

**THEORY OF NUTRITION AND ESSENTIAL ELEMENT OF INTER-RELATIONSHIP  
WITH HUMAN NUTRITION**

**BY**

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***ABSTRACT***

*Certain people are more susceptible to inadequate nutrition than others. For examples, individuals in rapid growth period such as infants, adolescents and pregnant women, have higher nutritional needs than others and are therefore, more susceptible to the effect of inadequate nutrition other known as Malnutrition. Those living in deprived socio-economic circumstance or that lack adequate sanitation, education, or means to procure food that are nutritionally rich, are also at risk. Lack of adequate nutrition perpetuates poverty; it blunts the intellect and saps the productivity of every one it touches. Thus, quality of food and feeding is an important issue in health outcomes.*

***Key words: Nutrition, growth, measurement of growth, theories of nutrition***

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**INTRODUCTION**

Proper nutrition is powerfully good; people who are given adequate nutrition are generally healthy. IAEA (2006) observe that micro-nutrients deficiencies have major health consequences in early life as adequate micro-nutrient is essential for normal growth and development. One of the priority areas for IAEA's project in human nutrition is to combat micro-nutrient deficiencies particularly in infants and young children. Thompson (2006) says our knowledge of adequate nutrition has been increased this last years, in such a way that it is easier to achieve adequate nutritional level in order to achieve better quality life, and increase the average life time of a person or certain population. Thompson (2006) highlights the goals of adequate nutrition thus: Maintaining a normal weight through a perfect combination of a healthy diet and physical exercise, Balancing the diet through the whole day instead of balancing every single meal, Replacing saturated fat with non-saturated fat, Drinking enough water through the whole day, Increasing the consumption of fruits, vegetables and legumes to satisfy the needs of

vitamin, mineral and fibre, Reducing the amount and frequency of consumption of meat, eggs and hard cheese, Completely eliminating the consumption of industrially manufactured products, Dramatically reduce the consumption of sugar, keeping the consumption of sodium below a maximum of 2,400 milligrams per day and keeping alcohol consumption at minimum levels. Most importantly, individual at risk for systemic infections (particular-gastro-intestinal) and those who suffer of chronic disease at greatly increased risk because they require additional energy to support their immune system, but rather they have decreased absorption of nutrients. That is to say that these set of people require adequate nutrition to help them build more energy to boost their immune system and supply of energy.

WHO (2005) says, the WHO's Department of Nutrition for Health and Development is responsible for formulating dietary and nutritional guidelines for international use. Adequate nutrition include the following; Protein, energy (calories), vitamin A and carotene, Vitamin D, Vitamin E, Vitamin K, Thiamine, Vitamin B6, Vitamin C, Antioxidant, calcium, iron, zinc, selenium, magnesium, and iodine. If these elements are adequate this means the nutritional value is adequate too.

### **Concept of Nutrition**

According to WHO/FAO (1998), nutrition refers to the process by which the human body assimilates and utilizes food or nutrients, and also the physiological process by which man takes in food to meet the organism's physiological needs. They see proper nutrition as a reasonable diet and the healthy cooking and processing of food, which provides the human body with a sufficient amount of thermal energy and various nutrients, while keeping the balance among all the nutrients, so as to meet the body's normal physiological needs and keep the body in a healthy state.

Man considers food to be of vital importance throughout the course of life, nutrition is the basic element that maintains life and provides cells with necessary energy so as to properly coordinate the actions of the various tissues and organs. Human life is compared to a small growing tree, which needs constant watering, fertilizing and cultivating to make it possible for the plant to grow with vigor. Layman et al. (2003) stressed that in the course of supplementing nutrition, only balanced diet can prevent the body from having imbalanced nutrients, which leads to disease. They further advanced that nutritional supplement should be reasonable and scientific. That is, when one falls ill, one gets treatment; when one is healthy, one guards against disease.

Therefore, disease prevention is the primary issue in meaning health. Sound and balanced nutrition and improved lifestyle can adjust and increase the body's immunity. Undernourishment, over eating, and unbalanced nutrition are major manifestation of malnutrition, which directly affects ones health. One must eat appropriately to live a healthy life.

WHO (1996) say nutritional supplementation mainly comes from external sources, that is, food. However, there are many types of eating:

1. Eating for survival
2. Eating to satiate ones appetite;
3. balanced diet for healthy state (that is eating with control what ones likes and eating conscientiously what one dislike (WHO/FAO, 1998).

