutritive value*
- *Retention of original colour of food.*

For the process of preservation, a preservative (e.g. salt, sugar, vinegar) is needed.

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DO YOU KNOW?

A preservative is a substance that is added to food to inhibit and retard the growth of microorganisms and helps in the process of preservation.

Principles of Food Preservation

1. ***Prevention or delay of microbial decomposition.***
   a. By keeping out microorganisms and preventing contamination from pathogens. It involves applying the strictest rules to minimize the risk of infection *(asepsis)*.
   b. Removal of microorganism through usage of membrane which retains microorganisms *(filtration)*.
   c. By hindering the growth and activity of microorganisms *(refrigeration, dehydration, addition of chemical preservatives)*.
   d. By killing microorganisms *(boiling, irradiation)*.
2. ***Prevention or delay of self decomposition of food***
   a. By destruction or inactivation of enzymes *(blanching)*.
   b. By prevention or delay of chemical reactions *(anti oxidants)*.
3. ***Prevention of damage caused by mechanical causes, insects and rodents.***

4.2 PRESERVATION METHODS

Many foods cannot be stored as such and need to undergo a treatment or a technique which helps to prevent spoilage. The techniques adopted to preserve the foods are grouped into ***traditional techniques and modern industrial techniques.*** *Traditional techniques* include curing, freezing, boiling, heating, sugaring, pickling, canning, smoking, salting and fermentation. *Modern industrial technique* involve pasteurization, vacuum packing, artificial food additives and irradiation.

In this chapter, preservation techniques are discussed under the following headings. They are use of low temperature, use of high temperature, dehydration, use of chemical preservatives and preservation by high osmotic pressure.

Activity 1

Boil sliced potatoes in water for three minutes. Observe the changes that take place in the texture, colour and appearance.

4.2.1 Preservation of Foods with Low Temperature

Use of low temperature reduces the microbial activity and enzyme activity thus prolongs shelf life of foods. Two different temperatures are employed in low temperature namely *chilling temperature and freezer temperature.*

4.2.1.1 Chill Storage

Chill temperature is just above the refrigerated temperature. In chilling fish, the temperature is reduced to freezing point of water. Chill temperature delays both bio-chemical and bacteriological changes. The deteriorative changes are retarded when low temperature is maintained. Hence the shelf life of food is improved and this ensures preserving natural and functional properties of food. Storage at *–1°C and –4 °C* can provide stability in the presence of food preservation.

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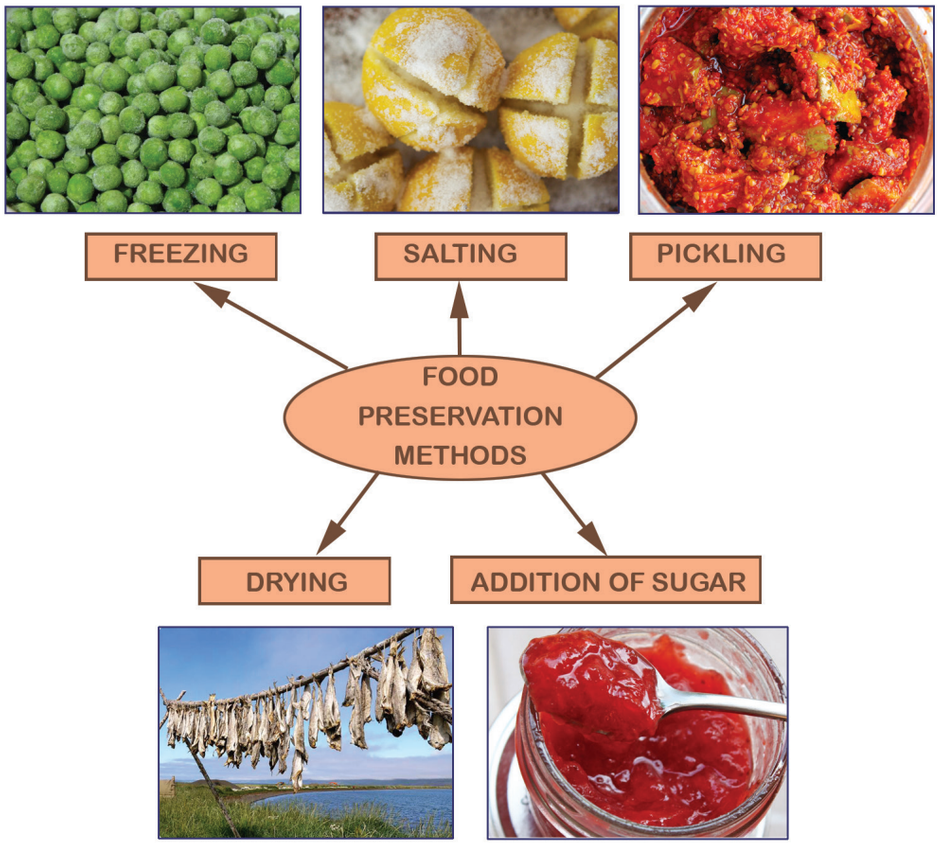
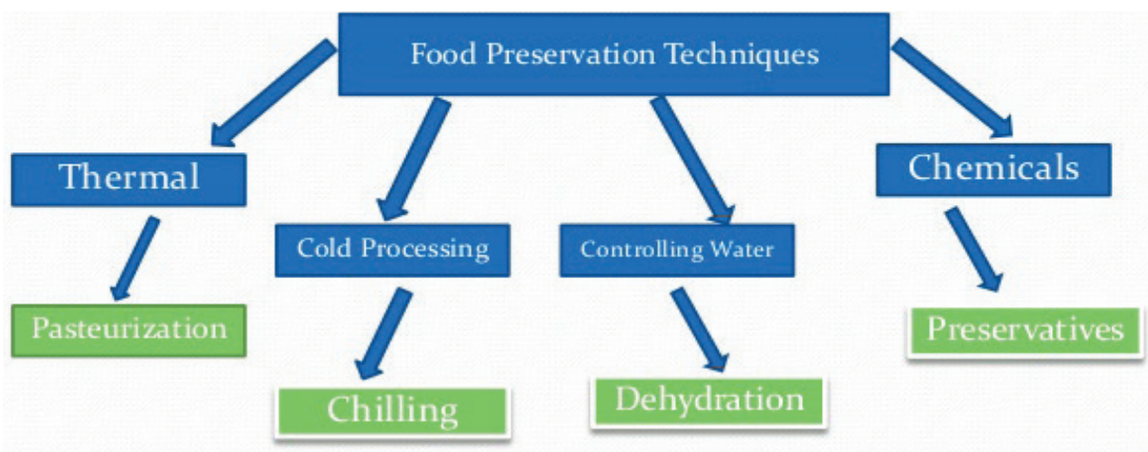


▲ Fig. 2 Methods of food preservation



▲ Fig. 3 Techniques of food preservation

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Food stored in the refrigerator

Fact

Ice and snow was used to preserve food in ancient times, now 85 per cent of all foods are refrigerated.

Table 1 Comparison Data of Shelf Life of Frozen and Refrigerated Foods

Vegetables/ Meat/Dairy/ Fruits	Refrigeration	Freezing
Pears	5 Days	One year
Butter	1–2 months	9 months
Milk	8–20 days	3 months
Lean fish	1–2 days	6–10 months
Fatty fish	1–2 days	2–3 months
Poultry	1–2 days	6–9 months
Bread	1–2 weeks	2–3 months
Flour	1 year	1–2 years
Corn	1–2 days	8 months
Green peas	1–2 days	8 months
Spinach	5–7 days	8 months

Source: foodclubkitchen.com

4.2.1.2 Freezing

Freezing is a means of preserving food through *the application and maintenance of extreme cold temperature (–4°C to –40°C)*. It is *effective* because most of the water of the food tissue is changed from *the liquid to the solid state*. This change in the physical state of water retards enzymatic action and stops microbial growth, the cause of food spoilage, thus preserving food. Many foods can be *frozen for twelve months or more* without major changes in size, shape, texture, colour and flavour.

- **Slow freezing process**

It is also known as *sharp freezing*. In this method, the food is frozen under temperatures ranging from *–4°C to –29°C*.

Frozen grapes

Normal grapes

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Tips for Preservation

In vegetables, enzyme action may produce undesirable effects on flavour and texture during freezing. So the enzymes must be destroyed by heating before the vegetables are frozen.

Freezing may *require three to seventy-two hours* under such conditions. *Home freezing* is done by this method.

- **Quick freezing process**

The temperatures used in the *quick freezing process* range from *–32°C to –40°C*. It freezes food so rapidly that fine crystals are formed. The time taken for quick freezing is significantly lower than that of slow freezing. In quick freezing, *large quantities of food* can be frozen in a short period of time. The use of very low temperature for both freezing and holding frozen products adds to the cost but of *desirable for* many products in terms of *retention of palatability* and *nutritive value.*

- **Dehydro freezing**

Dehydro freezing of fruits and vegetables is the drying of the food to about 50 percent of its original weight and volume and then freezing the food to preserve it. The quality of dehydro frozen fruits and vegetables is equal to that of fruits and vegetables which are frozen without preliminary drying. The cost is marginally less because of weight and volume savings in packing, freezing, storing and shipping.

DO YOU KNOW?

Cryogenic liquids are liquefied gases used for freezing due to its low boiling point. The commonly used cryogenic liquids are liquid nitrogen, liquid carbon-dioxide and freon.

Points to be Considered Before Freezing Food

Vegetables:

Blanching (dipping the products in boiling water for two to three minutes) vegetables before freezing reduces the number of microorganisms, removes some air from the tissues, makes them more compact and enhances their colour. Its most important function is to *inactivate enzymes* otherwise that would cause deterioration in palatability, colour and ascorbic acid content during storage.

Fruits:

The enzymes of fruits can be inactivated by *blanching* but it *is not done* as it gives the *fruit a cooked flavour and soft texture*. Rather fruits are cut directly into sugar syrup or sugar to prevent oxidation. Sugar not only increases the sweetness but helps to retain volatile aroma.

Meat and poultry:

Meat and poultry require only *wrapping for freezing*. After slaughtering the animal, the pork, meat and poultry is chilled promptly to avoid spoilage. The tendency of the fat of the pork and poultry to become rancid during storage in a freezer is aggravated by storage before freezing.

4.2.2 Preservation by High Temperature

The temperature and time used in heat processing a food depends upon the effects of heat on food and the other preservative methods employed.

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4.2.2.1 Pasteurization

Pasteurization is a heat treatment that kills part but not all the micro organisms present and involves the application of *temperatures below 100°C*. The heating, may be by means of steam, hot water, dry heat or electric currents and the products are cooled immediately after the heat treatment. *Milk is usually pasteurized.*

Pasteurized products are not sterile. They contain vegetative organisms and spores which are still capable of growth. Hence *many pasteurized foods* must be stored *under refrigeration*. Pasteurized milk can be stored for over a week under refrigeration while pasteurized milk stored at room temperature will spoil within a day.

Table 2 The Time and Temperature for the Pasteurization of Various Food Products

Food	Temperature (°C)	Duration
Milk	62.8	30 mts.
	71.7	15 sec.
Ice cream mix	71.1	30 mts.
	82.2	60–20 secs.
Grape wine	82–85	1 min.
Dried fruits	65.6–85	30–90 mts.
Bottled grape juice	76.7	30–90 mts.
Carbonated juices	65.5	30 mts.

Source: Food Science III Edition, New Age International publishers Srilalshmi. B. (2006), Chennai

4.2.2.2 Blanching

Blanching is a heat treatment like pasteurization. It is done *by dipping the products in boiling water for two to three minutes at 180°F to 190°F.* Blanching focuses on *deaerating* the product and *inactivating degradative enzymes* before further processing. Blanching is an *important step in freezing food*, as frozen foods can develop off flavour, vitamin losses and colour changes while in storage.

Blanching

- *Prevents bacterial growth.*
- *Fixes the natural colour of vegetables – holds the colour.*
- *Shrinks the product, better for filling the container.*

Blanching of tomatoes

Activity 2

1. Cut apple/banana. Expose them for 5 minutes in the air. Observe what happens.
2. Squeeze a few drops of lemon juice on a slice of apple. Does the colour change?

4.2.2.3 Canning

Canning involves the application of temperatures to food that is high enough to destroy essentially all micro organisms present. It also involves *airtight sealing* in

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sterilized containers to prevent recontamination. The degree of heat and the length of time of heating vary with the type of food and the kinds of micro organisms. Large quantities of food are canned for preservation. In developed countries, canned foods form a major part of the diet of the people. *Items* often canned are *meats and meat products, fruits and vegetables, fish products, soups, etc.*

The process of canning involves the following steps:

- *Receiving, cleaning, grading and inspecting of raw commodity.*
- *Blanching to inactivate enzymes.*
- *Placing in the container with added brine or syrup and deaeration of the product.*
- *The next process is exhausting. Exhausting is done to expel the air and gas from the can so that its internal pressure, after heating and cooling, is the same as the atmospheric pressure.*
- *After exhausting, the filled cans are permanently sealed mechanically.*

▲ Fig. 4 Home scale canning

- *The sealed containers are subjected to high temperatures, to destroy the most heat resistant organisms.*
- *After this, the cans are cooled by water in a cooling canal to about 38°C, before storage.*
- *The final step is casing and storing the cans.*

4.2.3 Preservation by Dehydration

Dehydration is *the extraction of moisture* from food products like fruits, vegetables, herbs and meat. It inhibits the growth of microorganisms and *imparts a long storage life*. This is a modern development of smoking and drying. Some *changes* that occur during the process of dehydration are:

- *Chemical changes*
- *Browning and flavour changes*
- *Denaturation of proteins*
- *Concentration on the surface of the food (case hardening)*

Dehydration can be done by *drying and salting*. Evaporation is quickened with the addition of moderate heat which is sometimes provided *by natural sunlight*. The ultraviolet rays from the sun serve to *kill microbes*. Modern methods of dehydration use circulating air that is heated just enough to promote dehydration without cooking the food. Food preservation by drying is one of the oldest methods used by human beings. Drying is one of the methods used for dehydration.

4.2.3.1 Drying

Drying is the method nature resorts to preserve foods. Natural drying was adopted by early man to dry fruits, fish and meat by exposing them to the sun.

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Dried tomatoes

Sun drying is used in many parts of the world for preserving certain foods, such as fruits and nuts. However, this method can be used only if the *climatic conditions are hot* with low humidity. In many cases foods are pretreated before drying to make the structure more porous and to facilitate transfer of moisture, thereby speeding the drying rate. Food porosity increases the chance of quick solubility on reconstitution, but is at a disadvantage due to increased bulk and shorter storage stability. *Vegetables like beans, peas, potatoes, cauliflower, ladies finger, garlic, onion and all leafy vegetables can be sundried.*

Changes during drying

- Shrinkage occurs on the surface first and then proceeds to the inner layers. With quick high temperature drying of food, the surface becomes dry and rigid long before the center dries out.
- Dried food pieces may also contain cracks and pores of various diameters. The shrinking and pore clogging by the solutes is known as core hardening. It can be minimized by gradual drying with low surface temperature.
- Foods that lack good structure and are high in sugar content, give an impression of retaining moisture even after the drying process. Fruits like grapes and figs have high sugar content and lack good structure, hence appearing moist even after dehydration.
- Complete prevention of these changes is impossible. They can be minimized by using appropriate technology.

Dry figs are richer in fiber. A ¼ – cup serving of dried figs is nutritionally comparable to a serving of two large fresh figs, providing about same amount of calories, fibres and potassium.

Methods of Drying

A number of drying methods are available; some are suitable for liquids, others for solid foods or mixtures containing food pieces. The common drier types used for liquid and solid foods may be categorized as the air-convection drier, drum or roller drier and vacuum drier.

4.2.3.2 Types of Driers

- **Air-Convection drier** – In the air-convection drier, hot air supplies the heat for evaporation. Though there are different types of air-convection driers, they all have an insulated enclosure, a means of circulating air through the enclosure and a means of heating this air.

  If liquid, the food may be sprayed or poured into pans or on belts. Food in the form of a fine spray or mist is

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introduced into a tower or chamber along with heated air. The small droplets come into contact with the hot air, blast off their moisture, become small particles and drop to the bottom where they are removed. This method can produce a high quality product even with heat sensitive products like milk, eggs and coffee.

- **Drum or Roller drier** – Liquid foods, purees and mashes are dried by this method. The food to be dried is applied, as a continuous thin layer, on to the surface of a revolving drum or between a pair of drums moving in opposite directions heated by steam. The dried layer of food is scraped by a scraper blade positioned at a point on the drum. Foods that are sticky cannot be scraped when it is hot. Such a sticky food becomes brittle when cooled, which facilitates scraping. For heat resistant food products, drum drying is one of the inexpensive dehydration methods.
- **Vacuum driers** – This method is quiet expensive but gives good quality foods. It consists of a vacuum chamber that can withstand air pressure and contains shelves to hold food. The shelves are heated. The food gets heated by conduction and radiated heat. Liquid foods dehydrated by vacuum drying have a puffed structure and are easily dissolved in water. There is minimum flavour change and heat damage because low temperature is used in this method.

Dried foods are very convenient as they are light weight, take up little storage space and can be stored for long periods as emergency foods.

4.2.4 Smoking of Foods

Smoking is mostly done to preserve the meat. This process helps to develop flavours in it. Wood smoke contains small amounts of formaldehyde, higher aldehydes, formic acid, acetic acid and resins. These compounds have antiseptic properties and destroy microorganisms present. The temperature and period of smoking vary with the type of meat. In sausages, the smoking is done for a few hours after smoking the material is packed in polythene bags and kept at refrigerated conditions.

4.2.5 Preservation by Chemical Preservatives

Preservatives are chemical agents which serve to retard, hinder or mask undesirable change in food. Preservatives help in retaining the original quality of food and delaying their spoilage.

Preservatives are classified into class I and class II preservative. Class I preservatives are available at home. Class II preservatives are prepared in the industries.

- Sulphur dioxide is the only permitted preservative used in the form of sulphites.
- In India, sodium benzoate, sulphites and sorbic acids are permitted preservatives used in fruits and vegetables.
- Dried fruits are treated with sulphur dioxide to conserve the colour and to prevent the growth of microorganisms.
- Sodium benzoate is preferred to benzoic acid because of its solubility and used in tomato ketchups, sauces, jams, jellies, pickles and fruit juices.

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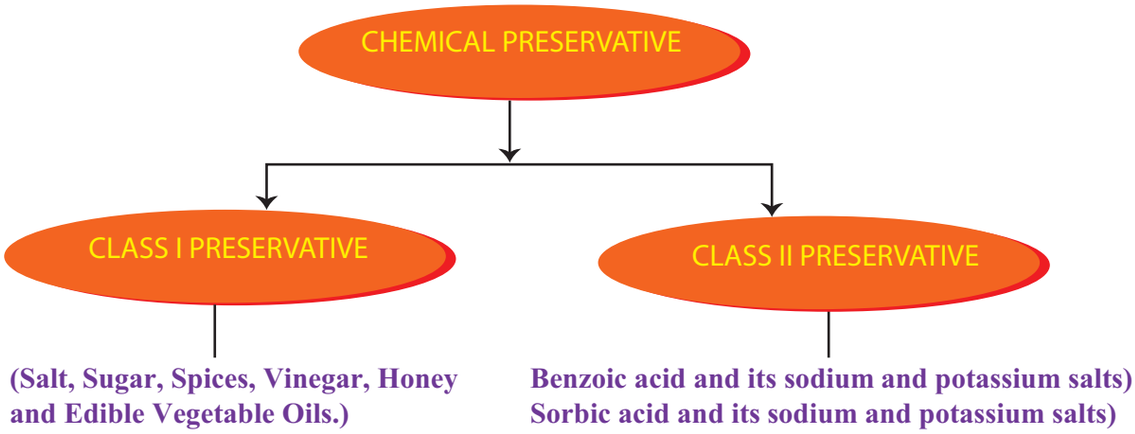

- Sorbic acid and its salts are effective against yeasts and moulds but less effective against bacteria. They are good preservatives for foods with high fat content e.g., low fat spreads and processed cheese.

Sulphite Fact

It is an effective and economical additive. Sulphites decolourise the anthocyanin pigment present in food; hence it is not used in grape crush and squashes. Instead, sodium benzoate is used which retains the colour.

Household preservatives – vinegar (acetic acid) and ascorbic acid (in lemon) are used for preservation.

4.2.6 Preservation by High Osmotic Pressure

The principle of osmosis is used to preserve jams, jellies and pickles. In this process, water tends to draw out from microbes (*plasmolysis)* and makes it dehydrated, thus killing them. But yeasts and moulds are relatively resistant to high osmotic pressure. Hence, preserved foods like pickles tend to spoil if not stored properly.

Mango jam

4.2.6.1 High Concentration of Sugar

Sugar is used to preserve fruits. Preserving fruits in honey to avoid spoilage is a well known practice. Nowadays jams and jellies prepared from fruits have a high concentration of sugar and it acts as a preservative. Pectin, acid and sugar are essential to prepare jam. Jam or jelly are prepared by adding commercially prepared pectin and it also reduces the

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cooking time. Jellies are clear substances made of fruit juice or the extract of a fruit.

Sugar acts in the following ways:

- Sugar draws the water out of food therefore making it unavailable for microorganisms.
- As a result of water loss, microbial metabolism is stopped.
- Hence, the growth of microorganisms is stopped

Preparation of jelly:

- Under-ripe fruits are used, because the pectin content is high and good acidity is essential for a good jelly.
- Pieces of fruit are completely immersed in water and cooked for 10–20 minutes. Hard fruits like guavas need to be cooked for 45 minutes.
- After the fruit is cooked, it is strained without disturbing the fruit pieces.
- The fruit extracts contain pectin which determines the addition of sugar. When the level of pectin is high, it needs more sugar but requires less boiling time.
- Rapid boiling facilitates rapid evaporation, which avoids strong flavour and darkened colour.
- Then the jelly is poured in bottles or moulds, and allowed to set without any disturbance.

CASE STUDY

Case study 1

After a grand marriage function, 50kgs bananas, 5 kgs of tomatoes and 3 kgs of lime were left unused. Suggest ways to preserve these food items.

Preparation of jam:

- Fruits like apples are cooked with skin and made into pulp with the strainer for making jam
- Equal quantities of sugar and pulp are taken to make jam.
- After it is cooked, it is transferred to a sterilized bottle and allowed to cool.

Test for doneness for jam

Sheet test – the mixture is allowed to drip from a large cool spoon. If the syrup forms a sheet instead of two separate drops, the jam is done.

Bubble test – when the end point reaches, big bubbles can be seen throughout the jam.

Plate test – set a plate in the freezer for some time. Put the jam and tilt the plate slowly. The jam should come down as a whole mass forming "U" shape. Water should not separate out.

Fork test – dip the fork into the jam or jelly. Jam of correct consistency forms a sheet between the needles of the fork.

Honey

Honey is a natural preservative in its original state and was one of the earliest preservatives used by ancient civilizations. It has a high concentration of sugar that draws out the water out of yeast or bacteria cells which contaminate the food.

4.2.6.2 High Concentration of Salt

Foods are also preserved by the principle of osmotic pressure in salting and pickling. Most commonly used preservative is sodium chloride. Required quantity may be added to slow down or prevent the growth of microorganisms or enough to permit lactic acid fermentation to take place.

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Salted mangoes and cucumber

Activity 3

Cut a lemon into two. On one half, add some salt and leave the other as it is. Leave it aside for a week. Note the changes.

Sodium chloride preserves the food by the following principles:

- It causes the high osmotic pressure and hence plasmolysis occurs.
- It dehydrates foods by drawing out and tying up moisture, as it dehydrates microbial cell.
- It ionizes to yield the chlorine ion which is harmful to organisms.
- It reduces the solubility of oxygen in the moisture.
- It sensitizes the cell against carbon dioxide.
- It interferes with the action of proteolytic enzymes.

Pickling:

In pickling, food is placed in edible liquids like brine, vinegar or vegetable oil which inhibit or kill microorganisms. Sometimes, food is heated along with pickling agent so that it gets saturated with it.

Pickles may be broadly divided into three groups:

Sweet pickles e.g., tomato sweet pickle, mango sweet pickle.

Sour pickles e.g., mango pickle, lime pickle.

Fermented pickles e.g., cucumber pickle, cabbage pickle, chilli pickle, meat and sausages.

The important preservative agents in pickles are salt, vinegar, sugar, oil, spices and condiments. Each has a specific role in preservation.

Mango pickle

Lemon pickle

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CASE STUDY

Case study 2
During harvest festival season, tomatoes are available in abundance. How can we make use of this?

Salt:

Salt is employed to control microbial population in foods such as butter, cheese, cabbage, olives, cucumbers, meats, fish and bread. There are four methods of salt curing; dry salting (fish), brimming (vadu manga), low salt fermentation (chilli pickle, sauerkraut from cabbage) and pickling (lime pickle). Sodium chloride or common salt is used primarily as a preservative and flavouring agent.

Vinegar:

Vinegar is a natural preservative. Vinegar is made from a two step process. The first process involves the carbohydrate being converted into alcohol by fermentation. The second step is its conversion to an acetic acid. The acetic acid in vinegar kills microbes and stops food spoilage. Pickling is a common method of using vinegar as a preservative. It is also used to improve the flavour of foods.

Spices and condiments:

These have *bacteriostatic* effect (slowing the growth and multiplication of microbes). The essential oil of spices is inhibitor of microorganism. The inhibitory effects of the spices differ with the kind of spice and the microorganisms being tested. Mustard flour and the volatile oil of mustard, for example, are very effective against *Saccharomyces cerevisiae*. In pickles like avakai and chilli pickle, mustard flour helps in the prevention of the growth of spoilage organisms in the food.

Turmeric powder, tamarind, chilli powder, asafoetida, fenugreek seed, cinnamon and cloves are usually *bacteriostatic*. Ground pepper corn and all spices are less inhibitory than cinnamon and cloves. Extracts of these plants have been shown to be inhibitory to *Bacillus subtilis* and *E. coli*. Allicin is the active principle in onions and garlic that kills bacteria and acts against fungi.

Bacteriostatic effect – prevents the growth of bacteria (i.e., it keeps them in the stationary phase of growth)
Bactericidal effect – means that it kills bacteria (cidal-killing)

Oil:

In addition to salt and several spices, oils are used in making pickles. Spice mixtures and oil are added to the fruit or vegetable. It is allowed to ferment for a month or so. The fermentation process renders fruits soft and the fruit take on the additional aroma and flavour of the spices. Aerobic bacteria and mould growth are prevented by covering the top with oil. Properly prepared and stored pickles can last upto a year or more without spoilage.

Spoiled pickle

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DO YOU KNOW?

Any part of pickle which sticks out of oil gets acted by yeast decreasing the acid level. Once this acid level goes down, the bacteria starts acting on the pickle, making it slimy and slippery. This is how **pickles get spoilt**.

Latest techniques in food preservation

4.2.7 Food Irradiation

Food irradiation is a process of food preservation in which food is exposed to ionizing energy – *radio isotope cobalt 60 and cesium-137*. The electromagnetic *radiation suppresses* the growth of most *microorganisms*.

Hospitalized patients, who have compromised immune systems and *astronauts in space*, consume irradiated foods. More than forty years of scientific research show that this process is safe. The radiant energy kills the bacteria in the food, but it does not touch the food directly.

The uses of food irradiation are:

- *To avoid the use of harmful chemical compounds* in insect disinfestations of stored products and microbial decontamination of spices.
- *To extend the shelf life* of meat, poultry and sea foods by killing microorganisms which cause spoilage.
- *To replace the chemicals* used for slowing sprouting in tubers and bulbs and delay ripening of fruits.

4.2.8 Vacuum Packing

Vacuum packing is a process that removes air from the package prior to sealing. This method involves placing items in *a plastic film package, removing air from inside, and sealing the package*. This technology is *widely used* all over the world in the *packaging of milk and milk products, juice etc.*

Facts!

China is the largest apple producing country in the world.

In banana cultivation, Tamil Nadu tops the other states in India.

SUMMARY

- Millions of fruits and vegetables are produced each year and they are lost due to poor processing and preservation.
- Hence all fresh foods have to be preserved to avoid spoilage.
- Preservation ensures increase in shelf life of foods, the quality, the edibility, retention of nutritive value and retention of original colour of food
- The principles of food preservation techniques are prevention or delay of microbial decomposition, prevention and delay of self-decomposition of food, and prevention of damage caused by mechanical causes, insects and rodents.
- Preservation methods include traditional techniques and modern industrial techniques.
- In traditional techniques curing, freezing, boiling, pickling and salting, etc., helps to preserve the food for future use.
- Advanced techniques like vacuum packing, irradiation improves the quality and shelf life of the food.

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GLOSSARY

Shelf life (வாழ்நாள் நீடித்தல்) - The period of food stuff to withstand without spoilage

Spores (இனப்பெருக்கத்திற்கு உதவும் நுண்துகள்கள்) - useful for reproduction

Aroma (நறுமணம்) - a pleasant smell

Rancidity (எண்ணெய் சிக்கல் வாடை) - development of off- flavour in fatty foods

Contamination (மாசடைதல்)- Spoilage caused by environmental factors like water, dust, air, smoke.

Plasmolysis (கிருமிகளிலிருந்து ஈரப்பத–த்தை நீக்குதல்)- Removal of water from the micro organisms

Decay (படிப்படியாக அழிவுறுதல்) - be slowly destroyed

Hazardous (தீங்கு விளைவிக்கக் கூடிய / ஆபத்தான) - dangerous

Edible (உண்ணத்தக்க) - good or safe to eat

Food spoilage (உணவு கெடுதல்) - the condition where food loses its original freshness

Food security (அனைவருக்கும் உணவு கிடைப்பதை உறுதி செய்தல்) - ensuring availability of food to everyone

Microbial decomposition (நுண்ணு–யிரிகளின் செயல்பாட்டினால் உணவு மெல்ல மெல்ல அழுகல் நிலையை அடைதல்) - food is spoiled slowly by the action of microbes

Questions

I. Choose the correct answer

1. Food processing helps to increase the food _____
   a. shelf-life c. colour
   b. spoilage d. Taste

2. One of the oldest method in preserving food is _____
   a. refrigeration
   b. sun drying
   c. pasteurization
   d. Irradiation

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3. Plasmolysis is removal of _____
   a. moisture from micro-organism
   b. nutrients from food
   c. fibre from foods
   d. enzymes from food

4. Brine solution is made from _____
   a. salt c. acid
   b. sugar d. alkali

5. Canning involves application of ____
   a. cold temperature
   b. high temperature
   c. freezing temperature
   d. mild temperature

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6. Smoking is generally done to preserve _____

a. meat c. pulses
b. cereals d. milk

7. Frozen foods are stored for _____

a. 3 months d. 12 months or more
b. 6months
c. 9 months

8. Milk is pasteurized at _____ temperature for 30 minutes.

a. 62.6^{0}C c. 62.8^{0}C
b. 62.7^{0}C d. 62.9^{0}C

9. Preservation helps to maintain the optimum qualities of food in terms of _____

a. colour c. flavour
b. texture d. all the above

10. Removal of microorganisms through usage of membrane is called _____

a. filtration c. boiling
b. asepsis d. irradiation

II. Very short answer (2 marks)

1. Why is sodium benzoate used in the place of benzoic acid in jam and jelly preparation?
2. How does addition of sugar act as a preservative? Write two foods where sugar is used as a preservative.
3. Write few examples for pasteurized food. Give the temperature and time used for the same.
4. Heat treatment is given before freezing the food. Why?
5. Write any two methods where osmotic pressure is used to preserve food and how?
6. Freezing helps in preserving the food. Do you agree with the statement? If yes, How?
7. Enumerate the changes that occur in drying process.

III. Answer briefly (3 marks)

1. What is pasteurization? Pasteurization ensures complete safety of the food. Justify the statement.
2. How addition of sodium chloride acts on food to preserve it?
3. Explain the role of chemical preservatives in preserving fruits and vegetables.
4. Use of sugar helps to preserve the food. Prove it with suitable example.
5. List the causes of food spoilage.
6. Write a note on different types of freezing.

IV. Write in detail (5 marks)

1. Low temperature can be used to preserve the food. Suggest a method and explain.
2. When you are preparing jam, knowing about the end point is very important. Enumerate the methods that will help you identify the end point and explain.
3. Canning plays an important role in food preservation. Justify and Explain the procedure for canning vegetables.
4. Freezing is one way of preserving the food. Explain the points to be considered while preserving fruits, vegetables, meat and poultry by freezing.
5. Explain any two types of driers

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Chapter 5 Nutrition

Learning Objectives

This chapter helps the students to travel through the world of nutrients and their impact on health of humans. It also serves to:

- Be an eye opener towards the concept of nutrition
- Give an understanding of macronutrients and micronutrients
- Study the role of nutrients and their vitality in human life
- Enlighten the hazards of improper nutrition
- Gain knowledge about the likelihood of overcoming deficiency disorders

5.1 INTRODUCTION

Food is the basic necessity of life. Everybody eats food and most people enjoy it. From the beginning, scientists were curious about the food they consumed, its passage in the body and its effects. In the beginning nutrition was mainly related to the energy needs of the body from carbohydrates, proteins and fats. Minerals were studied in detail when they were discovered to be important nutrients. Along with the minerals came the discovery of vitamins. Now nutrition is an important part of our life. We have realized that quality of our health depends upon the nourishment we provide to our body. Most people eat what they like and their choice of food is not influenced by the awareness of its nutritive value. It is always necessary to understand that a delicious dish is not necessarily a nutritious one.

5.1.1 Introduction to Nutrition Science

Definition: Nutrition is the science of foods, the nutrients and their action, interaction and balance in relationship to health and disease; the process by which the organism ingests, digests, absorbs, transports and utilizes nutrients and disposes of their end products.

Antoine Lavoisier is the father of Nutrition. He designed a calorimeter which measured the heat produced by the body from work and consumption of varying amounts and types of foods

Nutrients are the constituents in food that must be supplied to the body in suitable amounts. They are classified as macronutrients and micronutrients.

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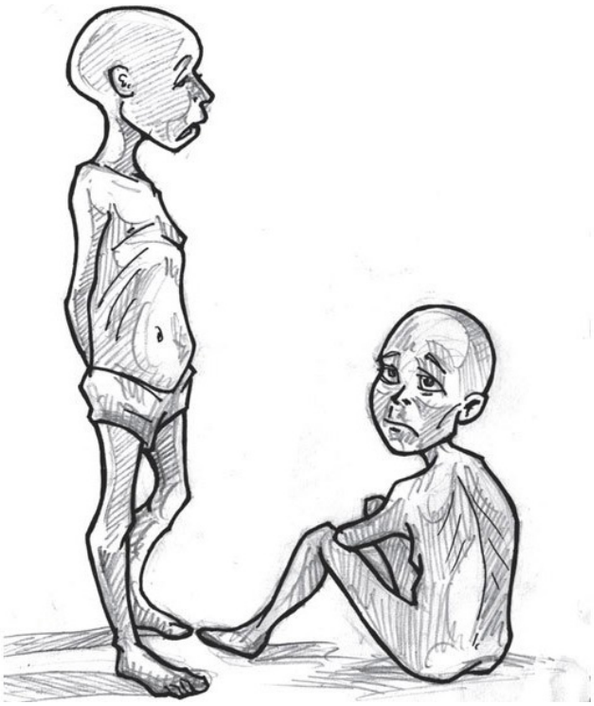
Nutrients

Macro nutrients
- Carbohydrates
- Proteins
- Lipids/fats

Micro nutrients
Vitamins
Minerals



Poorly nourished children

Wellnourished children

▲ Fig. 1 Depiction of Poorly nourished children and wellnourished children

5.2 MACRONUTRIENTS

Macronutrients refer to the nutrients that are needed in large quantities. They are broadly classified as carbohydrates, protein and lipids/fats.

5.2.1 Carbohydrates

- **Definition:** Carbohydrates are sugars or polymers of sugars such as starch that can be hydrolyzed to simple sugars by the action of digestive enzymes or by heating with dilute acids. Generally but not always, the hydrogen and oxygen in them are in proportion to form water, hence the term carbohydrate.

  The predominant function of the carbohydrates is to provide energy needed by our body. Starch found in cereals and sugar in sugarcane and fruits are examples of carbohydrates in foods.
- **Classification:** The dietary carbohydrates are classified as:

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Carbohydrates

- Monosaccharides eg: Glucose Fructose
- Disaccharides Eg: Sucrose Lactose
- Polysaccharides eg: Starch

▲ Fig. 1 Classification of Carbohydrates

- **Functions:** The functions of carbohydrates include
  - Carbohydrates are a source of energy. Each gram of carbohydrate yields 4 kilo calories
  - Adequate supply of carbohydrate ensures that proteins are spared from performing the role of giving energy.
  - Major source of energy for muscular work.
  - Detoxifying action and regulating influence of protein and fat metabolism.
  - Source of energy for heart muscle
  - Excess calories through carbohydrate is stored as fat in the adipose tissue.
  - Stimulates the peristaltic movement in the form of dietary fiber which helps in preventing heart diseases, diabetes mellitus and cancer.
- **Food Sources:** Carbohydrates are found in cereals like Rice, Wheat, Bajra, Jowar. Fruits, Honey and Jaggery are also rich sources of carbohydrates

Food sources of carbohydrates

▲ Rice

▲ Wheat

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▲ Bajra

▲ Jowar

▲ Fruits

▲ Honey

▲ Jaggery

5.2.2 Proteins:

- **Definition**

  The word '**protein**' is derived from the Greek word protos meaning 'first'. Protein is the basic chemical unit of living organisms and is essential for nutrition, building of new tissues (growth) and maintaining and repairing of those already built. Casein from milk, albumin in egg and gluten in wheat, are examples of proteins occurring in foods.

- **Classification:** The proteins are classified as:
  - Complete proteins e.g. Egg proteins
  - Partially complete proteins e.g. wheat proteins
  - Incomplete proteins e.g. Gelatin or zein

- **Functions**: Proteins perform the following functions;
  - Necessary for growth
  - Wear and tear of human body is repaired
  - For regular supply of raw materials for the formation of digestive juices, hormones, plasma proteins, hemoglobin, vitamins and enzymes.

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- Each gram of protein supplies 4 Kcal of energy

- **Food Sources:** Animal foods like Meat, Fish, Eggs and Milk are excellent sources of proteins. Plant sources like Pulses, Oil seeds and nuts are also good sources of protein

▲ Meat

▲ Eggs

▲ Pulses

▲ Fish

▲ Milk

▲ Oil seeds

▲ nuts

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- **Deficiency:** Deficiency of protein causes protein energy malnutrition which covers a wide spectrum of clinical stages ranging from the severe forms like kwashiorkor and marasmus to the milder forms like growth retardation. Protein energy malnutrition is due to "food gap" between the intake and requirement. The average energy deficit in Indian children is 300kcal/day. Deficiency of protein is discussed in detail in the section protein energy malnutrition

▲ Butter

▲ Ghee

5.2.3 Lipids/Fats

- **Definition:** Lipids are organic substances soluble in fat solvents such as alcohol, ether, and chloroform but not in water. The term includes fatty acids, soaps, neutral fats, phospholipids, steroids and waxes. Oils found in seeds, butter from milk, and lard from meat, are examples of fats found in foods.

Table 1 Classification of Lipids

Simple Lipids	Compound Lipids	Derived Lipids
Fats and Oils	Phospholipids	Hydrolytic substances of simple and compound lipids
Waxes	Glycolipids	
	Lipoprotein	

Source: Swaminathan.M 2012, Foods and Nutrition, Bangalore Printing and Publishing Company, Bangalore.

- **Classification:** Lipids are classified as follows
- **Functions:** The functions of lipids are to
  - Provide energy reserve and supply 9 kcal/gram.
  - Serve as a vehicle for the absorption of fat-soluble vitamins A, D, E, and K
  - Supply essential fatty acids necessary for growth and function
  - Provide energy source so that proteins are spared for tissue growth and repair
  - Gives satiety
  - Act as insulators against heat and cold.
- **Food Sources:** Visible fat sources are Butter, Ghee and Oil. Invisible fat sources are Cereals, Pulses, Oil seeds, Milk and Egg.

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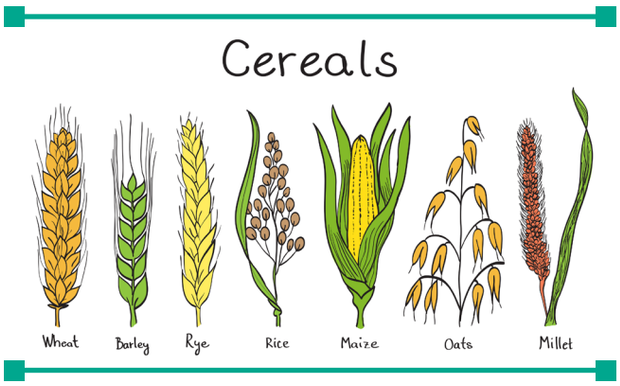

▲ Cereals

▲ Oil seeds

▲ Egg

▲ Oil

▲ Pulses

▲ Milk

5.3 MICRONUTRIENTS

Until the middle of the 19th century the importance of minerals and vitamins was not given adequate emphasis. It was observed that the macronutrients alone were not sufficient to promote and sustain growth.

This led to the discovery of the micronutrients namely the minerals and vitamins which are essential for growth and maintenance. Macro minerals are those which are present at levels more than 0.05 percent in the human body. Calcium, phosphorus, magnesium, sodium and potassium belong to this category. Other minerals present at less than 0.05 percent in the human body are defined as micro minerals. The micro minerals are also

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known as the trace elements. Some micro minerals are iron, iodine, zinc, copper, fluorine, selenium, chromium, manganese, cobalt and molybdenum.

5.3.1 Minerals

The minerals calcium, phosphorus, iron iodine, sodium and others are found in various foods in combination with organic and inorganic compounds. Minerals are necessary for body building, for building bones, teeth and structural parts of soft tissues.

(i) Calcium

- **Distribution:** Calcium makes up between 1.5 to 2 percent of body weight accounting for 1200-1600 g of the adult male body. Ninety percent of calcium is found in mineralized tissues such as bones and teeth as calcium phosphate and calcium carbonate. The remaining 1% is found in blood, extracellular fluid (ECF), muscle and tissues.
- **Functions:** The functions of calcium in humans are manifold:
  - **Bone formation:** The important minerals within bone are calcium phosphate and magnesium. There is 1 kg of calcium in the adult skeleton as a complete crystalline material with phosphate.
  - **Tooth formation:** The enamel and dentin of tooth contain considerable amounts of calcium which are dense and are present along with keratin.
  - **Growth:** It is required for growth as it forms an important part of the bones and teeth and proper functioning of every cell in the body.
  - **Blood clotting:** Calcium contributes to clotting of blood.
  - **Contraction of the muscle:** Calcium ions are bound by the electrostatic forces to the proteins inside and outside the cells and to cell membranes. Proteins bound by calcium alter their configuration at the neuro muscular junction by the nerve impulses causing free calcium to be released. The free calcium bound to troponin leads to an internal trigger and so the contraction of the muscle takes place
  - **Metabolic essentiality:** Calcium acts as a activator for the enzyme renin present in gastric juice which aids the digestion of milk.
- **Food sources:** Calcium is present in both animal and plant foods. The richest source of calcium among animal foods is milk and

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among the vegetable sources it is green leafy vegetables. Among the green leafy vegetables, amaranth, fenugreek and drumstick leaves are rich sources of calcium. Ragi among cereals is a rich source of calcium. Small dried fish, nuts and oil seeds like gingelly seeds, betel leaf with slaked lime are also a rich source.

- **Absorption:**

  Factors increasing absorption of calcium: Vitamin D, acidity of digestive mass, lactose, protein and phosphorus are the factors which favor the absorption of calcium.

  Factors decreasing absorption of calcium: Oxalic acid, phytic acid, high fat diets including steatorrhea, emotional instability, increased gastrointestinal mobility, lack of exercise, ageing, caffeine and drugs decrease the absorption of calcium in the body.

Food for thought: Cola beverages and bone fractures

Drinking cola beverages which contain phosphoric acid and often caffeine may increase the fragility of bones in children and adolescents. So it's better to avoid cola drinks.

- **Health Problems/ Deficiency:**
  - **Osteoporosis:** This is a condition associated with a loss in bone density and bone mass which literally means "porous bone". With the ageing process resorption predominates bone formation resulting in osteoporosis.

    Risk factors for osteoporosis include
    - Females who are fair complexioned are at eight times more at risk
    - Asian Race
    - Family history
    - Prolonged dietary insufficiency
    - Poor absorption and utilization of calcium
    - Restricted movement
    - Decreased levels of estrogen
    - Hyper parathyroidism
    - Vitamin D insufficiency
  - **Osteomalacia:** It is a condition where the quality of the bone is diminished and the quantity of the bone is not compromised.
  - **Osteopenia:** It refers to the bone density that is lower than normal peak density but not low enough to be classified as osteoporosis.

