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FEED OR STARVE THE FUTURE: NUTRITION AND UNDER-FIVE CHILDREN

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Abstract

The study assessed the nutrition and under- five children, the concepts discussed were; overview of nutrition in under- five children, factors contributing to malnutrition in under- five children, dietary specific behaviour that promote growth of under- five children, functions of adequate diets in physical and cognitive development of under- five children, techniques for diagnosing malnutrition in under- five children, roles of nurses in prevention of malnutrition and general preventive measures against malnutrition in under- five children. The implications of the study to nursing practice was that nurse practitioners should teach women in various health facilities the importance of healthy eating and how to prevent malnutrition. Nurses should concentrate more on enhancing and promoting maternal and child nutrition. Nutritional education programme should be broadened, training and retraining of nurse practitioners should be done on regular basis. It is therefore suggested that mothers should be educated healthy and adequate dietary practices. Nigerian Government should incorporate measures to lessen the burden of malnutrition among children. Funding of nutritional education programme by the national assembly should be incorporated. Appropriate monitoring and actions should be taken to promote national immunization against childhood diseases.

Keywords: Nutrition, Under- five children, Women, Malnutrition, Nutrition Education, dietary practices.

Introduction

Nutrition is the process of consuming, absorbing, and using nutrients that the body needs for development, reparation and development of life[1]. In the first year of life, proper nutrition gives a kid the rudimentary structures for healthy immunological function, immune system strength, and

brain development, all of which help in the prevention of future non-communicable diseases[2]. Nutrition is one of the elements that alter cognitive development[3]. Children who are properly fed have a stronger immune system and better general health, which makes them more able to fend off illness and disease while also having a positive impact on human potential and brain development[2]

In order to guarantee healthy development, proper organ formation and function, a robust immune system, proper neurological development, and general well-being in children under the age of five, [4]indicated that optimal nutrition is essential in the early years of life. In underdeveloped nations, malnutrition is a public health issue that primarily affects children under the age of five (United Nations International Children Emergency Fund[5]. In addition to reducing children's capacity for economic output in their early years, malnutrition has been associated to impaired immunological, neurological, and cognitive development[6] .Child care is one of the major fundamental causes of childhood malnutrition, and it shows up in how a child is fed, reared, socialised, and directed, according to National Population Commission. The basis of reducing malnutrition in all its manifestations is improving the choice of children's diets and feeding practises in the earliest years of life[7].

The United Nations General Assembly, of which Nigeria is a member State, declared 2016–2025 the United Nations Decade of Action on Nutrition in order to reduce the burden of the growing malnutrition epidemic and its effects on children, especially those under the age of five. This period represents an exceptional opportunity to address all forms of malnutrition. In order to support better nutrition and health care for women and children, Mrs. Aisha Buhari, the wife of the President of the Federal Republic of Nigeria, founded the Future Assured Campaign to End Child Malnutrition in Nigeria in 2021. [2]States that the issue of malnutrition is more pervasive in Northern Nigeria and that malnourished children can be seen in every state of Nigeria. Over 11 million children are stunted, which is an enormous burden on the future of the nation and can result in stunting, which leaves children under developed when it comes to their physically bodies or mentally[8].

Concepts of Nutrition in Under-Five Children

The fundamental basis of a child's survival and development is good nutrition[9] as cited UNICEF. Children who have a nutritious diet are more likely to grow, learn, play, and take part in activities within the community[9]. In order to assist malnourished children live, recuperate, and go on to live healthy, productive lives, UNICEF places a high priority on the early detection, treatment, and care of these children[7]. Prevention is the first step in all UNICEF nutrition programmes, and where prevention fails, treatment is essential. Children need the proper environment at the right time to grow and develop to their full potential; the 1,000 days between conception and a child's second birthday are the most important for good nutrition. 5states that proper nutrition during the first year of life gives children the basis for good brain development, strong immune systems, and healthy growth, all of which help in preventing future non-communicable diseases. Under-five children's health and well-being are important indices of any society's socio-economic well-being. The human brain requires all essential nutrients, including protein, lipids, carbohydrates, vitamins, minerals, and water, to construct and maintain its structure. Therefore, healthy eating is essential for the development and function of the brain[10]. It can be challenging to meet a child's nutritional demands in the early years, and many parents struggle to provide their kids with adequate food that is age-appropriate, safe, nutritious, and affordable. These difficulties are aggravated by war, natural disaster, and other humanitarian crises.

The WHO in[11] defines malnutrition as a cellular imbalance between the supply of nutrients and the energy needed by the organism to maintain growth and carry out certain functions. There are two types of malnutrition: acute malnutrition (underweight and wasting) and chronic malnutrition (stunting). The word known as "malnutrition" can refer not only to an low intake of macronutrients like protein and calories but also to an insufficient intake of micronutrients like iron. Marasmus and kwashiorkor are two types of acute malnutrition WHO cited in[12]. According to[13], children need a variety of foods, including grains, proteins, fruits, vegetables, and dairy, to meet all of their nutritional needs, including micronutrients like dietary fibre, vitamins, and minerals as well as macronutrients like proteins, healthy fats, and healthy carbohydrates. Beans, eggs, and other legumes can provide the protein requirements of a vegetarian child. It is generally a good idea to choose fruits and vegetables with intense colour, such as those that are particularly brilliant or

dark, as the more vibrant a fruit or vegetable is, the more vitamins and minerals it contains[13]. Milk and cheese are dairy products, and many children get their vitamin D from these sources. However, a child's vitamin D supplement can be used as an option to dairy products.