The key point in eating habits are moderation, vegetables, not eating over cooked foods, eating slowly, light taste, freshness; variety, coldness, and abstinence.

### **Growth in Infant**

The word “infant” is derived from the Latin word “infans” meaning “unable to speak”. Thus, many define infancy as the period from birth to approximately 2 years of age, when language begins to flourish. It is an exciting stage in life, of “first”– Smile, first successful grasp, first evidence of separation anxiety, first word, first –step, first sentence. The infant is a dynamic, ever changing being who undergoes an orderly and predictable sequence of neurodevelopment and physical growth. This sequence is influenced continuously by intrinsic and extrinsic forces that produce individual variation and make each infant’s growth path unique (Johnson & Blasco, 2007). Intrinsic influences include the child’s physical characteristics, state of wellness or illness, temperament, and other genetically determined attributes. Extrinsic influences emanates primarily from the family: the personalities and style of care giving by parents and siblings, the family’ economic state with impact on resources of time and money, and cultural Mileu into which the child is born (Johnson & Blasco, 2007).

Infant’s growth can be viewed broadly in terms of the traditional developmental milestones. This traditional developmental milestone provide a systematic approach by which to observe the progress of the infant over time. For instance a two (2) year old infant would not be able to speak well. Five word sentence to the child, whom at this stage does not follow simple command may represent echolalia typical of antism (echolalia is the involuntary repetition of words in a disordered form.

Although, according to Johnson & Blasco (2007), infant development occurs in an orderly and predictable manner. It proceeds from cephalic to caudal and proximal to distal as well as from generalized reactions to stimuli to specific goal-directed reactions that becomes increasingly precise. The quality of infant’s relationship with key individuals was considered central to future development. During the second half of the century the name of piglet became almost synonymous with child development. Piaget was the first to describe the infant as having intelligence (Johnson & Blasco, 2007). For centuries, it has been assumed that the infant’s mind was a ‘blank tablet waiting to be written on’. Because infants could not tell us what they were experiencing, it was believed that they saw and heard little and thought even less, with consciousness as adults, knew it not existing. Therefore, piaget revealed that infant were able, and capable of thinking, analyzing and assimilating.

### **Physical Growth**

Growth milestones are the most predictable, although they must be viewed within the context of each child’s specific genetics and ethnic influences. It is essential to plot the child’s growth on gender and age. Accordingly fetal weight gain is greatest during the third trimester. During the first two (2) months of life, this rapid growth continues, after which the growth rate decelerate. Birth weight is regained by 2 weeks of age and doubles by 5 month. Height does not double until between 3 and 4 years of age. Similarly, head growth during the first 5-6 months is due to continued neuronal cell division. Later increasing head size is due to neuronal cell growth and

supporting tissue proliferation (Barker et.al 1993). According to Johnson & Blasco (2007), large and small head size, both are relative red flag for developmental problems. Failure to develop protective reactive may indicate neurometo disorder.

### **Infancy:**

- Index finger to poke and explore object parts. When this occurs in concert with thumb opposition, the fine pincer grasp is mastered.
- Precise release of tiny objects follows, so that fundamental manipulative skill reach adult levels by the end of infancy.

### **Height and Weight:**

Although the majority of individuals who are of below or above average size are otherwise normal, there is an increased prevalence of developmental disabilities in these two subpopulations. When conferring deviation from norms in the specific child, family characteristics must be reviewed.

### **Measurement of growth**

Growth alters the size of the body, including its parts and organs. Shapes also change - like the young child's potbelly, which recedes during adolescence, and the round face that becomes oval. Not all growth changes, however, occur at the same rate. One child may become taller and heavier while another child's growth stays about the same. Any height, weight, length, or circumference changes in a child are measurable. The most practical indexes used for measuring growth are units of height and weight, expressed in terms of feet, inches, pounds, and ounces, or in metric units.

There are two periods of accelerated growth during normal development. A growth spurt occurs during infancy, the stage of development between birth and about eighteen months of age. By the age of four, the growth rate becomes fairly constants for the remainder of childhood. The second growth spurt begins between ten and fifteen years of age. Again, this growth rate gradually levels off until the individual attain full height at about sixteen to nineteen. The growth patterns for boys and girls are similar excerpt for the time when the growth spurts occur. For girls the growth spurt is approximately two years earlier than for boys, beginning between the age of about ten and twelve. Girls reach maximum height at about sixteen. Boys start their second growth spurt at about twelve and continue to grow at a rapid rate until about age fifteen or sixteen, followed by a gradual increase until they reach maximum height at about eighteen. In early adolescence, just before the second spurts, however, the average final height for boys is greater than for girls.