The strength of the bone is measured by a bone density test using a CT (Computed Tomography) scan or DEXA (Dual energy X ray Absorptiometry). The numerical result of the bone density is quantified as a "T score". The lower the T score, the lower the bone density. T scores greater than 1.0 are considered normal and indicate healthy bone. T scores between 1.0 and -2.5 indicate osteopenia. T scores lower than -2.5 indicate osteoporosis.

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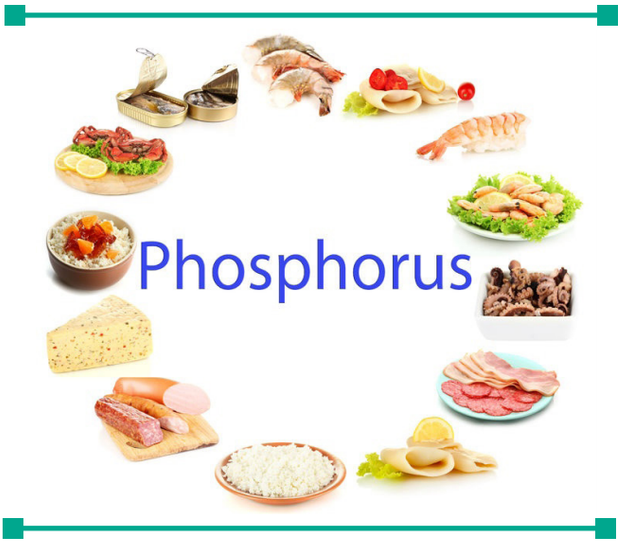
The difference between osteopenia and osteoporosis is a matter of severity of the loss of bone density.

- **Tetany:** A decrease in serum calcium levels gives rise to a condition called tetany. The symptoms of tetany are severe intermittent spasms of the muscles of hands and feet accompanied by muscular pain. Twitching of facial muscles occurs.

(ii) Phosphorus

- **Distribution:** It comprises 1 percent of total body weight along with calcium. An adult human body contains about 400-700 g of phosphorus as phosphates. Bones and teeth contain 85 percent of phosphorus and soft tissues contain15 percent of phosphorus.
- **Functions:**
  - Formation of bone and teeth along with calcium and magnesium.
  - Formation of phospholipids which are integral parts of cell structure.
  - Constituent of co enzymes like coenzyme I and co – carboxylase.
  - Integral constituent of DNA and RNA (nucleic acids) and nucleoproteins.
  - Buffering of acid or alkali excesses to maintain normal pH.
  - Temporary storage and transfer of the energy derived from metabolic fuels.
  - As part of enzymes needed for the metabolism of carbohydrates, protein and fats.
- **Food Sources:** Phosphorus is widely distributed in foods. Milk and meat are rich in phosphorus. Whole grain cereals, legumes, nuts, carrots and fish are also rich sources of phosphorus.



- **Calcium Phosphorus ratio:** Nutritionists recommend that a Ca:P ratio **between 1:1 to 2:1** should be provided by the total diet.
- **Deficiency:** Phosphorus is so ubiquitous in various foods that near total starvation is required to produce dietary phosphorus deficiency. Inadequate phosphorus intake is expressed as hypophosphatemia which manifests in the form of anemia, anorexia, muscle weakness, bone pain, rickets, osteomalacia, general weakness and increased susceptibility to infection.

(iii) Iron

- **Distribution:** Iron content of normal adult man is estimated to be about 4 grams. Iron is distributed as 60% in the circulating **hemoglobin,**

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5% **myoglobin**, various **heme and non heme enzymes** (5%). The remaining iron is found in body storage as **ferritin** (20%) and **hemosiderin** (10%) the two major iron storage proteins.

In developing countries estimated prevalence of anemia is 39 percent in children and 42 percent in women. In Asia 12.8 of maternal mortality deaths are caused by anemia.

- **Forms of dietary iron**

  Heme iron: Heme iron is the iron associated to the protein globin to form hemoglobin and is found in flesh foods only

  Non heme iron: This form is present in all plant sources in addition to 60% of animal sources.

Heme absorption varies from 15-35 % depending on the iron status of the consumer. Non heme iron absorption can vary widely from less than 1% to more than 90% but usually in the range of 1-20%.

- **Absorption:** Several factors favor and inhibit iron absorption

  Factors favoring absorption of Iron:
  - Body needs,
  - Ascorbic acid,
  - Animal tissues,
  - Pregnancy,
  - Low iron status,
  - Low heam iron intake.

  Factors decreasing the absorption of iron:
  - Binding agents like fiber, phosphates, phytates and oxalates,
  - High calcium intake,
  - Achlorohydria (low gastric acid)
  - Infection
  - Gastrointestinal disease.

- **Functions:** Iron has varied significant functions in human body. They include:
  - Transport and storage of oxygen where each gram of hemoglobin contains about 3.34 mg of iron.
  - As myoglobin iron is required for oxygen storage in muscle.
  - Iron acts as a cofactor of enzymes.
  - It is a component of cell enzyme systems that oxidize glucose and other energy yielding nutrients.
  - Production of immune cells that attack foreign bacteria invading the body.
  - Positive iron balance is necessary for continued growth.
  - To build reserves for physiologic stress during adolescence for both boys and girls.
  - Necessary for brain development, cognitive function, the synthesis and breakdown of neurotransmitters.

- **Food sources:**

  Rich sources of iron are cereals, millets, pulses and green leafy vegetables. Of the cereal grains and millets bajra and ragi are very good sources of iron. Other sources of plant foods include manathakali

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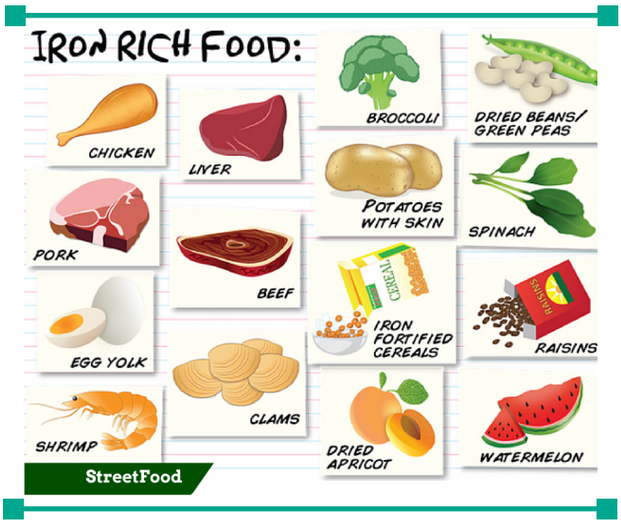
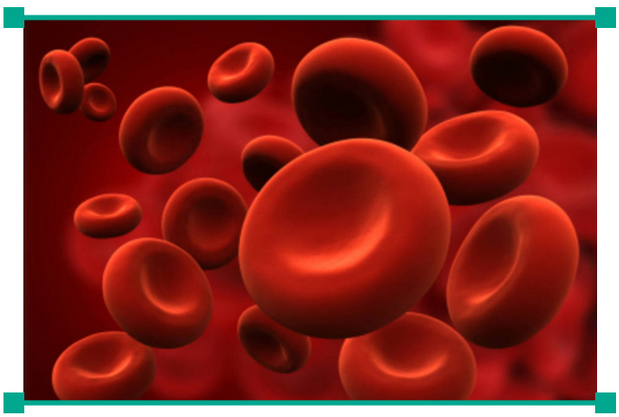
leaves, rice flakes, mint, soya bean, cow pea, gingelly seeds and dates. Animal food sources include red meat, and fishes like herring and mackerel.

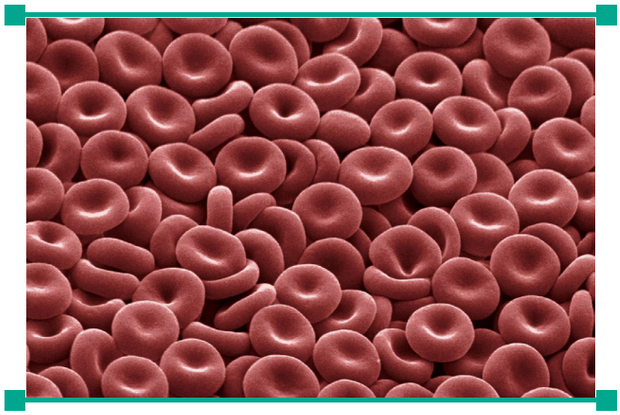


- **Deficiency**

  Iron Deficiency anemia: When there is an insufficiency of iron for the formation of hemoglobin, the RBC's become pale and small. The resulting anemia is called hypochromic and microcytic anaemia which is the most common form of anaemia throughout the world affecting women mainly in their reproductive years, infants and children.



▲ Normal RBC

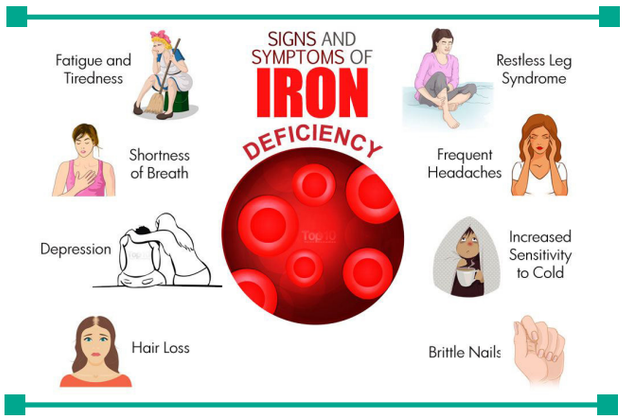


▲ Microcytic and hypochromic RBC

Causes: Low iron intake, blood loss, malabsorption chronic diseases, obesity

Signs of Iron Deficiency

- Fatigue
- Muscle weakness,
- Pale color
- Decreased resistance to infection
- Spoon nails(Koilonchyia)
- Angular stomatitis
- Dizziness
- Dimness of vision
- Insomnia
- Headache



Regular consumption of iron rich foods, vitamin C rich foods, seasonal fruits and vegetables can definitely prevent anemia.

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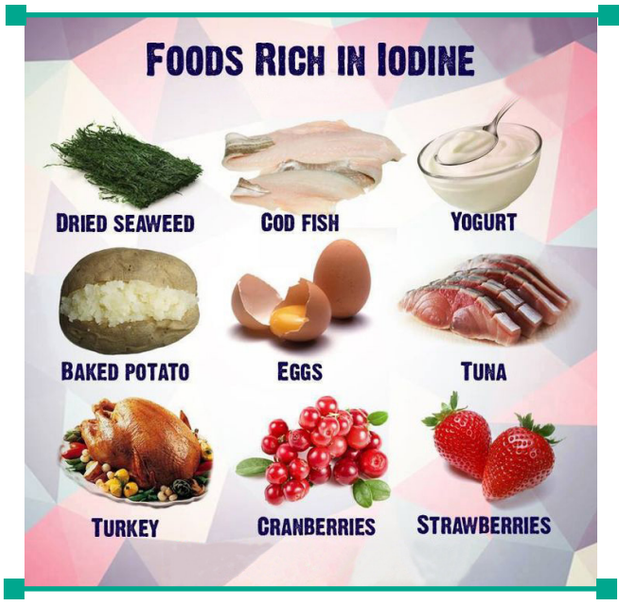
Activity 1

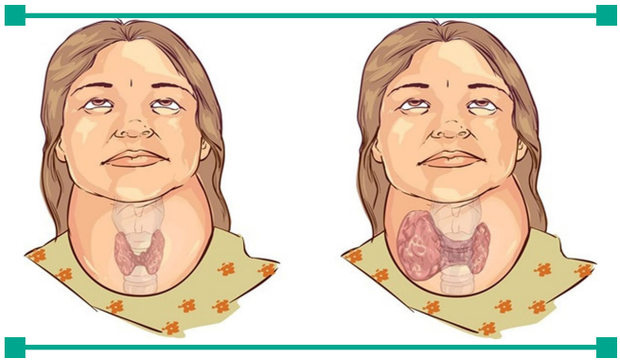
Prepare recipes using low cost iron rich food sources for breakfast kunch and dinner for an adolescent girl with anemia

(iv) Iodine

- **Distribution:** It is one of the essential micronutrients required for normal growth and development of human brain and body. Human body contains a total of 15-20 mg of iodine. Thyroid gland contains 75% of iodine and is an essential constituent of thyroxine the active principle of thyroid gland
- **Functions:** Iodine though required in small quantities is needed to perform the following functions
  - Synthesis of thyroxine which regulates growth, development and reproduction.
  - Helps the thyroid hormones to increase and regulate the processes of brain function
  - Enables the thyroid hormones to regulate the conversion of carotene to active vitamin A.
- **Food sources:**
  Marine fish and eggs are good sources of iodine. Based on the dietary pattern and analysis of raw foods, iodine content of various regional diets range from 170-300 µg/ day
- **Deficiency:** It covers a collection of disorders at all stages of human growth and development.

  Goiter: Goiter is the enlargement of thyroid gland which results when iodine is not available in sufficient quantities to produce normal quantity of thyroxine. It also arises from eating foods (goitrogens) that inhibit the synthesis of thyroxine.





REMEMBER

21st October is Global Iodine Deficiency Disorder Day

Cretinism: A congenital disease resulting from a lack of iodine and thyroxin secretion characterized by physical deformity, dwarfism, mental retardation and often goiters.

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Dietary improvement: Salt iodization remains the most cost effective way to deliver iodine to both humans and livestock and is credited with eradicating iodine deficiency.

CASE STUDY

Case study 1

Margret is having a swelling in her neck which makes it difficult for her to breathe and swallow food. The enlargement is soft and does not pain.

1. What is the condition she is suffering from?
2. What is the nutrient deficient in her food?
3. Suggest some foods for her quick recovery

(v) Zinc

- **Distribution:** Zinc is the most important intracellular trace element. An adult human contains 2g of zinc of which 60% is in skeletal muscle, 30% in bone and 4-6% is present in zinc.
- **Functions:** The functions of zinc include
  - Important constituent of enzymes like alkaline phosphatase and carbonic anhydrase.
  - Required by protein kinases that participate in gene expression.
  - Also a component of metalloenzymes.
- **Food sources:** Meat, seafood and liver are good sources of bioavailable zinc. In cereals most of the zinc is found in the outer fiber rich part of the kernel.

- **Deficiency:** The clinical manifestations of severe zinc deficiency in humans are growth retardation, dermatitis, hair loss, diarrohea, increased infections, delayed wound healing, loss of appetite, hypoguesia (diminished taste) dysguesia (altered taste) hyposmia (diminished smell). Decreased zinc intake is associated with increased risk of low birth weight and preterm delivery.

5.3.2. Vitamins

Fat soluble vitamins A, D, E and K and also water-soluble vitamins C and B group are found in foods. These are needed for

Fat Soluble	Water Soluble
A, D, E, K	B complex group and C

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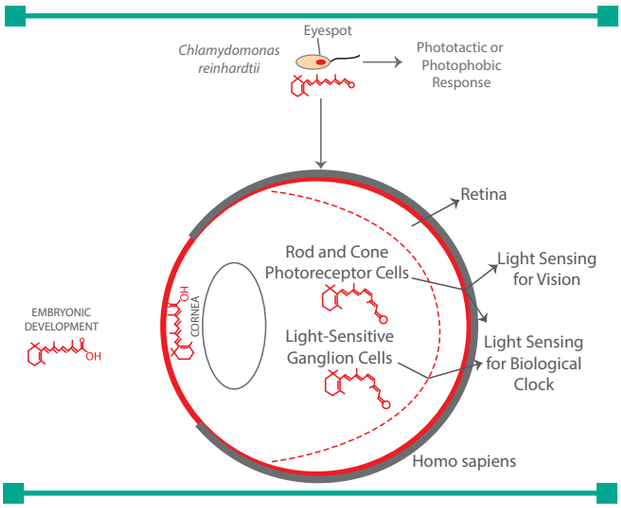
growth, normal function of the body and normal body processes.

5.3.2.1 Fat Soluble Vitamins

(a) **Vitamin A:** The vitamin A compounds include retinol, retinal and retinoic acid. Because it has a specific function in the retina of the eye and because it is an alcohol it was given the name retinol. Beta carotene is precursor of vitamin A and is found in large quantities in vegetables and fruits.

- **Functions:** Vitamin A performs the following functions:
  - Vitamin A is essential for vision in normal and dim light.
  - Formation and maintenance of healthy functioning epithelial tissue.
  - Glycoprotein and mucoprotein synthesis
  - Cancer prevention
  - Prevention of degeneration of myelin sheath
  - Normal bone formation and reproduction.



- **Food sources:** In the animal foods vitamin A is present in the form of retinol which are identified to be liver, cream, butter and egg yolk. Liver oils of fish like cod, halibut and shark are the richest sources of vitamin A. The main contributors of beta carotene are the yellow and green vegetable fruit sources of carotene- carrots, papaya, mango, sweet potatoes, spinach and broccoli.

- **Deficiency:** Decreased Vitamin A intake leads to vision problems
  - **Night blindness:** People suffering from night blindness cannot see objects in dim light
  - **Xerosis Conjunctiva:** The conjunctiva is dry, thickened, wrinkled and pigmented. This is due to the keratinization of the epithelial cells.
  - **Xerosis Cornea:** This manifests in the form of corneal dryness which gives the cornea a dull

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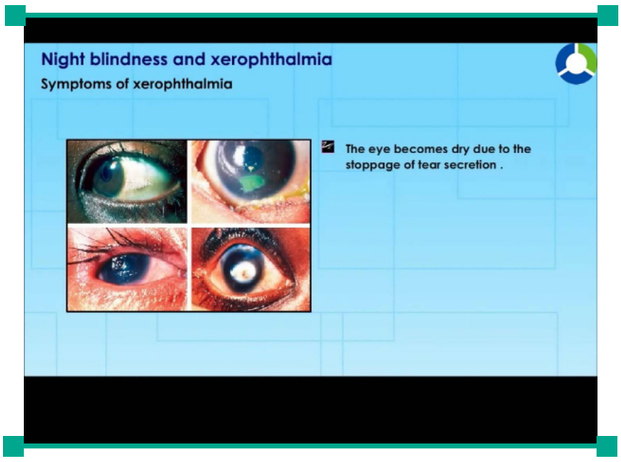
hazy and lusterless appearance.

- **Bitot's spots:** These are greyish or glistening white plaques occurring in the conjunctiva usually triangular in shape and are found in children.
- **Keratomalacia:** When Xerosis of the conjunctiva and cornea is not treated it may develop into the condition called kerato malacia which is characterized by necrosis, ulceration and bacterial invasion of cornea leading to the total destruction of the eyeball and eventually total blindness.



WHO in 2013 has estimated 44 percent of South Asians suffer from Vitamin A deficiency and it has been identified as a major public health problem.

- **Prevention of vitamin A deficiency**
  The strategy should be a combination of long term nutrition education programme, enhanced intake of vitamin A rich food, improvement in household food security and availability of vitamin A rich foods and a periodic massive dose of vitamin A.

INTERESTING FACT

UNICEF-supported Vitamin A supplementation programmes have been reaching children aged 6 to 59 months across the globe. They have improved the immunity of children and their chance of survival has increased from 12 to 24 per cent.

Activity 2

Suggest simple dietary tips to enhance the intake of Vitamin A for school children

(b) **Vitamin D:** Vitamin D is known to be a prohormone of a sterol type and the synthesis of active form of vitamin D is known as the 1,25 – dihydroxycholecalciferol which is accomplished by the combined action of skin, liver and kidneys.

- **Functions**
  - Maintains balance with parathyroid hormone to stimulate the active transport of calcium and phosphorus.
  - Acts on the bones promoting calcification.
  - Facilitates the absorption of calcium and phosphorus from the intestines.
  - Involved in widespread basic cell processes with targets

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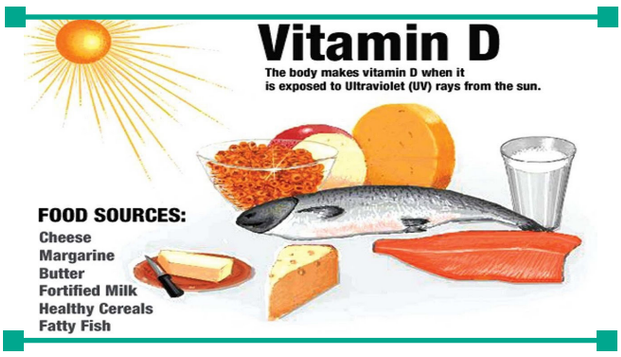
in brain, kidney, liver, skin, reproductive tissues.

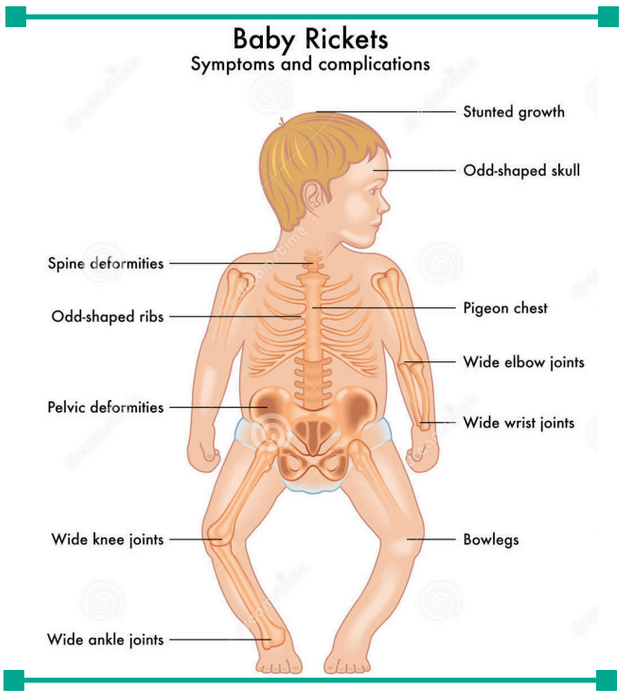
- **Food sources:** Vitamin D is present only in some foods of animal origin. Certain marine fishes and fresh water fishes are known to be good sources of vitamin D. The most important sources are egg yolk, butter, cheese, milk.



- **Deficiency:** Vitamin D deficiency occurs in children who are not adequately exposed to sunlight. It is characterized by inadequate mineralization of the bone. In children the condition is known as rickets and in adults it is called Osteomalacia.

  Rickets: In rickets there is softening of the skull bones and the head is enlarged, elongated and flattened on the vertex. Softening of the ribs, sinking of the chest, beaded junctions of the ribs with cartilages (rickety rosary), pigeon chest, knock knees and bow legs. Deformities of the long bones spine, pelvis, muscles, and feet are observed. Dentition is delayed.

  Osteomalacia: It is the adult counterpart of rickets. It occurs in



women of child bearing age and in those who consume poor cereal diets deficient in vitamin D and calcium. Besides it is found among those who stay indoors all day and seldom go out in the sun.

(c) **Vitamin E:** Vitamin E is the generic name for a group of vitamins, three of which –alpha tocopherol, beta tocopherol and gamma tocopherol display the greatest biologic activity. Of these three, alpha tocopherol is the most significant form of Vitamin E

- **Functions**
  - Vitamin E a major antioxidant which reduces the incidence of heart diseases.
  - It is essential for normal reproduction in man.
  - It acts along with selenium in reducing the body's requirement for each other.
  - It plays a vital role in the immune function of the body.

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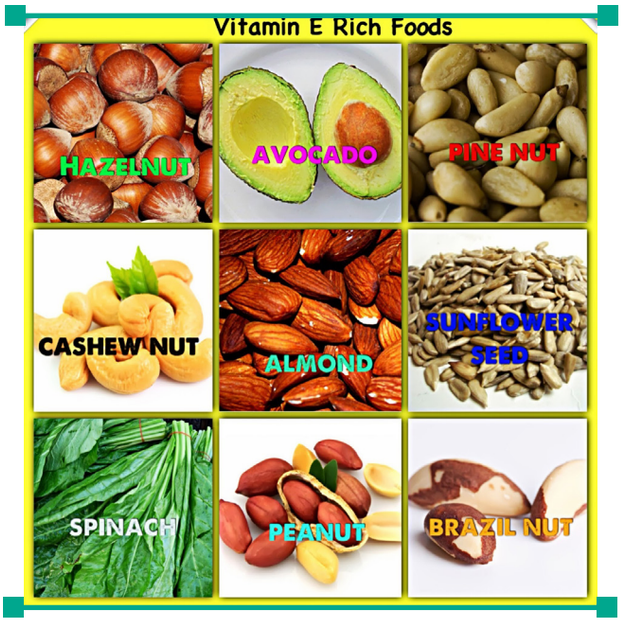
- **Food sources:** Vegetable oils, nuts and whole grams are the richest sources of vitamin E (eg. Wheat germ oil). It is present in small quantities in lettuce, grasses and embryos of many seeds. In general, plant foods are richer sources of vitamin E than animal foods.



- **Deficiency:** Vitamin E deficiency has been associated with irritability, edema and hemolytic anemia among infants. Also muscular dystrophy is common to all species in which there is degeneration of skeletal and cardiac muscle with vitamin E deficiency.

(d) Vitamin K

Vitamin K occurs in two forms.

1. Phylloquinones (vitamin K1) - plant source and dietary form of vitamin K
2. Menaquinone (vitamin K2) - synthesized by intestinal bacterial flora.

- **Functions:** The major functions of Vitamin K though not many are listed as follows:
  - Vitamin K is essential for blood clotting.
  - Required for the synthesis of blood clotting factors by the liver.
  - Vitamin K is vital to maintain normal levels and activation of blood clotting factor like prothrombin,
- **Food Sources:**
  The major dietary source of vitamin K is Phyllo Quinone which is present in high concentration in most vegetables like cabbage, spinach and cauliflower. Animal food sources include cheese, egg yolk, and liver.

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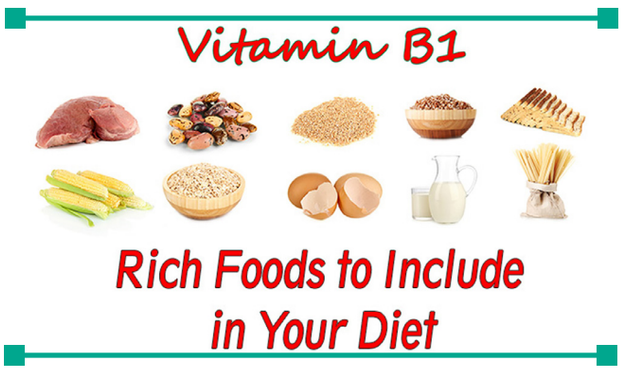
- **Deficiency:** It manifests in the form of defective blood clotting. Low levels of prothrombin and hemorrhage are seen in severe forms of deficiency.

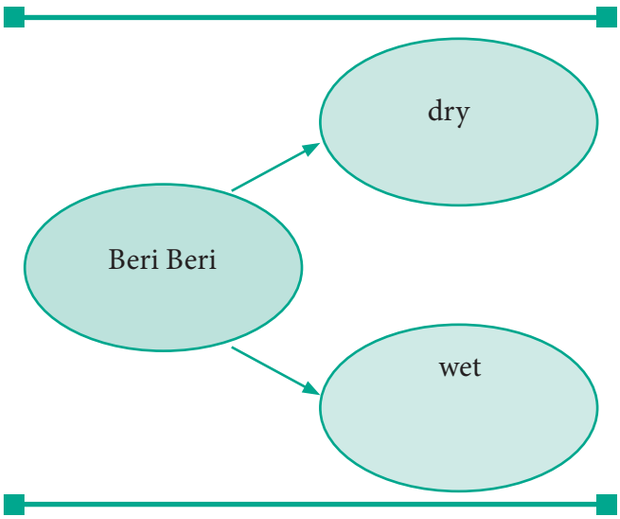
5.3.2.2 Water Soluble Vitamins

(a) Thiamin (B1): Thiamin is the first member of the B complex vitamins which is essential to the body in its coenzyme form.

- **Functions:** The coenzyme of thiamin is Thiamin Pyro Phosphate (TPP). Thiamin is useful in our body for the following functions
  - It enhances growth in human beings.
  - It plays an important role as a coenzyme in carbohydrate metabolism
  - Maintenance of nerves in normal condition.
- **Food sources:** Good food sources include lean pork, beef, liver, whole or enriched grams and legumes.

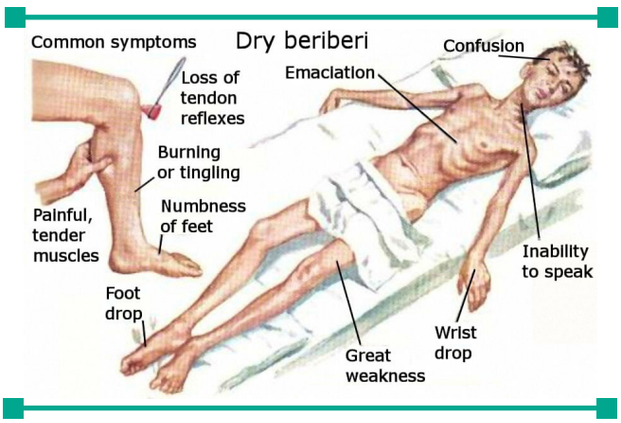


- **Deficiency of thiamin:** The discovery of thiamin provided the answer to the puzzle of a nutritional problem called beri beri. The deficiency of thiamin causes beri beri in human beings. The Philippino word beri beri means "I Can't" refers to the lack of neuromotor coordination in persons with the disease.



▲ Fig. 3 Types of Beri Beri

Beri Beri is of two types: dry and wet type. In dry beri beri the muscles become progressively wasted, weak and walking becomes difficult. If not treated the patient becomes bedridden and will die. In wet beri beri edema is present which involves the face, trunk and serous cavities. Palpitation and breathlessness are present. The heart becomes weak



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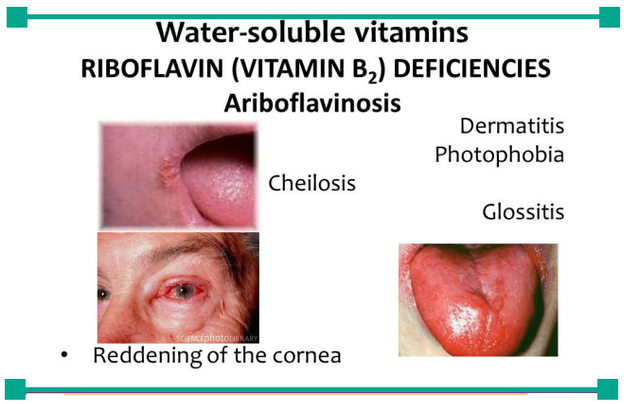
and death occurs due to heart failure. Infantile beri beri is seen in many South East Asian countries where the diets consist mostly of "polished rice".

(b) **Riboflavin (B2):** Riboflavin is a stable vitamin which is resistant to acid, heat and oxidation. But it is unstable in the presence of alkali and light.

- **Functions:**
  The two coenzymes of Riboflavin Flavin Mono Nucleotide (FMN) and Flavin Adenine Dinucleotide (FAD) perform the following functions
  - Formation of red blood cells in the bone marrow.
  - Regulates the functions of hormones in carbohydrate metabolism.
  - Present in the retina in the free form which gets converted to a compound which stimulates the optic nerve.
  - Release of energy from glucose, amino acids and fatty acids.
- **Food sources:** Good sources of riboflavin are milk and milk products, eggs, liver, whole or enriched grains and green leafy vegetables.

- **Deficiency:** The deficiency of riboflavin (ariboflavinosis) leads to glossitis (swollen and reddened tongue), swollen lips, cheilosis (inflammation of the corners of the mouth, are some of the common symptoms observed. Further deficiency states are marked by chronic conditions like tuberculosis, prolonged fevers, malabsorption, hyperthyroidism and malignancy.



(c) **Niacin:** Niacin formerly known as nicotinic acid was obtained by the oxidation of nicotinic acid. Apart from the food sources, Niacin is also obtained from tryptophan (60mg) an essential amino acid which can be converted into niacin (1mg).

- **Functions:** Two coenzymes of Niacin Nicotinamide Adenine Dinucleotide (NAD) Nicotinamide Adenine Dinucleotide Phosphate (NADP) are required for:
  - Release of energy from all energy yielding nutrients like carbohydrate, protein and fat.
  - Normal functioning of the skin, intestinal tract and the nervous system.

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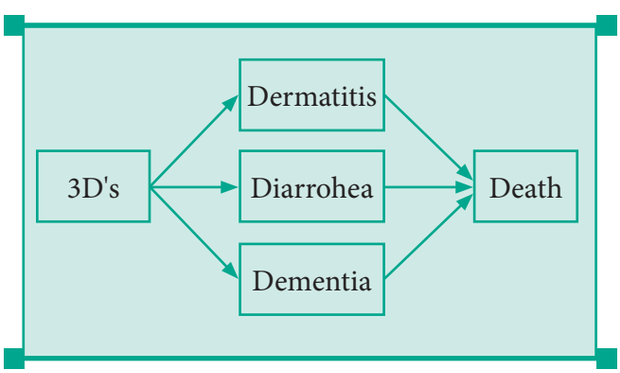
- Synthesis of protein and fat for the formation of DNA and RNA.

- **Food sources:** Whole cereals, pulses, nuts and meat are good sources of Niacin. Groundnut is rich in Niacin. Milk is rich in Tryptophan the precursor of Niacin in the body.

- **Deficiency:** Deficiency of Niacin causes Pellagra which is the 3D (Dermatitis, diarrohea, dementia or depression) disease leading to the fourth D (Death).



▲ Fig. 4 Pellagra or 3D disease

Consumption of diets rich in corn can create amino acid imbalance as corn is rich in leucine and deficient in tryptophan. The typical features of pellagra are loss of weight and increasing weakness. Non- specific signs like anorexia, nausea, digestive disturbances and emotional changes like anxiety, irritability and insomnia may be present.

Dermatitis of Pellagra

(d) **Pyridoxine (B6):** Pyridoxine exists in the body in three forms: Pyridoxal,

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Pyridoxine and Pyridoxamine. Pyridoxal 5 phosphate is the co-enzyme form of pyridoxine.

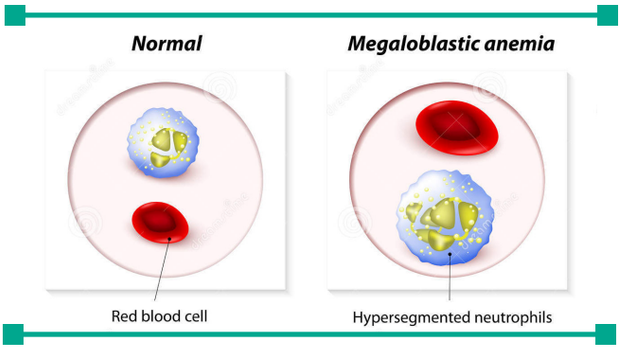
- **Functions:** Pyridoxal 5 phosphate acts as a coenzyme in protein metabolism. Its functions include
  - Amino acid transport.
  - Essential for the growth of infants.
- **Food sources:** Good food sources include grains, seeds, liver, kidney and other meats.

- **Deficiency:** Clinical Symptoms of pyridoxine deficiency have not been clearly defined. Some types of angular stomatitis (cracking at the corners of the lips) and certain types of anaemia have been reported due to decreased intake of pyridoxine.

(e) **Folic acid:** The term folic acid was coined to as it was first extracted from dark green leafy vegetables such as spinach.

- **Functions:** The different functions of folate include:
  - Normal growth and division of all cells.
  - Maturation of red blood cells.
  - Vital role in the metabolism of some amino acids.
- **Food sources:** The rich sources of folate are fish, mutton, liver, egg, chicken, green leafy vegetables and pulses.

- **Deficiency:** Deficiency of folic acid causes megaloblastic anaemia. Megaloblasts appear in bone marrow and peripheral blood. Poor dietary intake of folic acid, low absorption, increased losses, increased requirements, infestation, infection and drugs also cause folic acid deficiency. Symptoms include weakness, tiredness, dyspnea, sore tongue, headache and palpitation. Folate



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deficiency during pregnancy can result in neural tube defects like spina bifida and anencephaly.

(f) **Cyanocobalamin (B12):** The vitamin is named as cyanocobalamin because of the presence of cobalt and cyanide in its structure. It can be absorbed in the body only in the presence of Intrinsic Factor (IF).

- **Functions:** Physiological functions and biochemical functions of cyanocobalmin are:
  - Maturation of erythrocytes
  - Synthesis of myelin (white sheath of lipoprotein) that surrounds many nerve fibres.
  - Increase in White Blood Corpuscle (WBC) count and platelet.
  - Stimulation of appetite and general wellbeing of the people.
  - Cures neurological symptoms of pernicious anemia.
- Food sources: Cyanocobalmin is synthesized by bacteria and is found in foods of animal origin. Liver is the richest source of cyanocobalmin. Meat, fish, kidney, brain and eggs are good sources of cyanocobalmin.

- Deficiency: Inability to produce the intrinsic factor which binds cyanocobalmin leads to pernicious anemia. The red blood cells are macrocytic and the count is often less than 2.5 million. Symptoms include soreness and inflammation of the tongue, paresthesia (numbness and tingling) in fingers and toes, demyelination of the white fibres of the spinal cord and in severe cases degeneration of the spinal cord.

Other B complex vitamins include biotin, pantothenic acid which do have their vital functions as coenzymes in various biochemical functions of the body

(g) **Vitamin C (Ascorbic acid):** Ascorbic acid is the chemical name of vitamin C which can be synthesized from glucose but humans depend on their diet for vitamin C as they do not have an enzyme gulonolactone oxidase which catalyzes the conversion reaction.

- **Functions:** Functions of vitamin C include:
  - Collagen formation of bone, teeth, cartilage, skin and scar tissue.
  - Formation of dentin layer of tooth
  - Wound healing.
  - Activation of calcitonin, gastrin, oxytocin, thyrotropin, vasopressin.
  - Drug detoxification
  - Regulation of cholesterol, maintenance of the blood vessel structure and antioxidant effects.

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- Conversion of inactive form of folic acid into its active form
- Reducing agent to keep iron in its ferrous form to facilitate iron solubility.
- Adrenal cortex function.
- Enhances calcium absorption.

- **Food Sources:** Citrus fruits like orange, lemon, tomatoes, guava, watermelon are good sources of Vitamin C

- **Deficiency:** Scurvy the most severe form of vitamin C deficiency arises mainly due to faulty cooking habits and inadequate intake of fruits and vegetables. The clinical features of scurvy are characterized by gingivitis (bleeding gums) petechiae (small hemorrhagic spots), arthralgia (pain in the joint), depression, postural hypotension, delayed wound healing. Main deficiency symptoms in infants include tender bones, cessation of bone growth, anaemia and pyrexia.

Scurvy

Scurvy leg

Scurvy

5.4 WATER

Water: Water is defined as an essential nutrient because it is required in amounts that exceed the body's ability to produce it. All biochemical reactions occur in water. It fills the spaces in and between cells and

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helps form structures of large molecules such as protein and glycogen. In human adults total body water accounts for about 70 per cent of the lean body mass.

- **Distribution:** In an adult male of 70 kg body weight, 70, percent of water that is 30 litres is found in intracellular fluids. Of this about 4 litres are found in bones. The remaining 30 percent of water is extra cellular fluid found in 3 litres of plasma and 8.5 litres of interstitial fluid and one litre of transcellular fluid which includes saliva, pancreatic juice, aqueous humor and cerebrospinal fluid.
- **Functions:** Water performs the following functions in the body
  - Controls body temperature
  - Transports nutrients and waste
  - Dissolves important substances in tissues and cells
  - Dissolves medications
  - Lubricate the cushion joints
  - Protect the spinal cord and other sensitive tissues
  - Get rid of wastes through urination, perspiration, and bowel movements.
- **Requirements:** the requirement of water depends on person's age, weight and life style. Adults should consume 1 litre of water for every 1000kcal in their diet, infants should consume 1.5 litre/1000kcal.

Activity 3

How many glasses of water you take once a day on week days and week-ends? Check and find the difference

- **Overall water balance:** The average adult processes 2.5 litres to 3 litres of water each day.

  Water enters the body in three forms:
  - Water taken in as water or in other beverages
  - Preformed water in food
  - Metabolic water produced by cell oxidation

  Water leaves the body in the following ways via the
  - Kidneys
  - Lungs
  - Skin
  - Faeces

Water imbalance: Water can be depleted in the body due to reduced intake caused by unavailability of water, inability to obtain water and swallow it. Increased losses of water are also experienced due to hot environment, hyperventilation, prolonged vomiting and diarrhea, kidney disorders and diabetes insipidus.

- **Water deprivation:** Dehydration of body occurs when water is not taken in adequate amounts to make up for the water loss. It occurs in severe diarrhea and vomiting. Evidence of dehydration manifests in the form of sunken eyes, dry tongue, loose and inelastic skin. Simple water deprivation also causes loss of sodium and potassium. The subject should be given water, glucose and electrolytes to replenish his fluid levels.
- **Water Intoxication (water excess)**: Over hydration occurs when large quantities of water are drunk in a hot climate or water excretion by the kidneys is impaired. Water Excess causes drowsiness, giddiness

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confusion headache, nausea, convulsions and coma

DO YOU KNOW?

World Water Day is celebrated on 22nd March

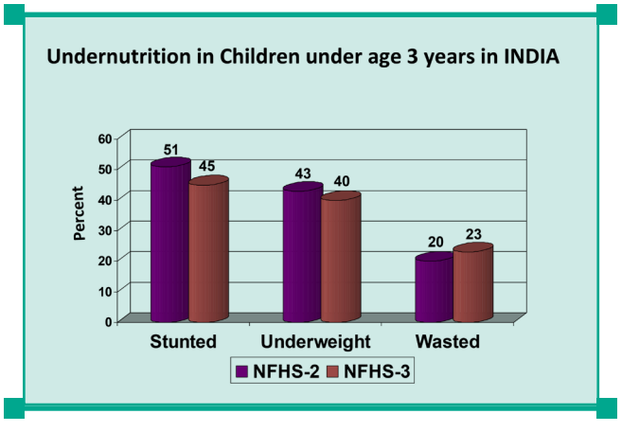
Activity 4

Conduct a study among your class mates regarding quantity of water consumed daily,the frequency at which they consume water and the quantity consumed each time.

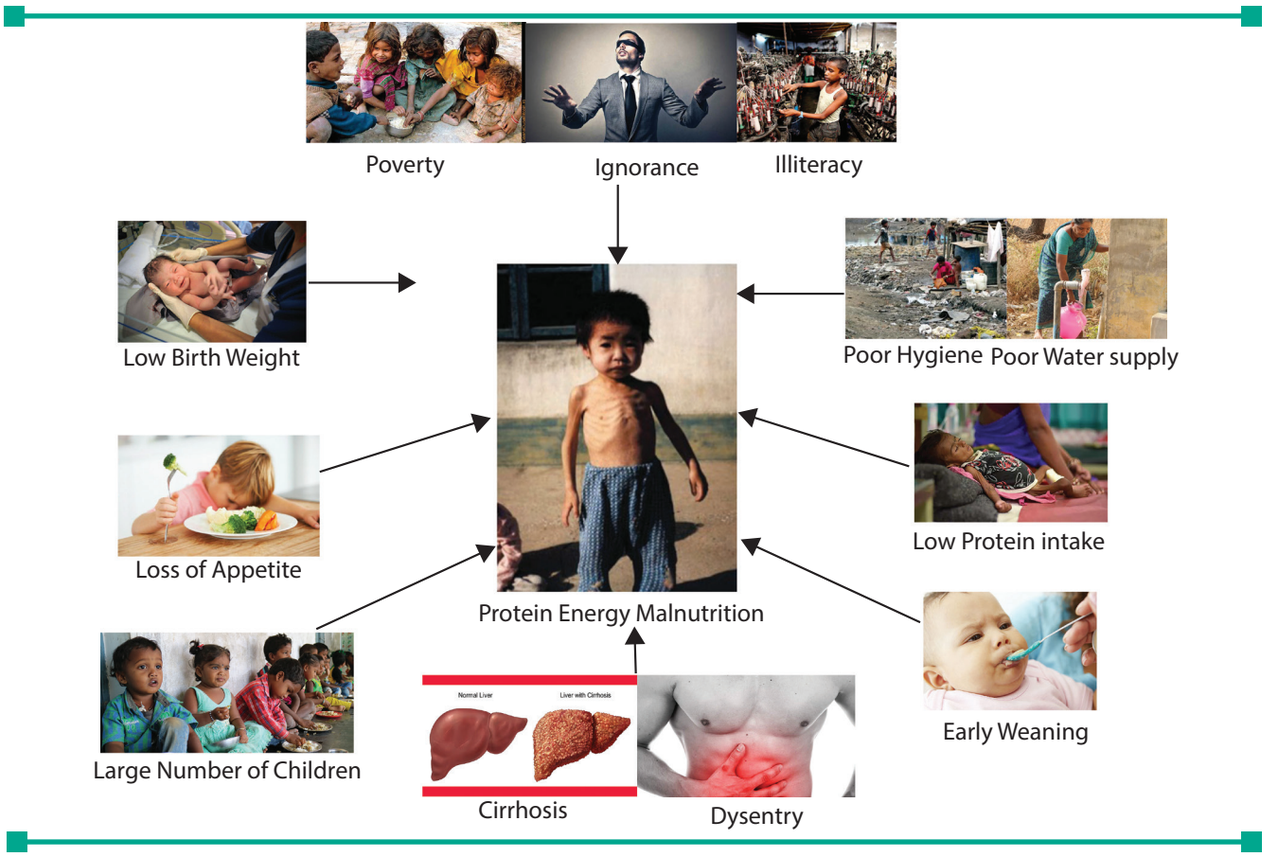
Ask them to list out the benefits of drinking water

5.4 MALNUTRITION

WHO defines Malnutrition as "the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance and specific functions"



▲ Fig. 5 Undernutrition in Children in India



▲ Fig. 6 Causes of Protein Energy Malnutrition

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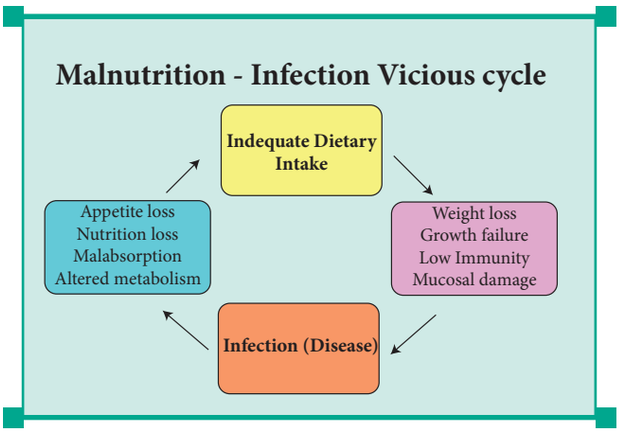
The global Nutrition report 2017 states that 38 percent of Indian children are stunted and 21 percent are severely wasted highlighting that proper nutrition is the solution to end poverty and fight disease conditions in our country

Malnutrition is the condition that develops when the body does not get the right amount of the vitamins, minerals, and other nutrients it needs to maintain healthy tissues and organ function.