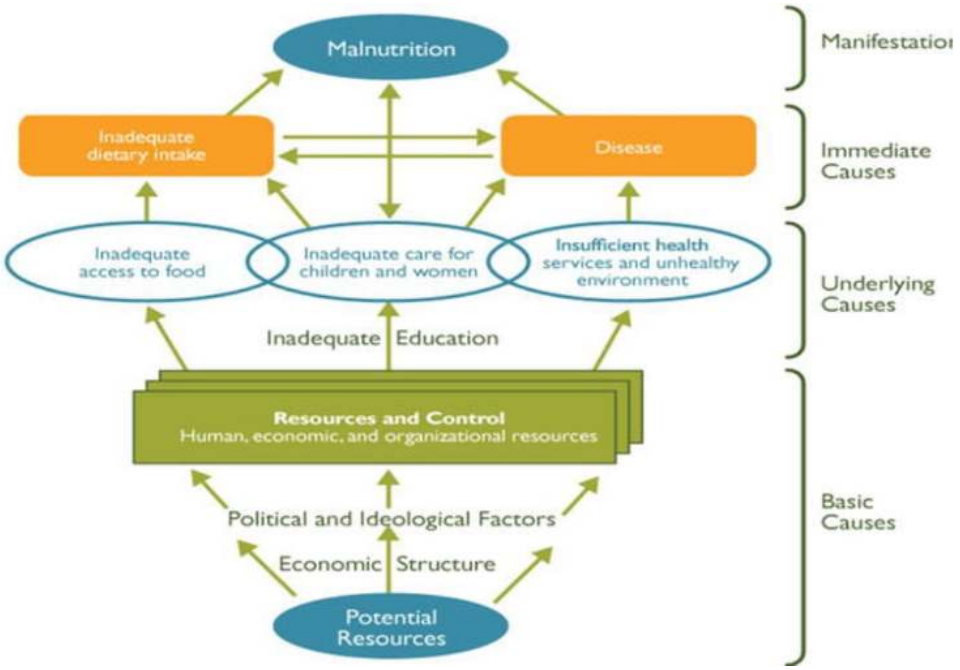
Malnutrition is defined as inadequacies in dietary intake, an imbalance of critical nutrients, or inadequate nutrient utilisation by[5&14] Under-nutrition and over-nutrition are two types of malnutrition. manifest in four main ways: underweight, micro nutrient deficiencies, wasting or acute malnutrition, and persistent stunting or chronic malnutrition. Overweight and obesity are symptoms of over-nutrition. Low weight for height is referred to as "wasting," which can also refer to mild or severe acute malnutrition. Kwashiorkor, marasmus, and marasmic-kwashiorkor are all symptoms of severe acute malnutrition[12]. It frequently occurs when a person hasn't eaten enough food or has had a lot of frequent or protracted sickness. Children who waste have an increased mortality risk (UNICEF). Low height for age is referred to as stunting, and it is caused by current malnutrition[5]. It has to do with poor socio-economic status, illness, inadequate nutrition for pregnant mothers, and hunger. It is brought on by chronic or recurrent under-nutrition, which is commonly associated with poverty, poor maternal nutrition and health, recurrent illness, or improper feeding and care of young children. Stunted children cannot develop to their full physical and intellectual potential. Underweight is defined as low weight for age. A child that is underweight may also be stunted or wasted. Micro-nutrient deficit is the absence of vitamins and minerals that the body requires to produce enzymes, hormones, and other compounds for growth and development WHO in[15]. According to [16], 149 million children are stunted and 45 million are underweight, and low protein and energy intake during childhood is a strong predictor of a number of psychosocial issues in later life. With a nationwide incidence rate of 32% of children under the age of five, malnutrition is the second major cause of stunted children in the globe according to UNICEF in [9]. Malnutrition is a primary or secondary cause of 45% of all deaths of children under the age of five, and it is estimated that 2 million children in Nigeria are suffering from severe acute malnutrition [9]. Additionally, [17]noted that 11 million of the 60 million under-five children in developing nations who were found to be stunted were Nigerian children. The prevalence of overeating is rising globally; 5.7% of children under the age of five were overweight, up from 5.4% in 2000[18]

Objectives

The purpose of this study is to identify the factors that contribute to under nutrition in children under the age of five and to highlight dietary-specific behaviours that help children achieve adequate nutrition. the study also intends to describe the function of nutrition in the physical and cognitive development of children under the age of five, describe diagnostic techniques for undernutrition in children under the age of five and highlight prevention techniques for under-five malnutrition.

2.1 Review of Causes of Malnutrition in Under-Five Children

The lack of nutrients and calories needed in a typical diet leads to malnutrition in children. According to [19]preterm infants are more liable to developing malnutrition than term infants and are more vulnerable to it when they are weaned. Cystic fibrosis, childhood malignancies, congenital heart disease, and other chronic illnesses are the main risk factors for malnutrition[20]. Malnutrition is also a risk factor for vulnerable children such as orphans and those who have been neglected. Having an eating disorder, a behavioural issue, or a psychological disorder that causes them to avoid or reject meals can also cause children to become undernourished. Malnutrition has a variety of causes that can be found at the individual, family, district, national, regional, and global levels[21]. The conceptual framework created by UNICEF for the dry lands of Africa can be used to determine the causes of malnutrition. [22]further divided the causes of malnutrition into three categories: fundamental, immediate, and underlying.



UNICEF[78]

2.1.1 Immediate-level causes of malnutrition

According to[23], inadequate dietary intake and diseases are the primary causes of malnutrition, which is caused by an imbalance between the body's required amount of nutrients and the actual amount of nutrients introduced and absorbed by the body. The main contributors to poor diet and disease are inadequate care for women and children, a lack of healthcare resources food insecurity, inadequate care for women and children, a lack of healthcare resources, and unhygienic conditions[23]. According to [24]immediate level malnutrition can be caused by increased energy expenditure, reduced dietary intake, decreased macro- or micronutrient absorption, excessive losses, or altered requirements. According to [25]the interaction of drugs and delivery can affect nutrient intake such as metabolism, elimination, digestion, storage, and absorption thus leading to nutritional deficiency or excess.

2.1.2 Underlying-level Causes of Malnutrition

According to [23] some causes of malnutrition include insufficient access to healthcare, poor social and care environments, and unhealthy environments. Conflict, poor education, deprivation, gender

inequality, shoddy infrastructure, and other fundamental problems are the root causes of the problems[23]. According to Mother Care Health Education [27] household food insecurity or a shortage of food is the main cause of undernutrition in children. Food insecurity is a particular issue for displaced people. It occurs when people are constantly anxious about having access to enough nutritional, affordable, and safe foods, which may be the result of being unable to afford the costs of safe food[28].

Inadequate care for children who are chronically unwell, ineffective newborn feeding practises, and inappropriate health-seeking practises are all examples of a poor social and care environment[29]. The social and caring atmosphere in the home and neighbourhood might have a direct impact on the children's nutrition. Infant and young child feeding practises are a key element of healthy nutrition[2]. Caregiving practises and attitudes towards modern health services, water supplies, and sanitation are all influenced by cultural factors and resources like cash, time, and knowledge[30]. [29]lists inexpensive health care, access to clean water, proper sanitization, and decent housing conditions. Children who live in poverty do not have access to a healthy diet [27].

