B.Sc. NUTRITION LAB MANUAL

5th Semester

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Nutrition

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C11P: Public Health and Hygiene (Lab)

1. Protein under nutrition and its recovery:

Protein-energy undernutrition is graded as mild, moderate, or severe. Grade is determined by calculating weight as a percentage of expected weight for length or height using international standards (normal, 90 to 110%; mild PEU, 85 to 90%; moderate, 75 to 85%; severe, < 75%).

PEU may be

- Primary: Caused by inadequate nutrient intake
- Secondary: Results from disorders or drugs that interfere with nutrient use

Primary PEU

Worldwide, primary PEU occurs mostly in children and older people who lack access to nutrients, although a common cause in older people is depression. PEU can also result from fasting or anorexia nervosa. Child or elder abuse may be a cause.

In children, chronic primary PEU has 2 common forms:

- Marasmus
- Kwashiorkor

The form depends on the balance of nonprotein and protein sources of energy. Starvation is an acute severe form of primary PEU.

Marasmus (also called the dry form of PEU) causes weight loss and depletion of fat and muscle. In developing countries, marasmus is the most common form of PEU in children.

Kwashiorkor (also called the wet, swollen, or oedematous form) is a risk after premature abandonment of breastfeeding, which typically occurs when a younger sibling is born, displacing the older child from the breast. So children with kwashiorkor tend to be older than those with marasmus. Kwashiorkor may also result from an acute illness, often gastroenteritis or another infection (probably secondary to cytokine release), in a child who already has PEU. A diet that is more deficient in protein than energy may be more likely to cause kwashiorkor than marasmus. Less common than marasmus, kwashiorkor tends to be confined to specific parts of the world, such as rural Africa, the Caribbean, and the Pacific islands. In these areas, staple foods (eg, yams, cassavas, sweet potatoes, green bananas) are low in protein and high in carbohydrates. In kwashiorkor, cell membranes leak, causing extravasation of intravascular fluid and protein, resulting in peripheral edema.

In both marasmus and kwashiorkor, cell-mediated immunity is impaired, increasing susceptibility to infections. Bacterial infections (eg, pneumonia, gastroenteritis, otitis media, urinary tract infections, sepsis) are common. Infections result in release of cytokines, which cause anorexia, worsen muscle wasting, and cause a marked decrease in serum albumin levels.

Starvation is a complete lack of nutrients. It occasionally occurs when food is available (as in fasting or anorexia nervosa) but usually occurs because food is unavailable (eg, during famine or wilderness exposure).

Secondary PEU

This type most commonly results from the following:

- **Disorders that affect gastrointestinal function:** These disorders can interfere with digestion (eg, pancreatic insufficiency), absorption (eg, enteritis, enteropathy), or lymphatic transport of nutrients (eg, retroperitoneal fibrosis, Milroy disease).
- **Wasting disorders:** In wasting disorders (eg, AIDS, cancer, COPD) and renal failure, catabolism causes cytokine excess, resulting in undernutrition via anorexia and cachexia (wasting of muscle and fat). End-stage heart failure can cause cardiac cachexia, a severe form of undernutrition; mortality rate is particularly high. Factors contributing to cardiac cachexia may include passive hepatic congestion (causing anorexia), edema of the intestinal tract (impairing absorption), and, in advanced disease, increased oxygen requirement due to anaerobic metabolism. Wasting disorders can decrease appetite or impair metabolism of nutrients.
- **Conditions that increase metabolic demands:** These conditions include infections, hyperthyroidism, pheochromocytoma, other endocrine disorders, burns, trauma, surgery, and other critical illnesses.

Treatment of PEU

- Usually oral feeding
- Possibly avoidance of lactose (eg, if persistent diarrhea suggests lactose intolerance)
- Supportive care (eg, environmental changes, assistance with feeding, orexigenic drugs)
- For children, feeding delayed 24 to 48 hours

Worldwide, the most important preventive strategy is to reduce poverty and improve nutritional education and public health measures.

Mild or moderate protein-energy undernutrition, including brief starvation, can be treated by providing a balanced diet, preferably orally. Liquid oral food supplements (usually lactose-free) can be used when solid food cannot be adequately ingested. Diarrheal often complicates oral feeding because starvation makes the gastrointestinal tract more likely to move bacteria into Peyer patches, facilitating infectious diarrhoea. If diarrhoea persists (suggesting lactose intolerance), yogurt-based rather than milk-based formulas are given because people with lactose intolerance can tolerate yogurt. Patients should also be given a multivitamin supplement.

Severe PEU or prolonged starvation requires treatment in a hospital with a controlled diet. The first priority is to correct fluid and electrolyte abnormalities and treat infections. A recent study suggested that children may benefit from antibiotic prophylaxis. The next priority is to supply macronutrients orally or, if necessary (eg, when swallowing is difficult), through a feeding tube, a nasogastric tube (usually), or a gastrostomy tube (enteral nutrition). Parenteral nutrition is indicated if malabsorption is severe.

Other treatments may be needed to correct specific deficiencies, which may become evident as weight increases. To avoid deficiencies, patients should take micronutrients at about twice the recommended daily allowance until recovery is complete.

Children

Underlying disorders should be treated.