▲ Fig. 7 Vicious Cycle of Malnutrition

- **Protein Energy Malnutrition**

It is a group of body depletion disorders which includes kwashiorkor, marasmus and the intermediate stages.

i. **Marasmus:** Marasmus is derived from the Greek Word "Marasmos" which means wasting. Marasmus involves inadequate intake of calories and protein. It represents simple starvation. The body adapts to the stress of deficit in protein and calories.

▲ Fig. 8 Signs and symptoms of Malnutrition

ii. **Kwashiorkor:** Kwashiorkor is a form of severe protein–energy malnutrition with sufficient calorie

Table 2. Difference between Marasmus and Kwashiorkar on signs & symptoms

Marasmus	Kwashiorkar
Severe growth retardation	Low body weight
Loss of subcutaneous fat	Pitting edema on feet and legs
Severe muscle wasting	Puffiness (edema) on face (moon face)
Wrinkled Skin	Apathy and irritability
Failure to thrive,	Scaly pigmentation of skin
Dehydration	Loss of hair
Temperature is subnormal	Hair discoloration
Frequent watery diarrohea and acid stools	Anorexia
Oedema and fatty infiltration are absent	Diarrohea due to defective digestion
Irritability, fretfulness and apathy	Hyper pigmentation

Source: www.yourarticlelibrary.com/flood/constituents/constituents-of-food-and-its-functions/64425

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intake, but with insufficient protein consumption, and this feature distinguishes it from marasmus.

- **Steps to alleviate malnutrition**

Health Promotion:

- Measures direct to pregnant and lactating women (education, supplement)
- Promotion of breastfeeding
- Development of low cost weaning food
- Educating mothers to plan and space child birth
- Ensuring food security in the home
- Ensuring clean environment

Specific protection:

- Increase intake of protein and energy rich food (e.g. milk, egg, fresh fruits)
- Educating people towards regular immunization
- Promote intake of fortified foods.

Early diagnosis and treatment:

- Baseline information
- Early detection of clinical signs of protein energy malnutrition
- Regular assessment of body mass index
- Biochemical and laboratory investigations.

Rehabilitation:

- Hospital treatment
- Nutritional rehabilitation services (NRC i.e. Nutritional Rehabilitation Centers)
- Follow up care

SUMMARY

- Nutrients are essential for providing nourishment to the body. They are broadly classified as macronutrients and micronutrients.
- Humans contract nutritional deficiencies if the nutrients are not consumed in right amounts and right proportion. Macronutrient deficiencies are mainly related to proteins of the body.
- Protein energy malnutrition results in conditions like Marasmus and Kwashiorkor which predominantly affect children in their developmental years.
- Deficiency of Minerals like calcium causes bone related disorders like osteopenia, osteoporosis.
- Iron deficiency anemia can be prevented by consumption of iron rich foods like ragi, dates, jaggery and green leafy vegetables.
- Iodine is an essential mineral to prevent goiter.
- Fat soluble and water soluble vitamins are essential for the normal functioning of the body and their deficiencies lead to multiple deficiency disorders.
- Fat soluble vitamin deficiencies are predominantly related to vision, bone health, child birth and blood clotting.
- Water soluble vitamin deficiencies can lead to diseases like beriberi, pellagra, scurvy, megaloblastic anemia and pernicious anemia.
- Water the universal solvent is also considered as a nutrient
- Water dehydration and intoxication can also lead to fatal consequences.

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ICT CORNER

Step: 1

Type the URL link given below in the browser or scan the QR code with your mobile to access website.

Step: 2

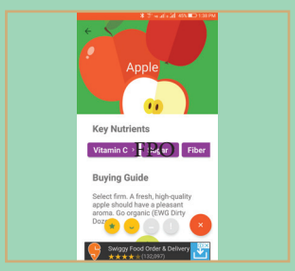
Click on "Nutri Guide" tab and you can find various nutrients like Vitamins, Minerals Proteins.

Step: 3

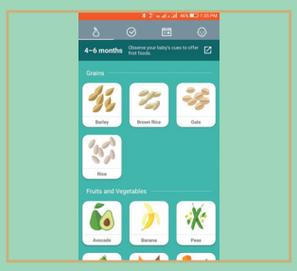
Now Click on the Vitamins and you can find different types of Vitamins.

Step: 4

Click on Vitamins button and a new screen will open with Vitamin chart with Biochemical, RDA, Dietary Sources Signs & Symptoms. Explore Biochemical, RDA, Dietary Sources, Signs & Symptoms of all the Vitamins.



Step1



Step2

Step3

Step4

WEBSITE LINK:

http://218.248.6.39/nutritionatlas/home.php

3WCP1

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GLOSSARY

Anaemia (இரத்த சோகை): Deficiency in the circulating haemoglobin red blood cells or packed cell volume.

Antioxidant (ஆண்டிஆக்ஸிடண்ட்): A substance that prevents oxidation eg:tocopherols prevent oxidation and therefore deterioration of fats due to rancidity.

Bitot's spots (பிட்டாட்டின் புள்ளிகள்): Grey, shiny spots on the conjunctiva resulting from Vitamin A deficiency.

Cheilosis (கடை வாய்ப்புண்): Lesions of the lips and the angles of the mouth.

Dehydration (நீர்ப்போக்கு): Excessive loss of water from body due to diarrhea, vomiting.

Dementia (டிமென்ஷியா): Deterioration or loss of memory, reasoning power characterized by confusion and disorientation.

Dermatitis (டெர்மட்டிட்டிஸ்): Inflammation of the surface of the skin.

Gingivitis (பல் ஈறு வீக்கம்): Inflammation of the gums

Glossitis (நாக்கில் ஏற்படும் அழற்சி): Inflammation of the tongue

Inflammation (வீக்கம்): The reaction of tissues to injury, characterized by swelling, redness and pain.

Intrinsic factor (அகக்காரணி): Mucoprotein in gastric juice which facilitates absorption of vitamin B12.

Kwashiorkor (குவாஷியோர்கர்): A form of malnutrition that is characterized by nutritional edema with dyspigmentation of skin and hair.

Marasmus (உடல் இளைப்பு): A form of malnutrition that is characterized by nutritional atrophy, severe, chronic calorie deficiency and severe malnutrition.

Nutrient (ஊட்டச்சத்து): Chemical substance in foods which nourishes the body.

Oedema (உடலில் நீர்க்கோப்பு): Presence of abnormal amounts of fluids in intercellular space, resulting in swelling.

Prothrombin (புரோத்ராம்பின்): Factor in blood plasma for blood clotting.

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Questions

I. Choose the correct answer

1. Malnutrition means over nutrition and _____
   a. Optimum nutrition
   b. Under nutrition
   c. bio nutrition
   d. balanced nutrition

2. Rice is a rich source of _____
   a. Protein c. fat
   b. carbohydrate d. vitamins

3. An Example of complete protein is _____
   a. Egg c. zein
   b. wheat d. meat

4. Goitre occurs due to the deficiency of _____
   a. Calcium c. Iodine
   b. Iron d. phosphorus

5. Moon face is observed in _____
   a. Marasmus
   b. Kwashiorkar
   c. Keratomalacia
   d. Xerosis cornea

II. Very short answer 2 marks

1. What is Protein Sparing action?
2. Rama is having bow legs and knock knees. What is the deficiency condition she is suffering from?
3. Why do people living in hilly regions suffer from iodine deficiency?
4. What is dehydration?
5. Suggest any two nutritious recipes for a child with marasmus

III Answer briefly 3 marks

1. List any three functions of fats
2. Give the food sources of a vitamin which causes clotting of blood
3. Give any two functions of a vitamin which prevents pernicious anemia
4. What is megaloblastic anaemia?
5. What are the clinical signs and symptoms of 3D disease?

IV Write in detail 5 marks

1. Give the causes of malnutrition in children in India.
2. Malini is unable to see in dim light. What has caused this deficiency in her and what can she do to prevent the progression of this disease.
3. Neela is feeling tired, restless, and has less concentration in class. What is the condition she is suffering from .Suggest the reasons and some foods to improve her condition.
4. Hari had a fall from the stairs and his wound in the leg is not healing. What nutrients would help him to recover quickly?
5. How is water distributed in the body? How many glasses of water should you drink per day?

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Chapter 6 Family Meal Management

Learning Objectives

- To provide an indepth understanding of meal management for people of different age groups.
- To provide a body of knowledge relevant to the study of the role of nutrition throughout the lifecycle.
- To provide an understanding about the link between nutritional needs and nutrition related problems
- To identify and overcome obstacles in the provision of healthy diets for specific age groups.

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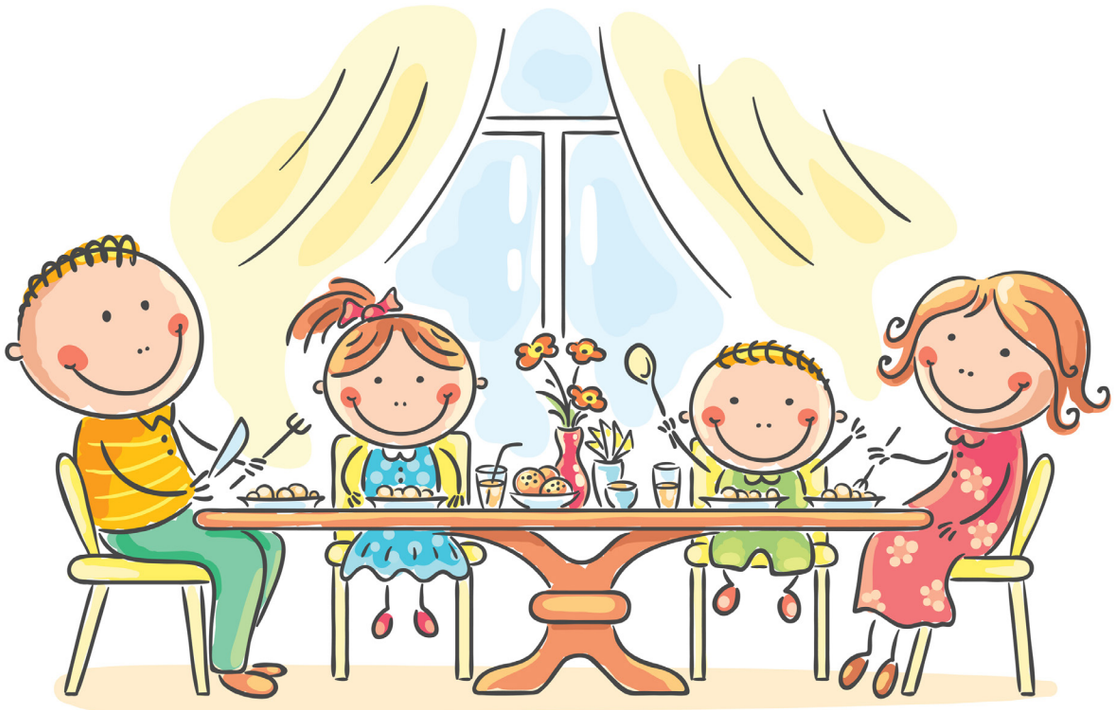

6.1 INTRODUCTION

In recent times, food has emerged as a source of comfort and a potential threat to health. It reflects cultural heritage and gives a feeling of security and pleasure. Healthy food intake is an important

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Important terminologies

Health: Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1948).

Nutrient requirement: It is defined as the minimum amount of the absorbed nutrient that is necessary for maintaining the normal physiological functions of the body.

Calorie: A calorie is the energy it takes to raise the temperature of I gram of water to 1 degree Celsius.

Basal Metabolic Rate (BMR): The amount of energy expended daily when the body is at complete rest.

Dietary Fibre: Dietary fibre delays the intestinal transit of the food consumed. Dietary fibre is important for proper bowel function, to reduce chronic constipation, diverticular disease, haemorrhoids, coronary heart diseases, diabetes and obesity. They protect against colon cancer.

Antioxidants: Antioxidants restrict the damage that reactive oxygen free radicals can cause cellular components. They are of primary biological value in giving protection from certain diseases. Raw and fresh vegetables like green leafy vegetables, carrots and fresh fruits including citrus fruits and tomatoes have been identified as good sources of antioxidants.

part of life. Hence, it is very essential to gain knowledge about food, its planning, preparation and service. Creative meal management for people at different age groups can add pleasure and satisfaction to their lives and ensure healthy living.

Vegans eat no foods of animal origin

6.1.1 Balanced Diet

A balanced diet is one which provides all the nutrients in required amounts and proper proportions so that the need for calories, proteins, minerals, vitamins and other nutrients are adequately met. It can be easily achieved through a blend of four basic food groups. The nutrient requirements vary with age, gender, physiological status and physical activity. A balanced diet provides **(i)** 50-60% of total calories from carbohydrates, **(ii)** about 10-15% from proteins **(iii)** and 20-30% from both visible and invisible fat. In addition, a balanced diet should provide other non-nutrients such as dietary fiber, antioxidants and phytochemicals.

6.1.2 Recommended Dietary Allowance (RDA)

The Recommended Dietary Allowances (RDA) presented are in estimates of nutrients to be consumed daily to ensure that the requirements of all individuals in a given population are met. The

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recommended levels depend upon the bio availability of nutrients from a given diet. The term bio availability indicates what is absorbed and utilised by the body. In addition RDA includes a margin of safety, to cover variation between individuals, dietary traditions and practices. The RDAs are suggested for all age groups such as infants, pre-schoolers, children, adolescents, pregnant women, lactating mothers and adult men and women taking into account their physical activity. The RDA of an individual depends upon various factors which are as follows:

1. ***Age:*** Adults require more total calories than a child, whereas a growing child requires more calories per kg of body weight than an adult.
2. ***Sex:*** Males with high Basal Metabolic Rate (BMR) require more calories than females.
3. ***Activity:*** The type of activity also determines the energy requirements. The activities are classified as sedentary, moderate and heavy based on the occupation of an individual as given in the table 1 below
4. ***Physiological: Stress*** Nutrient requirements are increased in conditions of physiological stress such as pregnancy and lactation.

6.1.3 Steps in Planning Balanced Diets or Menu Using Food Guide Pyramid and Exchange Lists

Menu planning is the process of planning and scheduling intake of meals for general or specific individual requirements. The four food groups suggested by ICMR given in unit-III (Food Science), permits an individual to plan a menu to achieve nutrient intake as specified by recommended dietary allowances. There are certain principles in planning menus. They are:

1. A good menu plan should meet the nutritional requirements of each member of the family.
2. Meal pattern must fulfill family needs.
3. Meal planning should save time and energy.
4. Meal planning should satisfy the budget of the family.
5. Meal plan should give maximum nutrients.

Table 1 Classification of Activity

	Activity		
Sex	**Sedentary**	**Moderate**	**Heavy**
Male	Teacher, Tailor, Barber, Executive, Peon	Fisher man, Basketmaker, Potter, Goldsmith	Stone cutter, Mineworker, Wood cutter
Female	Teacher, Tailor, Executive	House wife, Nurse, Servant maid	Wood cutter

Source: Gopalan C, Sastri B.V, & Balasubramanian S.C (2007)

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6. The meal planned should consider individual likes and dislikes.
7. Planned meals should provide variety.
8. Meals should give satiety.
9. Menus should include available foods.

There are three steps involved in planning a menu

Step1: Recommended dietary allowance:
To plan a balanced diet the first step is to know the recommended dietary allowances for different age groups.

Steps in menu planning

1. Recommended dietary allowance
2. Food list
   i. Using ICMR tables
   ii. The Exchange list
3. Meal plan

The Recommended Dietary Allowance for Indians ICMR (2010) is given in the Table 2.

Table 2 Recommended Dietary Allowances for Indians (Macronutrients and Minerals)

Group	Particulars	Body wt. kg	Net Energy Kcal/day	Protein g/day	Visible Fat g/day	Calcium mg/day	Iron mg/day
Man	Sedentary work	60	2320	60	25	600	17
	Moderate work		2730		30		
	Heavy work		3490		40		
Women	Sedentary work	55	1900	55	20	600	21
	Moderate work		2230		25		
	Heavy work		2850		30		
	Pregnant Women		+350	82.2	30	1200	35
	Lactation 0 – 6 months		+600	77.9	30	1200	25
	6 – 12 months		+520	70.2	30		
Infants	0 – 6 months	5.4	92 Kcal/kg/d	1.16 g/kg/d	–	500	46 µg/ kg/day
	6 – 12 months	8.4	80 Kcal/kg/d	1.69 g/kg/d	19		5
Children	1 – 3 years	12.9	1060	16.7	27	600	09
	4 – 6 years	18	1350	20.1	25		13
	7 – 9 years	25.1	1690	29.5	30		16
Boys	10 – 12 years	34.3	2190	39.9	35	800	21
Girls	10 – 12 years	35.0	2010	40.4	35	800	27
Boys	13 – 15 years	47.6	2750	54.3	45	800	32
Girls	13 – 15 years	46.6	2330	51.9	40	800	27
Boys	16 – 17 years	55.4	3020	61.5	50	800	28
Girls	16 – 17 years	52.1	2440	55.5	35	800	26

Source: Dietary guidelines of Indians National Institute of Nutrition, Hyderabad, (2010).

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Table 2 cont'd Recommended Dietary Allowances for Indians

Group	Particulars	Vit. A µg/d		Thiamin mg/day	Riboflavin mg/day	Niacin equivalent mg/day	Pyridoxine mg/day	Ascorbic acid mg/day	Dietary folate µg/day	Vit. B_{12} µg/day	Magnesium mg/day	Zinc mg/day
		Retinol	β-carotene									
Man	Sedentary work	600	4800	1.2	1.4	16	2.0	40	200	1	340	12
	Moderate work			1.4	1.6	18						
	Heavy work			1.7	2.1	21						
Women	Sedentary work	600	4800	1	1.1	12	2.0	40	200	1	310	10
	Moderate work			1.1	1.3	14						
	Heavy work			1.4	1.7	16						
	Pregnant Women	800	6400	+0.2	+0.3	+2	2.5	60	500	1.2		12
	Lactation 0 – 6 months	950	7600	+0.3	+0.4	+4	2.5	80	300	1.5		
	6 – 12 months			+0.2	+0.3	+3	2.5					
Infants	0 – 6 months	--	--	0.2	0.3	710 µg/kg	0.1	25	25	0.2	30	--
	6 – 12 months	350	2800	0.3	0.4	650 µg/kg	0.4				45	--
Children	1 – 3 years	400	3200	0.5	0.6	8	0.9	40	80	0.2 – 1.0	50	5
	4 – 6 years			0.7	0.8	11	0.9		100		70	7
	7 – 9 years	600	4800	0.8	1.0	13	1.6		120		100	8
Boys	10 – 12 years	600	4800	1.1	1.3	15	1.6	40	140		120	9
Girls	10 – 12 years			1.0	1.2	13	1.6				160	9
Boys	13 – 15 years			1.4	1.6	16	2.0	40	150		165	11
Girls	13 – 15 years			1.2	1.4	14	2.0				210	11
Boys	16 – 17 years			1.5	1.8	17	2.0	40	200		195	12
Girls	16 – 17 years			1.0	1.2	14	2.0				235	12

Source: Dietary guidelines of Indians, National Institute of Nutrition, Hyderabad, (2010).

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Step 2: Food list

Food list is the list of quantities of various food groups to be included in the diet so that it is balanced and can meet the RDA. This can be done by:

- Selecting food from all the four food groups.
- Deciding the quantities of the selected as multiples of portion sizes.

Food list can be prepared either by using ICMR tables or exchange lists.

i. Using ICMR tables

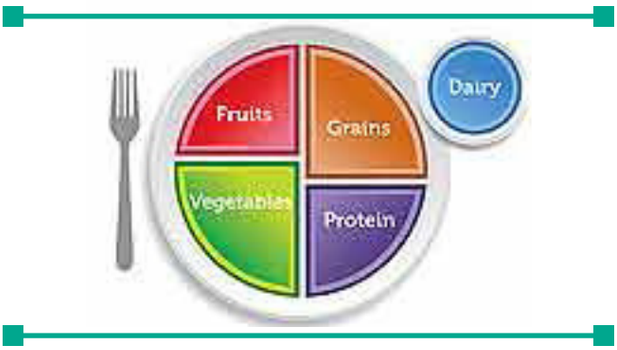
To make menu planning more convenient ICMR has suggested the portion size and balanced diets for adults and for different age groups. The portion sizes are given in terms of raw food.

ii. The Exchange Lists

The Exchange Lists are the basis of a meal planning. Food exchange lists are groups of measured foods of the same calorific value and similar protein, fat and carbohydrate content. All foods of exchange lists make a specific contribution to a good diet. Food exchange lists help in manipulation of protein, calories and other nutrients.

Step 3: Meal plan

The foods that are listed are converted into recipes and distributed in various meals like breakfast, lunch and dinner. My Plate helps individuals to make better food choices and eat healthfully. It illustrates the food groups using a familiar mealtime visual.



▲ Fig 1 My Plate

Table 3 Portion Size And Nutrient Content

Food Groups	Portion G	Energy Kcal	Protein g	Carbohydrate g	Fat g
Cereals and millets	30	100	3.0	20	0.8
Pulses	30	100	6.0	**15**	0.7
Egg	50	85	7.0	-	**7.0**
Meat/chicken or fish	100	100	9	-	**7.0**
Milk(ml) and milk product	100	70	3.0	**5**	**3.0**
Roots and tubers	100	80	1.3	**19**	-
Green leafy vegetables	100	45	3.6	-	**0.4**
Other vegetables	100	30	1.7	-	**0.2**
Fruits	100	40	-	**10**	-
Sugars	5	20	-	**5**	-
Fats and oils	5	45	-	-	**5**

Source: Dietary guidelines for Indians, National Institute of Nutrition, Hyderabad, (2011).

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Table 4 Exchange list

Preparation	Quantity of one serving	Calories
1. Cereals		
Uppma	1cup	270
Idli	2nos	150
Dosa	1no.	125
Kichidi	1cup	200
Wheat porridge	1cup	220
2. Pulses		
Plain dhal	½ cup	100
Sambar	1cup	110
3. Vegetables		
With gravy	1cup	170
Dry	1cup	150
4. Non-vegetarian		
Mutton curry	3/4 cup	260
Chicken curry	3/4 cup	240
Keemakofta curry	3/4 cup	240
Fish fried	2 big pieces	190
Prawn curry	3/4 cup	220
5. Savoury snacks		
Bajji or pakora	8 no's	280
Besankapura	1 no.	220
Chat(dahipakori)	5 pieces	220
Samosa	1 no.	200
Masala dosa	1 no.	200
6. Chutneys		
Coconut/ groundnuts/ til	2tbsp	120
Tomato	1tbsp	10
Tamarind(with jiggery)	1tbsp	60
7. Sweets and desserts		
Besanbarfi	2 small pieces	400
Rice puttu	½ cup	280
Halwa (kesari)	½ cup	320
Srikhand	½ cup	380
Sandesh	2 no's	140
8. Beverages		
Tea (2tsp sugar + 50 ml toned milk)	1 cup	75
Coffee(2tsp sugar + 100 ml	1 cup	110
Cow's milk (2 tsp. sugar)	1 cup	180
Lassi (2 tsp. sugar)	1 cup/glass (200ml)	110
Cold drinks	1 bottle (200ml)	150

Source: Dietary Guidelines for Indians - A manual, National Institute of Nutrition, ICMR, Hyderabad, India (2010).

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Table 5 Sample Meal Plan for Adult Man (Sedentary)

Meal time	Food group	Raw	Cooked recipe	Serving amounts
Breakfast	Milk	100ml	Milk or	½ cup
			Tea or	2 cups
	Sugar	15g	Coffee	1 cup
	Cereals	70g	Breakfast item	
	Pulses	20g		
Lunch	Cereals	120g	Rice	2 cups
			Pulkas	2 no's
	Pulses	20g	Dhal	½ cup
	Vegetables	150g	Veg-curry	¾ cup
	Milk	100ml	Curd	½ cup
Tea	Cereals	50g	Snack	
	Milk	50ml	Tea	1 cup
	Sugar	10g		
Dinner	Cereals	120g	Rice	2cup
	Pulses	20g	Pulkas	2nos
	Vegetables	150g	Dhal	½ cup
	Milk(curd)	50ml	Vegetables	¾ cup
	Vegetables	50g		
	Fruit	100g	Seasonal	1 medium

Source: Dietary guidelines of Indians, National Institute of Nutrition, Hyderabad, (2010).

Nutrition Portfolio

1. Describe your choices within each food group from day to day and include realistic suggestions for enhancing the variety in your diet.
2. Compare the foods you eat daily using the food guide pyramid and make a note of which food groups are usually over or under represented

Activity 1 Word Scramble

1. *RAEBD* ..... *A baked product.*
2. *CIER* ..... *A cereal.*
3. *RPAEGS* ..... *Fruit used to make wine.*
4. *NEGOAR* ..... *Fruit rich in vitamin c.*
5. *CMUCPAIS* ..... *Green pepper.*
6. *JLBARNI* ..... *A vegetable.*
7. *TYRPLOU* ..... *meat of domesticated birds*
8. *GRUTOY* ..... *Milk product*
9. *GAUSR* ..... *Sweetener*
10. *NDMAOL* ..... *a nut*

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Vegetarians use meat replacements made of textured vegetable protein (soy Protein)

Folic acid is also called pteroylglutamic acid, a deficiency of which results in macrocytic anaemia.

6.2 NUTRITIONAL NEEDS DURING DIFFERENT STATGES OF HUMAN LIFE CYCLE

6.2.1 Nutritional Needs of Infants

Infancy is a period of rapid growth. The development during infancy is more rapid than during at any other period in the life time of an individual.

Growth and Development

The growth and development is accompanied by a number of physiological changes which include changes in body size and body composition, changes in the gastro intestinal system, excretory system and circulatory system. Nutrition is crucial and proper dietary modifications are vital during this period.

Immunization

Malnutrition during infancy leads to a higher incidence of infant mortality. Besides malnutrition,infection causes mortality. Immunization protects the children against disease. Table 6 below presents the immunization schedule for infants and children.

Good nutrition is essential for the growth and development that occurs during an infant's first year of life. As an infant's mouth, tongue, and digestive tract mature, the infant shifts from being able to only suckle, swallow, and take in liquid foods, such as breast milk or infant formula,

Table 6 National Immunization Schedule (NIS) for Infants, Children

Age	Vaccine
Soon after birth	Hepatitis B 1st dose, OPV 1st dose, BCG
6 weeks	Hepatitis B 2nddose,DPT 1stdose,OPV 2nd dose
10 weeks	DPT 2nddose,OPV 2nd dose
14 weeks	DPT 3rddose,OPV 4th dose
6 weeks, 10 weeks and 14 weeks	OPV 5thdose,Hepatitis B 3rd dose
9 months to 12 months	Measles
15 to 18 months	MMR
16-24 months	DPT, OPV 1st Booster
2 years	Typhoid vaccine
5 – 6 years	DPT, OPV 2nd Booster

DPT- Diphtheria, Pertussis, And Tetanus: OPV-Oral Polio Vaccine; MMR- Measles, mumps, and rubella

Source: https://mohfw.gov.in/sites/default/files/24545352106148966387 3.pdf

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to being able to chew and receive a wide variety of complementary foods.

Energy: Infants need energy from food for activity, growth, and normal development. Energy comes from foods containing carbohydrate, protein, or fat. A general indicator of infant consuming an adequate kilocalories per day is the infant's growth rate in length, weight, and head circumference.

Carbohydrate

The major type of carbohydrate normally consumed by young infants is lactose, the carbohydrate source in breast milk. Lactose-free infant formulas, such as soy-based infant formulas provide carbohydrates in the form of sucrose. In later infancy, infants derive carbohydrates from additional sources including cereal and other grain products, fruits, and vegetables.

Protein

Breast milk and infant formula contains protein. The complementary foods such as meat, poultry, fish, egg yolks, cheese, yogurt, pulses, cereals and other grain products provide adequate protein.

Fat

Breast milk and infant formula are important sources of lipids, including essential fatty acids, during infancy.

Vitamin A

Breast milk and infant formula are major food sources of vitamin A. Additional sources of vitamin A or carotenes for infants consuming complementary foods include egg yolks, yellow and dark green leafy vegetables and fruits e.g., spinach, greens, sweet potatoes and liver.

Vitamin E

Infants receive vitamin E from breast milk and infant formula. Other vitamin E sources for older infants include green leafy vegetables, vegetable oils and their products, wheat germ, whole-grain breads, cereals and other fortified or enriched grain products, butter, liver, and egg yolks.

Vitamin K

Sources of vitamin K include infant formula, green leafy vegetables, pork, and liver.

Vitamin C

Breast milk and infant formulas are major food sources of vitamin C. Additional vitamin C sources include vegetables (e.g., tomatoes), fruits (e.g., citrus fruits, papaya, and strawberries), and regular fruit and vegetable juices which are naturally high or fortified with vitamin C.

Vitamin B_{12}

An infant's vitamin B_{12} stores at birth generally supply his or her needs for approximately 8 months. Infants consuming appropriate amounts of breast milk from mothers with adequate B_{12} stores or infant formula receive adequate amounts of this vitamin. Complementary foods such as meat, egg yolks, and dairy products provide this vitamin later in infancy as well.

Calcium

An infant can obtain sufficient calcium by consuming adequate amounts of breast milk or infant formula. Older infants can obtain additional calcium from complementary foods such as yogurt, cheese, cottage cheese (paneer), fortified or enriched grain products, some green leafy vegetables (such as turnip and greens), and tofu.

Iron

Sources of iron for infants include breast milk, infant formula, meat, liver legumes, whole-grain breads, cereals, or fortified or enriched grain products, and dark

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green vegetables. Heme iron is found primarily in animal tissues, including red meat, liver, poultry and fish and non-heme iron is found in breast milk, infant formula, cereals, or other grain products legumes, fruits and vegetables. Infants receive most of the iron in their diets as non heme iron.

Tofu, or bean curd, is a popular food derived from soya. It is a staple ingredient in Chinese cookery and is a good source of protein, containing all eight essential amino acids. It is also an excellent source of iron and calcium and the minerals manganese, selenium and phosphorous.

Zinc

Infants obtain zinc from breast milk, infant formula, meat, poultry, liver egg yolks, cheese, yogurt, legumes, and whole-grain breads, cereals, and other fortified or enriched grain products.

Sodium

Healthy, full-term infants consuming primarily breast milk or infant formula of standard dilution receive a relatively small amount of sodium but an amount adequate for growth.

Fiber

Breast milk contains no dietary fiber, and infants generally consume no fiber in the first 6 months of life. As complementary foods are introduced to the diet, fiber intake increases. Dietary fiber is found in legumes, whole grain foods, fruits, and vegetables.

Water

Infants' water needs are met from consuming breast milk, infant formula, and complementary foods. Water is also formed in the body in chemical reactions occurring to metabolize protein, fats, and carbohydrates. Under normal circumstances, the water requirements of healthy infants who are fed adequate amounts of breast milk or properly reconstituted infant formula are met by the breast milk or infant formula alone.

6.2.1 Breast Feeding

Infants who are exclusively breast fed for the first 6 months of life grow well and breast feeding is beneficial not only during this period but also during later years of life. The infant is put on the breast within half an hour after a normal delivery. ***American Academy of Paediatrics(2005) firmly adheres to the position that breast-feeding ensures the best possible health as well as the best developmental and psychosocial outcomes for the infants***

Colostrum: During first two or three days colostrum is secreted in small quantities of about 10-40 ml. The composition of colostrum is as follows:

Table 7 Composition of Colostrum

Nutrient	Quantity / 100 ml
Energy (k cal)	58
Fat (g)	2.9
Calcium (mg)	31
Phosphorus (mg)	14
Iron (mg)	0.09
Protein (g)	2.7
Lactose (g)	5.3
Carotene (IU)	186
Vitamin A (IU)	296

Source: Guthrie (1989)

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Colostrum contains an interferon like substance which has strong antiviral activity. It contains a B12 binding protein making it unavailable for the growth of ***E-coli*** and other bacteria. It also contains antibodies against viral infection.

Advantages of breast feeding

Breast feeding is the simple and best method of feeding and has the following advantages

1. Nutritional factor

The composition of human milk is best suited for infants. In human milk the protein content is lower but the content of carbohydrate, namely lactose is higher. The fat content is comparatively less. The protein is present as lactalbumin which is better digested than the protein in cow's milk. Lactose provides natural sweetness and also helps in absorption of calcium and iron. Fat though less is highly emulsified and therefore better digested. When compared to animal milk, breast milk provides higher amount of vitamin C. Similarly calcium in breast milk though less when compared to cow's milk is better absorbed by the infant. The composition of human milk is best suited for infants. The table 8 below shows the comparison of Human milk and cow's milk.

2. Hormones and growth factors:

Breast milk is a rich source of hormones like Thyroid Stimulating Hormone (TSH), thyroxin, insulin and prolactin. It also contains growth regulating factors, growth promoters and growth modulators.

DO YOU KNOW?

August 1-7 is the World Breast Feeding week

Table 8 Comparison Of Human Milk and Cow's Milk

Nutrient per 100 ml	Human milk	Cow's Milk
Water (g)	88	87.5
Energy (k cal)	65	67
Protein (g)	1.1	3.2
Carbohydrate (g)	7.4	4.4
Fat (g)	3.4	4.1
Calcium (mg)	28	120
Phosphorus (mg)	11	90
Iron (mg)	– –	0.2
Carotene (µg)	137	174
Thiamine (mg)	0.02	0.05
Riboflavin (mg)	0.02	0.19
Vitamin C (mg)	3	2
Caseinogen lactalbumin ratio	1.2	3.1

3. Immunological factors:

The following factors in breast milk provide passive immunity.

a. **Macrophages:** They can digest bacteria and also develop immunity against infectious diseases.
b. **Lymphocytes:** Lymphocytes produce antiviral substances like interferon.
c. **Lactoferrin:** It is an iron binding protein that inhibits the growth of *E.coli* and other bacteria.
d. **Enzymes:** Breast milk also supplies enzymes like lipase, amylase and lactoperoxidase which increase digestibility and also destroy the harmful microorganisms.
e. **Immunoglobulin:** They are defensive proteins which include all types of antibodies.

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4. Economic factors

Breast milk is the most economical food for the baby. Even after accounting the extra food cost required by the mother, breast milk is cheaper than any other type of artificial feed.

5. Psychological factors

Breast feeding is essential for a healthy, happy and emotional relationship between the mother and the infant.

6. Natural contraceptive

Breast feeding prevents the onset of another pregnancy and also prevents breast cancer.

7. Other advantages:

a. Infants jaw is more fully developed.
b. Breast milk is microbiologically sterile.
c. Human milk is always fresh and at the right temperature.
d. It is convenient to administer at any time.
e. Breast fed babies have better cognition and IQ later in life when compared to bottle fed babies.

Artificial feeding

Though breast milk is the best milk and there can be no substitute for it, there are certain circumstances during which the infant needs to be given artificial feeds.

Reasons

1. Illness of short duration like fever, or severe illness like tuberculosis and heart disease.
2. The mother is on steroids, anticoagulants or radioactive drugs.
3. Insufficient milk secretion.
4. Death of mother.

Premature Infants are born before 37 weeks of gestation

Solid food added to an infant's diet is called beikost

6.2.1.2 Complementary Foods and Weaning Foods

Milk provides all the food a baby needs for at least the first four months of life. As babies gain weight and grow older they need a more varied diet. The change over from milk to more solid food is called weaning. The idea of weaning is the process of gradual introduction to a wide range of 'non milk' foods to infants in addition to breast milk. Weaning the baby from breast or bottle feed starts by four months.

Stages of Weaning

Weaning is a transition from breast milk or formula milk to solid foods. It is divided into the following stages:

→ **STAGE I**- Babies are usually ready to start on solid foods between 4-6 months
→ **STAGE II**- 6-9 months
→ **STAGE III**- 9-12 months

Stage I

Babies cannot chew and the first weaning foods need to be similar in consistency to milk. Cereals such as rice or wheat flours mixed with milk is a suitable first weaning food. Food should be the same temperature as their usual milk feed. Mashed, pureed, starchy vegetables made to the same consistency are also suitable foods.

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e.g.potato, carrot. Foods should be salted or sweetened. Babies should have 600ml of breast or infant formula milk daily along with the weaning foods.

Stage II

Babies get used to spoon feeding and will take more solid foods. They can begin to have the same foods as the rest of the family, but in mashed or pureed form. They are able to chew foods at six months, so can be given hard foods to chew. These are called finger foods. These include foods such as raw soft fruits and vegetables, raw strips of carrot, cooked green beans and soft banana. Foods with increased quantity, different texture and stronger tastes should be encouraged.

Stage III

At this stage babies will probably eat solid foods in addition to 500-600ml breast milk or infant formula after nine months. Wide variety foods should be given with a range of textures, because the baby can cope up with food that is lumpier in texture.

Important points to be considered while introducing supplementary foods

→ Introduce only one food at a time.
→ Allow the infant to become familiar with the food before trying to give another.
→ Fruit juice should be fed only by cup not by bottle.
→ When the baby is able to chew, gradually substitute finely chopped fruit and vegetables usually at 8 to 9 months.
→ Variety in choice of foods is important.
→ Infants may object to eat some foods by themselves but will take them willingly if one is mixed with another. Egg may be mixed with formula cereal or vegetable.
→ The child can be fed with a spoon until the baby gets used to an adult method of feeding.
→ Give freshly prepared food.
→ Food should be given between breast feeds.
→ The temperature of the food should not be hot or cold.

Supplementary Foods

Foods that are regularly fed to the infant, in addition to breast-milk, providing sufficient nutrients are known as supplementary or complementary foods. These could be liquid foods like milk or semi-solid foods in the case of gruels or porridge or solid preparations like rice, which can be given to children over the age of one year.

Types of Supplementary Foods

Liquid Supplements

→ ***Milk:*** The frequency of breast feeding is reduced to 3 to 4 times a day and cow's milk is substituted in 6 months. Cow's milk is diluted with water in the proportion of 2:1 for the first feed. Sugar can be added to increase taste and calories.
→ ***Juice of Fresh Fruits:*** Small quantities of fresh fruit juices should be given in the 3rd and 4th month of the infant. In early stages fruit juice is diluted with water and only a couple of teaspoons are fed and the amount is gradually increased.
→ ***Soup from Green Leafy Vegetables:*** Green leafy vegetables can be

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substituted as an alternative if fruits are not available.

Solid Supplements

Mashed Foods: Mashed food should be given around the 7th and 8th month along with the liquid supplements for the infant.

→ ***Cereal and Starchy Gruels:*** Mashed cereals are rice, wheat and ragi which are usually eaten as porridge with the addition of vegetable oil.

→ ***Vegetables:*** Cooked, mashed vegetables like potato, green leafy vegetables and carrots can be introduced to get vitamins and minerals in the diet.

→ ***Fruits:*** Fruits should be stewed and sieved. Sugar and lime can be added for flavor.

→ ***Non Vegetarian Food:*** Egg yolk is given as good source of protein and it is usually introduced in soft custards. Egg white is not given until the infant is 10 months old, as it causes allergic manifestations. Minced, cooked meat or boiled fish with salt can be given.

CASE STUDY

Case study 1

Kavitha has a 6 month year old baby. Outline an appropriate schedule for her to use as a guide for adding solid foods to her baby's diet during the first year of life. What foods are not appropriate at this age?

Activity 2

Guess the nutreints thar are present in the foods listed below

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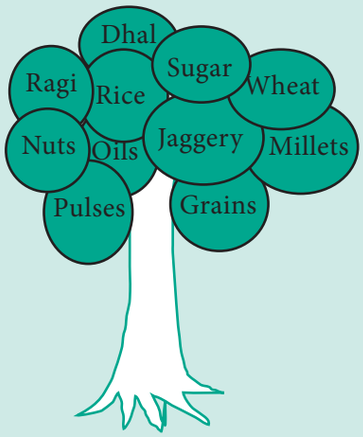
Activity 3

Prepare a weaning food using the following ingredients -



→ ***Pulses:*** Pulses along with cereals in the form of porridge can be given. Pulses and meat preparation can be given alternatively

Unmashed: When the infant starts developing teeth, it is the time to give lumpy foods, cooked cereals and pulses solids like idly, idiappam, bread, chappathi and semi solids like rice and dhal. Vegetables can be chopped and boiled into small pieces. As the child grows, it is better to give fruit segments instead of juice. Fruit provides bulk in the diet and is good for bowel movement.

Problems of Weaning

→ Obesity
→ Underweight
→ Choking
→ Food allergy

6.3 NUTRITIONAL NEEDS OF PRESCHOOL AND SCHOOL GOING CHILDREN

The rapid growth during infancy is followed by a generally slow growth between one to six years. The child becomes more active and the social and environmental influences have a great impact on their food behaviour and eating pattern. The need for nutrients is increased as growth and development continues.

Growth Pattern

During the second year, the increase in height is about 10 cm and weight gain is 2 to 2.5 kg. After two years annual gain in height and weight is only 6 to 7 cm and 1.5 to 2 kg respectively. However, there is a wide variance in the physical development of children.

As growth proceeds, changes occur in a) proportion of water, b) muscle tissue, c) fat deposits and d) skeletal structure. The body water gradually decreases and there is addition of adipose tissue and minerals to the bones.

Nutritional Needs During Preschool

Energy

The energy needs for the child is determined by his basal metabolism and activity. If the preschool child is not given proper complementary foods and supplementary foods, it may lead to protein and energy malnutrition.

Protein

Protein is a vital dietary component for pre-schoolers, as it is needed for optimal growth. Enough protein should be consumed every day for proper growth and development.

Fat

Adequate fat is required to provide the extra calories and reduce bulk in the diet.

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Minerals

Calcium is needed for bone and teeth mineralization and maintenance. The amount of calcium a child needs is determined in part by the consumption of other nutrients, such as protein, phosphorus and vitamin D, as well as the child's rate of growth.

Iron requirement during childhood is needed for growth and for increase in the haemoglobin concentration. Dietary lack of iron accompanied by hookworm infestation can lead to anaemia. Zinc is essential for proper development. It is needed for wound healing, proper sense of taste, proper growth, and normal appetite.

30%–50% of aneamia in children and other age groups is caused by iron deficiency (World Health Organization 2007).

Vitamins

The incidence of Vitamin A deficiency is high. The recommended intake for B vitamins is based on the energy intake. The dietary intake of vitamin C for pre-schoolers is the same as for adults i.e., 40 mg/day

Dietary Guidelines

Transition from an infant diet to a regular adult diet should be smooth and gradual. Factors that need to be considered while planning a diet for a preschool child are:

- The food should be interesting and attractive. For example, chapattis, poori and bread slices can be cut into interesting shapes to make eating interesting for a child.
- The diet should include enough quantity and quality of different nutrients. They should be encouraged to have milk every day. Milk can be given with delicious flavours.
- Plenty of fruits and vegetables are needed for proper elimination.
- Fruits are given raw or in the form of simple desserts.