2.1.3 Basic Level Causes of Malnutrition

Human resources (time, knowledge, people, time and skills), economic resources (assets, lands, income, and others), and organisational resources (formal and informal institutions, extended families, and child care organisations) are the three crucial components of resources in the basic level causes of malnutrition [31]. Civic, political, and economic institutions are some of Institutional national institutions that are fundamental to governance. The market, traditional institutions, and broader societal norms and laws are essential components of informal institutions. The burden of malnutrition is determined by these informal social structures, which also impact power dynamics and resource allocation among various socioeconomic groups in society[30]. The primary causes of malnutrition are poverty, ignorance, lack of resources at all levels, political and economic instability, war, uneven treatment of women, and natural catastrophes[28]. According to[17], environmental variables, maternal factors, and child factors all have a role in under-five malnutrition.

2.1.4 Child Factors

Child factors are things like gender, age, diseases, breastfeeding, and the child's place in the family that have a negative impact on a child's nutritional health before the age of five[32].

2.1.4.1 Gender

In 2020, 58.3% of boys and 68.6% of girls in Varanasi had protein energy malnutrition (PEM)[32]. Because male children in Africa are more likely to survive and carry on the family name than female children, male children are given preference over female children[33].

2.1.4.2 Age

Protein energy malnutrition was highest in the third year and lowest in the second, according to 2021 Sudanese research. In their study, [33]revealed that children under the age of a year were less likely to have undernutrition than those between the ages of 24-35 months. According to Kumar cited by[34], children aged 13 to 24 months had higher rates of stunting (18.2%) and underweight (45.5%), whereas children aged 37 to 48 months had the greatest rates of wasting (18.2%). Children's malnutrition can be made worse by some illnesses like tuberculosis, diarrhoea, and measles, and a combination of these illnesses can impair the immune system.

2.1.5 Maternal factors

Maternal factors can influence a child's nutritional condition either directly or indirectly. These include environmental influences, family size, food insecurity, and maternal literacy.

2.1.5.1 Maternal literacy

Maternal literacy affects under-5s' nutrition[17]. According to[26], mothers or other main carers are frequently required to provide children with care for the first five years of life. The quality of care provided depends primarily on the mothers' knowledge of fundamental health care procedures and nutrition. Additionally, according to [35]Literate mothers delay having children, lowering infant mortality. According to [36] research from 2019, stunting is a danger for kids whose mothers lack education. According to [17]Higher-income males are more likely to marry educated women, so the women get to live in better neighbourhoods, and hold higher-paying occupations, all of which have a direct or indirect impact on child survival and health.

2.1.5.2 Family size

The nutritional status of children can be impacted by an increase in family size because of a decline in per capita income, according to [37]. This means that as families have more children, there is less food available for each child, which in turn affects the nutritional status of the children. In such circumstances, having a large family may encourage unhealthy dietary habits, especially in homes with lower incomes[37].

2.1.5.3 Lack of Access to Food

Food insecurity usually results from a person's inability to buy enough food[38]. According to [17], poor communities are more likely to experience food insecurity due to bad road conditions, inadequate household income levels, and other issues. Food scarcity may occur in marketplaces when food prices are low because farmers may produce fewer food items that aren't equal to consumer demand[17].

2.1.6 Environmental Factors

Poor children frequently live in urban area or highly remote areas with a complete lack of basic amenities like water supply and other sanitation facilities, which can lead to water body contamination and diarrhoea that prevents kids from eating enough nutrient-rich food and promotes wasting[39].

2.2 Nutritional Specific Activities That Promote Nutrition in Under-Five Children

Nutritional intervention, as defined by the World Food Programme of the[40], is any sort of intervention for kids aged <5years to improve their overall nutritional condition. Among the nutritionally specific therapies are promoting the benefits of breastfeeding, supplemental feeding, attentive feeding techniques, and stimulation, mothers' education interventions that make meals and beverages more accessible to kids, such as take-home food packages or food vouchers food augmentation Supplementation Intervention in behaviour and regulation prevention, detection, and treatment of malaria are crucial for the development of children under five.

2.3 Roles of Nutrition in Physical and Cognitive Development of Under-Five Children

Starting children off on the right diet, ensuring they have a balanced diet, adequate hydration, and with an active lifestyle can help them not only grow taller but stronger too[41]. This is one of the

finest methods to develop strong confidence and love for physical activity in children. If you consider food to be fuel, then providing a balanced diet that includes foods from all the different food categories gives the child the best chance to obtain all the nutrients they require to grow and develop.

2.3.1 Physical Development

Children need to take proper nutrition over time to support their long-term growth and development since nutrition and growth are complex processes that call for the proper balance of nutrients. A child's growth and development can be negatively impacted by malnutrition, which can take the form of consuming insufficient calories and nutrients or making poor food choices. Malnutrition can impact children's self-confidence during physical exercise, which can further deteriorate established growth and development[42]. Healthy eating habits and proper nutrition are a useful method to prevent malnutrition. Early childhood growth is directly related with a healthy, balanced, and nutrient-rich diet as well as environmental stimulation[43].

The ability of a child to grow to their maximum height depends greatly on how active they lead their lives[41]. Children who are sedentary during their formative years have trouble doing so. The same author claims that if a child is given the proper nutrition to assist bone growth and development, even if they are not developing at a typical rate, they can still reach their full growth potential. During the early years of life, nutritious diet encourages excellent health and proper physical growth. Malnutrition impairs immunity, stunts cognitive and behavioural development, delay early physical growth, and increases morbidity and death[5].

2.3.2 Cognitive Development

All necessary nutrients are needed for human brain development in order to establish and maintain its structure[20]. A healthy diet is essential for a child's cognitive development[20]. Cognitive impairment is more likely to develop in children who lack adequate nutrition [20]. Diet plays two roles in cognitive development: it provides the building blocks from which the brain is made and the energy necessary for the brain to function properly. Diet helps in the growth of the brain's mental capacity. Stunting can impair a child's physical characteristics as well as their cognitive and neurological development[42]. Malnutrition in early life reduces brain cells, synapses, dendritic

arborization, and myelin production, resulting in a smaller brain and altered neurotransmitter systems[44]. Through influences on brain cell structure, neurotransmission, brain energy supply, and metabolism, food and nutrition have significant and pervasive effects on brain development and cognitive functioning.

2.4 Diagnostic Strategies for Under-Nutrition Among Under-Five Children

Measures to evaluate a child's malnutrition are known as diagnostic techniques[45]. Stunting, wasting, and underweight are signs of childhood undernutrition. The[2] reported that all of these occur in children who are less than two standard deviations from the median height for age, weight for height, and weight for age, respectively.