### **Theories of Nutrition**

There has been an ongoing debate between people in the field of nutrition which has caused a lot of confusion. This work seeks to explore the potential theories of nutrition by different schools of thoughts in order to unlock the secret of nature and the universe. According to Baba, Ohsum, Kanaya and Osumi (1999), weight loss or weight gain is all about calories, and 'a calorie is a calorie', no matter the source (e.g. carbs, fat, protein etc).

- (a) This theory “A calorie is a calorie” has most nutritionist as its proponents (such as Jack Groppell and Gillian McKeityh). This school of thought say that the weight loss or gained is a matter of “calories in, calories out”. Translated if one burns more calories than one takes in, a loss of weight will be experienced regardless of the calorie source, and if one eats more calories than what is burnt, each day, one is expected to gain more body weight regardless of the source of the calories. This theory is based on the fact that protein and carbohydrates contains approximately 4 calories per gram and the source of these calories matters not. They base this on the many each day, weight loss is the result and so it goes if one add x number of calories per day, what ensues is additional weight (Piatti, Piatte, Caumo, 1994).

However, the “calories in, Calories out” mantra fails to take into account modern research that finds that fat, carbohydrates and proteins have a very different effect on the metabolism via countless pathways, such as their effects hormones, effect on hunger and appetite, thematic effects worse, this theory according to Agus et al (2000) fails to take into account the fact that even within a macro nutrient, they too can have different effect on metabolism. This theory by this school of thought ignores the ever mounting volume of studies that have found diets with different macro-nutrient ratio with identical calorie intake have different effects on the body composition, cholesterol levels, oxidative stress etc. In translation, not only is the mantra “a calorie” confusing but very far from the others concept that different fat (e.g fish oil vs. saturated fats) have vastly different effect on metabolism and health in general.

Conversely, other scholars believe that if one eats large amount of some particular macro-nutrient in their magic ratios, the calories do not matter (Skov, 1999). For instance, followers of ketogenic style diet that consist high fat intakes and very low carbohydrate intake often maintain calories does not matter in such diet. But others maintain that if one eats very high protein intake with very low fat and carbohydrate intakes, calories does not matter. But the effect such diet have on various pathways is not considered like the old school of thought.

The simple realities of human physiology and as well as the law of thermodynamics is being ignored.

- (b) “The Brink’s Unified Theory of Nutrition”

“**Total** calories dictate how much weight a person gains or losses;

Macronutrient ratio dictates what a person gains or losses”.

This simple statement allows people to understand the differences that some people put on the same calorie intake but very different ratios of carbohydrate, fat and proteins; will lose different amount of body fat and or lean body mass, studies from this theory has it that people on a higher protein, lower carbohydrate diet lose approximately the same amount of weight as another on a higher carbohydrate lower protein diet. But the group of people on the higher protein diet lost more actual fat and less lean body mass (muscle) (Layman, Bioleau, Erickson, Paiter shive, Salther and christou, 2003). The study also reveals that using the same calorie intake but different macro-nutrients intake often find the higher protein diet may lose less actual weight than the higher carbohydrate, lower protein diets. The actual fat loss is higher in the higher protein low carbohydrate diets. The effect is usually amplified if exercise is involved as one might expect.

According to Layman et al (2003), this theory by Will Brink is a unification of the theories by the other two schools of thought that “calorie is a calorie” and “calorie does not matter”. Brink in his unified theory has been able to come away with the fact that the total calorie intake dictates how much weight a person gains or losses. Garrow, Webster, Pearson, Pacy and Harpin (1981) observe that diets with identical energy contents can be having different effects on leptin concentration, energy expenditure, voluntary food intake, and nitrogen balance, this suggest that the physiological adaptation to energy restriction can be modified by dietary composition. Knowing this, it becomes important for people to ferret out the truth about their nutritional diet composition. Farnsworth and Clifton (2003) observe that an optimal diet designed to make a person loss fat and retain as much LBM as possible is not the same as a diet simply designed for a person to lose weight.