For children with diarrhoea, feeding may be delayed 24 to 48 hours to avoid making the diarrhoea worse; during this interval, children require oral or IV rehydration. Feedings are given often (6 to 12 times/day) but, to avoid overwhelming the limited intestinal absorptive capacity, are limited to small amounts (< 100 mL). During the first week, milk-based formulas with supplements added are usually given in progressively increasing amounts; after a week, the full amounts of 175 kcal/kg and 4 g of protein/kg can be given. Twice the recommended daily allowance of micronutrients should be given, using commercial multivitamin supplements. After 4 weeks, the formula can be replaced with whole milk plus cod liver oil and solid foods, including eggs, fruit, meats, and yeast.

Energy distribution among macronutrients should be about 16% protein, 50% fat, and 34% carbohydrate. An example is a combination of powdered cow's skimmed milk (110 g), sucrose (100 g), vegetable oil (70 g), and water (900 mL). Many other formulas (eg, whole [full-fat] fresh milk plus corn oil and maltodextrin) can be used. Milk powders used in formulas are diluted with water.

Usually, supplements should be given with the formulas:

- Magnesium 0.4 mEq/kg/day IM is given for 7 days.
- B-complex vitamins at twice the recommended daily allowance are given parenterally for the first 3 days, usually with vitamin A, phosphorus, zinc, manganese, copper, iodine, fluoride, molybdenum, and selenium.
- Because absorption of oral iron is poor in children with PEU, oral or IM iron supplementation may be necessary.

Parents are taught about nutritional requirements.

Adults

Underlying disorders should be treated. For example, if AIDS or cancer results in excess cytokine production, megestrol acetate or medroxyprogesterone may improve food intake. However, because these drugs dramatically decrease testosterone in men (possibly causing muscle loss), testosterone should be replaced. Because these drugs can cause adrenal insufficiency, they should be used only short-term (< 3 months).

In patients with functional limitations, home delivery of meals and feeding assistance are key.

An orexigenic drug, such as the cannabis extract dronabinol, should be given to patients with anorexia when no cause is obvious or to patients at the end of life when anorexia impairs quality of life. An anabolic steroid (eg, testosterone enanthate, nandrolone) or growth

hormone can benefit patients with cachexia due to renal failure and possibly older patients (eg, by increasing lean body mass or possibly by improving function).

Correction of PEU in adults generally resembles that in children; feedings are often limited to small amounts. However, for most adults, feeding does not need to be delayed. A commercial formula for oral feeding can be used. Daily nutrient supply should be given at a rate of 60 kcal/kg and 1.2 to 2 g of protein/kg. If liquid oral supplements are used with solid food, they should be given at least 1 hour before meals so that the amount of food eaten at the meal is not reduced.

Treatment of institutionalized older patients with PEU requires multiple interventions:

- Environmental measures (eg, making the dining area more attractive)
- Feeding assistance
- Changes in diet (eg. use of food enhancers and caloric supplements between meals)
- Treatment of depression and other underlying disorders
- Use of orexigenic drugs, anabolic steroids, or both

The long-term use of gastrostomy tube feeding is essential for patients with severe dysphagia; its use in patients with dementia is controversial. Increasing evidence supports the avoidance of unpalatable therapeutic diets (eg. low salt, diabetic, low cholesterol) in institutionalized patients because these diets decrease food intake and may cause severe PEU.

2. Vitamin or Mineral under nutrition and its recovery:

Malnutrition refers to when a person's diet does not provide enough nutrients or the right balance of nutrients for optimal health.

Causes of malnutrition include inappropriate dietary choices, a low income, difficulty obtaining food, and various physical and mental health conditions.

Undernutrition is one type of malnutrition Trusted Source. It occurs when the body does not get enough food. It can lead to delayed growth, low weight, or wasting.

If a person does not get the right balance of nutrients, they can also have malnutrition. It is possible to have obesity with malnutrition.

When a person has too little food, a limited diet, or a condition that stops their body from obtaining the right balance of nutrients, it can have a severe impact on their health. In some cases, this can become life threatening.

This article looks at malnutrition in detail, including the causes, symptoms, and treatments associated with it.

Malnutrition occurs when a person gets too much or too little of certain nutrients.

Undernutrition occurs when they lack nutrients because they eat too little food overall.

A person with undernutrition may lack vitamins, minerals, and other essential substances that their body needs to function.

Malnutrition can lead to:

- short- and long-term health problems
- slow recovery from wounds and illnesses
- a higher risk of infection
- difficulty focusing at work or school

Some deficiencies can trigger specific health problems. For example:

A lack of vitamin A

Around the world, many children develop vision problems. Trusted Source due to a lack of vitamin A.

A lack of vitamin C

A lack of vitamin C Trusted Source can result in scurvy. Scurvy is rare in the United States, but it can develop if a person does not have a varied diet with plenty of fresh fruits and vegetables.

Older adults, young children, those who consume a lot of alcohol, and some people with certain mental health conditions may be particularly at risk.

An overall deficiency

Lacking all nutrients can lead to kwashiorkor, which is a "severe form of malnutrition." One symptom of this condition is a distended abdomen.

Marasmus is another potential result of severe nutritional deficiency. A person with marasmus will have very little muscle or fat on their body.

Symptoms

Some signs and symptoms of malnutrition include:

- a lack of appetite or interest in food or drink
- tiredness and irritability
- an inability to concentrate
- always feeling cold
- depression
- loss of fat, muscle mass, and body tissue
- a higher risk of getting sick and taking longer to heal
- longer healing time for wounds
- a higher risk of complications after surgery

Eventually, a person may also experience difficulty breathing and heart failure.