According to [46]assessment of nutrition can be done using the Anthropometry, Biochemical/ biophysical methods, Clinical methods, Dietary methods ABCD methods.

2.4.1 Anthropometric Measurements

The nutritional status of children can be evaluated using these non-invasive quantitative assessments of the body. Clinical examinations of infants and expectant mothers include anthropometric measures as part of the process. According to[47] it is the measurement of a person's height, weight, head circumference, and mid-upper arm circumference. Numerous measurements are needed to create a more thorough assessment because one measurement will not give a complete picture of the patient's state[48]. Anthropometric measurements are employed to assess the child's overall health, nutritional state, growth, and developmental pattern. Anthropometric information is used to establish policies, allocate resources, monitor and evaluate dietary programs, and provide care and treatment. For kids, standard anthropometric measurements include head circumference, mid-upper arm circumference (MUAC), height, and weight. A few measurements are shown as indices, such as head circumference-for-age, WFH, WFA, and BMI-for-age. Each index's z-score shows how much and in which direction a person's measurement deviates from the WHO Child Growth Standards median[2]. A z-score beyond the "normal" range shows a diet issue[2].

Height can be regarded as the distance between a person's bottom and their top. Children under the age of two are measured lying down (length) to determine whether they are growing well. Children older than two are measured for height while standing[49].

Age, sex, and height are necessary for the best interpretation of weight as a marker of overall nutritional health[50]. Weight is also a measure of an individual's mass or degree of heaviness[50]. A pan-style scale is utilized until the child is roughly 24 months old or is able to stand unassisted. newborns should not be wearing diapers while weight is measured, and the scale must be zeroed before each measurement[50].

A child's head is measured around its biggest region, above the eyebrows and ears, as well as around the back of the head, where it conspicuously slopes upward from the neck[2]. The brain develops most quickly in the first three years of life, which is principally responsible for head growth[50]. The fact that brain growth is typically conserved in situations of dietary insufficiency makes head circumference a less sensitive indication of short-term nutritional status than weight and height.

Using a straightforward colored plastic strip, it is quick and easy to identify whether or not a kid is malnourished by measuring the diameter of the mid-upper arm. From the age of 12 months to 59 months, children should be fitted with a mid upper arm circumference. It can also be used on kids older than six months who are longer than 65 cm.

A child at risk for acute malnutrition who has a mid-upper arm circumference between 125mm (12.5cm) and 135mm (13.5cm), YELLOW COLOR, should receive counseling and follow-up for growth promotion and monitoring (GPM). Over 135mm (13.5cm), which is the typical mid-upper arm circumference for children aged 1 to 5, shows that the youngster is well-nourished.

The mid-upper arm circumference rises only slightly between six months and five years, making it an age-independent screening tool for severe malnutrition in preschoolers. Malnutrition is indicated by a mid-upper arm circumference less than 12.5 cm.

2.4.2 Biochemical and Biophysical Methods For Nutritional Assessment

Assessing the amounts of nutrients or their metabolites in a person's blood, urine, or faces is known as a biochemical or laboratory method of assessment. It also provides an estimate of blood composition, enzyme activity, and tissue desaturation[51]. Once a diagnosis has been made, biochemical tests may be used to screen for disease or to determine the prognosis Although

expensive equipment and highly skilled technologists are needed, it seems to be one of the dependable methods for determining a child's nutritional status[52]. Emulsion tests to identify fat and oil are an example of this technique, as are blood samples to measure glucose levels in the body[2]. Physical alterations that happen over time are measured by biophysical methods. By utilizing a recognized measuring technique, it is connected to a particular indicator[53].

2.4.3 Clinical Methods of Assessing Nutritional Status

Clinical symptoms and anthropometric evaluations can suggest specific nutritional insufficiency. Skin, eyes, tongue, ears, mouth, hair, nails, and gums are prioritized. Clinical ways of monitoring nutritional status include examining for evidence of deficiency at specific body sites or questioning the patient if they have any symptoms of vitamin shortage in Barbosa[54].

2.4.4 Dietary Methods of Assessing Nutritional Status

The nutritional status of a person or a group can be determined using dietary techniques of evaluation, according to[55], by examining historical or present nutrient intakes from food. The creation of nutrition policy and dietary recommendations, as well as an understanding of how diet affects human health and disease, depend on an accurate evaluation of dietary intake[56]. There are various techniques for doing this:

2.4.4.1 24 -Hour Recall

An evaluation of a person's nutritional intake during the past 24 hours is known as a 24-hour dietary recall[56]. On non-consecutive, random days, multiple 24HRs would be gathered. The use of probing questions has been demonstrated to improve data accuracy and facilitate easy responses[57]. Meal preparation, post-preparation additives such butter and spices, and meal timing are investigated[58]. [59]found that estimations of macro nutrients derived from the 24-hour recalls are typically more reliable than those of vitamins and minerals. A trained expert asks the individual to list every meal and beverage they had in the preceding 24 hours. This approach is quick and simple. However, it may not be particularly accurate because it depends on the subject's short-term memory. The advantages of 24HRs over other nutritional evaluation methods include the lack of a literacy requirement for subjects (if data is gathered over the phone) and the possibility to collect data from people with physical disabilities (such as blindness, physical impairment, and arthritis injury[60].

This method is expensive because it relies on memory and seasonal variability, which can bias food and nutrient intake estimates[61].

2.4.4.2 Food Frequency Questionnaire (FFQ)

Food-Frequency Questionnaires are used to evaluate a person's typical dietary consumption over a given time period, usually a longer reference period, and ask about how frequently they consume different foods, frequently grouping foods with comparable nutrient profiles together. Given a list of items, the participant is asked to indicate how much they eat daily, weekly, and monthly. Compared to the 24-hour recall, this method is more precise, affordable, and simple to use. The list of foods, frequency of consumption, and portion size are the three elements of these questionnaires. Longer assessment times result in decreased participant motivation, which lowers data quality[60]. According to[63], food frequency questionnaires are used to evaluate dietary consumption overall or changes in intake over time. Unlike 24HRs approaches, FFQ requires literacy and physical capability to complete, but it has the potential to rank order individuals in a group according to their nutrient exposure, which is crucial to investigating diet and diet interactions[64].

2.4.4.3 Food Diary

A food diary, often called a food journal or food record, is a complete list of all the food, drinks, and supplements a research participant consumed over a specified period of time[58]. It is a tool that you can use to record your daily intake of food and liquids [65]. The individual keeps track of their food intake as they eat. This approach is dependable yet challenging to keep up. As participant burden typically results in a deterioration in the quality of information recorded if more days are recorded, typically 3–4 days of intake are documented. Although it is ideal, food intakes are more frequently estimated by participants before and after ingestion[58]. A motivated and literate populace is necessary for the use of food records[66].