DO YOU KNOW?

Food Jags- Patterns of eating in which very few food items are eaten with the exclusion of all the others for a long period of time

Table 9 Balanced diet for preschool children

Food groups	g/portion	Quantity(portions)	
		1-3 years	4-6 years
Cereals and millets	30	2	4
Pulses	30	1	1
Milk (ml)	100	5	5
Roots and tubers	100	1	1
Green leafy vegetables	100	0.5	0.5
Other vegetables	100	0.5	1
Fruits	100	1	1
Sugar	5	3	4
Fats / Oils (visible)	5	5	5

Source: Dietary Guidelines for Indians - A manual, National Institute of Nutrition, ICMR, Hyderabad, India (2010)

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- Unripe bananas and apples should not be given as they are difficult to chew and may choke the child.
- Candies and sweets should be in moderation. Foods like tea and coffee should not be given as they are more stimulating to the system.
- Foods should be seasoned so that they taste better and the child takes it well.
- Fried foods and concentrated foods should not be given as they are difficult to digest.
- The Child should never be forced to eat more than what he can take and the atmosphere should be peaceful, pleasant and lacking distraction.
- People feeding the child should not show dislike of any food in front of the child; this may lead to the rejection of the food by the child.
- Regularity of meals is essential.
- Food preferences of the child should be taken into consideration.

Nutritional Problems among Pre-Schoolers

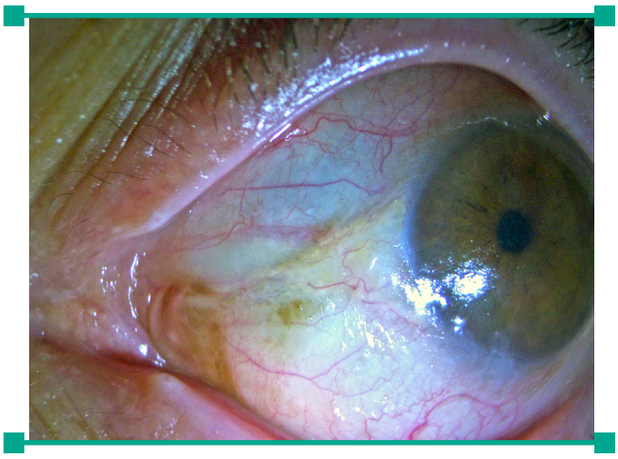
Protein-Energy Malnutrition (PEM)

The primary cause of malnutrition is a faulty and inadequate diet. Besides diet and socioeconomic factors, various environmental factors aggravate the dietary deficiencies. These include chronic infection, poor environmental sanitation, poor insanitary living conditions and poor personal hygiene. The diseases that represent extreme forms of PEM are

i. Kwashiorkor
ii. Marasmus, and
iii. *Marasmic Kwashiorkor*

Vitamin-A deficiency

Inadequate dietary intake of vitamin A or its precursor (β-carotene) is exhibited as Bitot's spots, kertomalacia in preschool children.



▲ Fig 2 Bitot's spot

▲ Fig 3 Keratomalacia

Nutritional Needs during School Age (6-12 Years)

The school-age, six to twelve years, has been called the latent time of growth. The rate of growth slows down and body changes occur gradually. The slow rate of growth during this period result in a gradual decline in food requirement per unit of body weight.

Energy

Energy needs vary with growth rate, body size and physical activity. The requirement **for calories** increases during school age.

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DO YOU KNOW?

Adiposity rebound is a phenomenon of normal growth, occurring at approximately 6 years of age which is when a child's body fat increases.

Protein

Girls require more protein than boys because they are reaching menarche. The protein requirements are slightly higher for girls than boys between 10-12 years.

Minerals

Calcium requirements are more to meet the need for skeletal development. They need to take 2-3 glasses of milk. Iron requirement is further increased by rise in the haemoglobin concentration.

Vitamins

Vitamin-A requirements of children is 600µg. Vitamin-C requirements are 40mg. Vitamin B complex requirements increase with calorie needs. The RDA of vitamins A and C are same as adult RDA.

Food Requirements

A natural increase in appetite is responsible for an increase in food consumption. Parents should encourage the child to eat appropriate portion sizes, eating a variety of food to meet their nutritional requirements.

Importance of breakfast

- Children who skip breakfast do not make up for the nutrition and energy needs and tend to perform poorly in academics(NIN, 2003-2004)
- Eating breakfast is a healthy habit.
- An ideal breakfast should have all 4 basic food groups.

Dietary Guidelines for School Children

- Nutritional requirements should meet their activity, growth and special requirements during sickness and injury.
- Menus should provide dishes that are quick to eat, nutritious and variety is needed.

Table 10 Balanced diet for School Going Children

		Quantity(g)		
		7-9 years	10-12 years	
Food groups	**g/portion**		**Boys**	**Girls**
Cereals and millets	30	6	8	10
Pulses	30	2	2	2
Milk (ml)	100	5	5	5
Roots and tubers	100	1	1	1
Green leafy vegetables	100	1	1	1
Other vegetables	100	1	2	2
Fruits	100	1	1	1
Sugar	5	4	6	6
Fats / Oils (visible)	5	6	7	7

Source: Dietary Guidelines for Indians - A manual, National Institute of Nutrition, ICMR, Hyderabad, India (2011)

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DO YOU KNOW?

Food insecurity means having limited or uncertain availability of nutritionally adequate and safe foods or a limited ability to acquire appropriate foods.

- Weather conditions should also be considered-in hot season more of liquid should be included.
- Snacky meals should be given at intervals which can be easy to handle.
- Fruits and dry fruits can be given for snacks.

6.4 PACKED LUNCH: GUIDELINES FOR PREPARING NUTRITIOUS PACKED LUNCH FOR SCHOOL CHILDREN

Packed lunch has become a necessity for school children as it is not possible to have lunch at home. Packed lunch is a lunch in a tiffin box to be eaten by the child while away from home.

Points to be considered while planning packed lunches are:

1. It should meet one third of the day's nutritional requirements.
2. It should include food from all the four food groups though the number of dishes may be less.
3. Food stuffs providing good quality protein like egg, milk or milk products like paneer or curd would improve overall protein quality in combination with vegetable protein.
4. At least one serving of green leafy vegetables should be included.
5. One fruit or vegetable salad may be included every day.
6. Variety should be present.
7. Preferably the food packed should be different from that prepared for breakfast.
8. The dishes should be packed in the right consistency so as to avoid leakage or food becoming dry during lunch which may not be appetising to the child.
9. Following are two examples of a packed lunch.
   - Vegetable peas pulao, onion raita, boiled egg, banana.
   - Vegetable dhal rice, amaranth porial, soya gravy, and butter milk.

Activity 4

Match the following:

Vitamin A	tomato
Calcium	lemon
Iron	carrot
Vitamin D	liver
Vitamin C	milk
Lycopene	sunshine vitamin

2. List out the junk foods that are liked by school going children

6.5 NUTRITIONAL REQUIREMENTS DURING ADOLESCENCE

Adolescents is the period between childhood and adulthood. It is a period of rapid growth after infancy and it reaches its peak between 11th to 14th years for girls and 13th to 16th years for boys. Adolescence require more food for the following reasons:

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a. this period (teenage) is spread almost over a decade,
b. it is characterized by rapid increase in height and weight, hormonal changes, sexual maturation and wide swings in emotion,
c. development of critical bone mass is essential during this period as this forms the ground for maintaining mineral integrity of the bone in later life,
d. the pattern and proportion of various body components like body water, muscle mass, bone and fat increase during the entire childhood and adolescence to reach adult values by about 18 years.

Adolescent girls are at greater physiological stress than boys because of menstruation. Their nutritional needs are of particular importance as they have to prepare for motherhood.

Nutritional Needs of Adolescents

Good nutrition is critical during the teenage years to ensure healthy growth and development. A healthy diet must meet the changing nutritional needs of a growing teenager.

Energy

Calorie needs is influenced by activity level, basal metabolic rate, increased requirements to support pubertal growth, development and energy expenditure. The energy requirements for boys are more than that of girls.

Protein

Protein needs of adolescents are influenced by the amount of protein required for maintenance of existing lean body mass and accrual of additional lean body mass during the adolescent growth spurt. When protein intakes are consistently inadequate, reductions in linear growth, delays in sexual maturation and reduced accumulation of lean body mass may be seen.

Fat and Essential Fatty Acids

The human body requires dietary fat and essential fatty acids for normal growth and development. The intakes of total fat and saturated fat should not exceed RDA.

Calcium

Calcium needs during adolescence are greater than they are in either childhood or adulthood because of the dramatic increase in skeletal growth. Milk provides the greatest amount of calcium in the diets of adolescents.Ragi, green leafy vegetables, milk and milk products are excellent sources of calcium.

Iron

Iron is vital for transporting oxygen in the bloodstream and for preventing anaemia. For both male and female adolescents, the need for iron increases with rapid growth and the expansion of blood volume and muscle mass. The onset of menstruation imposes additional iron needs for girls.

Zinc

Zinc is important in adolescence because of its role in growth and sexual maturation. Males who are zinc deficient experience growth failure and delayed sexual development.

Vitamins

Vitamin A is important for normal vision and plays a vital role in reproduction, growth, and immune function. The most obvious symptom of inadequate vitamin A consumption is vision impairment,

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especially night blindness. The low intake of fruits, vegetables and milk and dairy products by adolescents contributes to their less than optimal intake of vitamin A.

Vitamin E is well known for its antioxidant properties, which become increasingly important as body mass expands during adolescence. Fortified breakfast cereals and nuts are good sources of vitamin E. Vitamin C is involved in the synthesis of collagen and other connective tissues

Fibre

Dietary fibre is important for normal bowel function, and plays a role in the prevention of chronic diseases, such as certain cancers, coronary artery disease, and type 2 diabetes mellitus and reduces the risk of obesity. Increased intake of fruit, vegetables, and whole grains increases the fibre intake. Adolescents who skip breakfast or do not routinely consume whole grain cereals are at high risk for having an inadequate consumption of fibre.

Dietary Guidelines for Adolescents

Diet in adolescents is very significant because it influences the nutritional status later in life.

- Adequate well balanced nutritious food should be taken to prevent obesity or under nutrition.
- An adolescent girl should take enough calcium rich foods in her diet to increase bone density and delay the onset of osteoporosis.
- Should not miss breakfast.
- Junk food should be avoided.
- Avoid empty calorie foods such as carbonated beverages.
- Iron rich foods may be included in the diet to prevent anaemia.
- Calorie and protein rich foods should be taken to support the growth spurt.
- Include fruits and vegetables in the diet to meet the vitamin, mineral and fibre requirement.

Table 11 Balanced Diet for Adolescents (Number of portions)

		10-12 Years		13-15 Years		16-18 Years	
Food groups	**g/Portion**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**
Cereals & millets	30	8	10	11	14	11	15
Pulses	30	2	2	2	2.5	2.5	3
Milk & its products	100	5	5	5	5	5	5
Roots & tubers	100	1	1	1	1.5	2	2
Green leafy veg.	100	1	1	1	1	1	1
Other vegetables	100	2	2	2	2	2	2
Fruits	100	1	1	1	1	1	1
Sugar	5	6	6	5	4	5	6
Fat/oil (visible)	5	7	7	8	9	7	10

Source: Dietary Guidelines for Indians, National Institute of Nutrition, Hyderabad, 2011.

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- Home based diets are best for children's growth.
- Adolescents need to be encouraged to do physical activity particularly outdoor games. Physical activity regulates appetite.

DO YOU KNOW?

Dysphagia means difficulty in swallowing

Nutrition Related Problems

- Acne Vulgaris
- Anaemia
- Obesity
- Eating Disorders
  i. Anorexia Nervosa
  ii. Bulimia Nervosa
  iii. Binge Eating Disorder
- Predisposition to Osteoporosis

DO YOU KNOW?

Competitive foods are less nutritious, such as high- fat, high-sugar snacks, soda and other sweetened beverages and these foods competes with healthier food choices for consumption.

Difference between Appetite and Hunger

- Appetite is defined as any of the instinctive desires necessary to keep up organic life, especially the desire to eat.
- Hunger is defined as a craving or urgent need for food or a specific nutrient due to lack of food.

How to promote increased fruit and vegetable intake:

- Add fruit purees and mixes into yogurt, milkshakes and pudding
- Grate vegetables and add to batter and dough while making idlies, dosas and chapattis
- Mix vegetable purees into soups and noodles.

Activity 5

Reflect on your food choices as teenager. Do you think your meal choices were balanced and varied? What could you have done to improve your nutritional habits at that time?

6.6 NUTRITIONAL NEEDS OF ADULTS

When an individual reaches adulthood, body growth especially in terms of height and body status stop to a certain extent, but tissue breakdown and repair of body tissues continue even among adults. Therefore adequate amount of essential nutrients need to be provided for maintenance of physical and mental health in adults.

Energy-Kilocalories

There is a gradual loss of functioning body cells and reduced physical activity so adults generally require less energy intake as they grow older. The basic fuels required to supply these energy needs are primarily carbohydrates with moderate fat.

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Protein

The RDA for an adult necessities a protein intake of 0.8g/kg of body weight making the total protein. This amount of protein provides about 13-15% of the total calorie.

Carbohydrates

About 50-60% of the total diet calories should come from carbohydrate foods, with the majority being mostly complex carbohydrates such as starches. Easily absorbed sugars may also be used for immediate energy.

Fat

It provides a back-up energy source. Sufficient fat makes food taste better, aids appetite and provides needed kcal to prevent excessive weight loss.

Calcium and Phosphorus

In adults, calcium is required for replacing calcium lost from body through urine, feces, sweat and bile. Of the dietary calcium only 20-30% is absorbed and this is facilitated by vitamin D. A desirable intake of phosphorus is recommended. The elemental Ca:P ratio in the diet should be maintained at 1:1.

Iron

The loss of iron through sweat, gastrointestinal tract and urine is estimated to be 14 mg/kg body weight. Apart from this women have additional loss due to menstruation. Thus the iron requirements for women are more than men.

Vitamins

Studies have revealed that 600 mg of retinol daily would be sufficient to maintain a normal serum vitamin A level. The requirement for B Vitamins is based on calorie intake. Requirement of folic acid among Indians is 200µg.A daily intake of 20 mg vitamin C is sufficient to maintain

Table 12 Balanced Diet for Adults - Sedentary/ Moderate/ Heavy Activity

S. No	Food Groups	Portion g/Day	Activity: Sedentary Man	Sedentary Women	Moderate Man	Moderate Women	Heavy Man	Heavy Women
			Number Of Portions					
1.	Cereals And Millets	30	12.5	9	15	11	20	16
2.	Pules	30	2.5	2	3	2.5	4	3
3.	Milk	100ml	3	3	3	3	3	3
4.	Roots And Tubers	100	2	2	2	2	2	2
5.	Green Leafy Vegetables	100	1	1	1	1	1	1
6.	Other Vegetables	100	2	2	2	2	2	2
7.	Fruits	100	1	1	1	1	1	1
8.	Sugar	5	4	4	6	6	11	9
9.	Fats/ Oil Visible	5	5	4	6	5	8	6

Source: Dietary Guidelines for Indians A Manual, NIN, Hyderabad (2011).

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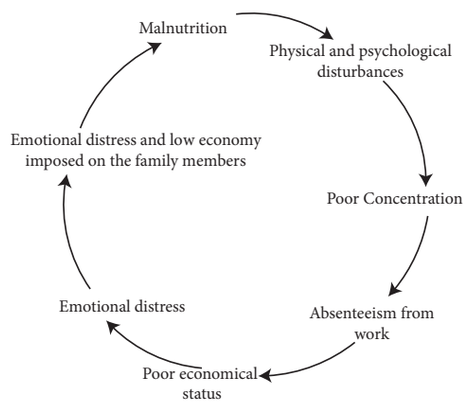
ascorbic acid status. Since 50 percent vitamin C is lost during cooking 40 mg of vitamin C per day is recommended.

Nutritional Problems for an Adult

- Osteoporosis
- Anemia
- Chronic Disease
- Diabetes Mellitus
- Underweight
- Coronary Heart Disease (CHD)
- Poor Nutritional Status

Many of the health problems of older adults are not only due to general aging but also due to states of malnutrition.



▲ Fig. 6.4 Malnutrition

6.7 NUTRITIONAL REQUIREMENTS OF PREGNANT AND LACTATING WOMEN

Nutrition requirements increase tremendously during pregnancy and lactation owing to the physiological changes.

DO YOU KNOW?

Primipara – A woman having her first child

Wholesome nourishment before pregnancy has a greater impact on the long term health on the mother and foetus. A well nourished foetus enters life with good physical and mental health.

Physiological Changes in Pregnancy

Foetal development is accompanied by many physiological, biochemical and hormonal changes which influence the nutrient needs and the efficiency with which the body utilizes them. The changes include

i. Increased basal metabolic rate (BMR)

Due to foetal growth the BMR increases.

ii. Gastro intestinal changes

Gastro intestinal motility diminishes which may result in constipation.

iii. Hormonal changes

During pregnancy there is increased secretion of the following hormones: i) Aldosterone ii) Progesterone iii) Thyroxin iv) Parathormone.

iv. Changes in body fluid

The blood volume expands by 50 percent and this increased amount of blood is required to carry nutrients to the foetus and remove metabolic wastes from the foetus.

v. Altered renal function

Increased blood volume and increased production of waste products like creatinine, urea and other wastes due to foetal and maternal metabolism produces a high glomerular filtration rate (GFR).

vi. Weight Gain during Pregnancy

Less than half of total weight gain resides in the foetus, placenta and amniotic fluid. Women with desirable body weight is 12.5 kg ranging between 11-13 kg.

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6.7.1 Nutritional Needs during Pregnancy

In addition to the RDA for an adult women the nutritional needs increase during pregnancy.

Energy

Energy requirement during pregnancy is increased because of the additional energy required for growth and activity of foetus, growth of placenta and maternal tissues, increase in maternal body size and steady rise in BMR.

Protein

An additional protein intake is essential for:

- Growth of the foetus.
- Development of placenta
- Enlargement of uterus, mammary glands
- Increased maternal blood volume
- Formation of amniotic fluid

Fat

ICMR expert committee has suggested an intake of 30g of visible fat/day during pregnancy.

Calcium

Additional calcium is needed for the growth and development of bones as well as teeth of the foetus and also for the protection of calcium resources of the mother to meet the high demand of calcium during lactation.

Iron

The requirement of iron increases from 21mg/day to 35mg/day during pregnancy.

The increased requirement is due to

i. expansion of maternal tissues including red cell mass, iron content of placenta and blood loss during parturition.

ii. to build the iron store in foetal liver to last for at least 4-6 months after birth. This is because the baby's first food milk is deficient in iron.

DO YOU KNOW?

Pica refers to the compulsion for persistent ingestion of unsuitable substances that have little or no nutritional value like starch, clay and chalk.

Iodine

Due to increase in BMR, iodine needs are also enhanced during pregnancy.

Zinc

Deficiency of zinc adversely affects the outcome of pregnancy. Zinc deficiency leads to foetal mortality, foetal malformations and reduced intra uterine growth rate.

Sodium

Normal sodium intake without restriction is advised during pregnancy. Sodium is restricted when there is oedema or hypertension.

Vitamins

An additional allowance of Vitamin A is needed during pregnancy. Vitamin D is essential as it enhances maternal calcium absorption. Vitamin K is required for synthesis of prothrombin which is essential for normal coagulation of blood. A liberal vitamin K level in the mother's blood is helpful in preventing neonatal haemorrhage. Vitamin C, pyridoxine, and vitamin B12 needs are increased during pregnancy.

Folic acid

Folic acid is essential for increased blood formation i.e. haematopoiesis and for

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synthesis of essential components of DNA/RNA which increase rapidly during growth.

Problems during Pregnancy

- Nausea and vomiting
- Constipation
- Heart burn
- Oedema and leg cramps
- Pica
- Anemia
- Pregnancy induced hypertension (PIH)
- Gestational diabetes

Lactation

Adequate nutrition for the mother during lactation is also of vital importance as the infant is dependent on mother's milk for its nutrition for the first few months of life. Inadequate nutrition during lactation is reflected on both the quality and quantity of milk secreted.

Physiology of lactation

The Table 13 below gives the summary of hormonal control of lactation.

Nutrient Needs during Lactation

ICMR nutrient recommendations for a lactating mother are based on the composition of breast milk and the fact that 850 ml of milk is produced daily. However, the milk secretion continues to increase in the early periods of lactation up to six months and then gradually decreases. Therefore the nutrient requirements are given for the two periods in lactation i.e. 0-6 months and 6-12 months.

Energy

The lactating mother requires additional energy for the production of milk. Based on the optimal output of 850 ml/day, the additional allowance is recommended during first six months of lactation.

Protein

Due to production of milk, protein requirement also increases.

Fat

The total fat in breast milk is not influenced by the mother's diet. The fat also provides energy density to meet the higher energy requirement during lactation.

Calcium

The requirement for calcium doubles during lactation.

Iron

Since most mothers have lactational amenorrhea, it results in saving of nearly 1mg iron per day which otherwise would

Table 13 Summary of Hormonal Control of Lactation

S. No.	Hormone	Source	Function
1	Estrogen	Ovary	Stimulates breast development
2	Progesterone	Placenta	Prepares breast for milk production by changing glandular cells to secreting cells
3	Prolactin	Anterior pituitary	Stimulates milk production
4	Oxytocin	Posterior pituitary	Facilitates release of milk from alveolus

Source: Srilakshmi (2011)

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have been lost due to menstruation. There is a marginal increase in the iron intake.

Vitamins

The additional need of vitamin A during lactation is based on the amount secreted in the mother's milk. As the calorie and protein requirements increase during lactation, the requirements of B vitamins also increase correspondingly. Ascorbic acid content increases during lactation.

Galactogogues

Galactogogues are foods that help to produce more milk. Garlic, milk and almonds are considered to increase milk production. Studies carried out on nursing mothers have revealed that extra amounts of body building foods like fish and mutton increase the secretion of breast milk. Lactating mothers are also given special preparations containing ajwain and fenugreek seeds, which supply iron, protein, calcium and B- complex vitamins.

CASE STUDY

Case study 2

Jeni is pregnant. She comes for nutrition counselling. Explain to her the six nutrients that are required in larger amounts during pregnancy Describe their special roles and suggest four food sources for each.

6.8 NUTRITIONAL NEEDS AND CHALLENGES DURING OLD AGE

Individuals above the age of 60 years constitute the elderly. Health and well-being of the elderly is given more importance and has paved way for a specific field of study called "Geriatric Nutrition".

Aging

Aging is an irreversible biochemical change that occurs throughout an individual's life cycle and continues until death. In old age, the nutritional status is determined by the state of nutrition of an individual's cell. Conditions like dietary deficiency,

Table 14 A Balanced Vegetarian Diet For Pregnant and Lactating Mother Doing Sedentary Work

S.No	Food group	Pregnant mother Quantity (g)	Lactating mother Quantity (g)
1	Cereals millets	300	330
2	Pulses	60	90
3	Milk(ml)	500	500
4	Roots and tubers	100	100
5	Green leafy vegetable	150	150
6	Other vegetable	100	100
7	Fruit	200	200
8	Sugar	20	20
9	Fats and oil(visible)	30	30

Source: Dietary Guidelines for Indians - A manual, NationalInstitute of Nutrition, ICMR, Hyderabad, India, (1999)

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improper digestion and absorption, insufficient distribution of nutrients, accumulation of excess waste products lead to poor nourishment of cells.

With increasing age, cell functioning is slowed down and their response to hormones and synthesis of enzymes decreases. These changes are associated with a decrease in the number of functioning cells. Since the cells are interdependent, if one cell dies, others of the same or different organ lose their ability to function resulting in malfunctioning of the organ. This in turn gradually affects the total body functioning leading to death.

NUTRITIONAL NEEDS DURING OLD AGE

Energy

The calorie intake should be adjusted to maintain weight. The energy requirement decreases due to the following reasons:

a. Decreased physical activity
b. Reduction in lean body mass and increase in adipose tissue
c. Decrease in resting metabolic rate by 15-20 percent due to changes in body composition and physical inactivity

Protein

The protein requirements do not change during old age. It is the same as adults i.e. 1g/kg of body weight.

Carbohydrate

Since the calorie requirement is reduced, the carbohydrate content should also be proportionately reduced. Due to impaired glucose tolerance and gastrointestinal disturbances like constipation, emphasis should be on taking complex carbohydrates.

Fat

The fat requirements are also reduced, corresponding to the energy requirements. The intake of saturated fats and cholesterol should be less and unsaturated fat should be used in cooking.

Minerals

Calcium needs increases during old age due to increasing mobilization of calcium from bones and incidence of osteoporosis. During old age 1000mg of calcium is recommended per day because of the following reasons.

- Limited availability of calcium from foods
- To compensate age related bone loss and to improve calcium balance
- To prevent fractures and tooth decay
- To compensate decreased efficiency of calcium absorption

Aging does not affect iron needs. Hence iron needs are same as that for adults. Mild anaemia may affect the health of old people due to inefficient circulation. Therefore iron intake should be adequate during old age.

Vitamins

Vitamin A requirements remain the same i.e., 600 µg of retinol. Inadequate exposure to sunshine may affect vitamin D levels. The antioxidant vitamins such as vitamin E, carotenoids and vitamin C have been identified to promote health of the elderly. Vitamin B6 requirements are also increased due to gastritis which interferes with absorption.

Besides these various nutrients, water should be consumed in plenty as such or as fluids like buttermilk, fruit juice and soups. Intake of sufficient fluids reduces

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Table 15 Sample Menu

Time	Food Items
Early morning	Milk/tea/coffee
Morning	Idli/dosa Tomato chutney or vegetable sambar Fruit-1 slice
Mid-morning	Butter milk/soups/boiled eggs/ fruit salads
Lunch	Rice, sambhar, greens kootu, vegetable poriyal
Evening	Fruit yogurt/boiled sundal/custard
Dinner	Idiyappam/ idly/ dosa,vegetable stew/dhal,fruit.
Bedtime	Milk

the load on kidneys and relieves from constipation by stimulating peristalsis.

Nutrition Related Problems of Elderly

The elderly are at risk of poor nutrition due to economic pressure, poor dentition, aging tissues and inadequate diet, which may be compounded with the incidence of chronic disease. The commonly prevalent nutrition related problems among the aged include:

- Osteoporosis
- Obesity
- Anaemia
- Malnutrition
- Constipation
- Diabetes Mellitus
- Cardiovascular disease

Iron deficiency anemia is a serious public health problem throughout Central America, Like in India, Rice a staple food in Central America. It is typically polished and rarely iron-fortified.

CASE STUDY

Case study 3

An adult is on a limited budget and has poor vision and constipation. Knowing that fresh fruit and vegetables are often expensive, what suggestions would you make for your client to meet the suggested servings of five fruits and vegetables per day?

6.9 DIETARY MODIFICATION DURING OLD AGE

CASE STUDY

Case study 4

Mr. Ram is a healthy, active 82-year-old man. He exercises regularly and enjoys variety of foods. Recently he has started putting on weight. He says he eats exactly the same amount of food he ate when he was 30 years young. What dietary guidelines would you suggest to prevent constipation and additional unwanted weight gain?

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Table 16 Modification of Diet For Elderly

Dietary modifications	Reasons
Foods must be soft and easily chewable	Problems of dentition -fallen teeth or dentures
Foods should be easily digestible	Decreased production of digestive enzymes
Restricted fat in diet, inclusion of Poly unsaturated fatty acid (PUFA)	Susceptible to heart diseases
Foods rich in fibre should be given	To prevent constipation, reduce cholesterol levels. Also to prevent colon cancer
Coffee, tea, cold beverages should be restricted	May result in insomnia
Foods rich in calcium such as is milk should be given	To compensate bone loss and prevent osteoporosis
Green leafy vegetables can be given liberally	Source of nutrients like: iron riboflavin, folic acid, vitamin c, antioxidants, carotene, and fibre
Familiar foods should be included (others difficult to digest) New foods are difficult to accept	Unfamiliar or changes in the food pattern- may lead to Psychological problems-depression and anxiety
Clear soup can be given at the beginning of the meal	Aids digestion
Small and frequent meals should be given instead of 3 heavy meals	Favours complete digestion, prevents distress
Glass of milk can be given before sleep	Induces sleep
Heavy meal-lunch Light meal-dinner	Sleep is less likely to be disturbed
Too many sweets with lots of fats and sugar should be avoided	Too much of sugar may cause fermentation, discomfort-due to indigestion and causes tooth ache and increases cholesterol level. May lead to obesity
Plenty of fluids	To prevent constipation and dehydration

Activity 6

Debate on the importance of vegetarian and non vegetarian diet

SUMMARY

1. An individual's needs for nutrients and energy change over the life span.
2. The need for nutrients increases during periods of growth such as infancy, adolescence and during pregnancy.
3. When the growth period declines, energy needs and the need for certain nutrients declines.
4. Nutrition for children and teens should focus on a balanced diet, with activity levels factored in, whereas in adults, both young and old, it is imperative to focus on preventing diet-related health problems.
5. Healthy dietary practices and habits and regular physical activity can help reduce

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the chance of premature death and increase the chance of vitality.

6. This chapter emphasises the role of healthy diet, in the human life cycle from infancy to the elderly years and evaluates the role of nutrition in the promotion of health at every stage of the life cycle, identified.

GLOSSARY சொல்பொருள்

Allergy - (ஒவ்வாமை) A highly sensitive reaction of the body to certain substances, such as pollen, that are present in amounts that do not affect most people.

Amenorrhea - (மாதவிலக்கின்மை) *is a condition in which there is an absence of menstrual periods in a woman.*

Edema - (நீர்த்தேக்கம்) It is a swelling, usually of the legs, feet, or hands due to the accumulation of excessive fluid in the tissues.

Fortification - (மதிப்பை பெருக்குதல்) It refers to the practice of deliberately increasing the content of an essential micronutrient.

Glomerular filtration rate (கிளமரூல்ஸ் வடிக்கட்டும் விகிதம்) *is the test to measure level of kidney function and determine the stage of kidney diseases.*

Gruel - (கஞ்சி) It is a thinner version of porridge that may be more often drunk than eaten and may not need to be cooked.

Haemoglobin - (ஹீமோக்ளோபின்) It is a protein of red blood cells that contains iron and carries oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs.

Heme iron - (ஹீம் இரும்புச்சத்து) *Heme iron* is derived primarily from hemoglobin and myoglobin in animal protein sources.

Hemorrhage - (குருதிப் போக்கு) *It* is a rapid loss of blood, usually due to a ruptured blood vessel, or a rapid loss of resources or valuable people.

Immune - (நோய் எதிர்ப்பு) It is protection against a particular disease by particular substances in the blood

Junk food - (துரித உணவுகள்) *It* is food containing high levels of calories from sugar or fat with little fiber, protein, vitamins or minerals.

Mashed foods - (மசித்த உணவுகள்) To crush *foods*(e.g. boiled potatoes) into a smooth, evenly textured mixture.

Nausea - (குமட்டல்) A feeling of sickness in the stomach marked by an urge to vomit.

Yoghurt - (தயிர்) It is a prepared food having the consistency of custard, made from milk curdled by the action of cultures, sometimes sweetened or flavoured.

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ICT CORNER

Step: 1

Type URL or scan the QR code from your mobile. "Nuttri" App will open. Month wise child diet plan will appear. Click any food item to know the nutritional value in that diet

Step: 2

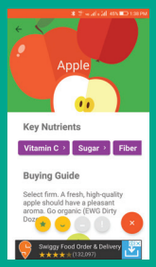
Click second tab and create your favourite diet and refused diet list

Step: 3

Click the calendar icon to plan a meal for a particular day

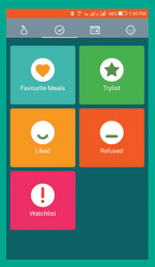
Step: 4

Then click last option to get many tips from the website (www.nuttriapp.com/references/)

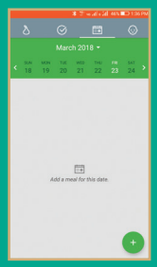


Step1

Step2



Step3



Step4

Timeline Project's URL:

https://play.google.com/store/apps/details?id=com.app.tnpscjobs&hl=en&rdid=com.app.tnpscjobs

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QUESTIONS

I. Choose the correct answer

1. Nutrients are
   a. chemical substances or compounds in foods that have specific metabolic functions
   b. foods that are necessary for good health
   c. metabolic control substances such as enzymes
   d. foods use to cure diseases.

2. Which of the following foods has the highest iron content to help to meet the need for increased iron during pregnancy?
   a. Lean beef c. Orange juice
   b. Liver d. Milk

3. The increased need for vitamin A during pregnancy may be met by increased use of foods such as
   a. chicken c. citrus fruits
   b. egg white d. carrots

4. Fat is needed in the child's diet to supply
   a. minerals
   b. water soluble vitamins
   c. amino acids
   d. essential fatty acids

5. Iron deficiency is associated with
   a. scurvy c. anemia
   b. rickets d. pellagra

6. The basic biological changes of old age include
   a. an increase in the number of cells
   b. decreasing need for water
   c. an increased basal metabolic rate
   d. a gradual loss of functioning cells and reduced cell metabolism

7QLC6

II. Very short answer 2 Marks

1. Define balanced diet.
2. What is My Pyramid?
3. What are food exchange lists?
4. Define RDA.
5. Define weaning
6. List any two problems in weaning
7. What is the importance of weaning?
8. Define Osteoporosis
9. List any two snacks for an aged man with dentures.
10. What are the protein requirements of an adult?
11. Define Low Birth Weight infant.
12. Draw the food plate.
13. How can constipation be prevented?

III. Answer briefly 3 marks

1. List any three factors to be considered in planning packed lunch for school going children?
2. What are the common nutrient related problems among adolescents?
3. What essential nutrients would you suggest for the growth of bones in osteoporosis?
4. How can an individual reduce the risk of chronic disease?
5. Explain any three problems during pregnancy
6. If a pregnant women approaches you for diet counselling what dietary modifications would you recommend?
7. List the guidelines to be followed in planning a diet for a lactating mother?

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8. Why does the energy requirement decrease during old age?
9. What are the causes of malnutrition during old age?
10. Distinguish between functional foods and nutraceuticals.

IV. Write in detail 5 Marks

1. Explain the steps involved in the planning of diet.
2. Give the RDA for an adolescent girl.
3. Outline the nutritional requirements of infants
4. Discuss on different types of supplementary food? Enumerate the important points to be considered in weaning.
5. Suggest liquid supplements that can be given for an infant belonging to a low income family.
6. Give any two supplementary foods prepared using local ingredients
7. A preschool child Ram does not eat fruits, vegetables and egg. He dislikes sundal also. What are the nutritional problems he is likely to face?
8. What dietary counselling would you give a mother for the nutritional problems faced by her 4 year old son?
9. Explain the nutritional requirements for school going children?
10. Explain the nutrient requirements of adolescents?
11. Explain in detail about the nutritional problems and requirements for an adult.
12. Explain to a pregnant mother why the nutrient requirements increase duringpregnancy?
13. What reason would you give a lactating women for increased nutrient intake?
14. Plan a day's menu for an elderly person.
15. What dietary advice would you give for an elderly person?
16. What are the nutritional needs for the elderly?
17. Suggest five packed lunches for Selvi, who is in standard VI.
18. Inadequate nutrient intake during adolescence will lead to health consequences in adulthood. Explain.

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Chapter 7 Family Resource Management

Learning Objectives

This chapter will enable the students to:

- Know about resource management and its importance
- Understand the types of resources
- Gain information about values, goals, and standards
- Learn about the process in decision making

SMLRU

7.1 INTRODUCTION

The first contact for every individual in this world is her/his family. The family is a socially recognized unit of people united together by marriage, kinship or legal ties. Management in the context on the family is the natural outgrowth of human associations and interactions. Its ultimate aim is to provide for optimal development of its individual members. Management of family allows us to overcome our individual limitations. Through the combination of individual efforts and resources, we achieve far more than what we could do independently. Most families are not aware of all the resources at their disposal. The quality and quantity of resources that are available to each family varies.

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7.1.1 Definition and Concept of Family Resource Management

Resources can be defined as anything we use to achieve what we want (our goals). In other words, they are the materials and human attributes which satisfy our wants.

The concept of management involves planned use of resources directed towards the achievement of desired ends. This involves the weighing of values and the making of series of decisions.

Home management is the vital factor in every family contributing to the overall health, happiness and well-being and higher standard of living for the family members. In simpler terms, home management is defined as the mental process of utilising the available resources to achieve what you want in life.

Figure - 1 indicates that **management is a process involving activities, through which action is initiated and resources are used for achieving a goal**. For this purpose, certain guidelines in the form of values, goals and standards can be formulated by every manager. For sure attainment of desired goals it becomes essential to plan, organise, coordinate and control all the activities, so that the resources are not wasted.

Management Process:

Management process consists of five steps 1) Planning 2) Organizing 3) Directing. 4) Controlling 5) Evaluating and are discussed below in detail.

1. Planning

Planning is very important to the success of management process. It is basically working out ways or course of action to achieve the goals. Planning can be habitual or conscious.

Planning involves thinking through the possible ways of reaching a desired goal. It also involves developing a sequence of actions within an overall organizational structure.

The entire task from beginning to its completion must be viewed in whole. If the paths leading to the goals are easy to see, the choice of the best plan can be made quickly. When the path is hard to see due to some obstacle, the planner must find ways of overcoming them. As children do not have enough experience, they can get the help of an experienced adult to plan. The final act in planning is arriving at a decision. **'It is the gate that releases action'.**

Good planning requires the use of the powers of thinking, memory, observation, reasoning and imagination. These powers, make it easier to plan and to meet situations in everyday living. For example the following points should be borne in mind while planning a birthday party.

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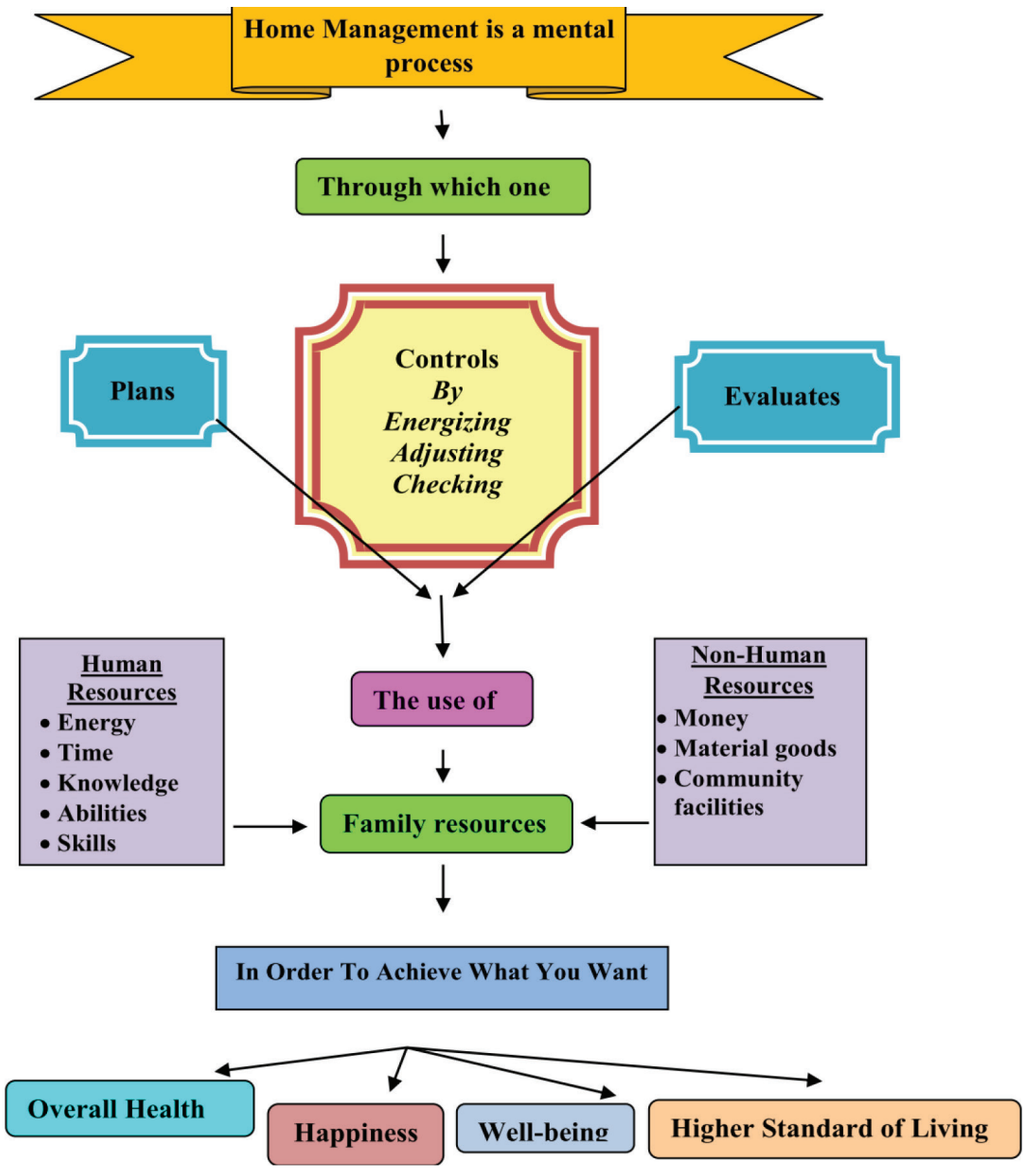

▲ Fig. 1 Management Process

1. The place or the venue of the party.
2. Number of invitees
3. Menu
4. How much money are we going to spend?
5. When are we going to have the party?

While planning, the following points should be considered.

- There should be a balance between the amount of resources available and the demands or needs.
- The decision should be made according to individual situations.
- The plan should be realistic.
- The plan should be flexible.

Types of Plan:

Repeat use plan | **Single-use plan**

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Single-use plan is one that is developed for a specific function, event or activity with the anticipation it will not be used again. While ***repeat use plan*** is one that is developed in the anticipation, it will be modified and frequently used in similar situations, for similar demands or events or to resolve like problems. ***Sequencing*** is a phase of the planning component of management process in which all tasks necessary to achieve the goal are placed in a logical order; the standards for each task are established.

Activity 1

- Identify and record the repeat use plans you use frequently and list the sequence of activities that take place.
- List any two single-use plans you have developed and identify the function, situation or event for which the plan was developed.

2. Organizing

Organising involves the performance of the following tasks.

a. Division of work among employees (assignment of duties)
b. Delegation of authority (transfer of official rights by a superior to his subordinate)
c. Creation of accountability (the subordinate, to whom work has been assigned and authority has been delegated, is made answerable for the progress of work).

3. Directing

Directing the human resource does not mean the process of issuing mere orders and instruction to the subordinate staff. It is, in fact, the process of supervising, guiding and motivating the employees in order to get the best out of them. By performing the directing function, the human resource manager will also be able to get the whole –hearted support and co-operation of all his subordinate staff. This help in the effective attainment of the enterprise objective.

4. Controlling

Controlling is carrying out the plan. This step calls for flexibility in thinking. At times new decisions are required which may result in changes in plan. For example: when the menus are planned for meals, if certain things are not available during shopping a fresh decision need to be made. The different phases of controlling are

- **Energising:** This is initiating and sustaining the action. The individuals who are involved in doing a particular task must be energized in order to get results. In spite of having a good plan, sometimes implementing the plan would become difficult. Here, the energizing function would act as a catalyst.
- **Checking:** This is a quick step by step evaluation of the progress of a plan. To go to school on time one has to get the clothes, the meals and books ready, which need checking of time at all stages.
- **Adjusting:** Adjusting is done in the plan if there is a need for fresh decisions to be taken. This should be done taking into account the problem in hand and the resources available. Getting into action,

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What is the role of management process in your daily life?

The management process is a tool used to achieve your goals. Through its use you are better able to attain your desired quality of life. Through the management process you can identify the demands being placed upon the resources (skill, time and money). This knowledge is then used for effective allocation and use of resources and to lead a more satisfying and successful life.

keeping the resources mobile and knowledge of what is to be done are all important in this step.

5. Evaluating

This is a checking up process, which may help one move forward. The efficiency of the process and the quality of the end product are to be checked. When there is clear cut objectives it becomes easier to evaluate the entire process. The success or failure of the plan must be evaluated on the basis of the set goals. In case of failure the demerits of the plan may be noted and rectified while making further plans. Evaluation can be general or more detailed.

Thus management in the home is a dynamic force in day to day living and is the administrative side of family living. The steps in the management process are interdependent and interrelated for efficient, effective and dynamic use of resources which leads to the proper management of the house, whereby goals are achieved to attain maximum satisfaction.