In children, there may be:

- a lack of growth and low body weight
- tiredness and a lack of energy
- irritability and anxiety
- slow behavioural and intellectual development, possibly resulting in learning difficulties

Treatment is possible. In some cases, however, malnutrition can have long-term effects.

Anorexia nervosa is a mental health condition that can lead to severe malnutrition.

Treatment

If a doctor diagnoses malnutrition, they will make a treatment plan for the person. The person may also need to meet with a nutritionist and other healthcare providers.

Treatment will depend on the severity of the malnutrition and the presence of any other underlying conditions or complications.

It may include:

- ongoing screening and monitoring
- making a dietary plan, which might include taking supplements
- treating specific symptoms, such as nausea
- treating any infections that may be present
- checking for any mouth or swallowing problems
- suggesting alternative eating utensils

In severe cases, a person may need to:

- spend time in the hospital
- gradually start taking in nutrients over a number of days
- receive nutrients such as potassium and calcium intravenously

The person's healthcare team will continue to monitor them to ensure that they are getting the nutrition they need.

3. Dietary management of non-communicable disease:-

Diet and Nutrition Transition

Globally diet/nutrition transition has accelerated all chronic diseases and currently developing countries are going through the same phenomenon. The green revolution in India (1970) changed the nutrition scenario from hunger and famine to food surplus and export. However, income inequality in India is still persisting with consumption among the poorest being qualitatively and quantitatively poor while the wealthiest produce and consume more. Due to

changes in food availability and accessibility, consumption of relatively unhealthy processed and packaged foods, rich in refined grains, oils, salt and sugar has increased. Consumption of whole grains, nuts, fruits and vegetables has not registered significant increase. A recent analysis of changing food consumption pattern in India (National Council of applied economic research, 2014), data from National Sample Survey organization and NNMB show that over the years cereal consumption has declined markedly with attrition of millets. Consumption of protective foods such as pulses, milk, vegetables (except starchy potato) and fruits which are sources of proteins (pulses), fiber and micro/phytonutrients (vegetables) continues to be low. All of them impact glycaemic index (GI). Though consumption of animal foods are low milk, fish and poultry have shown improvements but that of mutton declined. However none of these databases capture foods consumed outside the home environment, which can add to refined foods, sugar, salt and fat intake. While the consumption of energy, carbohydrates and proteins has declined, that of fat has gone up marginally (Fig. 4). The diets in general continue to be qualitatively markedly deficient in micronutrients, particularly vitamins A, B2 (riboflavin), folic acid iron and calcium. Estimates of Vit.B6 and zinc intake are not available. Deficiencies of vitamins such as Folic acid, B12 and B6 can result in elevated homocysteine, a vascular damaging amino acid. Vitamin D deficiency is now recognised as a public health problem which may impact negatively glycaemic control.

Refined Grains

The visible change in dietary ingestion of the populations across the globe is a shift towards refined carbohydrates (polished rice and refined wheat flour) and processed refined cereals replacing coarse grains. Refining retains starchy endosperm with loss of bran, germ and key nutrients. The loss of bran and pulverization of the endosperm aids in rapid digestion and absorption of carbohydrates from refined grains than whole-grain products increasing blood glucose and insulin concentrations. Thus the staples consumed in today's world are refined, containing only the starchy endosperm with glycaemic carbohydrates strongly associated with obesity and chronic diseases.

Sugar and Sugar-sweetened Beverages (SSB)

Over the last 50 year the consumption of sugar across the world has almost tripled (Lustig et al., 2012). SSB and other energetic beverages have increased to about 17-25% of total energy intake in all age groups . SSB industry is third largest industry in India after biscuits and tea. SSBs and total sugar intake is high (traditional + SSB) among Indians (25kg/capita/annum) compared to worldwide consumption (23.7kg/capita/annum). The sales of SSB have increased in India by more than 10% annually since 1998 and have exceeded 11 litres/capita/year (FoodnavigatorUSA.com, 2011). This may be due to aggressive marketing and sales of SSB despite the efforts made by medical experts and health organizations to limit the consumption of sugar.

Edible Oils and Fats

Visible fats and oils provide almost half of fat calories in an average Indian diet . Data from FAO suggest a rise in the percentage of dietary energy supply from fats (14-19%) and vegetable oils (6-10%) in India from 1980 to 2000 (FAO, 2004; WHO/FAO, 2003). In addition to

cooking oil, ghee (clarified butter), vanaspati (hydrogenated oils) and butter are the source of dietary fat among South Asians. In India ghee and vanaspati (latter rich in trans fatty acids TFA) are also used as bakery shortening and in the preparation of commercially fried, processed, baked, ready-to eat foods, and street foods. Joint WHO/FAO report 2003 recommends the TFAs intake to be limited to fat. Food Safety Standards Authority of India recommended TFA content in Vanaspati, to be reduced to 5% by 2013 and made it mandatory to specify the amount of TFAs on the label of all food products.

3. Dietary management of growing child:

Adequate nutrition is one of the important factors influencing growth & immunity. A balanced diet must contain sufficient amount of carbohydrate, protein, fat, vitamins, minerals and fibre in the required amounts. Each of these nutrients has a vital role in the all-round growth and development of children.