2.4.4.4 Observed Food Consumption

Due to the fact that this method demand perfect food measurement and weighting, observation of dietary intake is frequently carried out. It is accurate yet expensive and time-consuming. Direct observation of food intake confirm dietary assessment approaches by accurately measuring food intake[67]. Food consumption, receipt, distribution, and spillage can be observed. Dietary

observation should be conducted systematically employing a methodology that is consistent among observers and observation times. Participants are watched closely and asked to record their eating habits for a predetermined length of time[67]. The duration of observation is rather brief[68]. According to[68], direct observation of dietary intake can be used in the following situations: school meals to validate recalls in children; year-long observation of kids at school and at home to build familiarity without collecting data; periodic observation of family mealtimes and record of dietary intake; and evaluation of nutrition education interventions. To record the large range of possible intakes, including spices, the recording form needs to be more adaptable[68].

3.1 Prevention of Malnutrition in Under-Five Children

The provision of micronutrient supplements, vitamins, and fortified foods, as well as support and encouragement for mothers to exclusively breastfeed their infants for the first six months of life, are all measures to prevent children from becoming malnourished[69].

According to [70]nutritional planning is one strategy for promoting good nutrition at home for busy families and is best done with some element of repetition while consciously integrating variety into the routine. This is one of two approaches to addressing malnutrition, according to[69]. Families can begin by concentrating on one aspect of healthy nutrition for a week at a time and talking about it[2]. Parents can set a good example for their kids by making healthy choices for more on-the-go meals like breakfast and snacks. In order to encourage reflection and information seeking about nutritional health, it will be much simpler for the child to gravitate toward healthy nutrition if this is what they see model for them on a daily basis at home. Talk about these choices as you are making them and actively discuss nutritional options with your child as they occur in real time. Making sure that kids eat enough to meet their bodies' nutritional demands is also crucial. Excessive sleepiness, difficulty completing daily tasks and activities like homework, and a general lack of interest in normally enjoyed activities are all indications of malnutrition or inadequate nutrition, and these symptoms frequently precede more overt indicators of malnutrition like weight loss. Concerns about childhood obesity should also be addressed with professional assistance to assist the family in restructuring home nutritional practices and prioritizing actions to take to guarantee short- and long-term health[13].

Nutritional preparation requires government political commitment. A well-planned, long-term undertaking can accelerate development and have fulfilling, long-term impacts. Nutritional planning requires a nutrition strategy and long-term planning to increase food production, distribution, and purchasing power[71]. Land reforms, agricultural counseling to boost farm yields, and farm food marketing aid may be needed. The government's plans include income-generating activities for the poor, making high-quality food affordable through a public distribution system, and helping people purchased enough nutritious food. The second strategy to combat malnutrition is called Direct Nutrition Interventions, which is a set of tried-and-true nutrition-specific strategies that directly affect nutrition status and tackle its immediate causes.. Direct nutrition intervention is one of the interventions that has malnutrition prevention or reduction as at least one of its key objectives[64]. These interventions typically aim to address the primary direct causes of malnutrition as well as some of its underlying causes, such as inadequate food intake, illness, and the care of children and women[2].

3.1.2.1 Improved health care system

Malaria, measles, and diarrhea, present in our society, induce severe malnutrition in young children and neonates. A strong health care system that provides immunization, oral rehydration, routine de-worming, early diagnosis, and effective treatment of common illnesses helps minimize malnutrition in a community[72].

3.1.2.2 Nutrition education

Health education for mothers might include lessons on the nutritional value of everyday foods. Nutritional value and availability of low-cost, culturally-accepted meals is crucial to breastfeed for at least the first six months, if not up to two years. Feeding practices rooted in superstition and cultural norms inflict harm. How to make nutritious weaning foods and tasty supplements with inexpensive, easily sourced ingredients from your own kitchen. Consuming adequate quantity of milk, eggs, or meat is crucial for increasing the net dietary protein value. Why feeding sick kids is so essential The value and benefits of cultivating a food garden The significance of routine childhood immunizations and good hygiene practices.

3.1.2.3 Nutrition supplementation

Nutritional supplementation is the addition of a substance or product to a diet to ensure that all the required nutrients are obtained or derived[73]. The treatment and rehabilitation of severely malnourished children, the promotion of children's general health and well-being, the increase in children's resistance to infectious diseases, the acceleration of children's physical growth and mental development, and the improvement of children's academic performance and learning abilities are all examples of nutritional supplementation[74]. Expectant women, babies, preschoolers, and school-age children are seems typically targeted by government assistance programs. Calories, proteins, and micronutrients like iron, vitamin A, and zinc can be supplemented to treat and rehabilitate severely malnourished subjects, improve kids' overall health and wellbeing, boost kids' resistance to infectious diseases and lower morbidity rates, accelerate kids' physical and mental development, and improve academic performance and learning skill[74].

3.2 Roles of Nurses in Preventing Malnutrition

Nurses play an important role in the prevention of malnutrition, identifying those who are malnourished or at risk of developing malnutrition. Nurses have in-depth knowledge of health issues like malnutrition, and it is their responsibility to educate patients about prevention of nutrition. Nurses are close to patients; therefore, they are in an ideal position to be the first to identify nutrition concerns[75]. It is the role of nurses to observe dietary intake and tolerance, interact with the patient, and family or caregivers[76]. Nurses should commence health education of mothers on importance of healthy diet from antenatal clinic, education about the menu planning, managing easy nutrients from locally available foods. Nurses collaborate with government and non-governmental agencies working for nutritional betterment of households Nutritional surveillance. Nutritional supplementation [73]recommend nutritional requirements for different age group. Managing nutrients from locally available foods. Maintain adequate diet plans and hydration for clients. Determine the different patterns of the nutrition opted by the people. Collaborate with governmental and non-governmental agencies, and identifies malnourished children and maintain growth chart[77].