7.2 VALUES, GOALS AND STANDARDS

7.2.1 Values

Values, Goals and Standards are important factors in the management process. Values are the key to all motivating factors in human behavior. Value, as a concept is vague and subjective although it is very important to an individual. Values grow out of human desire and interest. Values differ in cultures. The family has the major responsibility for fostering values among the members. **The term "value" signifies the meaning or definition of worth that is attached to any object, condition, principle or idea.** Values provide a basis for judgement, discrimination and analysis and it is these qualities that make intelligent choices possible between alternatives. Thus, values are the fundamental forces that force or motivate human activities and endeavors.

According to **Gross and Crandall (1980)** a value is always important to the person who holds it. It is desirable and satisfying. It has the ability to develop in self-creative way and it tends to endure. It is a concept of the desirable, explicit or implicit which governs our choice of methods, modes or goals.

The following are the motivating values of human behavior-comfort, health, ambition, love, desire for knowledge, technological satisfaction, play, art, religion.

7.2.1.1 Classification of values

- **Intrinsic or Instrumental:** An **intrinsic value** is one that is important and desirable simply for its own sake. It

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is worthy of being sought for itself alone. Honesty, co-operation, creativity, beauty, discipline, respect etc. are some of the intrinsic values in management. On the other hand, **instrumental values** are ways of reaching intrinsic or end values, sometimes called goal values. Therefore, they form the basic values leading to another. Planning, skills, order and efficiency and technological satisfaction are examples of instrumental values.

- **Factual and Normative Values:** The other classification of values as factual or normative brings out the difference between the factual values that exist, regardless of their level of desirability and the normative values that have an ethical basis. The factual values also called descriptive, generally are based on people's preferences and desires. The normative are ethical values, which carry the idea of right or wrong. Some examples of factual values are honesty, religion, loyalty, faithfulness.

Activity 2

- What are your five highest values? Describe how these values are shown in your interaction within your family sphere.

7.2.2 Goals

Goals are important factors in the management process. Goals are the desires that individuals or families are willing to work for. They are more definite and clear than values because they are to be accomplished. They are tangible things, objects, ends or purposes. Goal is an objective or purpose to be attained. They are specific ways of realizing the values one hold.

Definition: Goal is defined as an objective, condition or something you desire to achieve or attain at any given period or time.

At present, your goals are to complete your courses and obtain higher degree so as to get job in your chosen profession. As each of these goals are achieved, new goals, will emerge leading to other higher goals in your life.

Goals, like values, play an important role in your life. Values give meaning to your life. Goals on the other hand, point the direction you want your path to follow. Thus, it can be said that values and goals are inter-related. Values are the vehicles and goals are the highways you use to attain your desired quality of life.

7.2.2.1 Types of Goals

Goals are classified under the following heads.

They are classified:

I) **According to the number of groups:**

i) **Individual goals** are established by an individual for himself. These are based on his own values. He puts in efforts for their achievement and receives satisfaction to himself, for example scoring 70% marks in the examination.

ii) **Group goals** are established by the group. These are based on the some of the common values and interests of the group members, for example, achievement of 100% result of the class at the S.S.L.C. examination.

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II) **According to duration for achievement of goals**

Throughout life each individual and each family is always seeking some objectives.

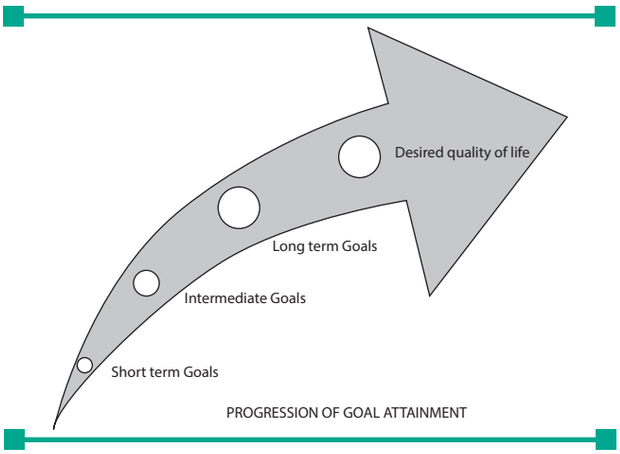
According to duration for achievement, goals are classified as short-term, intermediate and long-term goals.

i) **Short-term goals**

In short term goal, the period of attainment of goal is short. Example is to successfully complete the course of study. Since the achievement is anticipated in the near future, these goals usually involve a time period of six months or less.

ii) **Intermediate goals**

Intermediate goals are nothing but the link connecting between short term and long term goals. They have definite characteristics and serve a purpose in your life time achievement. The time duration involved in intermediate goals is longer than short term goals. Achievement of these goals is measured in terms of several months or years. For example, to complete your graduation you will require few years.



iii) **Long term goal**

The duration in achieving this goal is long. Classification differs from the other two, in regard to the time period, the degree of specificity and the extent of active implementation involved in attainment. Long term goals are those you have set for yourself in the distant future.

Long term goals may include one or more of the following – getting a good job in chosen profession, getting married, owning home or farm.

7.2.3 Standards

Standard is a scale of measurement of values. **According to Nickell and Dorsey (1970), standards are a set of measure of values stemming from our value patterns, determining the amount and kind of interest in something and the satisfaction we receive.** Standards serve as a measure or criterion for measurement of objects or ways of doing things.

There are standards that apply to a single situation or area such as standard of food or dress or conduct. Standards set the limits one will accept in working towards a goal.

Gross and Crandall classify standards as (1) conventional and (2) flexible.

i) **Conventional Standards:**

Conventional standards are those that are traditional and accepted by the community at large or by a social group within it. To illustrate

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'high' standard of cleanliness, we can take an example of cleaning and dusting furniture twice a day. This can be standard of any family. If an unexpected guest arrives and there is dust visible, the homemaker is apt to say 'I did not dust today'.

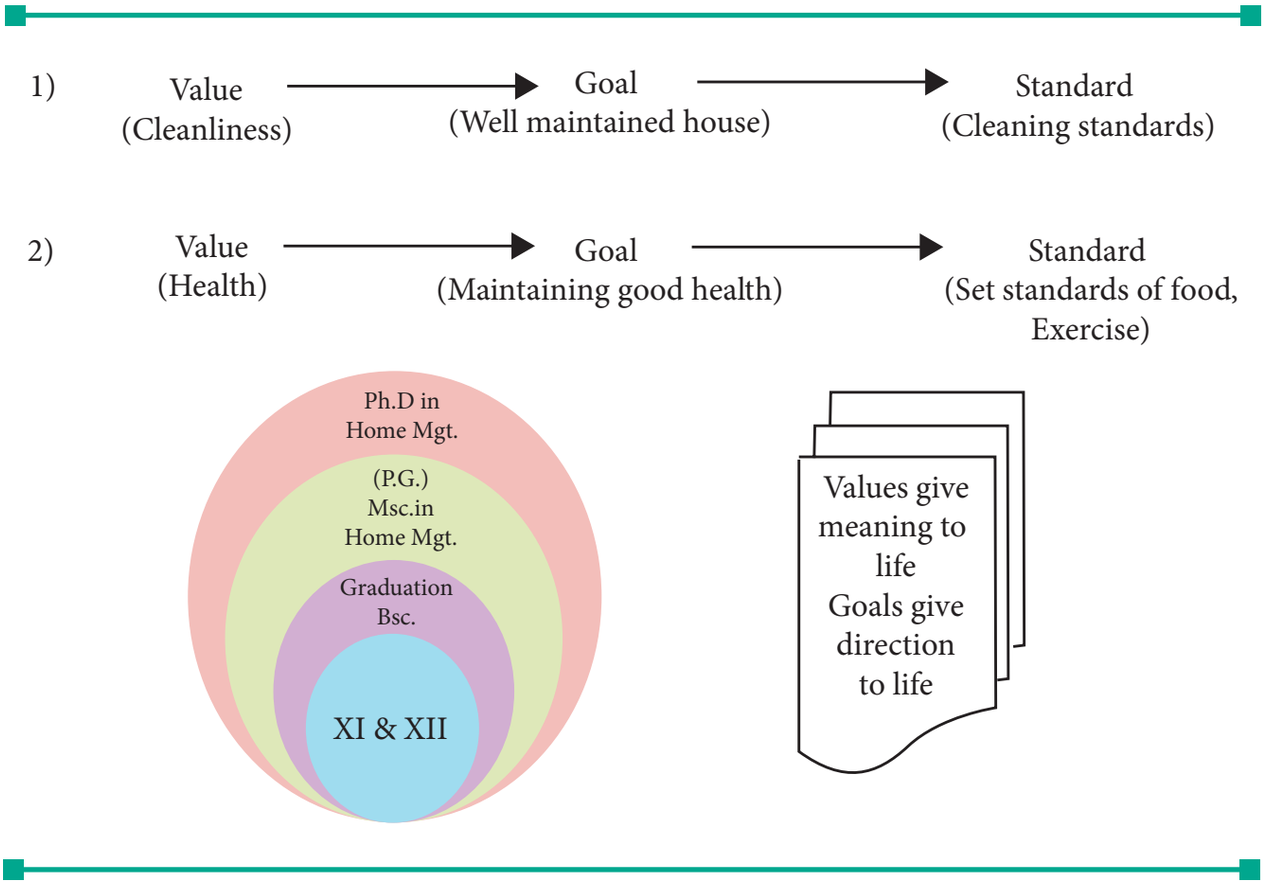
ii) Flexible standards:

Flexible standards can be changed to suit different situations; they give greater freedom of choice. Adjusting family standards to changing conditions is an example of the need to have flexibility in one's standards.

Interrelationship between goals, values and standards: Using kitchen as a selected area of the house, the concept of values, goals and standards can be illustrated as follows.

- Values give meaning to your life.
- Values are a prime motivating force in all management.
- Values is a dominant term

Goals are closely related to both values and standards in initiating management. They sten from values and are influenced by standards. Each exerts an influence on the other two. Goals are indicators of values. For example, the goal of owning one's home may be one expression of the value of security. Standards are specifications of values. They measure the degree of influence of a value. Standards set the limits one will accept in working towards a goal.



▲ Fig. 2 Inter-relationship of values, goals and standard

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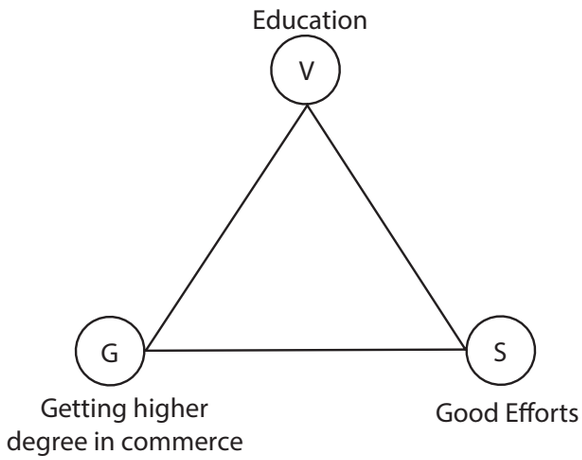

7.3 DECISION MAKING

The various steps in the management process are really a series of decisions, based upon our previous experiences. Therefore, decision making is the heart of the management. **A decision can be defined as a course of action consciously chosen from the available alternatives for the purpose of desired result.** So the role of decision making in management involves knowing and actually applying essential information in problem situations of day to day life. Thus it is used to achieve goals and assessing standards.

Management is a mental process which involves a series of decision making.

7.3.1 The steps in decision making process are:

1. **Defining the Problem**
   It involves the recognition of the problem. It needs relevant information to identify and define it first. Unless the problem is clearly defined and analysed the ultimate decision would not be effective. For e.g. planning household activities, purchasing labour saving devices, selecting clothing for the family.
2. **Identifying the Alternatives**
   Decision making will be effective only when one identifies possible alternatives. The choice of best selection of alternatives requires thorough knowledge about the availability of resources and their limitations.
3. **Analysing the Alternatives**
   After identifying the alternatives, the consequences of each alternative is systematically found, considering the goals, values and standards.
4. **Selecting an Alternative**
   After analysing the problem the possible alternatives. are selected. Evaluation plays a very important role in this selection. Choosing the best from the several possible alternatives will be helpful in solving the problem.
5. **Accepting the Consequences of the Decision**
   This is the ability to assess and accept the consequences of the decision for making future decision. It is the evolutional process. The process of evaluating the alternatives is based on your goals, values and standards. This experience would indicate the final outcome of the decision making. It creates self confidence in people and gives feedback to make effective decisions in the future.

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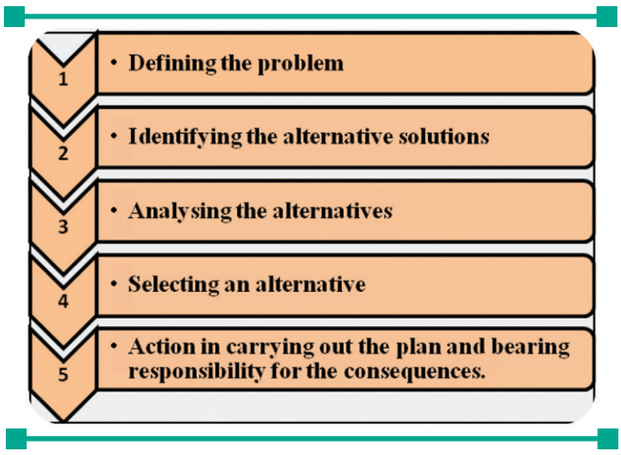

▲ Fig. 3 Steps in Decision making

7.3.2 Types of Decisions

There are different types of decisions namely individual decision, group decision, habitual decision, central decision, economic decision, technical decision and decision making due to experience and knowledge.

- **Individual Decision**
  It is the decision pertaining to an individual e.g. education. Individual decisions are more quickly made. The decision making of an individual revolves around the values, goals, standards and roles the individual assures in the relevant set of frame work.

- **Group Decision**
  It is made from the collective action of several individuals each of whom has distinct values, goals, standards and role perception. It is a difficult process and a slow process. Role conflicts would emerge in this situation.

- **Habitual Decision**
  It is the lowest level of decision. Once an individual is trained to do systematic work, he will follow that throughout his life. They are routine, repetitive actions related to daily activities. Once it becomes a habitual choice, the resultant action is quick and spontaneous.

- **Central Decision**
  Central decision has many supporting decisions to complete the whole task e.g. purchasing a house is a central decision. This leads to look out for other supporting decisions like transportation facilities, community facilities, savings etc.

- **Economic Decision**
  It is based on allocation and exchange process relating to resource use. This decision needs the allocation of human and non-human resources to attain a goal. It reveals the allocation of resources among the combination of goals that will bring about the greatest degree of satisfaction.

- **Technical Decision**
  This decision involves a decision, which will enable the best combination of resources to achieve the stated goal.

Decisions must be made based on past experiences and knowledge. This helps a person to become more efficient and skilled in decision making process.

7.4 FAMILY RESOURCES

Resources can be defined as anything we use to achieve what we want (our goals). In other words, they are the materials and human attributes which satisfy our wants.

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7.4.1 Types of Resources

Types of Resources

1. Human Resources

a. Knowledge
b. Time
c. Energy
d. Abilities & Skill
e. Attitude

2. Non-human Resources

a. Money
b. Material goods
c. Community facilities

1. **Human Resources:** These are the capacities and characteristics of an individual. These can be used only by the person who possesses them. They have the high potential to achieve what we want and many a times may not be cultivated or made available. Most of the time, families underestimate these resources and are unaware of them.
   a. **Knowledge:** It is important to be aware of things to be able to achieve what we want. If we want to buy a T.V. we need to know what features to look for, brands available. This will help in buying a better quality product.
   b. **Time:** It is constant for everyone, 24 hours a day. The way a person manages and uses her time is her personal choice. A student may finish all the work before going to play; another may waste his time watching television or talking on the cell phone.
   c. **Energy:** This is both mental and physical power of a person. To achieve goals, one needs to plan, organise and finally implement the plans. This would require both mental and physical energy.
   d. **Abilities and skill:** These are inherited and acquired. These may include skills like cooking, decorating, gardening. Each individual has particular abilities with which he/she can achieve his/her goals. These skills can also be developed by systematic learning and practice.
   e. **Attitude:** These are opinions or feelings a person has towards a thing which may hinder or help in achieving his goals. A positive attitude may help a person achieve what he wants whereas a negative attitude may hinder her in achieving what she wants.
2. **Non-human Resources:** These are tools and assets that families have at their disposal to achieve what they want. These are available for everyone to use. A person works hard and earns money to be used by him and his family. He/she may buy material goods or land from this money and may build a house on this land. Community facilities like banks, post offices, parks, and library. These are tangible and are more identifiable.
   a. **Money:** It is the pivotal resource which can be exchanged to buy material things, commodities and services. It can also be used for future use and thus gives a sense of security to the family.
   b. **Material goods:** These include durable goods or perishable goods used and owned by a family in their everyday use. Land, house, furniture and vehicle are examples. These help to make life easier and more comfortable for all family members. Durable goods like land can also help families to earn or save money. If vegetables are grown

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on land, the family can save money on buying vegetables or sell these vegetables to earn money.

c. **Community facilities:** These are those facilities which are common for all members of a community. Parks, libraries, post office, police and fire protection, banks, hospitals, transport facilities, roads, railways, electricity, water supply, markets, community centres and ration shops are examples of community facilities. All families can avail these facilities without directly paying for them but indirectly paying for them through taxes.

Activity 3

- Develop a plan to study for your examination.
- Identify all of the resources you would use to complete this plan.
- Classify each resource as to whether it is material or human.
- Does this plan use more of one classification than another? Why?

7.4.2 Characteristics of Resources

1. All resources are useful and all help to achieve goals.

One cannot call energy or time as a resource if it is wasted or not used. If a piece of land is lying vacant, it is not a resource, only when a family grows vegetables on it, does the land become a resource.

2. All resources are limited.

There is a limit to a person's knowledge, skill, energy, material goods and money available to the family.

3. All resources are inter-related.

A resource cannot be used in isolation. If a homemaker has to go to the market, she will use her knowledge, skill of bargaining, time, energy, money, market and transport to achieve this goal.

4. Resources can be substituted.

One can exchange one resource for another. A family uses time, skill and energy of a servant and gives her money in exchange. Similarly, material goods can be bought in exchange of money. One can exchange knowledge by paying tuition fees.

5. All resources need to be managed.

Since all resources are limited, they need to be utilized properly, otherwise they may be wasted. Time and energy have to be managed by work simplification techniques, proper postures and labour saving devices.

7.5 TIME AND ENERGY MANAGEMENT

Many activities are performed throughout a day. Some of the activities like eating, cooking, exercising, sleeping, bathing and entertaining are also carried out along with work related activities but all these are to be completed within the available time that is 24 hours. If energy will not be rebuilt from time to time the work would cease. The capacity needed to perform these activities is called energy.

Energy is the capacity to do the work. It means that just as available time as a resource is limited, we also have limited amount of energy. So we can say that within limited time we must finish all our work with our limited energy.

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Time and energy are the resources available to all the individuals. These two resources are very closely interlinked. Each one affects the other. Although energy available to each one is different but the time available is equal i.e. 24 hours in a day. If the work is needed to be finished properly and on time, it is needed to make best possible use of time and energy. In other words one must learn to manage time and energy properly.

7.5.1 Steps in Time-Planning

1. **Listing all the activities:** List activities that have to be performed on a particular day. These can be eating, sleeping, going to school, school time and completing homework.
2. **Grouping flexible and inflexible activities:** Separate the activities into two types. Those which are **flexible** like going to market for shopping. The timing and day for shopping can be changed as the situation demands and can be delayed to the next day. The other set of activities are those which are **inflexible**, like going to school, music or dance classes. The time for performing these activities is fixed and cannot be delayed or changed.
3. **Estimating time required for performing each activity:** In the list that is prepared in step-1, allot time required for performing each activity. Going to school may take between 7 -10 minutes or 1 hour. School time may be 5-6 hours. Fill in all other works which can be done within a short time in between all the other activities with fixed activities.
4. **Balancing:** Balancing is the adjustment of time for each of the activities. This is the most difficult task. After allotting time to each of the activities, you might find that the total time required by you to do all the work is more than 24 hours. This is done by the identifying the time needed for various activities in a day and allotting the time for each activity based on their priority.

Activity 4

Classify the following activities into flexible and inflexible activities.

Dusting, Mopping, Cooking food, Stitching clothes, Going to school, Washing clothes, Going for shopping, Preparing lunchbox for children, to attend a marriage ceremony, Ironing clothes

7.5.2 Factors that influence effective time management

- Make a time schedule which can be easily followed.
- Make a time schedule which is practical and flexible and can be changed easily in emergencies.

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- Think of an alternative plan of action for emergency.
- Allow for rest and leisure time activities.
- Combine activities (Dovetail) for better time utilization of time.

Activity 5

- Develop a time schedule for the coming week. Use this management tool (time schedule) for the week. Note on the time schedule for the week the use of your time resource and the factor that created the change.
- Record the use of energy resources for each day for one week.

7.5.3 Energy Management

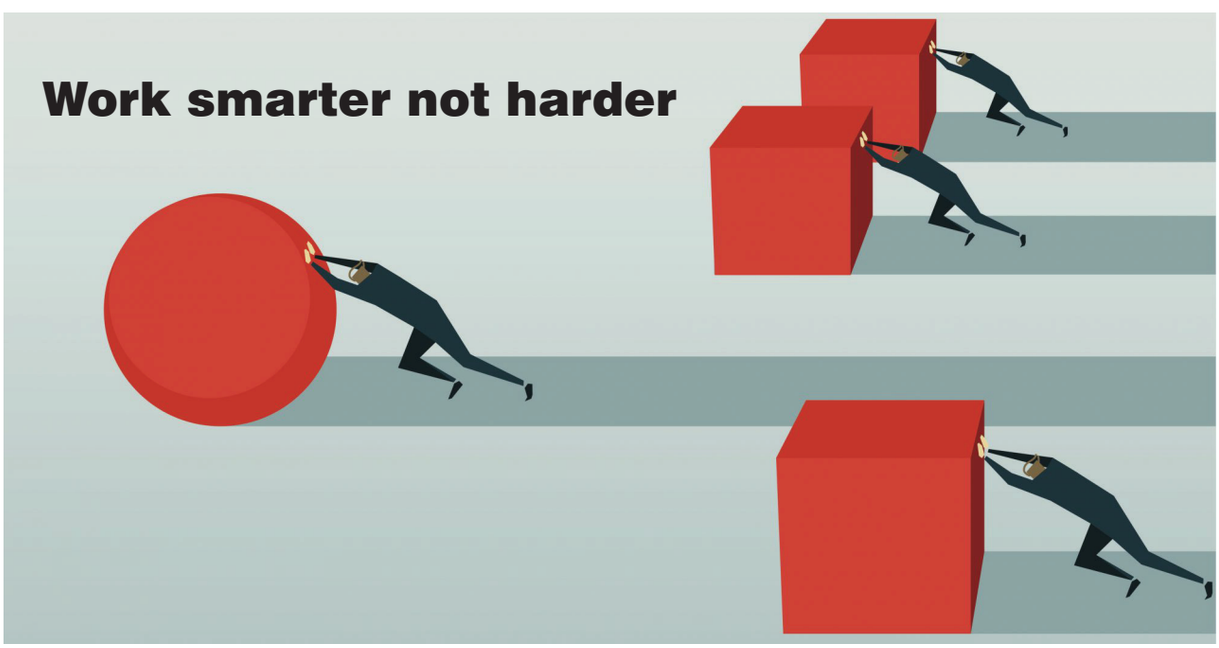
Energy management is a difficult task as the energy expenditure for various activities depends on the individuals physical and mental health. Various efforts are needed to perform different household tasks. They are mental effort, visual effort, manual effort, torsal effort and pedal effort.

During the day, different types of activities are performed requiring different amount of energy.

i. **Heavy activities** like running, jogging and mopping requires large amount of energy.
ii. **Moderate activities** like sweeping, ironing and cooking require average amount of energy.
iii. **Light activities** like reading, watching T.V. and listening to music need very little energy.

7.6 Work Simplification

Work simplification is making work easier. According to **Nickell and Dorsey (1959), "it is the conscious seeking of simplest, easiest and quickest method of doing work. "It aims at accomplishing more work with limited amount of time and energy.**



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Home-making involves various types of activities which are most of the time tedious, monotonous, time consuming and involves various types of skill. Most of the work if done without much skill and under pressure would lead to unhappiness or frustration. To manage the house one should know the best way of doing each household activity. To do the work easily one should know why, how, when, who and where a work should be done.

Dr. Marvin Mundel (1985) has given five factors (classes of change) that influence the character of work. They are:

1. Change in hand and body motions

Work can be simplified by using each part of the body properly and economically.

This can be achieved by,

1. Keeping body parts in alignment
2. Using muscles effectively
3. Doing the work in rhythmic motion
4. Developing skill in work.

2. Change in equipment and work arrangement

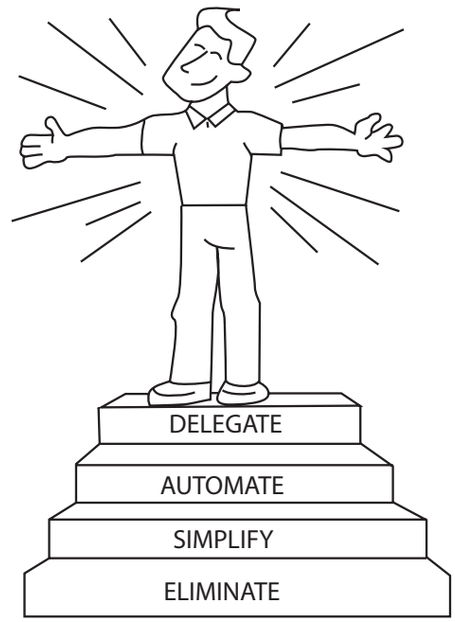
Using labor saving devices, planning work surfaces at proper height, depth and width with proper tools and adequate storage space and lighting will improve the efficiency of work.

3. Change in production sequence

When there are lot of household activities to be accomplished, time and energy can be saved by simplifying the work through combining the tasks and eliminating unnecessary steps.

4. Change in finished product

Simplification of work could be achieved by changing the standards or expectations of the finished product. Instead of laying a dining table in a formal way, especially when the mother is working outside home, she can just keep food items on the table and members in the family can help themselves.



5. Change in material

This refers to the change in the raw ingredient to get the same final products. For example, instant Vada mix or Dosa mix can be used to prepare the same final product, at the same time requirement for pre-preparation of Vada or Dosa from raw materials can be reduced.

7.7 Money Management

Among all the resources that are available to the family, the most important one is money. Money plays an important role in the life of man as an instrument through which he can satisfy his physical, material and mental needs. The income and expenditure pattern of the family decides the family's standard of living and its place in the society.

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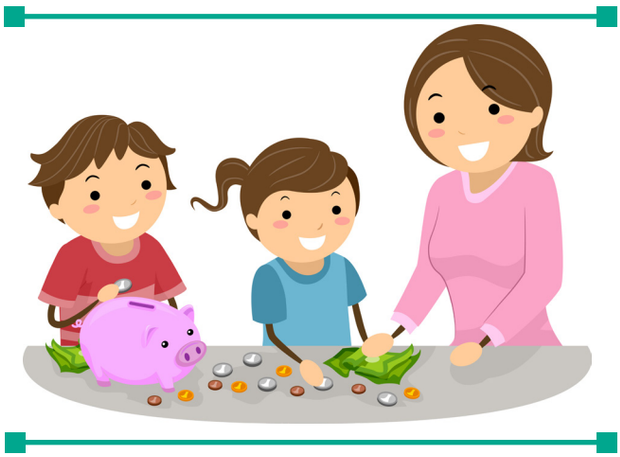


7.7.1 Concept of Income

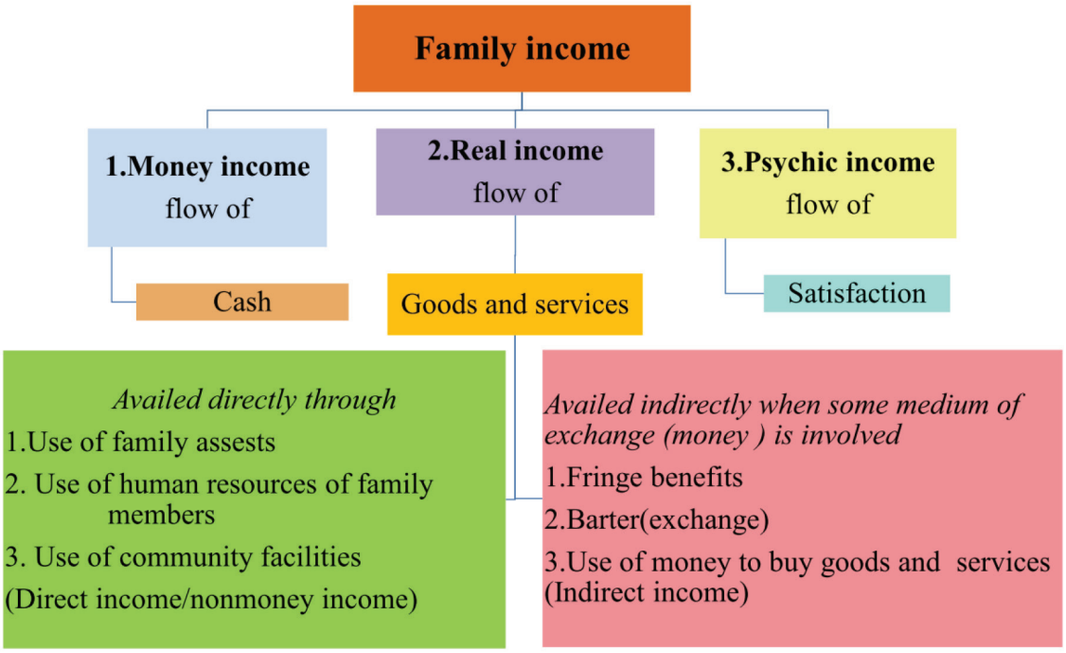
Income is the inflow of money, goods and services. Family income is one of the concept of income. It is defined as money or purchasing power earned by family members during a specific period of time and goods and services received or created in that time by the family eg. goods like vegetables from kitchen garden, services like doing household chores, teaching children etc.

Family income can be classified as:

1. Money income
2. Real income
3. Psychic income

1. Money income

Money income is the cash available to a family from any source, over a period of time. The period can be daily, weekly, monthly or yearly. It is obtained in the form of a currency, bank draft or cheques.



▲ Fig. 4 Types of family income

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Money income is tangible and is used for purchasing goods and services for the family. The sources of money income are given below.

Sources of money income

- Salary
- Bonus
- Wages
- Dividends from shares
- Pension
- Lotteries
- Rent
- Profits
- Cash gifts
- Interest from banks
- Investments

2. Real income

Real income is the stream of goods and services available to a family over a period of time. Real income is derived from properties and possessions owned by a family, skills, efforts and abilities of the family members and also from community facilities. These goods and services may be available to a family either directly through direct contribution of family members or by community facilities or indirectly when some medium of exchange, usually money is involved.

3. Psychic income:

It is the flow of satisfaction that arises out of everyday experiences, derived largely from use of money and real income. It is intangible, subjective and is the most important income in terms of quality of living. Psychic income depends on the skills of family members in utilizing their money and commodities judiciously. Satisfaction derived out of flowers obtained from the plants at home is an example for psychic income.

7.7.2 Factors Affecting Income of a Family

Several factors affect income generation such as:

a. **Skills and talents:** If a person has tailoring skills, they can start a boutique, while a knowledgeable homemaker can conduct bakery classes and generate income.

b. **Time and energy:** A person with time and adequate energy would be able to supplement his income by doing additional work.

c. **Interest in job:** A higher interest in the job increases efficiency which in turn helps in career advancement through promotions and results in a higher salary.

d. **Location of home:** Living in a remote area may lead to lesser job opportunities as compared to Cosmopolitan cities where there are more job opportunities.

e. **Investments/assets:** The more a person invests, the more interest can be earned. Other assets like property/ land also help in generating income through rent.

7.8 EXPENDITURE AND BUDGET MANAGEMENT

Happiness of the family is secured by income use or expenditure. The outflow of money is called expenditure. After earning money, a family spends it on their various needs, basic necessities such as food, clothing and shelter. After their needs are fulfilled, the family desires to have comforts and luxuries, which makes the family members more comfortable. All these expenses are referred

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to as expenditure. Expenditure provides the satisfaction of life for the members of the family.

7.8.1 Factors Affecting Expenditure of a Family

1. **Income:** In low-income groups, a major portion of income is spent on food whereas in high income groups only %50 of their money is spent on food.
2. **Family size:** Expenses on food, clothing, and education is more in larger families as compared to small sized families.
3. **Family composition:** In the expanding stage of the family more money is spent on education and clothes while in the contracting stage, more expenses are incurred on medicines.
4. **Family status:** Influenced by the social circles they move in, a considerable amount of cash may be spent by some families on, maintaining a number of cars, designer clothes, entertainment, luxury items.
5. **Type of family:** In a joint family, money is saved on rent and childcare.
6. **Family values:** Some people give more value to education and prefer spending more on books. Those giving more importance to religion spend more on religious activities.
7. **Location:** There is less expense in small towns as compared to that in cities. If the school or office is nearby, less money is spent on transport.
8. **Skill, knowledge and an interest to save:** A homemaker with her knowledge, skill and interest in culinary arts can prepare exotic dishes at home and thus reduce her expenditure.
9. **Access to community facilities:** Community facilities help save expenses. A person using a library need not spend money on buying books.

7.8.2 Budgeting

The common planning device for the use of money is the budget. It is a carefully prepared spending plan based on the actual family income. It is a plan based on previous experience, present needs and future expectations. A budget is always prepared for a fixed period of time generally for a month. Budget is a guide to realistic spending aimed at avoiding over expenditure.

7.8.2.1 Importance of budgeting

- Budget acts as an intelligent guide to spending.
- It enables a family to have an overall view of their income.
- Budgeting facilitates adjusting irregular income to regular expenditure.
- Budgeting helps people to discuss their needs and set their own priorities on them.
- It helps one to cut unnecessary expenditure.
- It helps one to be free from debts.
- It helps one to live within one's income.
- It encourages conscious decision making which may help in including long term goals in the budget.
- It relieves the family members from worries of future.
- It forces one to decide what one wants most out of life.
- It provides for future saving.

Its success depends upon its being simple, realistic, flexible and suited to the family or individual for whom it is made.

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Steps in preparing the budget for a family are given below.

STEP 01 List commodities and services needed by the family members throughout the budget period.

STEP 02 Estimate the cost of desired items. Total each classification for budget estimation. Past records are helpful.

STEP 03 Estimate and total expected income from all sources for the budget period.

STEP 04 Set aside a definite sum as emergency fund as well as for goal oriented savings and insurance.

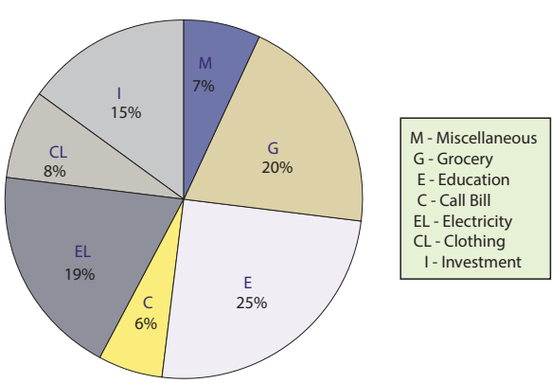
STEP 05 Bring expected income and expenditure in balance.

STEP 06 Check the plan if it is realistic.

▲ Fig. 5 Steps in preparing budget

7.8.2.2 The List of Budget Items

It is necessary to list the chief budget items to make sure that each item is attended to in the expenditure plan while portioning the income. Each family may have their own way of listing the items.



EXPENSES

The chief budget items include:

i. **Food**
ii. **Clothing**
iii. **Housing**
iv. **Education**
v. **Transport**
vi. **Personal Expenses (Sundries)**
vii. **Household Expenses**
viii. **Savings**

7.9 SAVINGS AND INVESTMENTS

Activity 6

- Find out what are the saving options available to a family.
- Find out how to open a bank account.

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Money from the present income that is collected and put aside for future consumption is known as **savings**. Savings of a month is the difference between the income and expenditure of that month.

Families should make sure that they save by cutting down their wasteful expenditures. The following figure shows the importance of savings and various institutions for savings and guidelines for selection of those institutions.

1. **Bank Accounts**
   Savings Account
   Current Account
2. **Post office**
   Savings Account
   Recurring Deposit Scheme
   Post Office Time Deposit Scheme

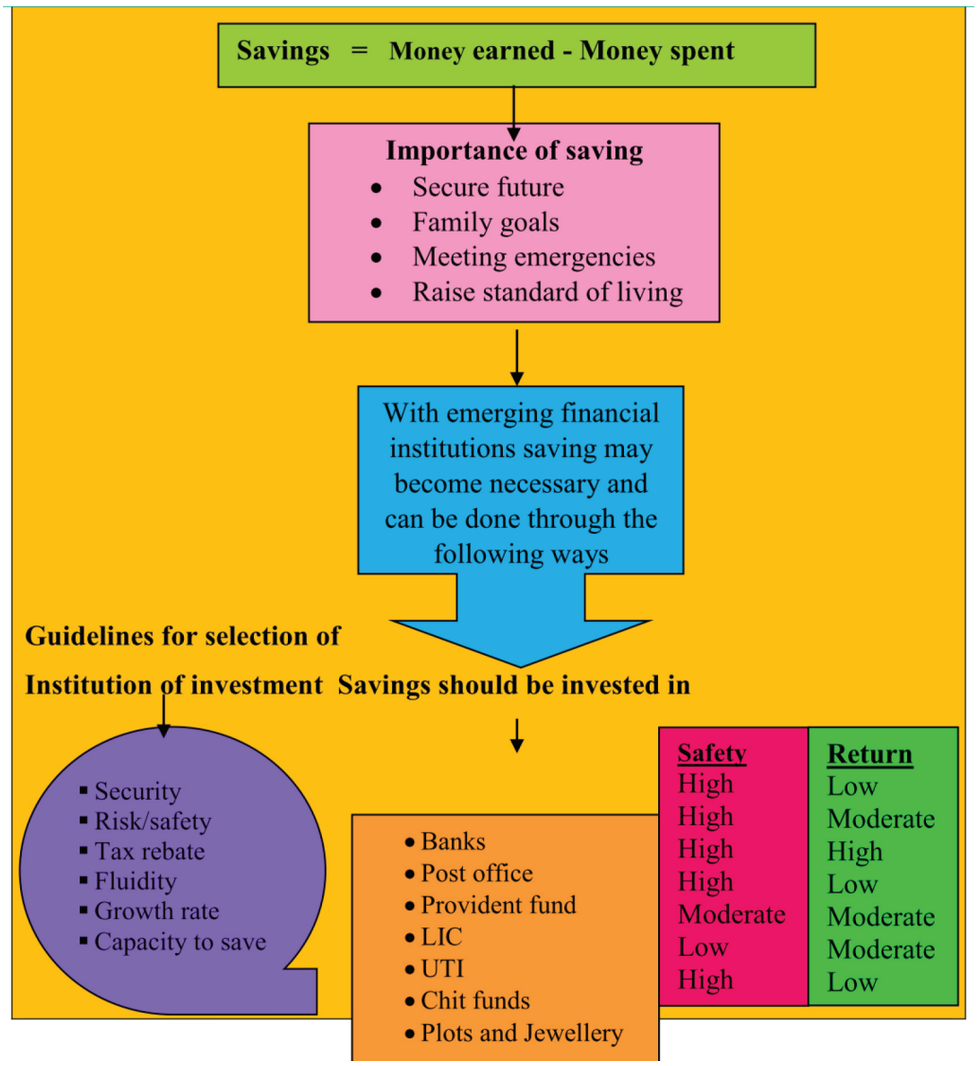

Fig. 6 Importance of Savings and Institution

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3. **Provident Fund**
   General Provident Fund
   Contributory Provident Fund
4. **Life Insurance Scheme**
   LIC (Whole Life Policy)
   Medical Insurance Scheme
   Endowment Policy
5. **Units of Unit Trust of India**
6. **Shares and debentures**
7. **Bonds**
8. **Chit Funds**
9. **Real Estate**
10. **Gold, Silver Jewellerys**

7.9.1 Important Avenues of Investment

When the **savings** are made to grow, it is called investment. There are various avenues of investment. They are:

7.9.1.1 Banks

An investor deposits his savings in a bank account which earns him a nominal rate of interest. Besides banking, the banks offer a series of diverse financial services such as loans, credit cards, ATMs (Automatic Teller Machines). With the computerization and networking of some of the banks, their services have become faster and customers can operate their account from any of its branches. This is called core banking. These are the main accounts used for depositing money in a bank.

1. Savings Account	• An individual can open this account either singly or jointly. The minimum balance amount required in an account with nationalized banks is ₹ 500/- and ₹ 1000/-* with cheque book facility. This amount may vary in private banks. • The deposit can be made as and when the investor desires. Withdrawals are done with the help of cheques or withdrawal slips. A passbook is also provided for the record of deposits (credits) and withdrawals (debits). • **Advantages of paying through cheques:** Cheques are considered safe method because 1) Cheques are deposited directly into the payee's account. 2) Currency is not handled directly by either the payer or the payee. 3) Cheques are an unquestionable proof of having paid or received a payment.

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2. Current Account	• This account is suitable for business persons who would like to keep their money in safe custody and withdraw or make payments as and when required. • There is no limit to the number of withdrawals. A person can withdraw his money any number of times. • No interest is paid in this account. • The bank charges for the services of keeping the money safe and offering it whenever required.
3. Fixed Deposit Account	• A certain amount of money is deposited in the bank for a fixed period. • The interest rate varies with the period of investment. The interest rate is higher than that of the ordinary savings account. • After the stipulated period, the principal amount and the total interest is paid to the investor. • An investment up to 1 lakh for 5 years qualifies for tax rebate.
4. Recurring Deposit	• This is an ideal form of savings for those having salaried income with a view to inculcate a regular saving habit. • A fixed amount of money (core money) is deposited every month (only once, between 1st -10th). At the end of the term the amount is paid.

Activity 7

- Find out what is the minimum sum of money needed to start a bank account.
- Find out details on specimen signature card, withdrawal slip, pay in slip, cheque.

7.9.1.2 Post Office

Post offices are situated in every locality and are found even in remote areas. There are various post office schemes, each having its distinct advantages.

1. Post Office Saving Accounts	• For opening of new account the introduction of depositor is necessary by a responsible person. • This is simple account involving a minimum deposit of ₹ 50/- • A cheque book facility is available; subject to a minimum balance of ₹ 500/-* in the account. • Maximum amount allowed in a single account is 1 lakh * and 2 lakh in a joint account. However, there is no limit for group/ institutional account. • The rate of interest is 4 %* per annum.

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2. Post Office Recurring Deposit Scheme	• Any individual (a single adult or two adults jointly) can open an account. • Minimum: Rs.10/- and multiples of Rs.5/- thereafter. Maximum: No limit. • Maturity period: 5 years. • Rate of interest 7.1% per annum with effect from 01.07.2017 • One withdrawal up to 50% of the balance allowed after one year. • Premature closure allowed after three years. • Interest earned is deductible under Section 80L of I.T. Act.
3. National Saving Certificate	• These can be purchased by an adult for himself or on behalf of a minor, jointly by two adults, a minor and a trust. • Certificates in denominations of ₹ 100/-, 500/-, 1000/-, 5000/-, and 10,000/- may be purchased from any post office, either directly or through authorised agents. • Minimum ₹ 100/- can be invested. There is no limit on amount of investment. • Period of maturity is 6 years. • Interest rate is 7.8%* per annum, (w.e.f 01-07-2017). • Deposit qualifies for tax rebate. • Premature withdrawals are not allowed. • Certificates can be kept as collateral security to get loan from banks.

CASE STUDY

Case study 1

Kumar is a Private company employee. He gets a salary of Rs.10000/- per month. His Salary is spent in meeting out the various needs of the family like food house rent Education of the children clothing etc., Kumar's wife keeps asides small amount of money from his salary every month. Kumar's salary is income and the money spent on various items is his expenditure.

What is the amount kept aside by Kumar's wife called?

What is the need of keeping aside this money?

What can be done with this money?

Fulfilling needs of the family meeting emergencies, maintaining a good standard of living

She has to deposit a fixed amount in each month.

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7.9.1.3 Provident fund

1. General Provident Fund	• It is compulsory only for government employees. • 10% of basic salary is contributed in the provident fund. • The employee can take loan from this fund and can return the loan in easy instalments every month, deducted from his/her salary. • At the time of retirement, the person gets this money in lump sum and pension. • Get tax rebate on amount invested. • Rate of interest is 8.5%.
2. Contributory Provident Fund	• This is compulsory for private and semi-private company employees. • In this both employee and the employer contribute certain percentage of money. On retirement, the employee gets his/her part of contribution in a lump sum but he/she gets employers' contribution in instalments as pension. • Eligible for tax rebate.
3. Public Provident Fund	• This is a statutory scheme of central government framed under the provisions of the Public Provident Fund Act, 1968. Such account can be opened in any Head Post Office, any branch of the State Bank of India and selected branches of other Nationalized Banks. • This is a 15 year scheme and the rate of interest is 8.8% • Only one Public Provident Fund account can be opened by any adult in his/her names or as guardian of a minor. • Invested amount can be minimum ₹ 500/- and maximum ₹ 1, 00,000/- in a financial year. The financial year starts from year ending 31st March.