A gap in intake of macro and micro nutrients can put a child into the vicious cycle that takes its toll on growth. This vicious cycle starts with inadequate nutrition and it may lead to infection & impaired immunity. As a result of this vicious cycle, a child may falter in desired growth for age. Breaking this vicious cycle is critical to help a child achieve age-appropriate growth.

Pedia Sure contains Immuno nutrients like Probiotics (Bifidobacterium and Lactobacillus acidophilus) & Fructo-oligosachharide a known prebiotic fiber. Pedia Sure also contains Vitamin C, E, Zinc and selenium which are known “Antioxidants” to fight against free radicals.

PHYSICAL ACTIVITY

Being physically active helps kids feel better in more ways than you may think. Kids who are physically active have better brain function and tend to do better in school than kids who aren't. A balanced diet that contains all the food groups will help ensure your child has proper growth & development to stay healthy & disease free.

Protein-rich foods are broken down into amino acids that are used by the muscles for growth. Unsaturated fats (also called healthy fats) are a necessary part of a healthy diet. When protein, carbohydrates, and fat are consumed together, digestion is slowed and energy is provided over a longer period of time.

COGNITIVE DEVELOPMENT

Good nutrition is important for cognitive development. Emerging science shows that many nutrients are needed for healthy brain function. Essential fatty acids - ALA (Alpha linoleic acid) & LA (Linoleic Acid) are known to support brain development. Iron is an integral part of hemoglobin which supplies oxygen for the brain to function. Choline helps in formation of neuro transmitter. Iodine helps in cognitive development.

BEHAVIOR

It happens to everyone once in a while: you missed breakfast or skipped lunch and, in a few hours, you are feeling it. You may be distracted by hunger, unable to concentrate, or even feeling grouchy.

Kids may experience the same symptoms from skipping meals, and it can affect their behaviour. In fact, school breakfast programs have been proven to have a positive impact on classroom performance and behavior, particularly for kids who are not getting the nutrition they need. Certain children that are significantly below normal height and weight may experience Failure to Thrive, a condition with common symptoms including delayed mental and social, as well as physical, skills.

In a study of school-aged children, more than two-thirds of kids who were food insecure experienced a decrease in emotional and behavioral problems after 6 months of a school breakfast program.

EMOTIONS

In today's world of fast food and overall poor eating habits, kids can develop a negative relationship with food early in life. However, parents have more influence over their kids' attitudes toward food than they may realize. It's common for parents to try to make sure their children are getting the nutrients they need by requiring a 'clean plate' at the end of a meal, or forcing kids to eat things they don't like. While this is often done with good intentions, it can lead to the child having negative feelings about mealtime and healthy foods.

A responsive feeding approach has been shown to be much more effective in terms of healthy nutrient intake1. By following the cues of a child to indicate hunger and fullness, parents can avoid mealtime turning into a fight. Children decide whether and how much to eat from what is offered. The key is for parents to offer a variety of foods with a scheduled meal and snack pattern full of the nutrients kids need.

ACADEMIC PERFORMANCE

Emerging science shows a link between nutrition and academic performance. Recent reviews of school breakfast programs in the United States confirm the benefits of breakfast for classroom performance, school attendance, and behavior, especially for children who may be food insecure. A report in 2012 concluded that 95% of teachers asked had observed that eating breakfast at school had improved kids' ability to concentrate.

Nutrients that can help

Providing a well-balanced breakfast with many different nutrients can help give your child a strong start to the school day4. Not only can a good breakfast help them stay focused in school, but also may lead to improved academic performance. You can make Pedia Sure a part of a healthy nutritious breakfast.

4. Impact of nutrition education on awareness development in the field of personal health:

Importance of Nutrition Education:

The importance of nutrition education as a means for improving nutrition of the community in the developing countries has increased rapidly during the recent past. Lack of awareness about the dietary requirements and nutritive value of different food is the main cause for prevailing malnutrition among school children, pregnant women, lactating mother and other vulnerable sections of the community.

Nutrition education should be practical and should be easily adaptable to the socioeconomic status, food habits and the available local food resources generally needed for the purpose of demonstration and feeding of the locally available audience. Nutrition education programme should become a part of the community.

Methods of Nutrition Education of the Community:

The various important methods of nutrition education are:

a. Lectures and demonstrations

b. Workshops

c. Film and slide shows

d. Poster, charts and exhibition

e. Books, pamphlets, bulletins and newspaper

f. Radio and television.

Lectures and Demonstration:

The lecture should be simple and too elaborate. It should be easily adoptable by the people attending the course. The demonstrations should be simple and these should make good use of locally available resources with the help of which it can be easily adopted by the community.

Workshops:

The nutrition work should discuss the prevailing nutritional problem in the community in simplest form and the solution for it.

Film Shows and Slide Shows:

These are extremely effective mode of education. They should be practical and illustrative and easily understandable.

Posters, Charts and Exhibition:

Posters should be simple and should immediately catch the attention of the viewers and should be written in the regional language. The letters should be clearly and easily visible at a distance too. Charts also should be in a position to stimulate the interest of the people. The charts should be well-balanced with the use appropriate colours and should not be crowded. Exhibitions

having posters and charts are the best mode for educating the community. It should be set up keeping in mind the educational level of the people the education programme is catering to.