3.3 Conclusion

In addition to genes and environment, nutrition for children is one of the key elements that affects a child's growth. There is a significant link between learning and dietary health. Building strong

children is simpler than fixing broken men. In order to combat malnutrition, it is important to raise awareness of education and training programs, particularly in rural areas, about the nutritional value of food, diseases caused by nutritional deficiencies, the importance of personal hygiene, the importance of maternal education, the use of treated water, and sanitary facilities. Insufficient energy intake or an excess of nutrients are both signs of malnutrition. Malnutrition can be caused by a number of reasons, including immediate, underlying, fundamental, child, maternal, and environmental influences. Malnutrition can develop right away as a result of inadequate nutritional intake and illnesses. Underlying causes of malnutrition are broken down into four categories: inadequate social and care environments, poor health services, and unhealthy environments. Malnutrition has several fundamental causes, including potential resource usage and control, environmental conditions, and livelihood systems. However, designing and implementing strategies and policy measures of nutrition and awareness campaigns for promoting child health require cooperation among the government, non-governmental organizations (NGOs), and community. As a result, there is a multiple burden of malnutrition worldwide, and emphasis should be placed on both under- and over-nutrition.

3.4 Recommendations

In other rural and urban regions, mothers should be encouraged to choose a variety of foods for their kids, particularly from the animal protein, fruit, and vegetable categories. The Nigerian government should incorporate the battle against malnutrition into all relevant policy areas and create a distinct and fully financed budget line for nutrition in the annual national budget. Increase spending on programs that focus specifically on nutrition and the improvement of health systems, including the necessary personnel. Address nutrition-related diseases and health issues, particularly in children and mothers, by including nutrition-specific interventions into primary health care programs.

Print media, social media, and electronic media should be utilised by health extension organizations as important sources for advancing nutrition education understanding of child malnutrition and associated preventative actions. In order to improve a child's nutritional condition, appropriate measure must be taken to promote children's vaccination programs for competing immunization as well as optimal nourishment for children to increase illness resistance and improve physical strength. When negotiating with outside donors like the World Bank and

World Health Organization, put nutrition first. In a number of studies, the reasons of over nutrition are not specifically mentioned. As a result, both industrialized and developing nations should be represented in research that focus on the causes of over nutrition.

3.5 Nursing Implications

3.5.1 Implications to Nursing Practice

Nurse practitioners should educate women in clinics the value of healthy dietary practices and how to avoid malnutrition. Nurses should concentrate on enhancing maternal and child nutrition. On every visit to a medical facility, nurses should look for symptoms of malnutrition in children under the age of five. Nurses should instruct mothers on supplemental, complementary, and exclusive breastfeeding. Nurses should instruct mothers on the use of culturally specific foods to improve children's health. With regard to education, Programs for nutritional education should be broadened. Training and retraining of nurse practitioners on nutrition is necessary for nurses to be able to recognize indicators of malnutrition in children. Administration programs should be implemented for Promotion and development of weaning diet. Planning of realistic and visible approach based on local resources Healthy dietary education and practices should be enforced while monitoring, managing and evaluating the impacts of nutrients and dietary practices should be done.

References

1. Shilpa D. (2023), Nutrition in Clinical medicine: Overview of Nutrition-Disorders https://www.msdmanuals.com/home/disorders-of-nutrition/overview-of nutritio n/over view-of-nutrition
2. World Health Organization (2021). UNICEF/WHO/The World Bank Group Joint Child Malnutrition Estimates: Levels and Trends in Child Malnutrition: Key Findings of the 2021.https://www.who.int/publications/i/item/9789240025257
3. Nyaradi B. (2020). The relationship between nutrition in infancy and cognitive performance during adolescence: PMID 26082928
4. Bhandari, S., Poudel, D. K., Marahatha, R., Dawadi, S., Khadayat, K., Phuyal, S., ... & Parajuli, N. (2021). Microbial enzymes used in bioremediation. *Journal of Chemistry*, *2021*, 1-17.
5. World Health Organization. "Levels and trends in child malnutrition: UNICEF." (2021).
6. Liu, L., Iketani, S., Guo, Y., Chan, J. F. W., Wang, M., Liu, L., & Ho, D. D. (2022). Striking antibody evasion manifested by the Omicron variant of SARS-CoV-2. *Nature*, *602*(7898), 676-681.

7. Lenhoff, A. (2020). *A stunting profile of children younger than five years in selected vulnerable communities in Worcester, Breede Valley, Western Cape* (Doctoral dissertation, Stellenbosch: Stellenbosch University).
8. Alifatin, A. (2022). Modeling and Role-Modeling Theory on Stunting Children in the Perspective of Philosophy.
9. Keeley, B., Little, C., & Zuehlke, E. (2019). The State of the World's Children 2019: Children, Food and Nutrition--Growing Well in a Changing World. *UNICEF*.
10. Bourre (2019). Effects of Nutrients (in Food) on the Structure and Function of the Nervous System: Update on Dietary Requirements for Brain. Part 1: Micro-nutrients. *J. Nutr. Health Aging; 10*:377–385.
11. Dipasquale, V., Cucinotta, U., & Romano, C. (2020). Acute malnutrition in children: pathophysiology, clinical effects and treatment. *Nutrients*, *12*(8), 2413.
12. Mwene-Batu, P., Bisimwa, G., Donnen, P., Bisimwa, J., Tshongo, C., Dramaix, M., ... & Briend, A. (2022). Risk of chronic disease after an episode of Marasmus, Kwashiorkor or mixed–type severe acute malnutrition in the democratic Republic of Congo: The Lwiro Follow-Up Study. *Nutrients*, *14*(12), 2465.
13. Universal Class (2023). Basic Nutritional Concepts and What Children need
14. Sandesh, N., & Wahrekar, S. (2017). Choosing the scientific journal for publishing research work: Perceptions of medical and dental researchers. *Clujul Medical*, *90*(2), 196.
15. Dhaliwal, S. S., Sharma, V., & Shukla, A. K. (2022). Impact of micronutrients in mitigation of abiotic stresses in soils and plants—A progressive step toward crop security and nutritional quality. *Advances in Agronomy*, *173*, 1-78.
16. Onwuzoo, A. (2023, December 17). 23 years after, Nigeria yet to meet 15% health budget. Punch. https://punchng.com/23-years-after-nigeria-yet-to-meet-15-healthbudget/# :~: text=Kindly%20share%20this%20story%3A,in%20the%202024%20appropri ation%20bill.
17. Kalu, R. E., & Etim, K. D. (2018). Factors associated with malnutrition among underfive children in developing countries: A review. *Global journal of pure and applied sciences*, *24*(1), 69-74.
18. Chong, C. T., Lai, W. K., Mohd Sallehuddin, S., & Ganapathy, S. S. (2023). Prevalence of overweight and its associated factors among Malaysian adults: findings from a nationally representative survey. *PloS one*, *18*(8), e0283270.
19. Le Doare, K., Holder, B., Bassett, A., & Pannaraj, P. S. (2018). Mother's milk: a purposeful contribution to the development of the infant microbiota and immunity. *Frontiers in immunology*, *9*, 325188.
20. Marina et al., (2022). The Effects of Nutritional Interventions on the Cognitive Development of Preschool-Age Children; 14(3): 532.doi: 10.3390/nu14030532. PMCID: PMC8839299.
21. Saeed, F., Ahmed, A., & Afzaal, M. (Eds.). (2023). *Combating Malnutrition through Sustainable Approaches*. BoD–Books on Demand.
22. Ghosh, P., Muhasina, K. M., Pandey, N., Justin, A., Singh Bisht, S., Basavan, D., & Palaniswamy, D. (2023). Ayurveda and Traditional Foods to Supplement Nutrition in India. In *Emerging Solutions in Sustainable Food and Nutrition Security* (pp. 371-396). Cham: Springer International Publishing.
23. Nicholl, P. (2019). "For every child, the right to a childhood" UNICEF (2019). *Child Care in Practice*, *25*(4), 345-348.