7.9.1.4 Insurance

Insurance is provided by private as well as government institutions. Life Insurance Corporation is provided by government of India. It is a means of providing against loss caused by natural or man-made factors. It is the most popular method of securing the future.

LIC has a variety of schemes to choose from. These schemes cater to all categories of people and to their diverse needs. Some of the popular schemes are given below:

7.9.1.5 Shares

Shares are a fractional part of the capital of a company. When a company wants to

1. New Money Back Plan- (20 years)	• This is a participating non-linked plan which offers an attractive combination of protection against death throughout the term of the plan. • Also there is periodic payment on survival at specified durations during the term.

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	• This unique combination provides financial support for the family of the deceased policyholder any time before maturity and lump sum amount at the time of maturity for the surviving policyholders. • This plan also takes care of liquidity needs through its loan facility. • In case of Life Assured surviving to the end of the specified durations 20% of the Basic Sum Assured at the end of each of 5th, 10th and 15th policy year. • In case of Life Assured surviving the stipulated date of maturity, 40% of the Basic Sum Assured along with vested Simple Reversionary Bonuses and Final Additional Bonus, if any, shall be payable.
2. Term Policy-AnmolJeevan and AmulyaJeevan - II	• These are a protection plan which provides financial protection to the insured's family in case of his/her unfortunate demise. • **Death Benefit:** In case of unfortunate death of the life assured during the policy term Sum Assured shall be payable. • On survival to the end of the policy term, nothing shall be payable.
3. Medical Insurance	• One year temporary medical assurance is provided to the insured. • This policy needs to be bought every year. • It has the benefit of 100% tax rebate and provides insurance cover for any hospitalization, major operation or illness. Some concession is given if the scheme is purchased for the whole family.

develop, they float shares to the public. When a person buys shares she becomes part owner of the company. She will then share both profit and loss of the company. The profits are called dividends.

- A person can get high rate of interest, if the company is making profits.
- Dividends are tax-free.
- There is a risk of losing money, in case the company goes in a loss.
- Investor may not be able to find a suitable buyer for his/her shares or may not get a good price.

Debentures

A debenture is an instrument of debt. Debenture holder is a creditor to the company who loans funds to the company for a period of time against a fixed rate of interest.

7.9.1.6 Units

Mutual fund is a public and private sector financial institution which offers various schemes for attracting investments from public. It issues units to the investors (unit holders) and invests the collected amount in securities. Each unit is of ₹ 10/-.

Profit and losses are shared by the investors in proportion to their investment. Mutual fund is required to be registered under SEBI (Securities and Exchange Board of India), before it can collect funds from public. SEBI protects the interest of investors and regulates the securities market.

- Open end fund-scheme is available for subscription and repurchase on a continuous basis. These do not have a stipulated maturity date.

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- Close end fund- these schemes have a stipulated maturity period. Fund is open for subscription only for a specified period of time.
- Investors have an option to sell back the units to mutual fund at the NAV (Net Asset Value) market value of assets.
- Tax rebate is available under some schemes such as ULIP (Unit Linked Insurance Plan and Pension Plans).
- There is no limit on investment in some schemes.
- Units can be pledged as security for loans.
- Unit holders can switch from close end to open end schemes.
- Some schemes may have high risk and high rate of interest. On the other hand, some schemes have fixed rate of interest but no risk.
- Dividends are tax free.

7.9.1.7 Bonds

Bonds are also debentures which are issued by government or Government Company. On liquidation (closing) of the company, the creditor is secured.

7.9.1.8 Chit Funds

This is an easy and simple device where a group of people join as committee and agree to contribute a fixed sum every month. Chits are taken out once every month. Chits are taken out once every month. The promoter gets the first collection and after that, whosoever gets his name on the chit drawn, gets the money.

SUMMARY

- Management is a process involving activities, through which action is initiated and resources are used for achieving a goal.
- Planning, organizing, controlling and evaluating are essential for effective management.
- Values, Goals and standards are important factors in the management process. Values are the key to all motivating factors in human behaviour. Goals are the desires that individuals or families are willing to work for. Standards are a set of measure of values stemming from our value patterns, determining the amount and kind of interest in something and the satisfaction we receive.
- Management occurs when there is some problem to solve, some choices to make. A decision can be defined as a course of action consciously chosen from the available alternatives for the purpose of desired result.
- Effective management involves careful use of resource. Resources can be defined as anything we use to achieve what we want (our goals). In other words, they are the materials and human attributes which satisfy our wants. They include human resources such as a. Knowledge b. Time c. Energy d. Abilities and skill e. Attitude and Non Human resources such as a. Money b. Material Goods c. Community facilities.

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GLOSSARY

Attribute - (பண்புகள்) A quality or characteristic of someone.

Sequence -(வரிசை) Coming after or next series.

Delegation -(அதிகார ஒப்படைப்பு) The assignment of any responsibility

Intrinsic - (உள்ளார்ந்த) Essential

Fringe -(விளிம்பு) An outer edge, margin

Psychic Income - (மனநிறைவுதரும்வருவாய்) - A pleasure and satisfaction that someone get from doing their job

Debenture -(கடன்பத்திரம்) A type of loan

Standard - (வாழ்க்கைத்தரம்) A level of quality

Value -(மனிதநேயம்) A major influence on a person's behavior and attitude.

Flexible - (நெகிழ்வான) Able to change

Decision Making - (தீர்மானித்தல்) Is the process of identifying and choosing and alternative based on the values.

QUESTIONS

I. Choose the correct answer

1. The planned use of resources to achieve the desired goal is
   a) Management c) Standard
   b) Values d) Goal

2. The process of basically working out ways or course of action to achieve goals is known as ____
   a) Organizing c) Planning
   b) Implementing d) Evaluating

3. The steps in the management process to carry out the plan is called _____
   a) Planning c) Directing
   b) Controlling d) Organizing

4. The link between short term and long term goal is
   a) Intermediate goals
   b) Interest goals
   c) Individual goals
   d) Short term goals

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5. Heart of the Management is
   a) Decision Making c) Evaluating
   b) Planning d) Directing

6. Non-human resources is
   a) Knowledge c) Money
   b) Skill d) Attitude

7. Circle the source of money income
   a) Salary c) Skill
   b) Cash gift d) Pension

II. Very short answer (2 marks)

1. Define management
2. What is planning?
3. Differentiate between human and non-human resources
4. What are community resources?
5. What is energy management?
6. What is the meaning of work simplification?

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7. Mention the name of decision where a person is doing a systemic work?
8. List the various types of simplifying work
9. What is 'organizing' in the process of management?

III. Answer briefly (3 marks)

1. List the steps involved in any management process
2. What are the different phases in controlling?
3. Explain the importance of 'evaluation' in the management process
4. List the various steps involved in decision making process
5. What do you understand by 'decision making'?
6. List the various steps to be kept in mind while making a time plan.
7. As a student how would you manage time?
8. List four ways of supplementing income
9. Differentiate between real income and psychic income
10. State four advantages of savings
11. Suggest 3 practical tips to save energy
12. Sheela is a homeworker. Suggest her some ways to control expenditure to manage her family.

IV. Write in detail (5 marks)

1. Discuss the interdependence and inter-relationship of the various steps involved in the process of management.
2. Explain the process of decision making with a suitable example
3. Discuss the importance of 'planning' for good home management
4. How does 'controlling' help in the proper management in any home situation. Explain with a suitable example
5. What are the different types of goals?
6. Give an account of the guidelines that you will keep in mind while making sound investments.
7. A person in IT Company wants to save his monthly income and avail insurance. Suggest some strategies to avail insurance and save his income.
8. Plan your daily schedule according to the concept of work simplification and rest periods.
9. What advice would you give to a married women who is finding difficult to manage work at home?

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Chapter 8 Communication

Learning Objectives

This chapter will help the students to:

- Understand the principles and process of communication
- Develop effective skills in communication
- Know the barriers in communication
- Learn about the various methods of communication and appropriate teaching aids
- Know the recent trends in communication

Communication - the human connection- is the key to personal and career success

8.1 INTRODUCTION

Communication plays an effective and essential role for running the show of any formal or informal teaching-learning

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process. Teaching is communicating and good teachers are always good communicators. It is also equally true for the learners. He who learns well is the one who participates well in the communication process. Good learners are always good receivers and responders. Communication, is a tool for teaching and learning, it is a two-way process. For proper interaction, teachers and students are required to acquire the art and technique of good communication.

Literarily the word "communication" means "to connect", to share or exchange.

Meaning of Communication

The term **communication** is derived from the Latin word "**communis**" which means to make common". **Communication**, therefore is the exchange of thoughts, messages, information, etc, by way of speech, signals or writing.

What is communication?

- Communication plays a key role in all aspects of life.
- Communications means: Contact (information exchange) between people, the exchange of thoughts, ideas and meanings.
- It is important to send signals (words, gestures) which can be understood by the sender and recipient.

Why we communicate?

We communicate to:

- Share our ideas and opinions
- Provide feedback to others
- Get information from others
- Gain power and influence
- Develop social Relationships
- Maintain self-expression and our culture

8.1 DEFINITION OF COMMUNICATION

According to W.H Norman and Summer "Communication is an exchange of facts, ideas, opinions or emotions by two or more persons".

According to Edger Dale "Communication is defined as the sharing of ideas and feeling in a mood of mutuality".

According to Theo Haiman defined, "Communication is the process of passing information and understanding from one person to another."

8.1.1 Functions of Communication

Communication as a human activity always serves a function.

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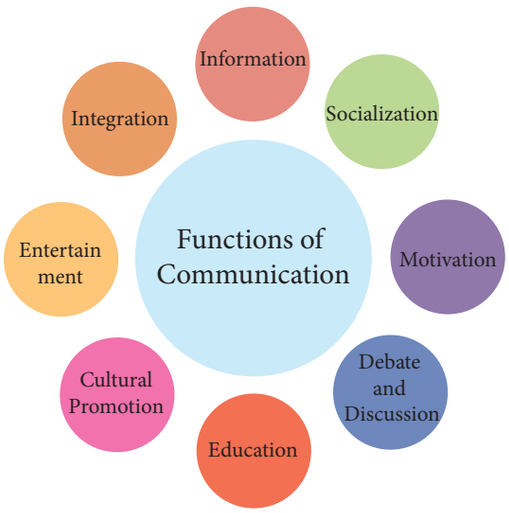
- **Information**
  The collection, storage, processing and dissemination of news, data, pictures, facts and messages, opinions and comments required to understand and react knowledgeably to personal, environmental, national and international conditions, as well as to to take appropriate decisions.
- **Socialization**
  Knowledge which enables people to operate as effective members of the society in which they live and which fosters social awareness thereby permitting active involvement in public life.
- **Motivation**
  The promotion of the immediate and ultimate aims of each society and the stimulation of personal choices and aspirations, the fostering of individual or community activities, geared to the pursuit of agreed aims.
- **Debate and discussion**
  The promotion and exchange of facts to facilitate agreement or to clarify differing view points on public issues. The supply of information needed to foster greater popular interest and involvement in all local, national and international matters of common interest.
- **Cultural Promotion**
  The dissemination of cultural and artistic products for the purpose of preserving the heritage of the past, the development of culture by widening in individuals horizons, awakening his imagination and stimulating his aesthetic needs and creativity.
- **Entertainment**
  The diffusion through signs, symbols, sounds and images of drama, dance, art, literature, music, sports, games etc. for personal and collective recreation and enjoyment.
- **Integration**
  The provision to all persons, groups and actions of access to the variety of messages which they need in order to know and understand each other and to appreciate others living conditions, viewpoints and aspirations.



- Information
- Socialization
- Motivation
- Debate and Discussion
- Education
- Cultural promotion
- Entertainment
- Integration

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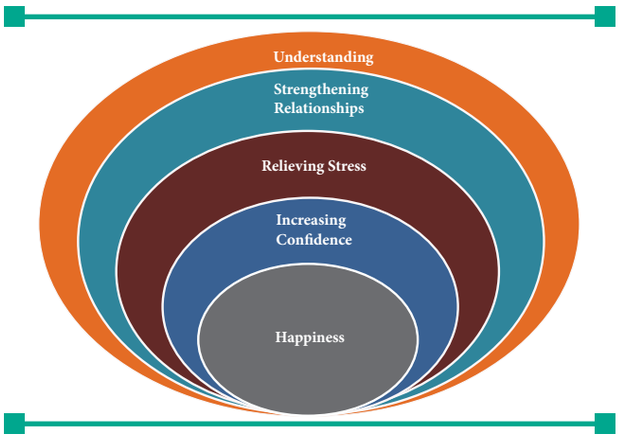
8.1.2 Importance of communications



Activity 1

Form a chain with 10-20 students. Convey a message from first person to the last through whispering. Finally ask the last person to say loudly the message he/she received from the previous person. Now ask the first person to read the message from paper and see how it is changed and conveyed.

8.2 PRINCIPLES OF COMMUNICATION

The principle of clarity: A message should be clear free from distortion and noise. A vague message is not only a barrier to creating effective communication but also causes the delay in the communication process and this is one of the most important principles of effective communication.

Principles of Brevity: Communication should be brief i.e. just necessary and sufficient. Repetition and over-explanation are likely to destroy the actual meaning and importance of the message. Moreover, the reader may feel disturbed by receiving a long message.

The principle of simplicity: Message should be given using simple and familiar words. Vague and technical words should be avoided. Simple words are easy to understand and help the receiver to respond quickly.

The principle of Timeliness: Communication is a means to serve a specific purpose. If communication is made in time, communication becomes effective. If it is made untimely then it may become useless.

The principle of Compass: The communication net should cover the whole organization. The concerned people must know "What exactly they need and "when they need it. And an effective communication will serve such.

The principle of Integrity: Communication should consider the level of people, principles & objectives of an organization to create a network or chain. Such network will provide a better field of internal and external communication.

8.2.1 Process of communication

Sender/Encoder

Sender is a person who sends message, in classroom oral communication, the encoder is teacher, and in written communication writer is the encoder. Teacher uses combination of words, gestures, symbols, graphs and pictures.

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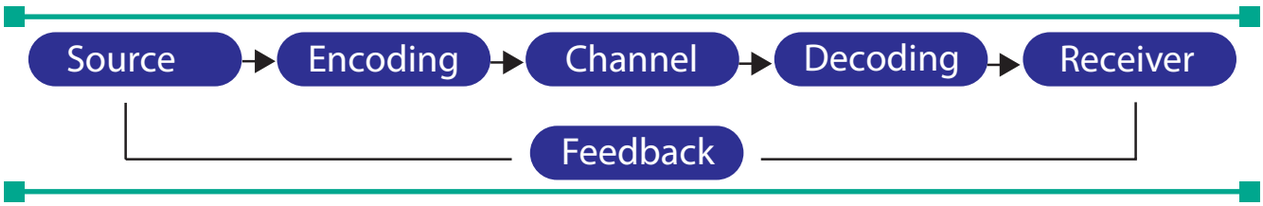

Activity 2

Write any five phrases or statements you use daily. How will you convey it to your class teacher and your friend? How does it vary?

S. No	Concept	Teacher	Friend
1			
2			
3			
4			
5			

Message or signal

The information shared between sender and receiver. For good communication, the central idea of the message must be clear. Thus, the teacher must decide what to communicate keeping in mind the context and how the receiver (students) will interpret the message.

Medium/Channel

The sensory route through which encoder will communicate his message to the decoder. The medium can be print, electronic, or sound. The choice of medium may be dependent on contextual factors, relationship between the sender.

Receiver /Decoder

The person to whom the message is being sent. Receiver (student) may be a listener or a reader depending on the choice of medium by sender (teacher) to transmit the instructional contents.

Feedback

The response or reaction of the receiver to a message. Communication is effective only when it receives some feedback as it completes the loop of communication.

8.3 METHODS OF COMMUNICATION

1. **Verbal Communication**
   Verbal communication is one way for people to communicate face-to-face. Some of the key components of verbal communication are sound, words, speaking and language.

2. **Written communication**
   Written communication means communication by means of written symbols.

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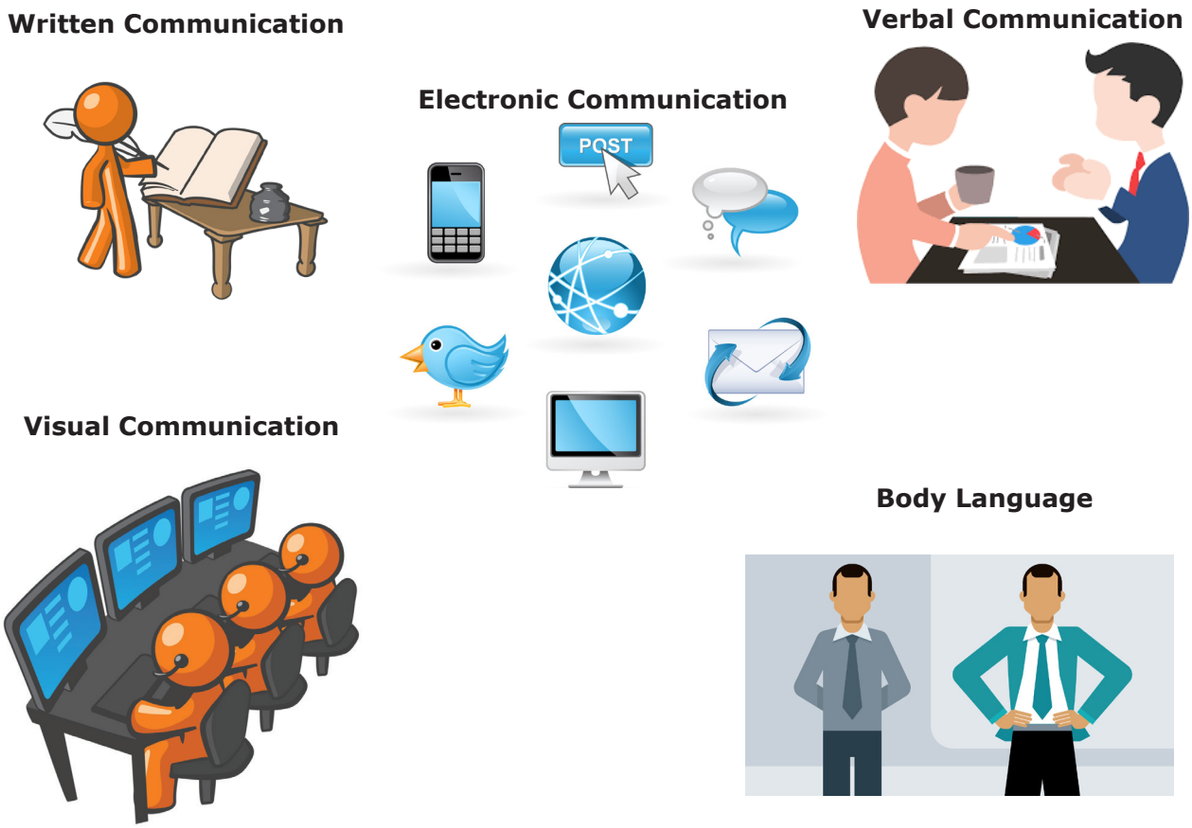

3. **Electronic communication**
   Electronic communication can be referred to as any communication that requires the use of technology. For example: Video conference, Electronic mail (E-Mail), Voice mail, Facsimile (Fax), Cellular phone and Paging system.

4. **Visual communication**
   Visual communication is a process of sending & receiving messages. Communication of ideas through visual images.

5. **Body Language**
   The process of communication through sending and receiving wordless messages is known as Non verbal communication. Such messages can be communicated through gesture, body language or posture, facial expression and eye contact.

8.3.1 Teaching Learning Methods

Lecture Method:

1. It is one of the oldest methods of teaching
2. It refers to the teaching procedure involved in the clarification or explanation to the students of some major ideas. It places more emphasis on the presentation of the content.
3. In this method teacher is more active and the students are passive. In this method question answer procedure is used to keep the students attentive in the class.
4. This method is used to clarify matter, to expand content and motivate the students.

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Drill and practice method

It promotes the acquisition of knowledge or skill through repetitive practice. "It refers to small tasks such as the memorization of spelling or vocabulary words, or the practicing of arithmetic facts and may also be found in more sophisticated learning tasks or physical education games and sports.

Rote Learning

- Rote learning is a learning technique which focuses on memorization. The major practice involved in rote learning is learning by repetition by which students commit information to memory in a highly structured way.

Discovery Methods

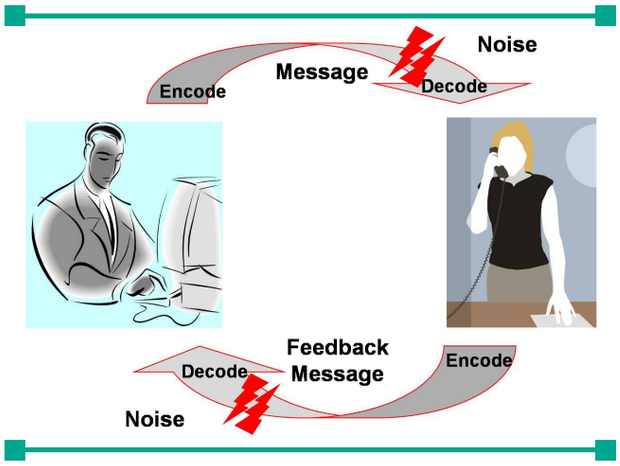
A method in which thoughts are synthesized to perceive something that the individual has not known before.

The learner get directly involved in learning. Learning is a result of the learners own insight, reflection, and experience.

8.4 BARRIERS TO COMMUNICATION

Noise represents any internal or external interference in the communication process. It can be caused by

1. **Physical Noise** – is the outside interference that blocks the communicator / receiver from receiving the message. This noise can be from any loud speaker, music system, fan in the room, running water etc.,
2. **Physiological noise** – any impairment like deafness, tooth removed, headache or pain in the body which can cause a block in effective communication.



3. **Semantic problem** – this problem arises from the choice of words used to convey a message.
4. **Syntactical problem** – caused by how a sentence is structured.
5. **Psychological problem** – when people are nervous, or reluctant to speak or preoccupied with other problems, then this causes a barrier to communication.
6. **Social noise** – when preconceived ideas are strong and if an individual is influenced by the unchangeable societal input, then these will cause problem to communication.

Activity 3

- Select any two different group settings such as a meeting and a social activity.
  - What was your role in each one?
  - Describe the extent of your participation in each
  - Can you recall any communication barriers?

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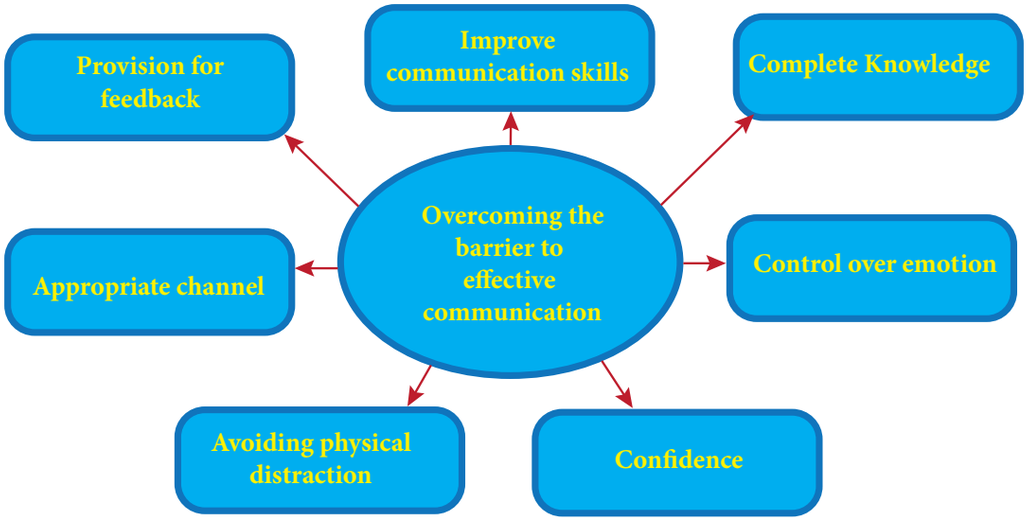
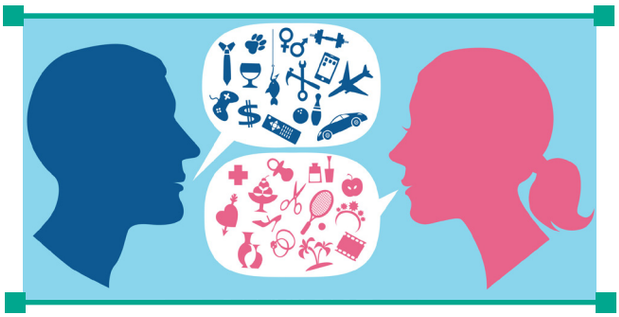
Overcoming the barrier to effective communication



8.5 COMMUNICATION SKILLS



7Cs of Communication

1. Candid 2.Clear 3. Complete
4. Concise 5. Concrete
6. Correct 7. Courteous

Communication skills is the ability to use language (receptive) and express (expressive) information. Effective communication skills are a critical element in your career and personal lives.

8.5.1 Importance of Communication

1. Positive Motivation

This is one of the important things that a teacher must possess. He always have different kinds of students in his class. So it is job of the teacher to create interest in their mind towards a subject and remove any fear of the student.

2. Effective Body language

This is the most powerful communication skill that a teacher must possess. Good presentation skills include a possitive body language that will help the lecture become more interactive and interesting for the students.

3. Sense of Humour

A good sense of humour keeps the students active and interested in there class. Lack of humour makes the lecture boring

4. Understanding the Students

Teachers should support students to communicate openly. There should be a dialogue rather than a monologue between the student and teacher while they solve any kind of problem in the classroom.

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The Four communication skills

1. Thinking	2. Listening
3. Speaking	4. Nonverbal

Good Communication Skills

- **Making eye contact** while communicating with people is important because it shows you are listening to them.
- **Not swearing and shouting** because it can be intimidating
- **Not chewing gum** while having a conversation with someone
- **Not texting** while speaking to some one as it will make them think your ignorant
- **Always trying to speak clearly** and use words everyone can understand
- **Make positive** facial expressions
- **Listening** to the person you are speaking to
- Have a **relaxed body language**
- **Don't speak over** other people
- **Do keep to the point** when explaining something

8.5.2 Steps to Successful Communication

Qualities of good Communicator

- Good Listener
- Aware of Nonverbal Communication
- Good Memory
- Positive and Empathetic
- Open minded

Tips for Improving Communication Skills

- Don't use clichés
- Brevity
- Sincerity
- Don't praise yourself
- Avoid argument
- Be tactful
- Silence
- Enunciation
  Clear, Loud, Syllables, Flexibility of tone

GETTING STARTED	FACIAL EXPRESSION	TONE OF VOICE	BODY LANGUAGE
•Approach from the front •Smile •Identify yourself •Use the person's name •If posible be at eye level	•Establish & maintain eye contact •Be friendly & relaxed •Always remember smile & laughter go a long way •Be patient and supportive	•Speak slowly & clearly •Use a gentle & relaxed tone of voice •Convey an easy going manner	•Avoid sudden movement •Be open & relaxed •Remain calm & confident to provide reassurance •Use gestures such as pointing •Give visual clues

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Activity 4

Now we have studied about communication skill. Let's have an exercise.
This is a three minute quiz. Take a paper and do as per the instructions given below.

1. Read everything before you do anything.
2. Write your name in the upper top left-hand corner of this page.
3. Circle the word "name" in sentence two.
4. Draw five small squares in the upper right-hand corner.
5. Put an X in each square you have just drawn.
6. Put a circle around each square.
7. Sign your name under the title of this page.
8. After the title, write, "yes, yes, yes."
9. Underline sentences number seven and eight.
10. Put an X in the lower left-hand corner of this page.
11. Draw a triangle around the X you have just made.
12. Stand up and (loudly) call out your first name.
13. On the back of this page multiply 5 times 4.
14. Draw a circle around the word "top" in sentence four.
15. On the reverse side of this paper add the numbers 25 and 100.
16. Count out in your normal speaking voice from one to 10.
17. If you are the first person to get this far, say, "ME, ME, ME!"
18. Using your pencil, punch three small holes at the bottom of this paper.
19. If you think you have carefully followed these directions, stand up, turn around and whisper, "I have carefully followed the directions."
20. Now that you have finished reading the directions carefully, do only sentences one and two. Sit quietly until everyone else if finished.

8.6 TEACHING AIDS

A teaching aid is a tool used by teachers, facilitators or tutors to help learners improve reading and other skills, illustrate or reinforce a skill, fact, or idea and relieve anxiety, fears, or boredom since many teaching aids are like games.

Definition of teaching aid are the aids used by the facilitator to help him/her in facilitating his/her lesson effectively.

8.6.1 Characterstics of Good Teaching aids

- They should be meaningful and purposeful
- They should be accurate in every aspect
- They should be simple

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- They should be cheap
- They should be improvised as for as possible
- They should be large enough to be properly seen by the students for whom they are meant
- They should be up-to-date
- They should be easily portable
- They should be according to the mental level of the students.
- They should motivate they learners

Uses of Teaching Aids:

- To help children improve reading and comprehension skills
- Illustrate or reinforce a skill, fact, or idea
- Relieve anxiety, fears or boredom, since many teaching aids are like games.
- To stimulate interest, display can call attention to products or practices.
- To encourage student's participation – displays may be studied and discussed by students as a part of class activity
- To help children to communicate ideas visually

Importance of Teaching aids

- Motivation
- Clarification
- Increase the vocabulary
- Save time
- Avoid dullness
- Direct experience

8.6.2 Classification of Teaching aids

On the basis of characteristic of the material used in the process of teaching aid classifications as mentioned below:

Audio-aids: Audio-aids help in developing the listening skill of a learner. Audio-aids are those aids which can be only listened. Examples, of such types of aids include, radio, gramophone, tape recorder, audio-tapes, walkman and headphones etc.,

Visual-aids: Aids which require the involvement of learners visual senses are called visual aids. Examples, of such types of aids include viz. graphic aids, 3d-aids, display boards and print material etc.,

Audio-Visual aids: In these aids both the listening (ears) and viewing faculties (eyes) are involved. Such aids include television programmes, video films, motion pictures, synchronized audio slide projectors, computers and computer-assisted instructions etc.,

Projected: Projected refer to those aids where a bright light is passed through a transparent picture by means of a lens and an enlarged picture is thrown or projected on the screen or the white wall. Eg: film-strip projector, slide projector, overhead projector, TV/VCR etc.,

Non-Projected: Non-Projected aids refer to those aids which do not require projector electricity or projection screen. Such materials can be simply shown, can be hanged or touched. Eg: Chalkboard, Whiteboard, Flannel board, Magnet board, Charts and Wall-Charts, Posters and Pictorial Materials, Models etc.,

Dr.Edgar Dale has classified and arranged audio-visual aids in a proctorial form called "Cone of Experience"

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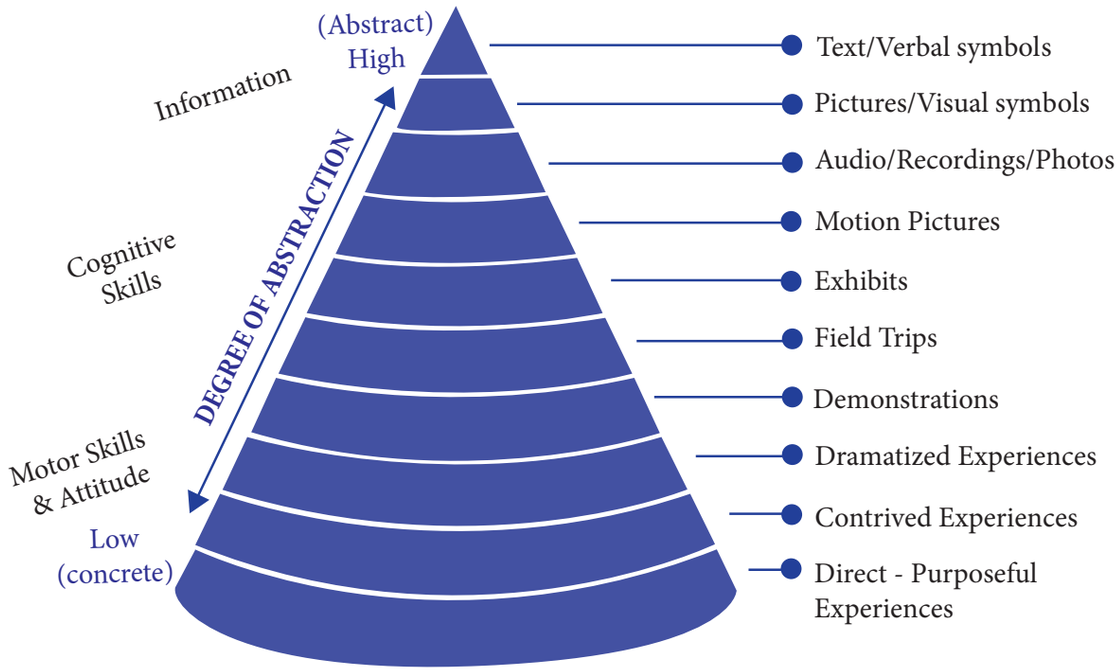
The primary source of contact between the individual and external world and any intellectual activity depends on experiences coming through senses. Even mental activities such as concentration, reflection, conception, imagination, association, recollection etc., have their basis in sensory experiences. Mind like stomach, works on what it is fed. This feeding comes through senses. The raw material for mental activity is provide by

i. Direct Experiences: Such experiences are gained by the pupils through excursions and trips etc.,
ii. Representative Experiences: This type of experiences are less concrete but are quite useful. This type of experiences are provided by models, specimens, film strips, radio etc.,
iii. Verbal and Symbolic Experiences: Such experiences are those which the pupils gain through word-oral or written. This type of experiences are very abstract and occur at conceptual level. E.g. verbal illustrations. This type of experience can not be properly followed at the initial stages of child-learning so at initial stage more emphasis be laid on direct and representative experiences.

The above cone represents the material used for audio-visual instructions.

The theory of audio-visual instruction needs that education must make learning permanent and experiences usable. The advocacy for the use of new material for improving instructions is based on the fact that the verbalistic learning is out

In the picture below are shown various experiences



Edgar Dale's Cone of Experience

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of date and the complexity of the time has made our school curriculum very much heavy as the present day knowledge has developed tremendously. We need new ways to adjust ourselves to the changed circumstances and the trends towards realistic learning.

Activity 5

Prepare a poster for your school cultural event

8.7 RECENT TRENDS IN COMMUNICATION – WEBSITE, EMAIL, MULTIMEDIA, E-LEARNING

Website: is a collection of related web pages, including multimedia content, typically identified with a common domain name, and published on at least one web server. A website may be accessible via a public Internet Protocol (IP) network, such as the internet, or a private Local Area Network (LAN), by referencing a Uniform Resource Locator (URL) that identifies the site.

Uses of websites

There are millions of websites on the internet. They are used for almost every conceivable purpose including business, personal and entertainment purposes. Some of the more common purposes of websites are described in the following section.

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What is Website?

A connected group of pages on the world wide web regarded as a single entity, usually maintained by me person or organization and devoted to a single topic or several closely related topics.

- Presenting information
- Storing information
- Browsing and searching for information
- Improving productivity
- Making decisions
- Communication with people
- Media sharing
- E-Commerce
- Education
- Downloading information

Best Education Websites in India for Children

There are plenty of websites for children in India that specifically help children to deal with the educational system in India. Find out the list of best Indian educational websites for children.

1. Kidswebindia – **kidswebindia.com** Is an educational website for children of all age group. This website focuses on most of all issues of Children. The website has resources and materials even for the age group 3 years. (For Example: Puzzles, Dental care, Nursery rhymes)
2. Chandamama – **chandamama.com** Is an educational website too as it helps children understand so much about Indian culture, ancient Indian history and tales. Additionally the website also has various learning section such ass drawing, contests, craft, essays and poems
3. Indiaeducation – **Indiaeducation.net** is a educational site that primarily focuses on students of class 10th and class XX. This site provides help with various subjects of class X and Class XII dealing with all science, commerce and arts. For X standard class, the site deals with all the CBSE and ICSE issues focusing on the syllabus, examination tip, exam stress, ideal prospects after class X, objective and faqs.
4. Few of the best education websites for children in India like- **Pitara.com, esiksha.com, dimdima.com, ekidzee.com, indiaedu.com, vidyaonline.net, babloo.com**

Email: Electronic main (email or e-mail) is a method of exchanging messages between people using electronic devices. Email messaging facility, e-mail can be read instantly.

Best Free Email Accounts

1. Gmail (www.gmail.com)
2. Outlook (www.outlookmaill.com
3. Yahoomail (www.yahoomail.com
4. Rediff (www.rediffmail.com)
5. Aol Mail (aolmail.com)
6. Yandex mail (www.mail.yandex.com)

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Uses of Email

- Information interchange
- Brain Storming and problem solving
- Record keeping
- Group work
- Staying in touch professionally
- Staying in touch socially
- Transmitting Documents

Multimedia: is content that uses a combination of different content forms such as text, audio, images, animations, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms or printed or hand-produced material.

Text:

- A broad term for something that contains words to express something
- Text is the most basic element of multimedia
- A good choice of words could help convey the intended message to the users

How to create Email account

For Example

1. Go to www.gmail.com
2. Click create account
3. Signup form will appear. Follow the directions and enter the required information
4. Review Google's terms of service and privacy policy, click the check box, then click next step.
5. Here, you'll have an opportunity to set up recovery options. Recovery options are helpful if you forget your password or if someone tries to access your account. If you don't want to set up recovery options at this time, click done
6. Your account will be created, and the Google welcome page will appear.

Email first entered limited use in the 1960s and by the mid 1970s had taken the form now recognized as email

What is an Email Message?

An email message is a text typically brief and informal, that is sent or received over a computer network. While email messages are usually simple text messages, attachments (such as image files and spreadsheets) can be included. An email Message can be sent to multiple recipients at the same time.

Examples of an Email?

The general format of an email address is local-part@domain, and a specific example is jsmith@example.com. An address consists of two parts. The part before the @ symbol (local-part) identifies the name of a mailbox. This is often the username of the recipient, E.g. jsmith

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Advantages

- Convenience
- Speed
- Inexpensive
- Printable
- Reliable
- Global
- Generality

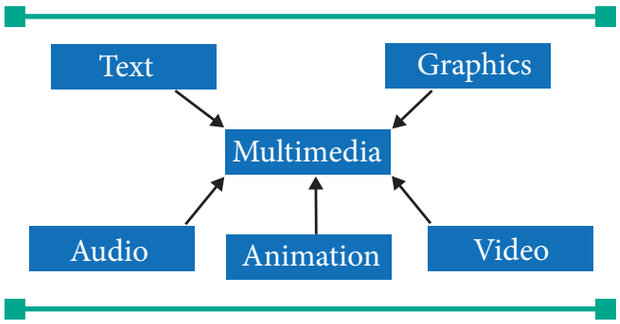
Disadvantages

- Misdirection
- Interception
- Forgery
- Overload
- Junk
- No response

What is Multimedia?

Derived from the word "Multi" and "Media"

- Multi: (Many, Multimedia)
- Media: Tools that is used to represent or do a certain things, delivery medium, a form of mass communication – newspaper, magazine / TV.
    - Distribution tool & information presentation – text, graphic, voice, images, music and etc.,



- Used in contents, menus, navigational buttons.

Video:

- Is the technology of capturing, recording, processing, transmitting, and reconstructing moving pictures.
- Video is more towards photo realistic image sequence / live recording as in comparison to animation
- Video also takes a lot of storage space. So plan carefully before you are going to use it

Audio:

- Produced by vibration, as perceived by the sense of hearing
- In multimedia, audio could come in the form of speech, sound effects and also music score

Animation:

- The illusion of motion created by the consecutive display of images of static elements
- In multimedia, animation is used to further enhance / enriched the experience of the user to further understand the information conveyed to them.

Graphic:

- Two-dimensional figure or illustration
- Could be produced manually (by drawing, painting, carving, etc.,) or by computer graphics technology.

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- Used in multimedia to show more clearly what a particular information is all about (diagrams, picture)

Why use multimedia in the classroom?

- The significance of presentation and speaking skills
- The importance of research, planning, and organization skills
- The impact and importance of different media
- Techniques for synthesizing and analyzing complex content

Multimedia usage

- Advertising /Catalogs
- Product showcase / Demonstration
- Education / Training
- Reference and Data dissemination
- Communication
- Commerce
- Presentations
- Entertainment and Gaming

Different types of multimedia

- **Online:** a product that needs to communicate with distant resources and sometimes distant users (websites, mobile services)
- **Offline:** a self-contained product, does not communicate with anything outside its immediate environment (CD, DVD, Blu Ray, Multimedia kiosks)
- **Hybrid:** Has elements of both on-and offline products, such as some computer games

Advantages

- User friendly interface
- Easy and quick to operate
- Meaningful and easy of use
- Interactivity
- It provides high quality vide, image, audio

Disadvantages

- Time consuming
- Very expensive
- Complex to create
- Memory storage very high
- It is not always easy to configure

E-learning: A learning system based on formalized teaching but with the help of electronic resources is known as E-learning.

Definition: Instructional content or learning experience delivered or enabled by Electronic Technologies (ong & Wang, 2003)

Electronic Learning (E-Learning)

Technology-assisted learning and teaching (online and in class)

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What is E-Learning Technology?

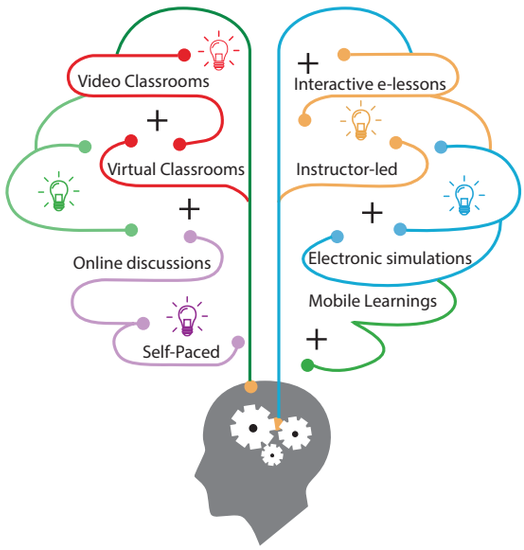
- Encompasses a broad range of application of technology
- Refers to using information and communications technology to:
  - Support the process of learning
  - Support communication in education
  - Evaluate learning activities
  - Manage resources
  - Create educational materials

Content is delivered using various media such as text, images, animations, streaming videos, and audio

Types of e-Learning

- Purely online –no face to-face meetings
- Blended learning – combination of online and face –to-face
- Synchronous
- Asynchronous
- Instructor-led group
- Self-study
- Self-study with subject matter expert
- Web-based
- Computer-based (CD-ROM)
- Video/audio tape

Choosing the right eLearning Methods: Factors and Elements



Benefits of E-Learning

- Focuses on needs of learner, not ability of trainer
- Flexibility of learning
- Effective use of time for both employee & trainer
- Economies of scale for all parties
- Technology can expand reach and range of traditional learning faculties

Advantage and Disadvantage of E-Learning

Advantages

- Just-in-time learing
- Standardised learing
- Self-paced learing
- Flexible means of asssessment
- No travel costs
- No classroom accommodation
- Cost-effective

Disadvantages

- Requires computer access
- Requires internet access
- Requires basic computer skills
- Does not suit all learners
- Development cost of good-quality bespoke material can be high
- Not all material may be compatible with underlying learning management system

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Classroom Vs E-Learning Approach		
	Classroom	**E-Learning**
Classroom	1. Synchronous 2. Limited capacity 3. Single learning path	1. Unlimited 2. 24*7 availability 3. Multiple learning methods
Content	• Textbooks/Library • Video • Collaboration • Powerpoint presentations / Transparencies etc.,	• Digital library • On Demand • Multimedia / simulations • Synchronous & Asynchronous communication etc.,

SUMMARY

Communication is a process of sharing or exchanging information ideas, thoughts and feelings between the source of communication (a teacher) and the receiver (a student) or known media (verbal or non-verbal). The six elements or components involved in a properly maintained two way communication process are the source, contents or message, media or channel, the receiver, response or feedback and the barriers of communications The cone of experience put forward by Edgar dale tells us what type of learning experiences and mode of teaching and learning will prove advantageous to what type of learners in a given teaching – learning situation.