Books, Pamphlets, Bulletins and Newspaper Articles:

Printed matter for nutrition education is suitable for educating students, teachers and other professionals. These materials should be made available in regional languages and should give sufficient information.

Radio and Television:

Radio and Television programmes reach a large number of audience within no time. Jokes, stories, dramas, etc. involving the nutritional problem help to create large scale awareness.

The main objectives are as follows:

a. To develop nutrition advisory services and nutrition education programmes for the public.

b. To participate and coordinate in community nutrition programmes with the co-operation of people working in other disciplines like social workers, village health workers and nurses, etc. and also with the help of social welfare agencies.

c. To help in developing supplementary nutrition programme where ever necessary.

d. To improve the nutritional levels of the community by the available means.

The Means for Nutrition Education:

a. The baseline information regarding nutrition problem in a community can be done by nutritional survey and by compiling the results one gets to know the correct prevalent problem which needs the education (especially to the vulnerable group like infants, preschoolers, pregnant and lactating mothers, etc.)

b. Studying the socioeconomic factors, religious beliefs, customs and traditions affecting the dietary patterns.

c. Development of Nutrition education material in local languages and local prevalent problems.

d. Supplementary feed programmes in the mother and child activities.

Applied Nutrition Programmes:

The applied nutrition programmes are defined as coordinated educational activities among the health and educational departments and other interested agencies with the active participation of the people of the community. The aim of this programme is to raise the nutritional status of mothers and children through improved food production and consumption. These are usually long term programmes which need to be carefully planned and co-ordinate. The programme should be formulated in such a manner that it should be adaptable to changing conditions.

Assessment of the Nutritional Status:

The nutritional status of community is the sum of the nutritional status of individual who form that community. The main aim of nutritional assessment of a community is to know the magnitude and geographical distribution of malnutrition as a public problem, to analyze the

factors responsible for it, and to effectively plan to control and eradicate them to maintain good nutrition.

Nutritional Assessment:

The assessment of nutritional status is accomplished by carrying out the following investigations:

a. Clinical examination

b. Anthropometric examination

c. Laboratory and biochemical examination

d. Dietary examination

e. The study of vital statistics

f. Assessment of ecological factors.

Clinical Examination:

Clinical examination plays a vital role in nutritional surveys. Its main goal is to assess levels of health of individuals or of population groups In relation to the food they consume.

However, clinical examination can have drawbacks too like:

a. Malnutrition cannot be quantified on the basis of clinical signs.

b. Many deficiencies are unaccompanied by physical signs.

c. Lack of specific and subjective nature of most of physical signs.

Therefore to minimize subjective and objective errors in clinical examination standard schedules have been devised to cover all the areas of body.

Anthropometric Examination:

Anthropometric measurements such as weight, height, median circumference, head circumference, skin fold thickness are valuable Indicators of nutritional status. Anthropometric measurements recorded over a period of time would show the patterns of growth and development.

Laboratory Examination:

Lab tests:

Haemoglobin – The estimation of Haemoglobin plays a vital role in health and nutritional surveys as it acts as a major Index for overall sate nutrition. ‘

Stool arid urine – Stool examination would detect any intestinal parasites present (if any). Urine can be examined for albumin and sugar.

Biochemical Tests:

Biochemical tests are time consuming and expensive and hence they cannot be applied in large scale. Most of the biochemical tests would give information about the current nutritional status.

Dietary Examination:

The value of nutrition assessment is greatly enhanced when it is supplemented by the food consumption assessment.

A diet survey may be carried by either of the following method:

a. Weighing a raw foods

b. Weighing of cooked foods

c. Oral questionnaire method

d. Checking of stock inventory.

The data collected using any of the above methods is analyzed for:

a. Mean intake of food in terms of cereals, pulses, vegetables, milk. meat. fish. etc.

b. For mean intake of calories, proteins, fats, vitamin, mineral and carbohydrates.

The best guide for the analysis of the dietary questionnaire is the use of ICMR publications: Nutritive value of Indian foods (1994). A dietary survey schedule is in the appendix at the end of the book.

Study of Vital Statistics:

The analysis of vital statistics, i.e. mortality and morbidity data in a community which enable one to identify high risk and the extent of risk to the community. Mortality data would, however, not give a satisfactory picture, but morbidity (data from Hospital or community health and Morbidity surveys) would throw sufficient light on problems related to protein energy malnutrition, anemia, with a deficiency endemic goiter, etc.

Assessment of Ecological Factors:

In any nutritional survey, it is necessary to collect certain background information of the given community in order to make the assessment complete.

The factors to be considered in the ecological factors related to malnutrition consist of the following:

Conditional Influence:

Bacterial, viral, parasitic agents [Amoebiasis, Ascariasis, etc.]

Cultural Influence:

Food habits and practices, child practices, feeding of pregnant or lactating mothers cooking beliefs and taboos.

Food Production: Customs related to the methods of cultivation food storage and distribution.

Socioeconomic factor:

Family size, occupation, income, education, housing, prices of food.

Health and Educational Services:

The number of hospital and health centers, distribution of health personnel, preventive and curative services. Mass media and communication. It is necessary to make an ecological diagnosis of various causative factors which co-exist with other factors responsible for malnutrition in a community before it is possible to put into effect for the prevention and control of malnutrition.