24. Ersado, T. L. (2022). Causes of malnutrition. In *Combating Malnutrition through Sustainable Approaches*. IntechOpen.
25. Yalçın, N., Armut, M., Çakır, B. K., & Demirkan, K. (2019). Drug-induced nutritional disorders. *Clinical Science of Nutrition*, *1*(3), 113-122.
26. Mother Child Health Education Trust; (2021) US: Underlying Causes of Malnutrition.
27. Avery (2021). Food insecurity and malnutrition. Kompass Nutrition and Dietetics ;1:3.
28. Burgess, A. (2008). Undernutrition in Adults and Children: causes, consequences and what we can do. *South Sudan Medical Journal*, *1*(2), 18-22.
29. Pridmore, P. J. (2019). Strengthening Municipal Governance to Tackle the Drivers of Child Malnutrition in Mombasa, Kenya. *SAGE Research Methods Cases Part 2*.
30. Harris, J., & Nisbett, N. (2021). The basic determinants of malnutrition: resources, structures, ideas and power. *International Journal of Health Policy and Management*, *10*(12), 817.
31. Nisbett, N., Harris, J., Backholer, K., Baker, P., Jernigan, V. B. B., & Friel, S. (2022). Holding no-one back: the nutrition equity framework in theory and practice. *Global Food Security*, *32*, 100605.
32. von Der Goltz, J., Dar, A., Fishman, R., Mueller, N. D., Barnwal, P., & McCord, G. C. (2020). Health impacts of the green revolution: Evidence from 600,000 births across the developing world. *Journal of health economics*, *74*, 102373.
33. Mtoi, E. H., & Nyaruhucha, C. N. (2019). Child care practices and nutritional status of under-five children in Tanzania: evidence from fishing communities in Pangani District. *Int. J. Asian Soc. Sci*, *9*(7), 390-405.
34. Maulina, R., Qomaruddin, M. B., Kurniawan, A. W., Fernandes, A., & Astuti, E. (2022). Prevalence and predictor stunting, wasting and underweight in Timor Leste children under five years: An analysis of DHS data in 2016. *Journal of Public Health in Africa*, *13*(2).
35. Chen, Y., & Fang, H. (2021). The long-term consequences of China's "Later, Longer, Fewer" campaign in old age. *Journal of Development Economics*, *151*, 102664.
36. Sufiyan et al., (2016). Effects of maternal literacy on nutritional status of children under five years of age in the Babban- Dodo community, Zaria city, Northwest Nigeria.
37. Choudhary, S., Meratwal, G., Bodat, S., & Choudhary, R. (2020). Determinants of Nutritional Status in Children Aged 0-6 Years in Rural Rajasthan. *Journal of Evolution of Medical and Dental Sciences*, *9*(28), 1977-1983.
38. Leroux, J., Morrison, K., & Rosenberg, M. (2018). Prevalence and predictors of food insecurity among older people in Canada. *International journal of environmental research and public health*, *15*(11), 2511.
39. *B*lack et al, (2018). maternal and child under-nutrition and overweight in low income and middle income countries. the Lancet, 382,427-451 https://doi.org/10.1016/SO140-6736(13)60937-X
40. United Nations (2018), intervention
41. Sylvain D. (2022). physical Development for Growth and Nutrition in Children
42. Govender, I., Rangiah, S., Kaswa, R., & Nzaumvila, D. (2021). Malnutrition in children under the age of 5 years in a primary health care setting. *South African Family Practice*, *63*(1).
43. Ramsuroop, J., Gutu, L., Ayinde, W. B., Basitere, M., & Manono, M. S. (2024). A Review of Biological Processes for Dairy Wastewater Treatment and the Effect of Physical Parameters Which Affect Their Efficiency. *Water*, *16*(4), 537.