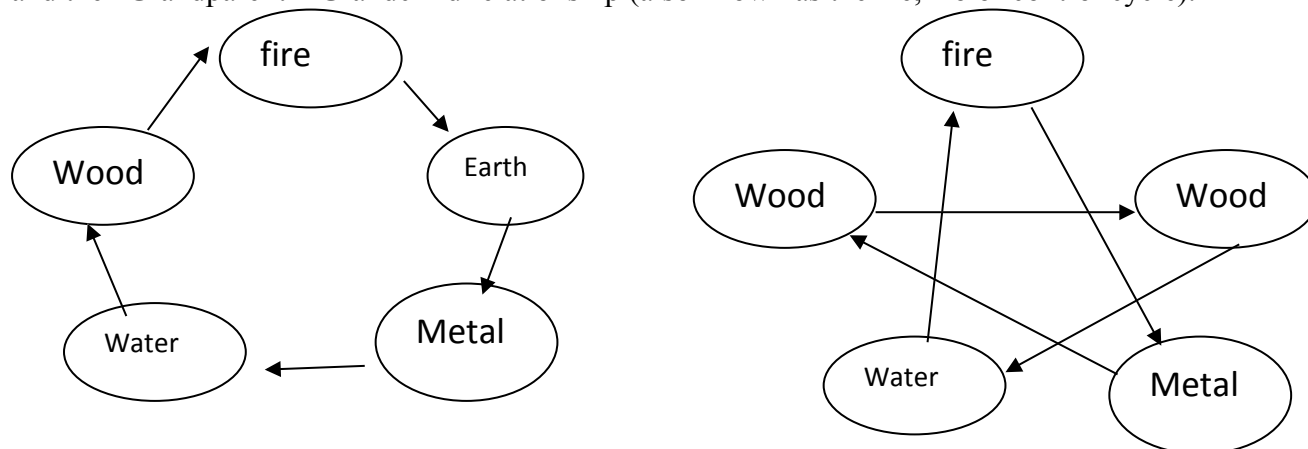
Brink (2000) through his unified theory opines that the optimal diet for losing fat or gaining muscle, or what ever the goal may be must account not only for the total calories, but macronutrients ratios that optimize metabolic effects and answer the questions what effect would this diet have on appetite? Diets that give the same macro-nutrients ratio to all people regardless of total calories, goals, activity level, etc. will always be less than optimal. That optimal macro-nutrients ratio can change with total calories and other variables, (e.g. 40/30/30 or 70/30/10, etc).

(c) “The Traditional Chinese Medicine Nutrition Theory” (TCM – Nutrition Theory).

This theory is also known as the “five –element theory”. The TCM theory provides a framework (from the five-element) which aids one in making food choices that will be best beneficial to a person at a given time. According to Dupuis (2006) five essential elements or factors have an inter-relationship with humans nutrition, and this elements must be kept in balance. The five elements are:

- ❖ Fire
- ❖ Earth
- ❖ Metal
- ❖ Water
- ❖ Wood

In order to make it clear how food fits into the theory, the relationship between these elements is taken into account first. There are two main relationships to be acquainted in order to understand the application of this five elements theory. Firstly, is the “Mother-son relationship” (also cycle) and the “Grandparent – Grandchild relationship” (also known as the Ke, Ko or control cycle).



**Figure 2.2**

**The five essential elements showing the inter-relationship with human nutrition,**

From the above, the generating cycle shows that fire, for example, helps support Earth and from the Control Cycle, Fire controls the growth of Metal. To understand how this might be applied, considering a person experiencing problems with Asthma. Asthma is a Metal (Lung) condition sometimes with an underlying physiological component of grief or sadness. From TCM perspective, Asthma may present as a phlegm damp condition. Therefore, following the Five element theory, we see that the earth (spleen) may be weak (phlegm damp coming from poor digestion, etc.) and not supporting metal (lung) resulting in an Asthmatic condition.

The Five element theory suggests that we would want to eat foods which strengthen the Metal (Lung), Earth (Spleen) and Fire (Heart) Element we would choose a majority of our foods from the metal grouping and an ample selection from both the earth and fire categorizations until our condition changes. Pitchford (2006) opines that the food choice should be thus:

- (i) Brown Rice – Increases strengthens spleen
- (ii) Navy Beans – Sweet flavour, benefits the lungs, and spleen (both aspects of Metal)
- (iii) Almonds – relieve stagnant of the lungs transform phlegm
- (iv) Mustard Green - Influences lungs, clear chest congestion, improve energy circulation.
- (v) Onions -Resolves phlegm and inflammations of the upper respiratory system.
- (vi) Radish -Transforms phlegm
- (vii) Pear -Affects the lungs, eliminates phlegm
- (viii) Avoid dairy (which may add mucus/phlegm), meat (which may weaken the spleen) and sweeteners (which may weaken the spleen and contribute to dampness).