C12P: Research Methodology (Lab)

1. Meaning of scientific research and its methods. Formulation of project design.

Research design is the framework of research methods and techniques chosen by a researcher. The design allows researchers to hone in on research methods that are suitable for the subject matter and set up their studies up for success.

The design of a research topic explains the type of research (experimental, survey, correlational, semi-experimental, review) and also its sub-type (experimental design, research problem, and descriptive case-study).

There are three main types of research design: Data collection, measurement, and analysis.

The type of research problem an organization is facing will determine the research design and not vice-versa. The design phase of a study determines which tools to use and how they are used.

An impactful research design usually creates a minimum bias in data and increases trust in the accuracy of collected data. A design that produces the least margin of error in experimental research is generally considered the desired outcome. The essential elements of the research design are:

Accurate purpose statement

Techniques to be implemented for collecting and analysing research

The method applied for analysing collected details

Type of research methodology

Probable objections for research

Settings for the research study

Timeline

Measurement of analysis

Proper research design sets your study up for success. Successful research studies provide insights that are accurate and unbiased. You'll need to create a survey that meets all of the main characteristics of a design. There are four key characteristics of research design:

Neutrality: When you set up your study, you may have to make assumptions about the data you expect to collect. The results projected in the research design should be free from bias and neutral. Understand opinions about the final evaluated scores and conclusions from multiple individuals and consider those who agree with the derived results.

Reliability: With regularly conducted research, the researcher involved expects similar results every time. Your design should indicate how to form research questions to ensure the standard of results. You'll only be able to reach the expected results if your design is reliable.

Validity: There are multiple measuring tools available. However, the only correct measuring tools are those which help a researcher in gauging results according to the objective of the research. The questionnaire developed from this design will then be valid.

Generalization: The outcome of your design should apply to a population and not just a restricted sample. A generalized design implies that your survey can be conducted on any part of a population with similar accuracy.

The above factors affect the way respondents answer the research questions and so all the above characteristics should be balanced in a good design.

A researcher must have a clear understanding of the various types of research design to select which model to implement for a study. Like research itself, the design of your study can be broadly classified into quantitative and qualitative.

Qualitative research design: Qualitative research determines relationships between collected data and observations based on mathematical calculations. Theories related to a naturally existing phenomenon can be proved or disproved using statistical methods. Researchers rely on qualitative research design methods that conclude “why” a particular theory exists along with “what” respondents have to say about it.

Quantitative research design: Quantitative research is for cases where statistical conclusions to collect actionable insights are essential. Numbers provide a better perspective to make critical business decisions. Quantitative research design methods are necessary for the growth of any organization. Insights drawn from hard numerical data and analysis prove to be highly effective when making decisions related to the future of the business.

You can further break down the types of research design into five categories:

1. Descriptive research design: In a descriptive design, a researcher is solely interested in describing the situation or case under their research study. It is a theory-based design method which is created by gathering, analyzing, and presenting collected data. This allows a researcher to provide insights into the why and how of research. Descriptive design helps others better understand the need for the research. If the problem statement is not clear, you can conduct exploratory research.

2. Experimental research design: Experimental research design establishes a relationship between the cause and effect of a situation. It is a causal design where one observes the impact caused by the independent variable on the dependent variable. For example, one monitors the influence of an independent variable such as a price on a dependent variable such as customer satisfaction or brand loyalty. It is a highly practical research design method as it contributes to solving a problem at hand. The independent variables are manipulated to monitor the change it has on the dependent variable. It is often used in social sciences to observe human behavior by analyzing two groups. Researchers can have participants change their actions and study how the people around them react to gain a better understanding of social psychology.

3. Correlational research design: Correlational research is a non-experimental research design technique that helps researchers establish a relationship between two closely connected variables. This type of research requires two different groups. There is no

assumption while evaluating a relationship between two different variables, and statistical analysis techniques calculate the relationship between them.

A correlation coefficient determines the correlation between two variables, whose value ranges between -1 and +1. If the correlation coefficient is towards +1, it indicates a positive relationship between the variables and -1 means a negative relationship between the two variables.

4. Diagnostic research design: In diagnostic design, the researcher is looking to evaluate the underlying cause of a specific topic or phenomenon. This method helps one learn more about the factors that create troublesome situations.

This design has three parts of the research:

· Inception of the issue

· Diagnosis of the issue

5. Explanatory research design: Explanatory design uses a researcher's ideas and thoughts on a subject to further explore their theories. The research explains unexplored aspects of a subject and details about what, how, and why of research questions.

2. Types of project design- exploratory, descriptive, experimental, cross sectional or longitudinal.

Title of Your Project (Capitalized Each Word except Preposition)

Project Submitted to Midnapore City College
for the Partial Fulfillment of the Degree of
Master of Science (Your Subject)

Submitted by

Your Name

Under supervision of

Supervisor Name

Department of Biological Sciences

MIDNAPORE CITY COLLEGE

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Year

Abstract

Introduction and literature review

Introduction

A. Broad introduction to thesis topic and method. One or two pages.

B. Research problem. State broadly. Explain carefully. In one sense, usually the problem is to expand the body of knowledge examined in the literature review.

Literature Review

A. Brief Overview. Theoretical foundations.

B. Literature. Group articles by ideas. For a given idea, first discuss common strands in the literature.

C. Model. Of a process, usually. Based on the literature reviewed.

D. Point out the gap

E. Reveal the research question and sometimes Hypotheses (in broad sense of the term; also called Propositions). For each, give brief restatement of justification tied to earlier sections; explain derivation and implications. Include assumptions. Explicitly state plausible rival hypotheses (explanations of process) of a substantive nature.