Multimedia approach to instruction calls for the judicious use of a number of sensory impressions or media in relation to the existing teaching - learning situation in such a combination that results in the attainment of the predetermined objectives in the best possible way.

GLOSSARY

Decoding – (குறிவிலக்கல்); to discover the *meaning* of information given in a secret or complicated way.

Encoding – (குறியீட்டு): to put information in the form of a code.

Feedback – (பின்னூட்டம்): A process in which a system regulates itself by monitoring its own output.

Multisensory materials – (பல்வகைப்பட்ட பொருட்கள்): involving more than one sense. Pronunciation, translations are examples.

Internet – (இணையம்) Network of Networks

Symmetric – (சமச்சீரான) It divides itself among the various

Web – (இணைய வலை) Network of websites

Website - (இணையதளம்) Network of web pages

www – (உலகளாவிய வலை) World wide web

E-mail – (மின்னஞ்சல்) Electronic mail

LAN – (உள்ளூர் பகுதி வலைபின்னல்) Local Area Network

URL – (இணையதள முகவரி) Uniform Resources Locator

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Questions

I. Choose the correct answer

1. Communication means _____
   _____
   (a) Knowledge (c) Connect
   (b) Technology (d) Skills

2. Face to Face communication _____
   (a) Visual (c) Electronic
   (b) Verbal (d) Written

3. _____ help in developing the listening skill of the learner
   (a) Audio aids
   (b) Visual Aids
   (c) Audio Visual aids
   (d) Projector

4. _____ Experiences are gained by the pupils through excursions and trips
   (a) Representative Experience
   (b) Verbal Experiences
   (c) Direct Experience
   (d) Symbolic Experience

5. Millions of websites on the _____
   _____
   (a) E-Learning (c) Media
   (b) E-Commerce (d) Internet

6. _____is a combination of text, graphics, sounds and animation
   (a) T.V (c) Multimedia
   (b) Mail (d) Internet

7. Which of the following is not a mass method of communication
   (a) Radio (c) Computer
   (b) Exhibition (d) Farm visit

8. Which of the following are the barriers of effective communication
   (a) Noise (c) Distance
   (b) Language (d) All of the above

9. Message should be given using simple and familiar words is the principles of
   _____
   (a) Brevity (c) Clarity
   (b) Simplicity (d) Timeliness.

Very short answer (2 marks)

1. Define communication
2. What is the best method for classroom teaching?
3. Write a qualities of a good communicators
4. Write a 7C's of Communication
5. What are verbal and non verbal communications? Illustrate with example
6. Gives some examples of non-projected aids
7. What is website?
8. LAN and URL – Expand it
9. How to create a E-Mail?
10. What are the benefits of E-Learning

III. Answer briefly (3 marks)

1. Why we communicate ?
2. Write in the importance of communication
3. List out the communication skills
4. What are the uses of teaching aids
5. What is E-Learning technology
6. Why use multimedia in the classroom?
7. Discuss the different barriers in communication
8. Explain the methods of communication
9. What are the characteristics of good teaching aids?

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IV. Write in detail (5 marks)

1. Explain in details about the functions of communication
2. What are the principles of communication
3. What do you know about Edgar Dale's cone of experience? Which drawing a sketch of the cone, discuss the type of experiences helpful in the process of teaching-learning
4. Discuss in details about the various principles of good communication
5. Write the advantages and disadvantages of E-Learning
6. Discuss in brief the various methods of communication carried out in different situation

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Chapter 9 Personality Development and Life Coping Skills

Learning Objectives

This chapter deals with:

- Meaning, definition and determinants of personality
- Self awareness and self esteem
- Stress management and problem solving
- Decision making
- Coping with depression, fear, shyness, loneliness
- Anger, verbal abuse, failure and criticism

J9VCX

Build Your Personality
Be Confident ...Be Strong....
Belief In Your Self
YOU CAN DO IT.....

9.1 INTRODUCTION

Personality refers to the totality of what a person is, which includes all traits **(Physical, Psychological as well as a variety of acquired habitual traits)** blended or organized in a characteristically unique manner that determines the mode of behavior and adjustments to the environment.

The term Personality has been derived from Latin word 'Persona' which means facial mask worn by roman actors on stage.

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9.1.1 Definition of Personality

"Personality is the dynamic organization within the individual of those psycho physical systems which determine his unique adjustment to his environment." **–(G. W. Allport,1937)**

"Personality is that which permits a prediction of what a person would do in a given situation." **–(R.B.Cattel,1950)**

Personality is the embodiment of physical, emotional, social, mental, moral and other traits of a human being. Each letter of the word **"PERSONALITY"** implies its meaning as follows.

P	Perception capacity
E	Emotional maturity
R	Responsiveness to the situation
S	Sociability
O	Originality
N	Neutrality
A	External appearance
L	Leadership feeling
I	Integrated
T	Tendency
Y	Young (in thinking)

Characteristics of personality

- Personality is self-consciousness
- It is dynamic
- It is the product of heredity and environment
- It is adjustable or modifiable
- It is unique
- It is integrated and functions as a whole
- It is assessable

9.2 DETERMINANTS OF PERSONALITY

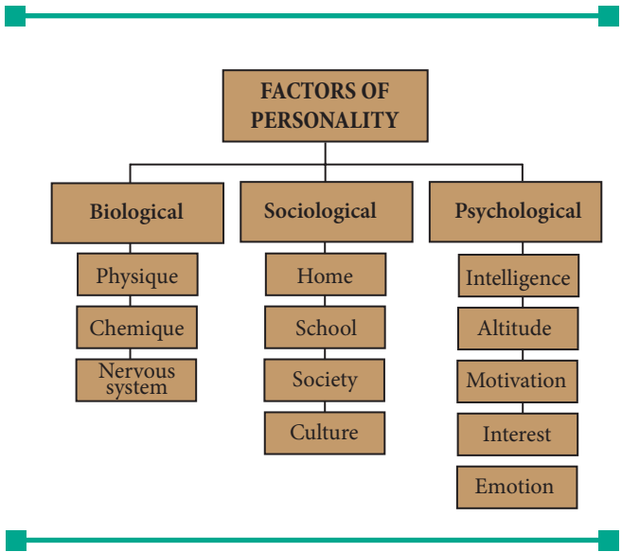
The personality of an individual may be influenced by various factors such as the **biological, Sociological** and **Psychological** factors.

The major factors and their sub components that determine and influence personality are given in figure 1.

9.2.1 Biological factors

There are three biological factors playing a great role in personality development. They are

1. **Physique**
2. **Chemique**
3. **Nervous System**



▲ Fig. 1 Factors influencing personality

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1. **Physique:** Height, weight, physical appearance, physical strength, general health, physical deformities and abnormalities are the factors that can influence the personality of an individual not directly but indirectly. For example: The child who is short of stature and who is physically handicapped may develop a feeling of inferiority.
2. **Chemique:** Chemique means the effects of the endocrine glands on the personality development. For example: Thyroid gland secretes thyroxin which controls rate of growth which in turn is relates to the personality of an individual.
3. **Nervous System:** Sensory organs depends upon the w ell developed quality of the nervous system. These sensory organs are the gateways of knowledge. For example: Quickness of adjustment, the readiness of acquiring new modes of responses, our reasoning and thinking all depend on the efficiency of the nervous system.

9.2.2 Sociological factors

Home, school, society and culture are the most important sociological factors involved in personality development.

Home

The following factors from the home can affect the personality of an individual

- Broken home, separated (or) divorced parents, alcoholic parents, quarrelsome parents.
- Over ambitious parents
- Parental preferences on the sex (male or female) of the child
- Step parents
- Number of children in the family.
- Educational and socio- economic status of parents

School

School factors responsible in shaping the personality of the children include:

- Discipline of the school
- Opportunity available for various curricular and co curricular activities.
- Size of the school
- Organizational climate of the school.
- Personality of the teachers

Society

The society circumstances and the environment also play a vital role in deciding one's personality.

Culture

An individual's personality is also determined by the culture in which they are reared.

9.2.3 Psychological factors

Intelligence, motivation, attitude, emotion and interest are some important psychological factors

9.3 SELF AWARENESS

"**Awareness**" is about noticing and being aware about things around you in the world. Self awareness is having a clear perception of one's own personality including **strengths, weakness**, **thoughts**, **beliefs, motivation** and **emotions**.

Self awareness also is defined as the capacity to recognize one's own feelings, behaviours, and characteristics – to understand cognitive, physical and emotional self at a basic level,

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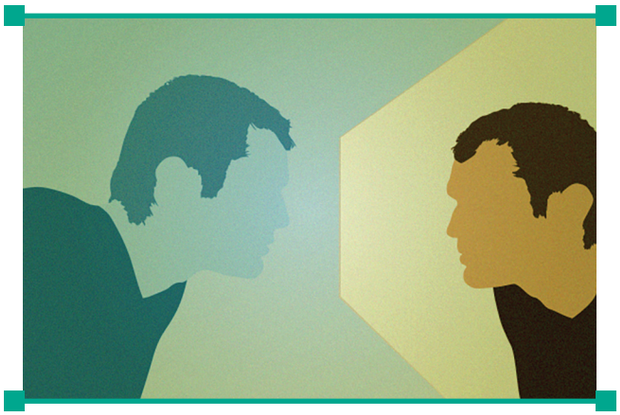

Self Awareness tips:-
Self awareness practice for the first time can be difficult but it can be achieved by 12 weeks or regular self assessment to become a successful individual.

9.3.1 Why is self-awareness important?

The importance of self –awareness is as follows:

- Build your self esteem and confidence
- To live your values and realize your dreams
- Make priorities based on what is important to you
- To change your way of living
- To choose a suitable career which will satisfy you
- To give more of yourself to others
- Benefit you and others in relationships

9.3.2 How can you become more self aware?

- Write down your goals and keep track of progress.
- Websites
- Self help Books
- Self analysis
- Meditation
- Be your own life coach
- Discuss with your family & friends
- Get regular feedback at work
- Beliefs and Values

Self Awareness worksheet

Fill out this worksheet together to build awareness of strengths, weaknesses for following

Activity 1

Self Awareness worksheet
Fill out this worksheet together to build awareness of strengths, weaknesses for following
I am strong in these areas: _____
_____
I struggle with:_____
_____
My favourite thing about school is:___
_____

9.4 SELF ESTEEM

Self-esteem is the personal value, self-respect and self -worth that an individual places on themselves

9.4.1 Definition

"Self Esteem is the satisfaction or dissatisfaction with oneself" (James – 1980)

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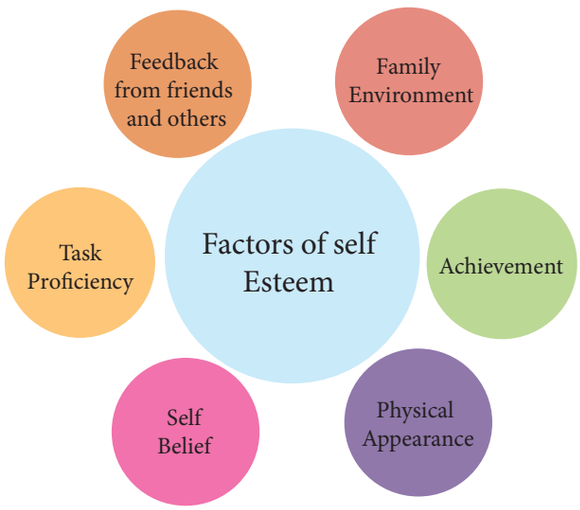
"Self-esteem is the judgment or opinion we hold about ourselves. It's the extent to which we perceive ourselves to be worthwhile and capable human beings." (Coopersmith, 1967)

9.4.2 Factors influencing Self Esteem

Self esteem or self image of adolescents is based on six domains as shown in figure 2.



▲ Fig. 2 Factors influencing Self Esteem

Family Environment

Family is the first school for an individual. A childs life is mainly influenced by the family environment; it is the primary source of social development. Each family is different from the other, as it is composed of different members. Each varies in its social and economic conditions with different background

Achievement

Academic achievement and achievement of one's goals related to their hobbies play a crucial role in forming a positive, healthy view of the self.

Physical Appearance

Physical characteristics such as hair, figure, height weight, skin colour may also influence the self-esteem of an individual

Self Belief

A person who has high confidence levels may learn things quickly, trust that they can complete tasks to a good standard and this subsequently may boost their self esteem.

Task Proficiency

This includes the skills required for performing tasks and the ability to complete the task. Task proficiency influences the personality of an individual

Feedback Friends and others

Positive & negative messages and feedback from friends and others may boost or break an individual's self-esteem.

9.4.3 Types of Self-Esteem

High Self-Esteem – Feeling positively about yourself, your actions and your future.

Low Self-Esteem – Feeling negatively about yourself, your actions and your future.

Improving our self esteem

- Say "stop" to your inner criticism
- Use healthier motivation habits
- Take a 2-minute self-appreciation break
- Write down 3 things in the evening that you can appreciate about yourself
- Do the right thing

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Self Esteem can be classified as HIGH SELF-ESTEEM and LOW SELF_ESTEEM

SELF ESTEEM

HIGH SELF-ESTEEM	LOW SELF_ESTEEM
1. Worthy of living	1. Poor risk taker
2. Self confident	2. Afraid of competitions or challenges
3. Accept themselves unconditionally	3. Non-Assertive
4. Seek continuous self-improvement	4. Lack initiative
5. Have peace with in themselves	5. Shyness
6. Enjoy good interpersonal relationship	6. Lack self-acceptance
7. Tolerate frustrations well	7. Blame others for their short comings
8. Assertive	8. Low aspiration
9. Willing to take calculated risks	9. Indifferent to needs of others
10. Self directed	10. Indecisive

Activity 2

About Me

I was really happy when_____

Something that my friends like about me is _____

I'm proud of _____

My family was happy when I _____

In school, I'm good at _____

Something that makes me unique is _____

9.4.4 Motivation

The Word motivation comes from the Latin word 'motum' which means 'move', 'motor', and 'motion'. That is 'to put into action or to move'.

Definition

Motivation is defined as "Acts that arouse, sustain and direct behaviour.

- It helps to sustain the attention in one's efforts or task
- Restlessness to achieve the goal stops after the goal is reached

A continuous flow in shape of a cycle named motivational cycle is explained in figure 3.

Need

A need is lack or deficit of some necessity. It's a state of physical deprivation that

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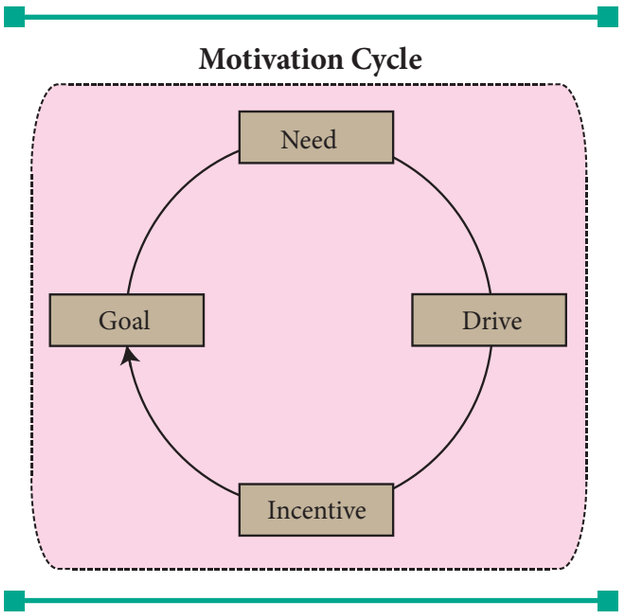
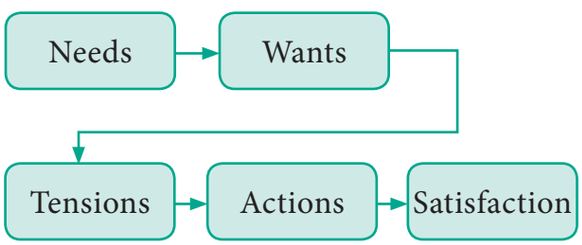


▲ Fig. 3 Motivational cycle



causes tension. The tension caused when the person is deprived of basic necessities of life as food, water, and sleep, causes imbalance. For any goal directed behaviour, need is the first condition or stimulating factor.

Drive

Need leads to drive, which is the second step towards achieving goal. Drive can be defined as the state of tension or arousal produced by need. It is the state of heightened tension leading to restless activity and preparatory behaviour. For instance, when person is hungry and/or thirsty, he seeks to reduce this drive by eating and/or drinking.

Incentive

Environment that activates, directs, and maintains behaviour is called incentive. It can be anything as long as it has either positive or negative value in motivating behaviour. For example: behaviour like eating food is an incentive that reduces the drive of the person caused by the need to fulfill his hunger. The reduction of behaviour then cuts off and restores balance in an organism.

Goal

The reduction of tension in the body can be considered as the goal of any motivated behaviour. Let's go back to the example of a hungry man. A hungry man eats food, and his body restores to a balanced condition. This then reduces the tension. This reduction of tension as a result of an energized activity is called goal. Once the goal has been completed, the organism is again ready for another goal-motivated behaviour.

9.4.4.1 Principles of Motivation

Maslow's Theory of Motivation

▲ Maslow

Maslow describes how motivation develops stage by stage from purely physiological drives to complex social purpose, as described in the figure presented below:

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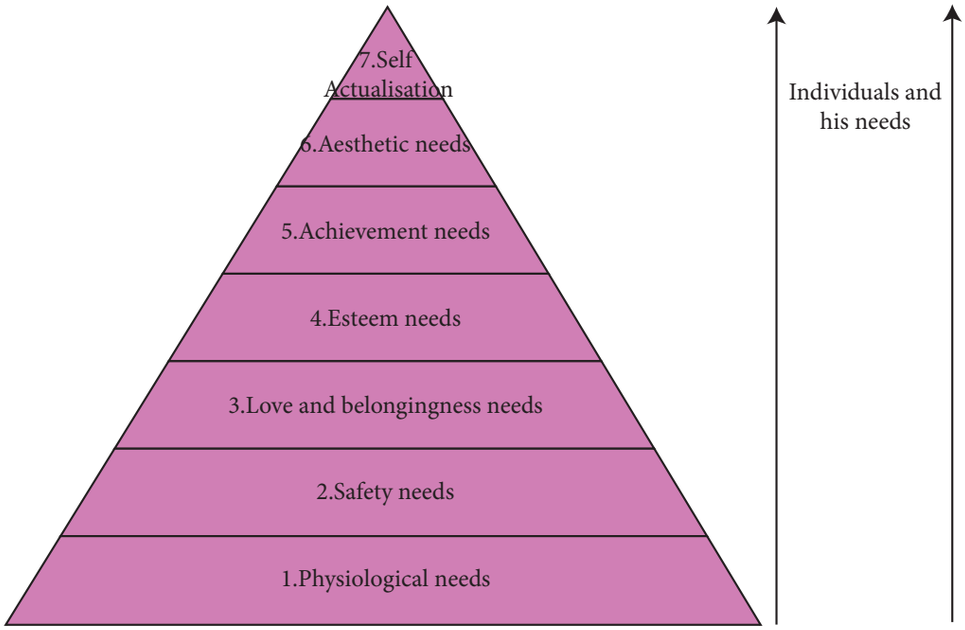

1. **Physiological needs:** The basic physiological desires are food, water, shelter, etc., They are the most basic and fundamental human needs.
2. **Safety Needs:** It arises on account of future expectations. For example, insurance against future, keeping a bank balance, investing in LIC.
3. **Love and Belongingness Needs:** Need for affection, praise, warmth, acceptance, approval, affiliation.
4. **Self-Esteem Needs:** Need for achievement, status, self-respect, self-confidence, feelings of strength and adequacy.
5. **Achievement Needs:** Needs for understanding implies knowledge of relationships, process, the integration of knowledge into broad structure etc. thus achievement needs are related to intellectual domination and cognitive competencies.
6. **Aesthetic needs:** This is concerned with appreciation of order and beauty. One whose lower order needs are fully satisfied or known that he need not bother about them, derives pleasure in beauty and nature.
7. **Self-Actualization Needs**: Need for self-fulfillment, self-expression, fulfillment of potentialities, working out one's own mental personality.

9.5 STRESS MANAGEMENT

Stress is a body's response to any physical, emotional or mental in life.

Stress leads to:-

1. Physiological discomfort
2. Some kind of emotional unhappiness
3. Strained relationships with other people

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9.5.1 Definition

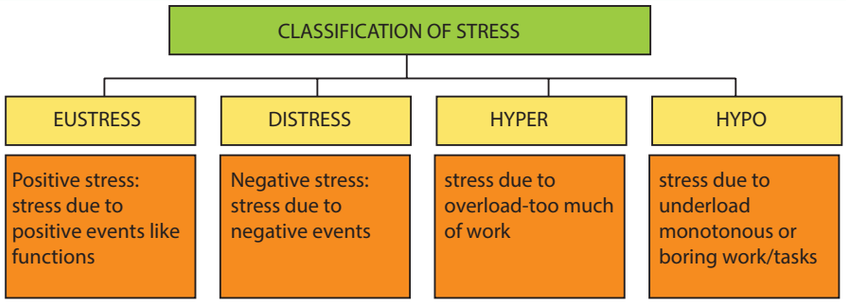
"Stress is defined as the pressure experienced by a person in response to life demands. **(Selye – 1956)**

9.5.2 Stress Management

Stress Management is the ability to maintain control when situations, people and events make excessive demands. Stress management means many things to different people because everyone has their own way of dealing with stressors.

9.5.3 Classification of Stress

Stress may be classified in the following manner:



- A stiff neck and/or tight shoulders.
- Back pain.
- Fast breathing.
- Sweating, and sweaty palms.
- An upset stomach, nausea, or diarrhoea.

9.5.5 Techniques to manage stress

There are many simple techniques that may prove useful in the management of stress as shown in figure 4

- Remove yourself from stressful situation
- Don't overcome yourself, talk to some-one freely

Each letter of the word "Stress" is

S ⇨ **Stand Back** (Remove yourself from stressful situation)
T ⇨ **Take a deep breath** (Think about the choice that is best for you)
R ⇨ **Relax** (Read a book, take a bath ,listen to music)
E ⇨ **Exercise** (Get that stressful energy out)
S ⇨ **Sleep** (Take a nap or rest for a while)
S ⇨ Speak (Talk to someone)

9.5.4 Effect of stress on the body

Stress has various harmful effects of the body. They include

- A fast heartbeat.
- A headache.
- Relax yourself
- Avoid extreme situations
- Indulge in physical activity
- Manage your time
- Get more sleep

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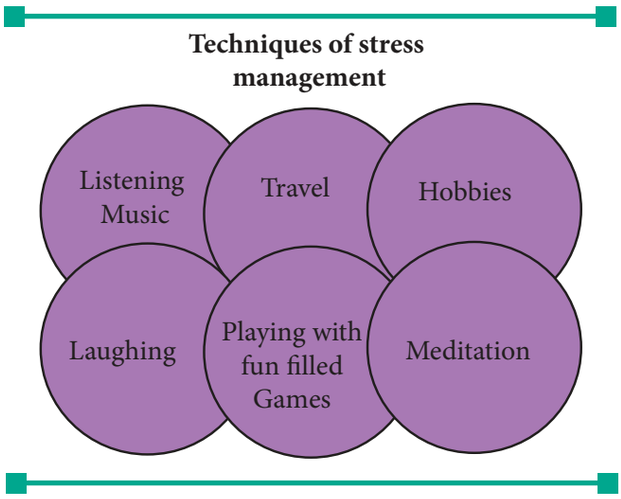

▲ Fig. 4 Techniques in stress management

Activity 3

Read through the situations below and ✓each one that you experienced within the last year. Mark whether the situation led to good stress or bad stress

Situation	I experienced this within the last year	Good Stress (Situation motivated you to prepare and do your best)	Bad Stress (Situation made you feel overwhelmed and worried most of the time).
1. Meeting new people			
2. Being peer pressured			
3. Fighting with friends or siblings			
4. Failing a test			
5. Giving a presentation			
6. Engaged in several activities			
7. Parents arguing			
8. Feeling left out			
9. Moving			
10. Being teased			

If you ticked the "**bad stress**" box more than three times, you might be experiencing stress overload. Talk to a trusted adult

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CASE STUDY

Case study 1

Sumithra has been studying for her final examination which is to be held next day morning. She studies till 1 a.m. in the night. Unable to concentrate any more, she sets the alarm for 6 a.m. and tries to go off to sleep. As she is very tense, she keeps tossing and turning in bed. Images flash through her mind of not being able to secure the marks. She blames herself for fooling around with her friends and not preparing thoroughly for the examination. In the morning she wakes up with a heavy head, misses breakfast, and barely makes it in time to school for her examination. She opens the question paper, her heart pounding, hands clammy with sweat and then she feels her mind has gone completely blank.

Some of you may have lived through an experience such as Sumithra's. The challenge posed by examinations is common to all students. Some of us succeed while others succumb to life stresses.

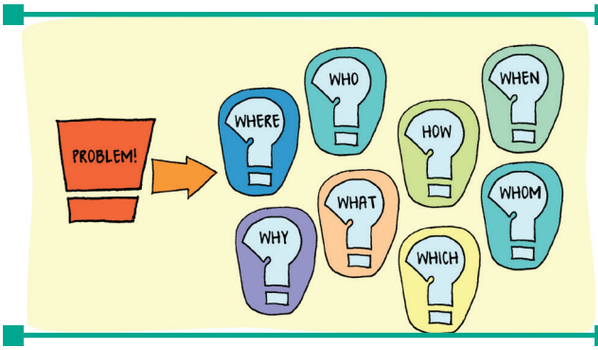
Life poses challenges all the time.

1. Suggest 3 ways to cope with that situation?
2. what do you infer from this case study?

9.6 PROBLEM SOLVING

9.6.1 Definition

Problem Solving is the term used for thinking or thought processes that is specifically aimed at finding Solutions to specific problems. This process continues on spectrum from conceiving an idea through accomplishing goal by means a set of mental operations.



"Generally people try the different strategies of solving a problem through **trial and error method**"

9.6.2 Factors affecting problem solving

- Poor Intelligence
- Absence of sufficient concepts
- Wrong thought habits
- Limited vocabulary
- Prejudices
- Lack of awareness

"The only way to solve a problem is to change the thinking that created it." Albert Einstein (1879–1955)

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9.6.3 Steps in Problem Solving

The steps in problem solving are as follows

Awareness of the problem–An individual has to be aware of the problem. If he senses that there is a problem he will know the way to solve it.

Example: What will happen to a boy who is absent continuously?

1. **Recognition of the problem**– The individual has to understand the problem by comparing his past experiences faced with present situation.

Example: All the students want to know what has happened to their favourite monitor

2. **Collection of data** – Collection of data plays an important part in solving the problems. Data regarding the problem is collected.

Example: One of the boy who lives nearby is spotted and asked to go to the monitor house. He finds out that his monitor is suffering from malarial fever.

3. **Formulation of hypothesis** - Hypothesis means "idea or suggestion put forward as a starting point for reasoning or explanation". Hence a hypothesis may be right or wrong, accepted or rejected after its validity is verified completely.

Example: One may ask why the monitor alone was attacked by malarial fever. The boys try to formulate tentative guesses to the question. Perhaps the monitor visited someone who had malarial fever. Perhaps monitor slept without mosquito net at night, or water stagnation near his house.

4. **Evaluation or testing of hypothesis**: Hypothesis formulated is tested.

when monitor comes back to school after recovery from malarial fever he says that there is a big pond near his house where water stagnates and breeds mosquitoes. He also tells them that one night he did not use mosquito net because it was a very hot night.

5. Making of Generalisation –Finding a general principle to a particular situation is called generalization.

i) One should not sleep without a mosquito net at night in swampy areas.
ii) One should maintain good habits so that he/she may not be attacked by a disease.

Five "I"- approaches to Daily Problem Solving

1. **Intention** - State the goal of the problem to be solved

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2. **Interest** - What is the problem? where do you see the problem in the process
3. **Investigate** - What is the root cause?
4. **Intervene** - Limit the effect of the problem
5. **Implement** - Permanently prevent the problem from reoccurring.

9.6.4 Tips to increase our Problem Solving Skills

- Dance
- Workout our brain with logic puzzles
- Get good night sleep
- Work out to some tunes
- Participate in yoga

Activity 4

Problem: Write who, what, why and how the problem occurred _____
_____
_____
_____
_____
_____

What was the result ? _____
_____
_____

Write two better ways to solve the problem:

1. _____
_____

2. _____
_____

How could I have prevented the problem
_____
_____

In the future I will _____
_____
_____

9.7 DECISION MAKING

9.7.1 Definition

According to **James Stoner** "Decision making is the process of identifying and selecting a course of action to solve a specific problem.

(Mathew, 2011)

9.7.2 Decision Making Process

Making a good decision requires patience and careful thought. The following steps serve as important guidelines for taking good decisions

9.7.3 Factors affecting decision making

The following factors influence the decision making process.

- Perception - people selectively interpret what they see on the basis of their interest, background, experience, and attitudes. Hence, people's decision will be impaired by wrong perception.
- Priority - Prioritizing the personal goals, the place of family, work, career in our

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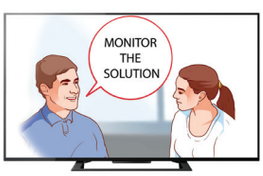
Step 1 – Define the problem. The first step towards a decision-making procedure is to define the problem. There would be no need to make a decision without having a problem. So, the first thing one has to do is to state the underlying problem that has to be solved.

Step 2 – Develop alternatives. The situation of making decision arises because there are many alternatives available for it. Hence, the next step after defining the main problem would be to state out the alternatives available for that particular situation.

Step 3 – Evaluate the alternatives. The most important stage of the decision-making procedure is to analyze each alternatives. The advantages and disadvantages of each option has to be critically assed. Rating each option with a numerical digit would also help in the filtration process.

Step 4 – Choose and finalize the alternative. The evaluation process would help in clearly looking at the available options and deciding the most suitable alternative

Step 5 – Implement the solution. The next obvious step after choosing an option would be implementing the solution.This is a very crucial step because all the people involved in implementation of a solution should know about their implications. This is very essential for the decision to give successful results.



Step 6 – Monitor the solution. Just making a decision and implementing it, is not the end of the decision-making procedure. It is crucial to monitor your decision regularly once they are implemented. At this stage, you have to keep a close eye on the progress made by implementing the solutions.

▲ Fig. 5 Steps in decision making process

Source: www.buzzle.com/articles/6 steps to decision making processs.html

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priority list is of most importance while making good decisions.

- Acceptability - Those who implement the decision must accept it both intellectually and emotionally.
- Resources - Available resources helps to make decisions fastly.
- Judgment - Practical strategies helps in improving decision making process.

9.7.4 Qualities of Good decision makers

- Evaluate circumstances, consider alternatives.
- Use critical thinking skills.
- Able to make decisions under pressure.
- Problem solving attitude.
- Opposed to a "that's not my job" approach.

9.7.5 Practical tips to help in decision making

Stick to your mission

1. Set a time limit
2. Avoid decision fatigue
3. Control what you can control
4. Understand whether the decision can be reversed
5. Make a daily decision quota

Decision making tips

- Take necessary time
- Be sensitive to timing time
- Write it down
- Look for a good decision
- Involve others
- Commit to it
- Be confident
- Listen to facts and feelings

Activity 5

3 good choices I would like to make this week....

1. _____
   _____
2. _____
   _____
3. _____
   _____

9.8 COPING MECHANISM

Coping Mechanisms can also be described as "Survival Skills". They are strategies that people use in order to deal with stresses, pain and natural changes that we experience in life.

Coping involves managing taxing circumstances, expending effort to solve life's problems and seeking to master or reduce stress.

We experience a range of emotions through out our lives. Some good, some not so good. Our behaviors are usually a result of how we handle our emotions. If we are able to handle our emotions positively behavior will be positive.

9.8.1 Coping with Depression

Depression is an emotional state of low mood and aversion to activity that can affect a persons thoughts, behavior, feelings and sense of well being. Depression is an illness characterized by persistent sadness and a loss of interest in activities that you normally enjoy, accompanied by an

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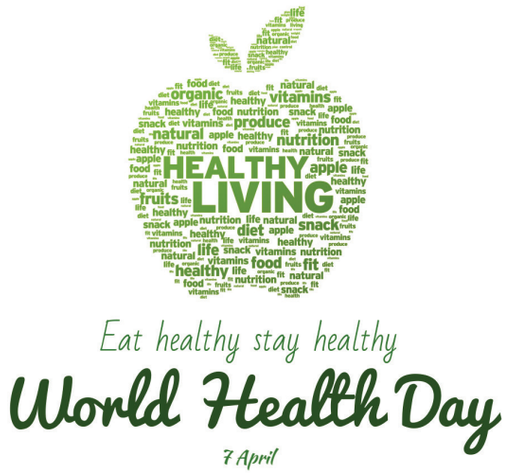

inability to carry out daily activities, for at least two weeks.

Cause of Depression

Depression is more than just feeling down. Research tells us that the other factors contribute to onset of depression include genetics, changes in hormone levels, certain medical conditions, stress, grief or difficult life circumstances.

Symptoms of Depression

A depressed person will experience any of the following symptoms.

WHO reports that 7.5% Indians suffer from mental disorders. Around 4.5% of India's population suffer from depression, 38 million Indians suffer from anxiety disorders.

Source: Times of India Feb 25, 2017

SYMPTOMS OF DEPRESSION

BEHAVIOUR	FEELINGS	THOUGHTS	PHYSICAL
• Not going out anymore • Not getting things done at home/school • Withdrawing from close family and friends	• Sad • Guilty • Irritable • Unhappy • Lacking in confidence	• I'm a failure • It's my fault • I'm worthless • Life is not worth living	• Tired all time • Sleep problems • headaches • Sick • Weight loss

2007 - 50
2016 -344
NUMBER OF STUDENTS SCREENED DURING NATIONAL DEPRESSION SCREENING DAY

40%
NEARLY 40% OF STUDENTS FELT OVERWHELMING ANXIETY AT SOME POINT IN LAST 12 MONTHS

15%
15% REPORT THAT DEPRESSION HAS AFFECTED THEIR ACADEMIC PERFORMANCE

National Depression Screening Day

2015-16 -10,564
2016-17 - 12,961
BEHAVIOURAL MEDICINE STUDENT VISITS

40%
NEARLY 40% OF STUDENTS FELT SO DEPRESSED IN THE LAST 12 MONTHS THAT IT WAS DIFFICULT FOR THEM TO FUNCTION

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9.8.1.1 Steps to overcome Depression

- Break tasks down into small steps
- Focus on your positive experiences
- Avoid isolation by connecting with people.
- Find a hobby and exercise daily.
- Use self relaxation techniques like deep breathing exercises
- Engage in voluntary activities to keep you active
- Set realistic goals challenge negative thoughts
- Improve diet and also take Omega 3 supplement
- Have a regular sleep time.

Omega 3 is an Essential Fatty Acid which has positive effect on mood. It is present in fish,pumpkinseeds and sunflower seeds.

Activity 6

How I Feel

I Feel : _____

Happy	Mad	Sad	Glad
Worried	Excited	Bored	Scared
Annoyed	Upset	Sick	Nervous

I Feel this way because:

_____

_____

_____

This is what I did about it:

_____

_____

_____

Something else I could have done is :

_____

_____

_____

Ask for help	Take deep breaths	Walk away
Do something else	Tell an adult	Talk to a friend

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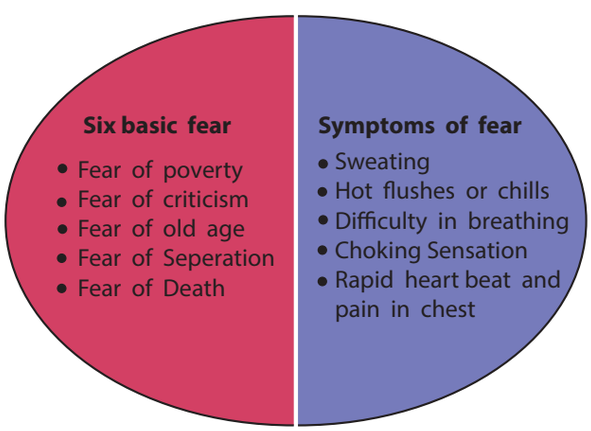
9.8.2 Coping with Fear

Fear is an unpleasant emotion that is preprogrammed into animals and humans as an instinctual response to potential danger. Fear is the emotion we experience when the automatic nervous system releases adrenaline energizing the system for fight or flight.

"**Fear** is discrimination learning. It provides us with information as to what object is dangerous and what delightful.

The common fears expressed in babyhood include those related to loud noise, animals, dark room, high places, being alone, pain and strange person places and objects. Older children have fears related to self or status. They are afraid of facilitating, being ridiculed and of being "different".



Types of Fear

- Fear of Failure
- Fear of Judgment
- Fear of Success
- Fear of Speaking
- Fear of not being able to make a living
- Fear of Rejection
- Fear of losing everything
- Fear of people and public places

Aware techniques for overcoming Fear

A - Accept the Fear

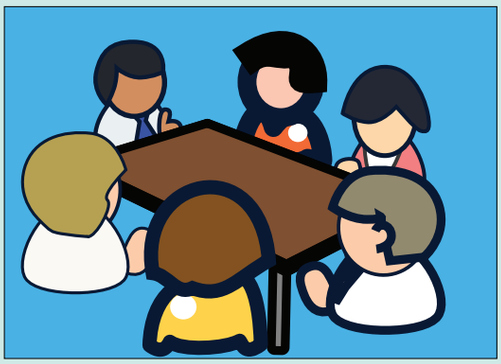
W - Watch the Fear

A - Act normal

R - Repeat the steps

E - Expect the best

Activity 7



Group Discussion

Discuss different fearful situation faced by higher secondary school children.?

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9.8.3 Shyness

Shyness is a psychological state that causes a person to feel discomfort in social situations in ways that interfere with enjoyment or that cause avoidance of social contacts altogether.

American Psychological Association (APA-2012) defined Shyness as the tendency to feel awkward, worried or tense during social encounters, especially with unfamiliar people.

Shyness is the fear of negative judgment and introversion.

9.8.3.1 Causes of shyness

- Less chances to meet people or less interaction with them.
- Insecurity / lack of confidence.
- Overprotection.
- Criticizing child in front of others

9.8.3.2 Symptoms of Shyness

- Blushing (cheeks turn red), feeling anxious
- Heart beats fast
- Sweating

Effective strategies to overcome shyness

1. Act confidently
2. When you meet someone focus all your attention on the other person.
3. Try new things even if they make you anxious
4. Be mindful
5. Talk freely
6. Engage yourself in any activity.

- Feeling mind has gone blank
- Trembling
- headache

9.8.4 Loneliness

Loneliness is a complex and usually unpleasant emotional response to isolation. Loneliness typically includes anxious feelings about lack of connection or communication with other beings, both in the present and extending into the future.

9.8.4.1 Symptoms of Loneliness

- Physical Symptoms - aches and pains
- Mental health conditions - increased risk of depression, anxiety, panic attacks
- Low Energy - tiredness or lack of motivation

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9.8.4.2 Causes of Loneliness

- Lack of social skills
- Lack of interest in other people
- Lack of empathy
- High self criticism
- Failure to disclose information about themselves
- Lack of sense of community

9.8.4.3.Coping with Loneliness

1. Think about what is making you lonely.
2. Talk freely
3. Take time to develop personal interests that you may not have had time for before.
4. Make new connections
5. Try a new recreational activity. Exercise and physical activity will increase your energy and help you to feel better about yourself.
6. Work on developing relationships with others. Avoid impulsive, desperate and clingy behaviours that tend to drive others away.
7. Work on your listening and communication skills.
8. Present a positive image.

9.8.5 Coping with Anger

Anger is a normal, usually healthy emotion. But when it turns destructive it can affect the very quality of our lives. Anger can be caused by external events, for instance getting angry with your friend or colleague and internal which is often triggered by unhappy memories or by worrying and brooding.

> Anger is a strong accompaniment to depression
>
> -Kim & Park -2009

Activity 8

Who can I call when….

I'm feeling lonely:

_____

I need some company:

_____

I need someone to talk to:

_____

I need someone to encourage me to get out of the house and do something fun:

_____

I need someone to remind me to follow my self care plan:

_____

_____

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9.8.5.1 Causes of Anger

Anger can be triggered due to many factors as given below:

- Rejection by parents
- Rejection by peers
- Lower levels of academic achievements
- More mental health intervention

9.8.5.2 What happens in your body -

when you get angry?

(i). Your heart pounds
(ii). Your breathing changes
(iii). Your muscles get tense
(iv). Your face gets red
(v). There's a knot in your stomach
(vi). There's a lump in your throat
(vii). Release of the hormone Adrenaline

Anger is a difficult feeling. When you're angry, you might do bad things that you wouldn't do if you were happy. But did you know that it's normal to feel angry from time to time? It happens to everyone

Good way to release anger

- Get some exercise
- Practice controlled breathing
- Find or do something funny
- Listening to music
- Repeat self calming statements

ANGER MANAGEMENT

- Think before you speak . In the heat of the moment it is easy to say something but later we will regret
- Spend time out
- Identify possible solution

Activity 9

Draw a picture of what you look like when you're angry

What's something you say only when you're angry?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

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9.8.6 Verbal Abuse

Verbal abuse is a way of attacking (or) negatively defining another person using words or silence – as a weapon. It can take a variety of forms ranging from loud rants to passive – aggressive remark

What is Verbal Abuse?

Verbal abuse occurs when someone uses language, either spoken or written, to cause harm to an individual.

9.8.6.1 Types of Abuse

Physical abuse

Intentional infliction of bodily harm or injury on another person

Emotional abuse

- Verbal abuse
- Using words to mistreat or injure another person

Stalking

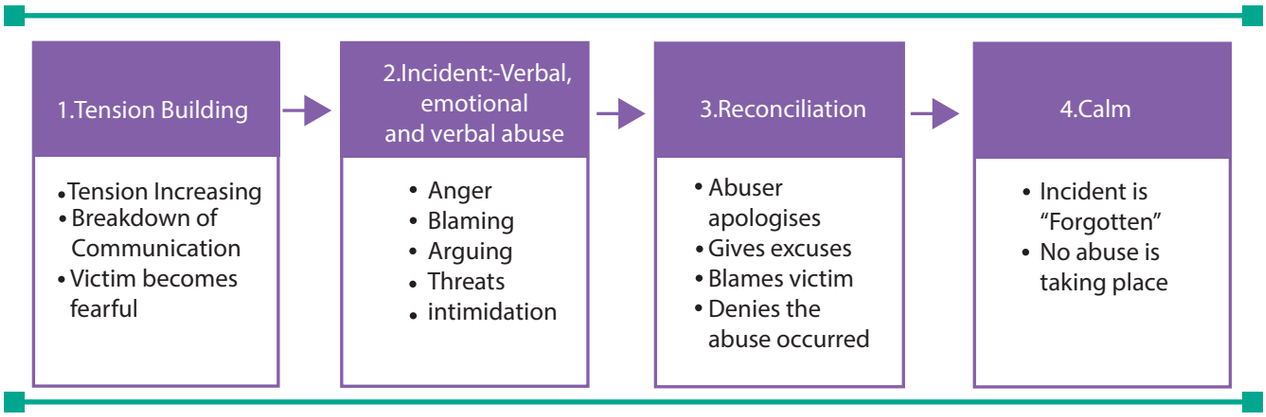
Repeated following, harassment or threatening on an individual to frighten or cause him or her harm

9.8.6.2 Effects of Verbal Abuse

- Can effect one's self image psychological and emotional ways
- Leads to low self esteem, fear depression, bad eating habits, sleeping problems and irritability
- Can cause students to fail school due to fear,
- Substance abuse, or in very extreme cases, death !

The cycle usually goes in the following order as shown in figure 5 and will repeat until the conflict is stopped, abandoning the relationship or some form of intervention.

9.8.6.3 Cycle of Abuse



▲ Fig. 5 Cycle of abuse

Source: http://en.wikipedia.org/wiki/cycle-of-abuse

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9.8.6.4 Helpful Tips for Overcoming Verbal Abuse –

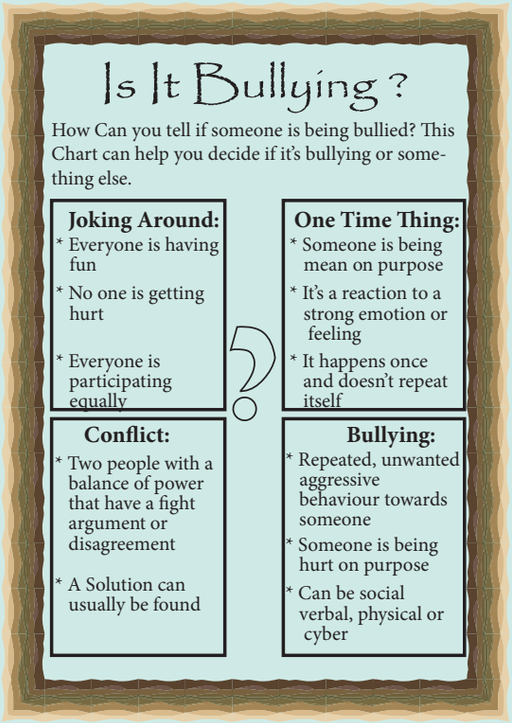
Tip 1: Stop the Cycle: When Someone abuses (either verbally or physically), it usually becomes a cycle.