44. Soumya, M. P., & Nampoothiri, K. M. (2021). An overview of functional genomics and relevance of glycosyltransferases in exopolysaccharide production by lactic acid bacteria. *International Journal of Biological Macromolecules*, *184*, 1014-1025.
45. Pandey, A., Harohalli Masthigowda, M., Kumar, R., Pandey, G. C., Awaji, S. M., Singh, G., & Pratap Singh, G. (2023). Physio-biochemical characterization of wheat genotypes under temperature stress. *Physiology and Molecular Biology of Plants*, *29*(1), 131-143.
46. NACS-National Assessment and Classification User's guide (2018)
47. Rahman, S., Khan, M. A., Anam, M. R., Nahar, Y., & Ara, S. (2023). Anthropometric measures in Bangladeshi schoolchildren to determine body composition and nutritional status: a descriptive cross-sectional study. *International Journal of Community Medicine and Public Health*, *10*(1), 57.
48. Diddana, T. Z. (2021). Obesity and Weight-loss Medication. *Journal of*, *7*(1).
49. Jin, H., Li, B., & Jakovljevic, M. (2022). How China controls the Covid-19 epidemic through public health expenditure and policy? *Journal of Medical Economics*, *25*(1), 437-449.
50. Asim, M. H., Ijaz, M., Mahmood, A., Knoll, P., Jalil, A., Arshad, S., & Bernkop-Schnürch, A. (2021). Thiolated cyclodextrins: Mucoadhesive and permeation enhancing excipients for ocular drug delivery. *International Journal of Pharmaceutics*, *599*, 120451.
51. Savira, F., Magaye, R., Liew, D., Reid, C., Kelly, D. J., Kompa, A. R., ... & Wang, B. H. (2020). Cardiorenal syndrome: Multi-organ dysfunction involving the heart, kidney and vasculature. *British journal of pharmacology*, *177*(13), 2906-2922.
52. Andrew, L., Wallace, R., Wickens, N., & Patel, J. (2021). Early childhood caries, primary caregiver oral health knowledge and behaviours and associated sociological factors in Australia: a systematic scoping review. *BMC Oral Health*, *21*, 1-14.
53. Davis, K. D., Aghaeepour, N., Ahn, A. H., Angst, M. S., Borsook, D., Brenton, A., ... & Pelleymounter, M. A. (2020). Discovery and validation of biomarkers to aid the development of safe and effective pain therapeutics: challenges and opportunities. *Nature Reviews Neurology*, *16*(7), 381-400.
54. Mendez-Guerrero, O., Carranza-Carrasco, A., Chi-Cervera, L. A., Torre, A., & Navarro-Alvarez, N. (2024). Optimizing nutrition in hepatic cirrhosis: A comprehensive assessment and care approach. *World Journal of Gastroenterology*, *30*(10), 1313.
55. Penzavecchia, C., Todisco, P., Muzzioli, L., Poli, A., Marangoni, F., Poggiogalle, E., ... & Donini, L. M. (2022). The influence of front-of-pack nutritional labels on eating and purchasing behaviors: a narrative review of the literature. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *27*(8), 3037-3051.
56. Regan (2021). Overview of dietary assessment methods for measuring intakes of foods, beverages, and dietary supplements in research studies. 70. 91- 96.
57. Campbell VA, & Dodds ML. (2020). Collecting Dietary information from Groups of older people. *J Am Diet Assoc;* 51:29-33.
58. Thompson P. and Byers F. (2019).Dietary Assessment Resource Manual. *The Journal of nutrition;* 124:2245S-2317S.
59. Marr D. (2019). Within- and between-Pearson Variation in Dietary Surveys: Number of Days Needed to classify Individuals. *Human nutrition. Applied nutrition;* 40: 347-364.
60. Gersovitz et al., (2018). Validity of the 24-Hr. Dietary Recall and seven-Day Record for Group Comparison. *J Am Diet Assoc;* 73:48-55

61. Jun, S., Cowan, A. E., Bhadra, A., Dodd, K. W., Dwyer, J. T., Eicher-Miller, H. A., ... & Bailey, R. L. (2020). Older adults with obesity have higher risks of some micronutrient inadequacies and lower overall dietary quality compared to peers with a healthy weight, National Health and Nutrition Examination Surveys (NHANES), 2011–2014. *Public health nutrition*, *23*(13), 2268-2279.
62. Carmen D., (2015). Food frequency questionnaires. 3: 49-56. doi;10.33051nh. 31 sup3.8751.
63. Reynolds, C. J., Pade, C., Gibbons, J. M., Otter, A. D., Lin, K. M., Muñoz Sandoval, D., ... & Moon, J. C. (2022). Immune boosting by B. 1.1. 529 (Omicron) depends on previous SARS-CoV-2 exposure. *Science*, *377*(6603), eabq1841.
64. Sonestedt, E., Borné, Y., Wirfält, E., & Ericson, U. (2021). Dairy consumption, lactase persistence, and mortality risk in a cohort from southern Sweden. *Frontiers in nutrition*, *8*, 779034.
65. Ajmera, V., & Loomba, R. (2021). Imaging biomarkers of NAFLD, NASH, and fibrosis. *Molecular metabolism*, *50*, 101167.
66. Beaton et al., (2018). Source of Variance in 24-Hour Dietary Recall Data: Implications for Nutrition Study Design and Interpretation. Carbohydrate Sources, *Vitamins, and Minerals. Am J Clin Nutr* 37: 986-95.
67. Baglio et al., (2020). Assessment of interobserver reliability in nutrition studies that use direct observation of school meals. *J Am Diet Assoc. 104*(9):1385-92.
68. Baranowski et al., (2021). The accuracy of children's self-reports of diet: Family Health Project. *J Am Diet Assoc. 86*(10):1381-5.
69. Jama (2020). Strategies to prevent malnutrition and improve nutrition:http://vikaspedia. in
70. National Academy of Sciences (2020), https://nap.nationalacadem ies.org/author/NAS/nati onal-academy-of-sciences
71. Pawlak, Karolina, and Małgorzata Kołodziejczak. "The role of agriculture in ensuring food security in developing countries: Considerations in the context of the problem of sustainable food production." *Sustainability* 12, no. 13 (2020): 5488.
72. Lin, F. R., Pike, J. R., Albert, M. S., Arnold, M., Burgard, S., Chisolm, T., ... & Coresh, J. (2023). Hearing intervention versus health education control to reduce cognitive decline in older adults with hearing loss in the USA (ACHIEVE): a multicentre, randomised controlled trial. *The Lancet*, *402*(10404), 786-797.
73. Stierman, B., Afful, J., Carroll, M. D., Chen, T. C., Davy, O., Fink, S., ... & Akinbami, L. J. (2021). National Health and Nutrition Examination Survey 2017–March 2020 prepandemic data files development of files and prevalence estimates for selected health outcomes.
74. Das, Ipsita, Thomas Klug, P. P. Krishnapriya, Victoria Plutshack, Rajah Saparapa, Stephanie Scott, Erin Sills, Njeri Kara, Subhrendu K. Pattanayak, and Marc Jeuland. "Frameworks, methods and evidence connecting modern domestic energy services and gender empowerment." *Nature Energy* 8, no. 5 (2023): 435-449.
75. Lovell-Badge, R., Anthony, E., Barker, R. A., Bubela, T., Brivanlou, A. H., Carpenter, M., & Zhai, X. (2021). ISSCR guidelines for stem cell research and clinical translation: the 2021 update. *Stem cell reports*, *16*(6), 1398-1408.
76. van den Berg, G. H., Huisman-de Waal, G. G., Vermeulen, H., & de van der Schueren, M. A. (2021). Effects of nursing nutrition interventions on outcomes in malnourished hospital inpatients and nursing home residents: A systematic review. *International journal of nursing studies*, *117*, 103888.

77. Alderwick, H., Hutchings, A., Briggs, A., & Mays, N. (2021). The impacts of collaboration between local health care and non-health care organizations and factors shaping how they work: a systematic review of reviews. *BMC Public Health*, *21*, 1-16.
78. UNICEF. (2018). Global annual results report 2018: goal area 5: every child has an equitable chance in life.