Methods (Short description)

Project schedule

Time Required / Phase of Experiments	0-10 Days	11-20 Days	21-30 Days	31-40 Days	41-50 Days	51-60 Days
Objectives and review study						
Collection of sample and Acid values estimation of different fats and oils.						
Results analysis and statistical tests						
Writing the report						

Estimation

Please summaries expected expenses for your project (eg. Expenses for chemicals, instruments, electronic components etc.)

Item	Expenses
A. Recurring:	
1.Remunerations/salaries	
2.Consumables Chemicals and Glassware	
4. Other costs	
B. Non-recurring Permanent equipment	
Grand Total (A+B)	

Conclusions and expected outcome

A. Summary of entire proposal.

B. Conclusions.

C. Implications. Speculate about broadest possible consequences, both theoretical and practical. Label speculation clearly.

References.

PREPARATION OF THE FINAL MANUSCRIPT

TYPING

The style may be Courier or Times New Roman, or another equivalent word processor style. The font size should be 12. Standard black font is used throughout the text. Color may be used in tables, figures, charts and diagrams. The style must be consistent throughout the thesis.

MARGINS

The binding of a thesis requires a left-hand margin of one and one-half inches (1 ½"). The top, bottom and right margins must be one inch (1"). The text should begin one inch from the top of the page (except on the first page of each chapter) and end one inch from the bottom. Supplementary materials (printouts, tables, figures, photographs, questionnaires, appendices, etc.) must also meet these margin requirements. Margin guidelines must strictly be observed to ensure the ability to produce a paper document.

SPACE AND INDENTATION

The text of the thesis must be one and half spaced. All paragraphs begin indented five spaces from the left margin. The spacing of long quotations, footnotes, tables, bibliographies, captions, etc. should conform to the specifications of this document or conform to the style manual specified for a student's discipline.

Preliminary pages: The pages preceding the first chapter (title page, approval page, abstract, table of contents, etc.) are counted, however, the first page with the number printed on the page is the ABSTRACT. Preliminary pages are numbered consecutively using lower case Roman numerals (iii, iv, v…) centered ½ inch from the bottom of the page. The title, copyright, approval, dedication and acknowledgment pages are counted, but not numbered. The page numbering begins appearing on the Abstract page. DO NOT use punctuation marks with the Roman numerals.

Text and reference pages: Starting with the first page of the text, all pages are numbered; including the bibliography, appendices, and index. Pages are numbered consecutively in Arabic numbers (1, 2, 3…). The Arabic numbers used for text must be centered and ½ inch from the bottom of the page. Do not use punctuation marks before or after page numbers, do not use them word "page" followed by the number and do not use letter suffixes such as 10a, 10b, etc.

Plagiarisms: No plagiarism of any form will be allowed and thesis will be returned if found any.

3. Methods: surveys, case study, anthropological or experimental.

- **These are the main methods which are used in Survey:**

1. Interviews
2. Questionnaires and surveys
3. Observations
4. Documents and records
5. Focus groups
6. Oral histories

Qualitative vs quantitative data collection methods

Some of the methods covered here are quantitative, dealing with something that can be counted. Others are qualitative, meaning that they consider factors other than numerical values. In general, questionnaires, surveys, and documents and records are quantitative, while interviews, focus groups, observations, and oral histories are qualitative. There can also be crossover between the two methods.

- **These are the steps of case study method:**

Step 1: Select a case

Once you have developed your problem statement and research questions, you should be ready to choose the specific case that you want to focus on. A good case study should have the potential to:

- Provide new or unexpected insights into the subject
- Challenge or complicate existing assumptions and theories
- Propose practical courses of action to resolve a problem
- Open up new directions for future research

Unlike quantitative or experimental research, a strong case study does not require a random or representative sample. In fact, case studies often deliberately focus on unusual, neglected, or outlying cases which may shed new light on the research problem.

Step 2: Build a theoretical framework

While case studies focus more on concrete details than general theories, they should usually have some connection with theory in the field. This way the case study is not just an isolated description, but is integrated into existing knowledge about the topic. It might aim to:

- **Exemplify** a theory by showing how it explains the case under investigation
- **Expand** on a theory by uncovering new concepts and ideas that need to be incorporated
- **Challenge** a theory by exploring an outlier case that doesn't fit with established assumptions

To ensure that your analysis of the case has a solid academic grounding, you should conduct a literature review of sources related to the topic and develop a theoretical framework. This means identifying key concepts and theories to guide your analysis and interpretation.

Step 3: Collect your data

There are many different research methods you can use to collect data on your subject. Case studies tend to focus on qualitative data using methods such as interviews, observations, and analysis of primary and secondary sources (e.g. newspaper articles, photographs, official records). Sometimes a case study will also collect quantitative data.

Step 4: Describe and analyze the case

In writing up the case study, you need to bring together all the relevant aspects to give as complete a picture as possible of the subject.

How you report your findings depends on the type of research you are doing. Some case studies are structured like a standard scientific paper or thesis, with separate sections or chapters for the methods, results and discussion.

Others are written in a more narrative style, aiming to explore the case from various angles and analyze its meanings and implications (for example, by using textual analysis or discourse analysis).