Tip 2: Leave the situation: The verbal abuse can be stopped by just walking away from the situation without saying anything.

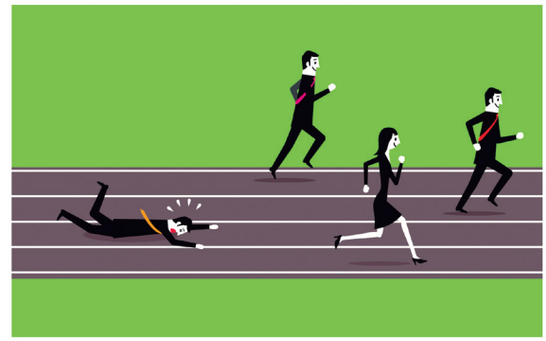
Tip 3: Report it to the higher Authorities: Verbal abuse at home, school or any other places should be reported to some trust worthy adult, head of the institution or any social group that will address the situation

"It's important for everyone – young or old, male or female, – to learn how to stop verbal abuse. No individual should accept that sort of attack from anyone, not even from their own parents.

Activity 10



9.8.7 Failure



Failure is a lack of success in achieving something especially in relation to a particular activity.

Definition

Making mistakes does not mean you're a failure. It just means you're trying and learning in life

Example of an Effect and cause of failure

Effect		Cause
Failure in exams	Result from	Not Studying
Failure in exams may	Result from	Carelessness
Failure in exams might	Be the result of	Headache on that day
Failure in exams could	Be the effect of	excitement

9.8.7.1 How to Overcome failure

The following nine powerful habits will enable an individual to cope with failure

1. Just accept how you feel
2. Remember you are not a failure just because of a set back
3. Be constructive
4. Find Inspiration
5. Move forward
6. Take action plan
7. Improve you self esteem

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Tips to overcome failure is shown in figure 6

▲ Fig. 6 Tips to Overcome failure

Vision- think positive of the situation you face, Attitude- have a relaxed attitude, Altitude- Aim high to achieve, Gratitude- Be greatful for the situation, Aptitude- be ready to learn from that situation, Fortitude-ability to withstand adversity (unfavourable fortune), Coaching- prepare yourself to overcome worst situation also, Consulting- discuss with trustable persons.These tips will lead to success.

9.8.8 Criticism

Criticism is defined as negative commentary about something or someone.

Criticism is the practice of judging the merits and faults of something.

People who accept criticism are the one's who are genuinely interested in self improvement.

Types of Criticism

1. **Factual Criticism**
   Criticism can be factual, pointing out right and wrong facts.

   Example: No, it is Tuesday, not Monday

2. **Evaluating criticism**
   Criticism can also be evaluative, pointing out good and bad. This is trickier, as it assumes the critic's values are similar or superior to those of the criticized person.

   Example: Don't look at me like that !

How to accept Criticism

- Stop your first reaction
- Remember the benefit to get feedback
- Listen for understanding
- Say thank you
- Ask questions to deconstruct the feedback
- Request time to follow up

Summary

- Personality refers to the totality of what a person is which includes all traits **(Physical, Psychological as well as a variety of acquired habitual traits)** blended or organized in a

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characteristically unique manner that determines his modes of behavior and his adjustments to the environment.

- Factors such as self awareness, motivation and self esteem help to enhance the personality of an individual. There are various simple techniques that are addressed in this chapter to boost an individuals overall personality.
- Young people of this generation undergo a lot of stress due to the various challenges they face. Managing stress effectively will enhance health as well as academic performance. Further simple techniques to solve problems also enhances personality and improves the quality of life of an individual.

GLOSSARY

Perceive – (உணர) To become aware or realize

Frustration – (ஏமாற்றம்) feeling of being upset or dissatisfied

Proficiency – (திறமை)skilled

Prejudice – (பாரபட்சம்) an opinion not based on reason or experience

Attitude – (அணுகுமுறை) a way of thinking

Aversion – (வெறுப்பு)strong dislike

Instinct – (உள்ளுணர்வு) inborn tendency or ability

Ridicule – (வேடிக்கையான) To mock

Empathy – (பச்சாத்தாபம்) understand and share the feelings of others

Volatile – (எளிதில் ஆவியாகிற, கணிக்க முடியாதபடி) liable to change unpredictably (தலையீடு) 11.Intervention-act of becoming involved intentionally in a difficult situation

Harassment - (துன்புறுத்தல்) behaviour that troubles someone

Questions

I Choose the correct answer

1. _____ means the effects of the endocrine glands on the personal development.
   (a) Physique (c) Nervous system
   (b) Chemique (d) sociological factors

2. The society circumstances and the environment play a vital role in deciding one's _____
   (a) Self-esteem (c) loneliness
   (b) Self-awareness (d) Personality

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3. Childs life is mainly influenced by the family environment; it is the primary source of _____
   (a) Social development
   (b) Physical development
   (c) Psychological development
   (d) mental development

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4. _____ is a stress due to positive events like functions.
   (a) Eustress (c) Hyper stress
   (b) Distress (d) Hypo stress

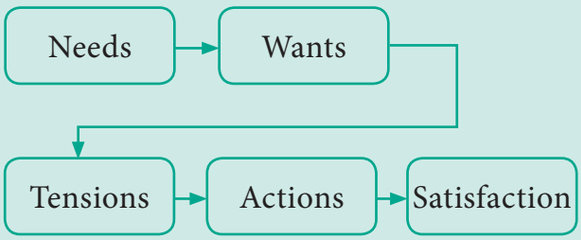
5. _____ is a process of identifying and selecting a course of action to solve problem
   (a) Criticism (c) sorting ideas
   (b) Decision making (d) self esteem

6. _____ is a complex and usually unpleasant emotional response to isolation
   (a) Loneliness (c) Anger
   (b) shyness (d) Fear

7. _____ is a intentional infliction of bodily harm(or) injury on another person
   (a) (b) emotional abuse
   (c) Verbal abuse (d) stalking

8. _____ is a lack of success in achieving something especially in relation to a particular activity
   (a) Failure (b) loneliness
   (c) shyness (d) depression

9. What does this cycle relate to?



   (a) Behaviour (c) goal
   (b) Motivation (d) Satisfaction

10. _____ is about noticing stuff in the world
   (a) awareness (c) criticism
   (b) loneliness (d) personality

11. People who accept _____ are the one's who are genuinely interested in self improvement
   (a) Awareness (c) criticism
   (b) loneliness (d) personality

12. _____ is the ability to maintain control when situations, people and events make excessive demands
   (a) Personality development
   (b) Self esteem
   (c) Stress Management
   (d) Motivation

13. _____ is a psychological state that causes a person to feel discomfort in social situations.
   (a) Loneliness (c) Criticism
   (b) Depression (d) Shyness

14. _____ is a normal, usually healthy emotion
   (a) Loneliness (c) Shyness
   (b) Anger (d) Selfawareness.

15. _____ is an unpleasant emotion
   (a) Fear (c) shyness
   (b) Loneliness (d) failure

II. Very short answer (2 marks)

1. Define Personality
2. List the determinants that affects personality
3. Define Motivation
4. Define Stress
5. Write any two points about the importance of self awareness?
6. Define self-awareness.
7. What are the types of self-esteem?
8. Define self-esteem.
9. What is meant by failure?
10. What is meant by problem solving?

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11. Define decision making
12. What is meant by depression?
13. What is fear?
14. Define Shyness
15. Define Loneliness

III. Answer briefly (3 marks)

1. Sensory organs are gateways of knowledge. How do these sensory organs help in personality development?
2. What are the characteristics of personality?
3. Draw and write about the Motivation cycle
4. Write about the effect of stress on the body
5. Write five "i" approaches to daily problem solving
6. What are the qualities of good decision makers?
7. What are the symptoms of fear?
8. What are the causes of loneliness?
9. What are the causes of shyness?
10. Write the cycle of abuse?
11. How do you motivate a student to score high marks?
12. Suggest 3 ways to help in making effective decisions
13. Ragu is depressed because he failed in his exam. How can you motivate him?

Write in detail (5 marks)

1. Explain in details about the determinants of personality?
2. Describe factors influencing self esteem
3. Explain Maslow's Theory of Motivation
4. Ragini is a 23 year old budding software Engineer. She is given a stressful project. Even during weekends she is entangled with work alone. As a friend suggest her some relaxation techniques to overcome the stress on her physical and mental health.
5. Explain the steps in problem solving
6. Ram wants to do higher studies but his parents asks him to go to work. As a colleague how would you guide him to take decision regarding his career.
7. What are types of abuse? Explain it
8. What are the symptoms of loneliness?
9. Sunitha always keeps herself isolated from her friends she sits, eats alone and feels lonely. Find out the reason and help her to overcome loneliness.

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HIGHER SECONDARY FIRST YEAR

HOME SCIENCE

PRACTICAL

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Practical Questions

Part A

I Identify the Spotter given 5x1=5

1. Cooker(Sample)
2. Pickle(Sample)
3. Ragi(Millet)(Sample)
4. Goitre(Picture)
5. Protein Energy Mal nutrition(Picture)

Cooker:	1. The given sample is identified as pressure cooker 2. Conserves nutrients, colour and flavour of the food 3. Saves time, fuel and energy
Pickle	1. The given sample is identified as Pickle 2. Pickling is a type of preservation where salt and oil is used as a preservatives 3. Here the growth of micro organisms are retarded the used vegetable is stored without spoilage for a reasonable time
Ragi	1. The given Millet is identified as Ragi 2. Rich in calcium and fibre. It is highly suitable for most of the people
Goitre	1. The given Picture is identified as person affected by goiter 2. It is a deficiency symptom of Iodine 3. Iodised salt is used to prevent goitre
Protein Energy Malnutrition	1. The given Picture is identified as child affected by Protein Energy Mal nutrition 2. Mostly children below 5 years are affected by this condition 3. Adequate consumption of cereals and pulsed help the child to alleviate the condition

Part B

1. Develop an aid to enhance cognitive development among preschool children.
2. Determine the best method of cooking rice. Prepare a recipe a Cereal.
3. Discuss the factors that affect the cooking quality of pulses. Prepare a recipe using any pulse.
4. How will you pre prepare green vegetable. Prepare a recipe using any one green leaf vegetable.
5. Write the principle of food preservation. Prepare a recipe using any one technique.
6. Plan a day's menus for a 4 year old child affected by protein energy malnutrition prepare and serve one main item for the child.
7. Plan a day's menu for a girl of 10 years old. Prepare and serve one iron rice food.

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Human Development and its challenges

Experiment No: 1

Date:

Aim: To develop aids to enhance cognitive development among preschool children by preparing a low cost aid to identify fruits and vegetables.

Objectives:

1. To identify specific needs of child at different stages of development.
2. To develop the skill of designing and making suitable toys/ play materials for children.

Importance of play

Toys are integral part of any child's life because they enjoy playing with toys or thing. During play, it will be seen that children

- Experience intrinsic joy.
- Offers enjoyment and soothing effect.
- Provides freedom from tension and restriction.
- Promotes opportunity for challenge and adventure.
- Stimulates appetite, digestion, blood circulation, respiration, sound sleep and mental alertness.
- Promotes muscle tone, balance, control and body awareness.
- Promotes concentration.
- Develops physical skills.
- Encourages problem solving by trial and error method.
- Fosters social adjustment through levelling of abilities in new settings, sharing and turn taking.
- Enhances eye-hand co-ordination and precision.
- Leads to imaginative play.
- Offers firsthand experience in three-dimensional material and spatial relationships.
- Offers endless scopes, as there is no right or wrong way.
- Encourages inventiveness, originality, and decision making.
- Stimulates curiosity, power of observation, aesthetic observation and sense of wonder.
- Builds self-confidence.

Materials required:

Chart paper – 1, Colour pens and pencils – 1 set, scissor- 1 and tray- 2 nos

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Procedure:

1. Draw an outline of five fruits and five vegetables on a chart and colour it appropriately.
2. Cut the fruits and vegetables along the outline.
3. Visit a balwadi or ICDS centre and select 2-10 preschool children for this observation
4. Now display the cut drawings of fruits and vegetables to the children in a jumbled form.
5. Ask the children to sort the drawings into two groups of fruits and vegetables.
6. Now ask the children to name the respective fruit or vegetable.

Result:

S.No	Name of the preschooler	Observation (time taken Minutes)	Inference

Discussion:

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Experiment No: 2

Date:

Aim: To develop aids to enhance cognitive development among preschool children by preparing a low cost aid to identify the size and colour.

Materials required:

Buttons or charts cut as buttons of different sizes (12) and buttons of different colour-12

Procedure:

1. Take buttons of four different sizes or draw buttons of four different sizes on a chart paper and cut them along the outline.
2. Visit a Balwadi or ICDS centre and select 2-10 preschool children for this observation
3. Now display the buttons to the children.
4. Ask the children to sort the buttons into four groups of increasing size.
5. Take buttons of four different colours.
6. Ask the children to sort the buttons into four groups of different colour.

Result:

S.No	Name of the preschooler	Observation (time taken Minutes)	Inference

Discussion

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Cereal Cookery

Experiment No: 3

Date:

Aim: To determine the best method of cooking of rice and preparing a dish by selecting any one of the cereal.

Materials required:

Raw rice, water, pressure cooker, gas stove, pan and lid

Procedure:

Take 50 grams of rice and cook in 150 ml of water.

Variations:

1. Straining – use 300 ml of water.
2. Absorption- In this method cook the rice with an equal or slightly greater volume of water, then cook over low heat until the rice has absorbed all the water
3. Pressure cooking: Add rice and water in the pressure cooker. Close the lid and pressure cook. Open the lid after the pressure from the cooker is released.

Result:

Method	Time in Minutes	Texture	
		Before cooking	After cooking
Straining			
Absorption			
Pressure Cooking			

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Vegetable pulao

Ingredients:

Basmati rice	- 1 ½ cup
Carrot, peas, potato	- 1 ½ cup
Capsicum cauliflower} Beans	- 1 ½ cup
Onion	- 1 (big chopped)
Ginger- garlic paste	- 1 tb.sp
Tomato	- 1 big (chopped)
Green chilli	- 1
Lemon juice	- 1
Bay leaf	- 1 or 2
Garam masala	- 1 tsp. Or as needed
Butter	- 1 Tb.sp
Salt	- as needed
Oil/ghee	- 1 tb.sp

Method:

1. Wash and soak the rice for 30 minutes and drain the water.
2. Heat ghee or oil in a thick, deep bottomed pan. Sauté the onion till golden colour.
3. Add ginger- garlic- green chilli paste and sauté for 10-12 seconds. Then add tomatoes and sauté for 2 to 3 minutes.
4. Add all cut vegetables, garam masala, butter and sauté for 2 to 3 minutes.
5. Add rice and sauté gently for 2 minutes on a low flame.
6. Add adequate water and stir
7. Sprinkle 6 to 7 drops of lemon juice. Add adequate salt and stir well.
8. Cover tightly and cook till the water is absorbed and the rice is well cooked.
9. Garnish with coriander leaves.
10. Serve hot with salad or raita.

Discussion

Describe the best method of cooking rice.

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Pulse Cookery

Experiment No: 4

Date:

Aim: To study the factors affecting the cooking quality of whole grams and red gram and prepare a recipe based on any one pulse.

Materials required:

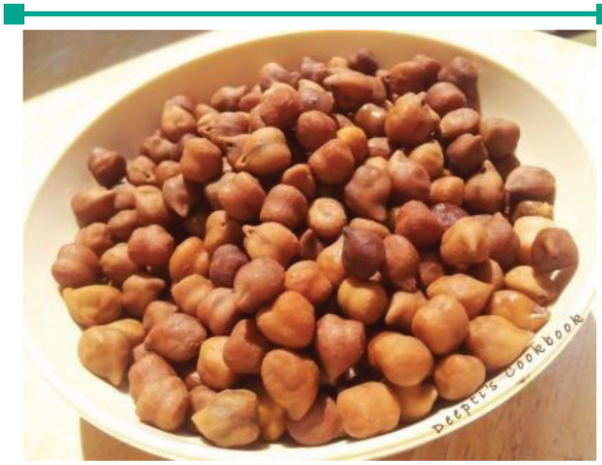
Whole bengal gram, Red gram dhal, tap water, sodium bi- carbonate, raw papaya, vinegar, water, pressure cooker, gas stove, pan and lid.

Procedure:

Take 20 grams of whole bengal gram. Soak over-night and cook in pressure cooker of water.

Variations:

1. Soak overnight and cook in 100 ml of tap water
2. Cook in 100 ml of tap water directly without soaking
3. Soak overnight and cook in 100 ml of tap water with Sodium bi- carbonate(1/2 teaspoon)
4. Soak overnight and cook in 100 ml of tap water with raw papaya pieces- ½ * ½ pieces 5 in number.
5. Soak overnight and cook in 100 ml of tap water with addition of vinegar (1 tsp).



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Result:				
Method	Food item	Cooking time (Minutes)	Colour change	Texture
Soaking overnight and cooking in tap water	Whole bengal gram			
	Red gram dhal			
Cooking without soaking	Whole bengal gram			
	Red gram dhal			
Soaking overnight and cooking with Sodium bi-carbonate	Whole bengal gram			
	Red gram dhal			
Soaking overnight and cooking with papaya pieces	Whole bengal gram			
	Red gram dhal			
Soaking overnight and cooking with vinegar	Whole bengal gram			
	Red gram dhal			

Masala vadai/chanadal vada

A popular south Indian tea time snack, made from skinned split Bengal gram. It is flavorful, delicious and crispy.

Ingredients

Channa/ Bengal gram dhal	- 1 cup
Salt	- as needed
Red chilli	- 1 or 2
Cumin	- ¾ tsp
Saunf	- ¾ tsp
Onion	- 1 (chopped-medium size)
Mint	- a handful
Greenchilli	- 1 to 2 (chopped)
Curry leaves	- a hand ful

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Method:

1. Wash and soak Bengal gram dhal in water for 1½hrs. Drain the water completely after the soaking time.
2. Powder red chilli, jeera and saunf coarsely. Set this aside.
3. Add dhal in the blender, ground to get a coarse mixture.
4. To a bowl, add ground dal mixture, chopped onion, mint and curry leaves chopped green chilli, coarsely powdered masala.
5. Mix together all the ingredients to get a well binding mixture. Add salt.
6. Take a small portion of the dough and shape to a vada.
7. Heat oil, add the shapened vada mixture, fry till golden brown. Tilt now and then for uniform looking.
8. Serve hot.

Discussion:

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Vegetable and Fruit Cookery

Experiment No: 5

Date:

Aim: To study the effect of cooking and factors affecting chlorophyll pigment in green leafy vegetables and preparing a dish using any one green leafy vegetables

Principles involved:

Cooking is the most basic method of food preservation. Cooking helps in improving the taste, appearance and texture of food.

Cooking also makes food safer for consumption and more digestible, enhance the nutritive value and shelf life of the food.

Materials required:

Green leafy vegetables- 1 bunch, tap water, vinegar, sodium bi carbonate, pan, gas stove, cutting board, knife

Procedure:

Cut 25g of any green leafy vegetable/ green vegetable into small pieces and do the following variations.

Variations:

1. Add to the boiling tap water.
2. Cook with 1 teaspoon of vinegar (white).
3. Cook with½ tea spoon of Sodium bi-carbonate.
4. Cook in open pan for 5 minutes and close it with lid
5. Cook for prolonged time.

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Result:		
Experiment	Observation	Inference
Adding to the boiling tap water		
Cooking with 1 teaspoon of vinegar		
Cooking with2/1 tea spoon of Sodium bi- carbonate		
Cooking in open pan and then closed pan		
Cooking for prolonged time.		

Preparation of ragi soya Drumstick adai:

Preparation of Leaves

1. Select fresh greens, not infected one.
2. Collect the leave, and wash it thoroughly.
3. Then chop it.
4. Should not rinse the greens after cutting.

Green Drumstick

Ingredients	Quantity
Ragi flour	-1 cup
Soya flour`	-¼ cup
Drumstick leaves	- a bunch
Green chillies	-4
Cumin Seeds	-1 tsp.
Salt	- to taste
Oil	-2 tabs

Methods:

1. Clean the drumstick leaves slightly sauté in little oil.
2. Mix the above ingredients and add sufficient water to form a soft dough.
3. Pat on a hot tawa into thin circles using wet hand.
4. Cook for 5 to 7 minutes, turning rotti twice and smearing with oil. Roast to brown colour.
5. Serve hot with chutney.

Discussion

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Food Preservation Methods

Experiment number: 6

Date:

Aim: To use salt and oil as preservatives in preserving food. E.g. Pickles.

Food Preservation Principles

Food preservation is essential to preserve the food when it is available in abundant. Preservation technique is used to preserve the food.

Principles of preservation:

a) Prevention or delay of microbial decomposition.

This is achieved by four ways.

Asepsis - Keeping out the micro organisms and preventing contamination from pathogens.

Filtration - Removal of micro- organism by using membrane

By hindering the growth and activity of micro- organisms (refrigeration, dehydration, etc.)

By killing micro organisms (boiling, irradiation)

b) Prevention or delay of self decomposition of food by blanching.

c) Prevention of damage caused by mechanical causes, insects and rodents.

Materials required:

Cutting board, knife, a kadai or a heavy bottomed vessel, bowl, wooden ladle/ stainless steel spoon (kuzhikarandi), sterile jar.

(i) Tomato pickle

Tomatoes are easily available everywhere and at all times of the year hence it has been selected as the main ingredient.

Ingredients

Tomatoes	–	500gms
Red chilli powder	–	6 tbsp.
Turmeric power	–	1 tsp.
Tamarind	–	80gms
Fenugreek	–	1 tsp.
Mustard	–	1 tsp.
Oil	–	2 tbsp.
Salt	–	as needed

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Seasoning:

Oil	–	90ml
Curry leaves	–	1 sprig
Mustard	–	1 tsp.
Garlic and cloves	–	6 (sliced)
Red chilli	–	1 (deseeded)
Asofoetida	–	a pinch

Method:

1. Wash the tomatoes in running water and dice them into medium-sized pieces.
2. Soak the tamarind in warm water.
3. Dry roast the fenugreek seeds and the mustard seeds separately till the aroma comes and powder them.
4. Cook the tomatoes with salt and turmeric powder on a medium flame till the pulp thickens.
5. Extract the tamarind juice and add it to the cooked tomatoes. Mix well and cook for 3-4 minutes until the mixture bubbles up.
6. Allow it to cool. Add chilli powder, fenugreek and mustard powder to this mixture and mix well.
7. Heat a pan with 2 tbsp. of oil. Splutter mustard add garlic and when the aroma comes add red chillis and curry leaves.
8. Lastly, add asofoetida and pour the rest of the oil to the tomato pickle along with the seasoning and mix well.
9. Allow it to cool and store it in a clean dry bottle.

Sensory assessment:

Food item	Appearance	Flavour	Taste	Odour	Texture

Discussion

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(ii) Banana Jam

Aim: To use sugar as a preservative in preserving food. E.g. jam

Materials required:

Knife, bowl, lemon squeezer, sauce pan, measuring cup, wooden ladle, sterile jar.

Note:

Bananas are easily available all times of the year and are affordable, hence it has been selected as the main ingredient.

Ingredients:

Bananas – 4

Lemons – 2

Sugar – 2 cups

Water – ½ cup

Method:

1. Remove the skin and slice the bananas.
2. Extract the juice from the lemon.
3. Add the bananas in the lime juice and mix it well.
4. Heat a large saucepan and add two cups of sugar and ½ cup of water. Cook for 10 mins.
5. Add the banana mixture to the syrup.
6. Allow it to boil for half an hour.
7. Allow the jam to cool and store it in a sterile container.

Sensory assessment:

Food item	Appearance	Flavour	Taste	Odour	Texture

Discussion

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Nutrition
Diet for a Pre-School Child

Experiment No: 7

Date:

Aim: Plan a day's menu for a 4 year old boy belonging to low income group suffering from marasmic/ Kwashiorkor. Prepare and serve one main item for his lunch. Calculate protein and energy for the prepared item.

Recommended Dietary Allowances for a Pre-School Boy

S.No	Nutrient	RDA
1	Body Weight Kg	18
2	Energy Kcal/d	1350
3	Protein g/d	20.1
4	Fat g/d	25
5	Calcium mcg/d	600
6 a) b)	Vitamin A Retinol mcg/d β-Carotene mcg/d	 600 4800
7	Iron mg/d	13
8	Thiamine mg/d	0.7
9	Riboflavin mg/d	0.8
10	Nicotinic acid mg/d	11
11	Pyridoxine mg/d	0.9
12	Vitamin C mg/d	40
13	Folic acid mcg/d	100
14	Vitamin B 12 mcg/d	0.2-1.0
15	Magnesium mg/d	70
16	Zinc	7

Broken wheat Payasam

Ingredients	Quantity
Broken wheat	-50g
Milk	- 200ml
Sugar	- 100g
Cardamom powder	-1/2 tsp
Cashew nuts and raisins	-10g
Ghee	-10g
Grated coconut	-10g

Method:

1. Pressure cook broken wheat with milk and water.
2. Fry nuts to golden brown in ghee.
3. Add grated coconut, fried nuts and raisins, sugar and cardamom powder and finish cooking.
4. Garnish with fried nuts.

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Menu Plan for an Preschool Boy Suffering from Marasmic/ Kwashiorkor			
Time	Meal	Menu	Quantity
6.30am	Early morning	Milk (Skimmed)	100ml
8am	Breakfast	Rice porridge Banana	50gms 35gms
10am	Mid morning	Broken wheat Payasam Gingelly seed laddu	25gms 20gms
12pm	Lunch	Dhal rice Scrambled egg Mashed Vegetable, guava	50gms 25gms 25gms 25gms
2pm	Mid afternoon	Tender coconut water	100ml
4pm	Tea	Skimmed Milk Sweet Khichri	100ml 30gms
8pm	Dinner	Soft chapathi Channa Gravy	40gms 25gms
9pm	Bed Time	Milk	100ml

Rice Porridge

Rice flour	–	30 gms
Groundnuts	–	30gms
Jaggery	–	50gms
Water	–	100ml

Method

1. Mix rice flour in a small amount of water and make it into a paste.
2. Roast and grind groundnuts into a paste
3. Add rice flour paste to boiling water and stir continuously.
4. Crush the jaggery and dissolve in half cup water. Strain and add it to the rice flour mixture.
5. Add groundnut paste and allow the mixture to cook for five minutes and remove from fire.

Nutrients Calculation of the Prepared Item						
			Protein (g)		Energy (Kcal)	
S.No	Ingredients	Quantity In Grams	For 100g	For prepared amount	For 100g	For prepared amount
1	Riceflour	30				
2	Groundnut	30				
3	Jaggery	50				

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Diet for a School Going Girl

Experiment No: 8

Date:

Aim: Plan a day's menu for a 10 year old girl belonging to low income group. Prepare and serve any one iron rich item. Calculate Protein, Iron for the prepared item.

Recommended Dietary Allowances for School Going Girl		
S. No	Nutrients	RDA
1	Body Weight Kg	35
2	Energy Kcal/d	2010
3	Protein g/d	40.4
4	Fat g/d	35
5	Calcium mcg/d	800
6 a) b)	Vitamin A Retinol mcg/d β-Carotene mcg/d	 600 4800
7	Iron mg/d	27
8	Thiamine mg/d	1.0
9	Riboflavin mg/d	1.2
10	Nicotinic acid mg/d	13
11	Pyridoxine mg/d	1.6
12	Vitamin C mg/d	40
13	Folic acid mcg/d	140
14	Vitamin B 12 mcg/d	0.2-1.0
15	Magnesium mg/d	160
16	Zinc mg/d	9

Dietary Principles for School Going Girl

- To prevent obesity or under nutrition, well balanced diet should be given.
- Calcium rich foods should be included in diet to increase bone density and delay the onset of osteoporosis.
- Iron rich foods must be included in the diet to prevent anaemia.
- Calorie and protein rich foods should be taken to support the growth spurt.
- Foods should be colourful and attractive.
- Fruits and vegetables should be included in the diet to meet the vitamins, minerals and fibre requirement.
- School going girl need to be encouraged to do physical activity which regulates appetite.
- Skipping meal should be avoided.
- Junk foods and empty calorie foods such as carbonated beverages should be avoided

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Sample diet for a School going child			
Time	Meal	Menu	Quantity
6.30am	Early morning	Milk (Skimmed)	200ml
8am	Breakfast	Idli, Sprouted green gram curry Orange juice	75gms 40gms 100ml
10am	Mid morning (Optional)	Vegetable Salad Dates halwa	60gms 50gms
12pm	Lunch	Vegetable pulao Capsicum Raita Curry leaves chutney	75gms 35gms 30gms
4pm	Tea	Skimmed Milk Chick pea sundal	100ml 50gms
8pm	Dinner	Soft chapathi Egg Green peas curry Dhal	75gms 40gms 30gms
9pm	Bed Time	Milk	100ml

Dates Halwa

Ingradients	Quantity
Dates	- 200g
Milk	-100ml
Jaggery	-20g
Essence	-as required
Almonds and pista	- 20g
Ghee	-50g

Method:

1. Grind seedless dates with milk.
2. Heat ghee in a pan, fry the nuts into golden brown.
3. Add the ground mixture and stir often in a medium flame.
4. Cook till halwa consistency is reached.

Nutrients Calculation for the Prepared Item						
			Protein(g)		Iron (mg)	
S.No	Ingredients	Quantity In Grams	For 100g	For prepared amount	For 100g	For prepared amount
1	Datees	200				
2	Milk	100ml				
3	Jaggery	20				

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Discussion

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APPENDIX

Normal Development Chart

	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Motor Skills: Gross Motor	• Runs forward well. • Walks on tiptoe • Walks upstairs feet on each step) (4-6 stairs) • Throws ball overhead • Kicks stationary ball. • Pushes riding toy with feet. • Claps with music • Jumps in place, two feet together.	• Runs around obstacles. • Uses slide without assistance. • Walks upstairs and down stairs leading with one foot. • Balance on one foot for 5-10 seconds • Catches ball most of the time. • Kicks ball forward • Steers and pedals trocycle	• Walks backward on toes and heels. • Walks downstairs alternating feet. • Swings, climbs • Throws ball with one hand to person 4-6 feet away. • Catches small ball throw from 3 feet • Jumps forward effortlessly. • Gallops and hops on one foot to music • Bounces large ball • Rides tricycle rapidly	• Walks balance plank forward, backward, sideways. • Swings independently, can hit ball with bat, dribble and bounce the ball. • Hops, Jumps, run effortlessly. • Rides bicycle with training wheels.	• Moves around with confidence and more purposefully in the environment. • Stand on each foot alternatively (with eyes closed). • Throws a small ball with one hand and catches it with both hands. • Gallops still more smoothly • Increase throwing speed. • Engages in skipping.	• Gross motor skills reach new levels of refinement. • Improved body balance, body awareness and precepto motor skills • Grows in height about 6cm (2.5 inches) per year

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Final Motor Skills	• Turns pages. • Builds tower of 3-4 blocks • Fills and dumps containers with sand. • Paints with a large brush, tear's paper. • Holds thick crayons with thumb and fingers. • Stack objects. • Puts small objects in slots, strings large beads. • Uses one hand consistently in most activities. • Balance on a plank. • Takes off simple unfastened clothing. • Scribbles spontaneously. • Draws horizontal and vertical lines.	• Copies circle, and cross. • Cuts across paper. • Builds tower of 8-9 blocks. • Enjoys clayi.e roll balls, snakes, etc., • Completes 3 pieces puzzle. • Traces writing template. • Uses both hands together for simple activities such as opening on bottle lids, using hammering toy. • Buttons and unbuttons own clothing.	• Copies circle square shapes • Cuts on line. • Builds tower for 10 or more blocks. • Writes a few upper case letters. Can do finger plays. • Draws simple recognizable pictures, pastes and glues easily and at the appropriate place. • Colours within enclosed space. • Dresses self without supervision • Folds and creases paper 3 times. • Uses Velcro straps, tries to tie their shoes.	• Copies triangle. • Cuts out simple shapes. • Has handedness well established (i.e child is right or left handed.0 • Has adult grasp of pencil. • Colours within lines neatly. • Writes letters. • Writes first name. • Writes numbers 1-10 • Dresses self completely	• Copies diamond shapes. • Draws, paints and cuts (improved) • Likes to draw what she/ he sees • Drawing becomes more detailed and representations. • Fills colour appropriately. • Writes their full name. • Uses scissors and writing tools effectively	• Draws a diamond shape. • Shows well established eye-hand co-ordination • Expresses through painting and drawing. • Drawings show design and balance. • Uses scissors and writing tools more effectively. • Tie shoe laces easily.

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Socio –emotional skills	• Separates from mother to go to preschool. • Watches other children, joins sometimes in their play. • Defends own possessions • Cannot share work space. • Enjoys floor plays. • Enjoys praise • Helps adults put toys away. • Insists on doing things independently. • Uses spoon, spilling little. • Begins to understand cleanliness.	• Initiates social interaction with another child. • Shars toys, materials. • Enjoys dress up clothes, waits and takes turns. • Enjoys simple humor. • Begins dramatic play such as playing house, pretending to be animals. • Participatesin small group, teacher directed activity for 10 -15 minutes.	• Gets along well in small groups. • Plays simple table games • Resolves problems with peers. • Distinguishes fantasy from reality • Talks about experiences / events and own feelings. • Brushes teeth with supervision. • Takes and keeps the material back at appropriate place	• Very social and makes friends more easily. • Has poise and control • Plays competitive games. • Engages in cooperative play with rules and roles assigned. • Provides alternative solutions in difficult situations. • Participates in independent work for 20 minutes.	• Identifies with others i.e outside the family. • Learns to control their emotions. • Tells needs and wants instead of snatching or using force. • Understands and empathises with others (feels sad or happy, when someone close is sad or happy) • Play with rules, takes centre stage. Begins to enjoy computer games, board games.	• Begins to develop a sense a sense of self or personal identity. • Becomes better negotiators and co-operates with others • Understands the rules and abides by them. • Likely to define oneself through internal characteristic such as, “I am smart and I am popular” or I feel proud when teachers assigns me responsibility in school”,

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Socio- emotional skills		• Washes hands unassisted. • More independent • Plays "mummy" or "papa"	• Shows more independence	• Brushes teeth unassisted, supports and assists other children.	• Symbolic play takes the form of acting in play.	• Likes to play board games and computer games. • Enjoys responsibility and independence. • Enjoys company of her/his friends • Likely to think about what they can do or cannot do in comparison with others e.g"I got more marks than atul" "I can run faster than others in class"
Cognitive Skills	• Names pictured objects.	• Arranges objects in order of size (upto 4 level)	• Matches identify and names some basic colours.	• Shows interest in clock and time like structured	• Loves jig-saw puzzles of all sorts	• Solve as increasingly complex problems

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Cognitive skills	• Short attention span, moving quickly from 0ne activity to another. • Identifies big/ small objects. • Touches and counts 1-3 objects. • Matches 3 colours. • Learning is mostly based on exploration. • Identifies own drawing. • Names objects that go together. • Finds difficulty in distinguishing between reality and fantasy. • Understand the concept of "one"	• Classifies objects/ pictures in categories. • Touches and counts 4 or more objects. • Identifies and names 4 colours. • Workds on puzzles 94-5 pieces.) • Asks why for information. • Repeats 3 numerals. • Continue to have difficulty between fantasy and reality.	• Has more extended attention span. • Draws, names and describes recognizable pictures. • Knows own age. • Recognises and names some letters and numerals. • Knows home address. • Can compare 3 pictures. • Can tell similarities and differences. • Can tell what material objects are made of. • Learns to distinguish between real and unreal.	Activities and attention span widened. • Names all numerals (1-10) and most alphabet letters. • Completes puzzle of 10 or more pieces. • Time concepts are expanding (Diwali will come after two weeks). • Longer attention span.	• Understanding moves from ego-centric to objective. • Shows a good grasp of topological relations for e.g inside-outside; top-below. • Begins to understand the ordinal numbers. • Plays with numbers to learn to count.	• Begins to develop abstract thinking, but is not advanced • Likes to collect things. • Begins to conserve length and weight • Tell the difference between right and left. • Can do single digit addition and subtraction problems. • Attention span widened.

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Language skills	• Says her name points to pictures of common objects when they're named. • Talks to self in mirror. • Understands no, not, don't and can't. • Enjoys listening to simple, short story books. • Identifies pictures of action words (eating claping, running). • Enjoys looking at picture books. • Verbalizes wants • Struggling to make sense of the world.	• Says full name talk in sentence of 4-5 words. • Tells about past experiences. • Continue to talk out loud to themselves as they play with materials. • Tells action in picture. • Makes up words and rhymes. • Asks for explanations. • Speech is understandable but there are still some sound errors. • Likes to talk with adults.	• Can identify and pint to pictures described. • 'Reads' pictures. • Provides rhyming words to complete a seti.e bat, rat,) • Asks for explanations. • Well formed sentence structure. • Follows instructions in proper order. • Understands comparatives like big, bigger and biggest. • Uses verbal directions into play activities.	• Retell story from picture book with reasonable accuracy. • Pretends or acts out a story. • Listens and takes turns in group discussion. • Loves to talk • Speaks fluently and clearly. • Uses more complex sentences. • Asks meaning of words. • Reads 10 common words. • Communicates well with family members and friends and strangers.	• Enjoys riddles and word games. • Finds pleasure in language and literacy games for e.g riddles, rhyming games, tongue twisters ect. • Exchanges ideas and opinions. • Uses, newly acquired literacy skills to record their ideas in simple short stories. • Communicate their thoughts in a much better way, about the story book they have read.	• Creates their own riddles. • Enjoys simple ross-word pzlles,riddles and word games • Shares and talks anout her/his opinion • Becomes interested in reading books • Tells more concreately what they are interested in, e.g., their likes/dislikes and interests. • Talks about her/his drawings and writings

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	2-3 YEAR OLDS	3-4 YEAR OLDS	4-5 YEAR OLDS	5-6 YEAR OLDS	6-7 YEAR OLDS	7-8 YEAR OLDS
Language skills	• Follows simple directions such as: Give me the block'. • Brings own shoes and socks. • Repeat parts of rhymes and songs. • Answers simple questions 'what is this?' • Can identify objects when told their use. • Places objects in, on, under, beside. • Can point to parts of the body.	• Listens to stories for a longer period. • Sings simple nursery rhymes. • Understands prepositions (on, under, inside) • Can point to smallest of 2 squares.	• Understands sequencing of events. • Asks when, how, and why questions. • Demonstrates a variety of uses for a language such as getting information, expressing opinions and giving information.	• Communicates well with family members and friends and strangers. • Indentifies and points to some, most, first, all.	• Pretend- play takes the form of expression through drama, rhymes, songs and music. • Likes to engage in conversation.	• Can read simple sentences • Have well developed oral speech.

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GLOSSARY

Allergy	ஒவ்வாமை
Amenorrhea	மாதவிடாய் இன்மை
Amniotic Fluid	அம்னோடிக்திரவம்
Anaemia	இரத்த சோகை
Anthropology	மானிடவியல்
Antioxidants	ஆக்ஸிஜனேற்ற
Apparel	ஆடை
Aroma	நறுமணம்
Attitude	அணுகுமுறை
Attribute	பண்புகள்
Auxiliary hand	துணைகை
Aversion	வெறுப்பு
Behaviour	நடத்தை
Bitot's spots	பிட்டாட்டின் புள்ளிகள்
Calcifications	கால்சியம் மூலம் எலும்புகள் கடினமாகின்றன
Cheilosis	கடை வாய்ப்புண்
Contamination	மாசடைதல்
Coping	சமாளிக்கும்
Crutches	ஊன்றுக்கோள்
Debenture	கடன்பத்திரம்
Decay	படிப்படியாக அழிவுறுதல்
Decision Making	தீர்மானித்தல்
Decoding	குறிவிலக்கல்
Defecation	மலம்கழித்தல்
Degenerative	சிதைவு

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Dehydration	நீர்ப்போக்கு
Delegation	குழு
Dementia	டிமென்ஷியா
Dermatitis	டெர்மட்டிட்டிஸ்
Distinguishes	வேறுபடுத்திகாட்டுவதாக
Domestic	உள்நாட்டு
Dominant hand	மேலாதிக்ககை
Economic Insecurity	பொருளாதார பாதுகாப்பின்மை
Edema	நீர்க்கட்டு (உடலில் நீர்விக்கம்)
Edible	உண்ணத்தக்க
Empathy	பச்சாத்தாபம்
Encoding	குறியீட்டு
Existence	இருப்பு
Feedback	பின்னூட்டம்
Flexible	நெகிழ்வான
Food security	அனைவருக்கும் உணவு கிடைப்பதை உறுதி செய்தல்
Food spoilage	உணவு கெடுதல்
Fortification	வலுவூட்டல்
Fringe	விளிம்பு
Frustration	ஏமாற்றம்
Geriatrics	ஜெரியாட்ரிக்ஸ்
Gingivitis	பல்ஈறுவீக்கம்
Glomerular filtration rate	குளோமரூலர் வடி கட்டுதல் விகிதம்
Glossitis	நாக்கில் ஏற்படும்அழற்சி
Grasp Objects	பொருள்கள் பிடித்து வைத்திருக்க முயற்சி
Gruel	கஞ்சி
Haemoglobin	ஹீமோகுளோபின்
Harassment	துன்புறுத்தல்
Hazardous	தீங்கு விளைவிக்கக்கூடிய / ஆபத்தான
Heme iron	ஹீம் இரும்பு

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Hemorrhage	இரத்த கசிவு
Heredity	மரபுசார்ந்த
Hopping	துள்ளல்
Immune	நோய் எதிர்ப்பு
Inflammation	வீக்கம்
Instinct	உள்ளுணர்வு
Interdisciplinary	பலதுறை
Intervention	தலையீடு
Intrinsic	உள்ளார்ந்த
Intrinsic factor	அகக்காரணி
Involuntary Reactions	தன்னிச்சையற்ற
Junk food	துரித உணவு
Juvenile Delinquency	இளம்குற்றவாளிகள்
Kwashiorkor	குவாஷியோர்கர்
Marasmus	உடல் இளைப்பு
Marginal	சிறிய
Mashed foods	மசாலா உணவுகள்
Menstruation	மாதவிடாய்
Microbial decomposition	நுண்ணுயிரிகளின் செயல்பாட்டினால் உணவு மெல்ல மெல்ல அழுகல் நிலையை அடைதல்
Microcephaly	சிறியதலை
Multisensory materials	பல்வகைப்பட்ட பொருள்கள்
Nausea	குமட்டல்
Nutraceuticals	நியூட்ராசிடிகல்ஸ்
Nutrient	ஊட்டச்சத்து
Orthopedic Problems	எலும்பியல் சிக்கல்கள்
Palatability	ஏற்புத்தன்மை
Perceive	உணர
Permanent Teeth	நிரந்தரபல்
Physiological	உடலியல்

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Plasmolysis	கிருமிகளிருந்து ஈரப்பதத்தை நீக்குதல்
Postnatal	பிரசவத்திற்கு பிறகு
Prejudice	பாரபட்சம்
Prenatal Stage	மகப்பேறுக்கு முற்பட்டகாலம்
Prestigious	மதிப்புமிக்க
Proficiency	திறமை
Prominent positions	முக்கியபதவிகள்
Prothrombin	புரோத்ராம்பின்
Psychic Income	மனநிறைவுதரும் வருவாய்
Psychological	மனோதத்துவ
Rancidity	எண்ணெய் சிக்கல் வாடை
Regulatory	ஒழுங்குமுறை
Ridicule	வேடிக்கையான
Salient features	முக்கியஅம்சங்கள்
Scribbling	கிறுக்கல்
Sequence	வரிசை
Shelf life	வாழ்நாள் நீடித்தல்
Sociology	சமூகவியல்
Spores	இனப்பெருக்கத்திற்கு உதவும் நுண் துகள்கள்
Standard	வாழ்க்கைத்தரம்
Swelling	வீக்கம்
Teleconferencing	தொலைத்தொடர்பு
Temporary Teeth	தற்காலிக பற்கள்
Transition	மாற்றம்
Umbilical Cord	தொப்புள்கொடி
Value	மனிதநேயம்
Volatile	எளிதில் ஆவியாகிற, கணிக்க முடியாதபடி
Wheelchair	சக்கரநாற்காலி
Yoghurt	தயிர்

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This book has been printed on 80 G.S.M.
Elegant Maplitho paper.

Printed by offset at:

Acknowledgement 265-266.indd 265 07-12-2021 3.05.26 PM

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NOTES

Acknowledgement 265-266.indd 266 07-12-2021 3.05.26 PM