In general, from Pitchford (2006) it is most important to eat food which follow the basic tastes, which correspond to the element that may strengthen the body and avoid foods which weakens it. That is to say, one may want to eat food, which falls into the pungent, sweet, and bitter categories, and avoid foods, which aggravate elements like sugar, meat and egg etc.

The assertion of this “Five Element Theory” is that one should try as possible to eat food that will not only sweet or tasty but that which would support the strengthening of the body component to always be active and function, while avoiding that which is sweet but poses danger to the health.

(d) Another important nutrition Theory Worthy of note is the “Solar Nutrition Theory”

This theory states that “it is not what you eat; it is when you eat it”. Solar nutrition is a time-determined eating system designed to maximize the utilization and assimilation of the sun’s energy from food, release cellular trauma, and optimize health and vitality. The solar nutrition theory is sometime known as the “Time Controlled Nutrition theory”.

According to Meckling (2002),

- ❖ Food have different nutritional values at different times of the day
- ❖ The organs of the body function on schedule.
- ❖ The pH of digestive fluid changes throughout the day.

Meckling (2002) adds that by eating certain foods at certain time of the day, solar energy ensures that food nutrients are aligned with nutritional needs of the body, providing complete digestion of the proteins, carbohydrates, fats, vitamin and mineral required by active cells, organs and system. Healthy nutrition contributes to decreasing risk of today’s leading health problems. Studies show that early indicators of chronic disease begins at youth. For instance,

obesity in childhood and youth is important because obesity tends to continue in adulthood, contributing to chronic disease. Furthermore, hardening of the arteries and high blood cholesterol levels, which are major contributors to coronary heart disease, are influenced by nutrition and lifestyle. Nutritionists say that proper nutrition and physical activity are likely to have long term health benefits in reducing the growing number of diet-related disease. In a related research on obesity in infants, by UNESCO (1990) in central African, Europe, American and other parts of the world found that, countries in the developed world had the least presence of obesity, the developing nations had a lesser prevalence while nations in the underdeveloped world had more prevalence condition of obesity. The result shows that 10% to 25% most European countries, 20% to 25% in some countries in America, up to 40% in some countries in Asian countries and more than 50% in some countries in Africa. The result analysis has it that the prevalent condition of obesity in infants is wholly caused by inadequate nutrition or imbalanced diet.

Barker et.al (1993) argue that infants who are well cared for, with more adequate diet score higher on test when they begin schooling than those with less adequate nutrition. The studies conducted in Honduras, Kenya and the Philippines show that academic performance and mental ability of children that are given adequate nutrition are significant higher than pupil's with poor nutritional status, independent of family income, school quality and teaching ability. The studies show that nutritional status of the infant is significant to the mental ability of the child. More so, Ajani (2004) revealed that mal-nutrition causes death and impairs the growth and development of the infant. In their research of the effects of mal-nutrition taking samples from West African Countries shows that 74% of the death of infants in this studying area, under the age of 5 is caused by under mal-nutrition. The research has it that mal-nutrition disrupts growth and weak the development of the infant, producing less healthy and less productive adults. In their protein-energy malnutrition (PEM) study, it shows that the number of protein- energy malnourished children has risen so high. The research reveals that carbohydrates dominate the nutritional status of food in Africa and its Diaspora countries. Most homes prepare food that derive much of its food energies (calories) from carbohydrate. It shows that carbohydrates makes up about 65%, fat about 20%, Water/mineral about 5% while the remaining 10% is for protein derived from meat and fish or beans and Sorghum. This is because the major foods in Africa are Starchy food like cassava, millet, corn, potatoes, plantain etc. (WHO/FAO, 1998).

## **Conclusion**

Adequate nutrition determines the level of growth of the pre-school children. A child whose diet is not balanced right from when he or she was a baby is bound to perform poorly in academic and this is as a result of lack of vitamin that is responsible for the development of the brain in his or her body. Proper feeding enhances development of body and brain. When a child takes in enough food, the child will be strong enough to receive lesson in the school.

## **Recommendations**

1. Government should provide drugs such as food supplements and other multivitamins for the school children as their growth is determined by their nutritional intake.
2. Adequate nutrition is necessary for the weight of the pre-school children so parents should not allow essential vitamins to lack in their daily meals.



3. Government should not hesitate to make cost of living to be low so that parent will be able to provide the needed balance diet to the pre-school children as this is essential for the determination of their growth.

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