In all cases, though, make sure to give contextual details about the case, connect it back to the literature and theory, and discuss how it fits into wider patterns or debates.

- **Anthropological or experimental method:**

Data analysis methods

Data for qualitative analysis most often consist of interview and focus group recordings and transcripts, field notes written during participant observation sessions, textual documents, and notes written about the data collection process itself. The techniques used for qualitative data analysis involve careful and repeated listening to the recordings and reading of transcripts, field notes, and collected textual documents. Anthropologists view this process as becoming "immersed" in the data as they search for themes. As the researchers listen to the recordings and read the texts, they commonly take notes on the content and on their developing analytic thoughts. Analysis is an on-going process that begins as the first data become available and continues to the end of data collection. For large projects with teams of researchers, individual review of the data is followed by repeated group sessions for team members to discuss and compare their analyses and to arrive at an agreed-upon interpretation. This process is especially helpful for comparison and triangulation of findings from mixed-methods studies that use multiple qualitative and quantitative methods. Projects using qualitative methods quickly amass large amounts of non-numeric data that can become difficult to manage. In response to this, private companies, government agencies, and open-source teams have created computer-assisted qualitative data analysis software packages that allow researchers to assign topical codes to chunks of text by using a codebook created in advance by the project team, and/or generating codes as needed during the coding process. An anthropological approach to data analysis considers data within the context of the entire text in which they appear. In this sense, coding in and of itself does not constitute the analysis, but it is an efficient tool to facilitate later phases of analysis during which coding is used to sort and locate data on specified topics.

4. Tools and techniques: observation, interviewing, questionnaire schedules or rating scales

Observation Techniques

In carrying out action research to improve teaching and learning, an important role of the researcher/instructor is to collect data and evidence about the teaching process and student learning. What follows is an introduction to some of the techniques which can be used for the said purpose.

Student Assessment

Closed Ended Questionnaires

Diary/Journal

Supporting Documents

Interaction Schedules

Interviews

Learning Inventories

Open Ended Questionnaires

Diagnosis of Student Conceptions

Tape Recording

Triangulation

Interviewing Techniques

1. Environment matters

Find somewhere quiet where you can speak without losing focus on the conversation. Your space should be private too. You might feel comfortable having your colleagues within earshot, but it will ratchet-up the pressure for your candidate if they feel that others are listening in.

Reserve your room ASAP if booking is required. Block out the diaries of everyone on the interview panel. And double check everything the day before your interview. Flapping around trying to find an empty room or missing colleague while your applicant loiters in reception will not reflect well on your company.

2. Interviews are a two-way thing

Of course, you hold most of the cards. But remember that your candidate is searching for the right fit too. You are an ambassador for your company, so it's best not to rollout your version of the belligerent Alan Sugar thing.

Be ready to make a glowing impression. Explain why working for your company is such a buzz. Get your candidate excited. Thank them for their time. You don't know who else is waiting to snap up the potential prodigy sat in front of you.

3. Know the ABCs of candidate CVs

Good interviewers are active, not passive. Knowing a few facts on the background and accomplishments of your candidate shows respect. More importantly it empowers you to ask questions that force your applicant to elaborate on their career history. That has two benefits:
1) you can check if their competencies match the role;

2) you can make sure the candidate is everything they claim to be on paper.

4. Explain how the interview will run

It's just good practice. It will help your applicant feel more comfortable too. Remember to leave time at the end of the interview for questions from the candidate.

5. Interviews go quickly. Choose your questions wisely

You only have a few minutes to gather crucial information on your applicant. It's not easy. And hiring the wrong person can be eye-wateringly costly. Bottom line? It's imperative that you ask the right questions.

Replace yes/no questions with open-ended alternatives that allow your candidate to answer thoroughly. Ask follow-ups that push past pre-prepared answers and force your candidate to think decisively on demand. You can even throw in a curveball - but our advice would be to go easy on the weirdness.

6. Forget about taking notes (for yourself)

If you need notes on the interview, have someone else sit in and write them for you. It's hard to concentrate on having a productive two-way conversation, one that shows respect to your candidate, if you are feverishly trying to scribble every last utterance onto a piece of paper.

7. Analyze your candidate's body language

It's said that body language is responsible for up to 58% of human communication. You could learn a lot about your candidate by studying their posture, facial expressions, hand movements and more. Easier said than done during a one-one conversation. It might pay dividends to hire a body language expert to sit in on your interviews.

As you can see, interviews are about much more than mundanely separating wheat from chaff. With the right interviewing techniques, you can take an active role in finding a candidate that fits your vacancy, your business and your budget.

Questionnaire schedule or rating scales:

- The research process is incomplete without the collection of data, which starts after the identification of the research problems and chalking out research design.
- There are several methods involved in the collection of primary data, like observation, interviews, questionnaires, schedules, etc.
- Both questionnaire and schedule are popularly used methods of collecting data in research surveys.
- There is much resemblance in the nature of these two methods and this fact has made many people to remark that from a practical point of view, the two methods can be taken to be the same.
- But from the technical point of view, there are many differences between the two common methods of data collection.

5. **Tabulation and interpretation:** Tabular and graphic representation of data and its interpretation, bar diagram, pie diagram. Statistical procedure- variables, mean, standard deviation, test of hypothesis (t-test), chi-square test, degrees of freedom, null hypothesis, Z-score.