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Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com



Review Article

Linking Nutrition Economics with Economic Principles

¹A.N. Maduforo, ¹G.T.O. Otitoju, ²B.O. Mbah and ^{1,3}C.E. Okoro

¹Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria

²Department of Home Science and Management, University of Nigeria, Nsukka, Enugu State, Nigeria

³Nutrition Section, Federal Capital Territory, Primary Health Care Development Agency, Garki, Abuja, Nigeria

Abstract

Nutrition economics is an emerging discipline in nutrition which studies the cost effectiveness of nutrition, their interrelationship with health and cost of nutritional related diseases. There is scarcity of data on the subject of nutrition economics and its link with economic principles. This review provided information on nutrition economics, economic principles and the relationship between economic principle and nutrition economics. There are 10 economic principles. These principles are categorised into three main groups: principles of how people make decisions, principles of how people interact and principles of how the economy as a whole works. Each of these 10 principles have a direct or indirect relationship with nutrition and nutrition economics. Malnutrition invariably has negative impact on the national development either through the resources spent in managing or treating diet related diseases and/or undernutrition and/or micronutrient deficiency. Therefore, prevention of all forms of malnutrition has a positive impact on national development because optimal nutrition ensures a healthy workforce that will be productive and possess innovative ideas that could transform the economy of nations.

Key words: Cost, economics, health, malnutrition, national development, nutrition

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Corresponding Author: A.N. Maduforo, Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria

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INTRODUCTION

Economics is the branch of knowledge concerned with the production, consumption and transfer of wealth¹. In another concept, economics is "the study of how society manages its scarce resources, how people decide what to buy, how much to work, save and spend, how firms decide how much to produce, how many workers to hire, how society decides how to divide its resources among national defence, consumer goods, protecting the environment and other needs"². National defence in this sense means the investment on security of the nation. How much do you invest and when do you invest and how do you invest it? There is a strong association between the security of nations and their nutritional indices. Hunger has the capacity to erupt violence and crimes. While nutrition on the other hand, is the science of how living organisms obtain and use food to support all the processes required for their existence. The study of human nutrition incorporates a wide variety of scientific disciplines. Some nutritionists, for example, are interested in food production and availability, whereas others conduct research on why people choose to eat certain foods. Still others investigate the relationships between diet and heart disease, how nutrition can influence athletic performance and whether the composition of our meals can influence weight management³. Indeed, the field of nutrition incorporates a broad array of important scientific and cultural aspects³.

Nutrition economics: Nutrition economics attempts to answer the question on "how does your diet impact your health expenditures?"⁴. It is not hidden that health care costs in the world continue to increase rapidly⁴. It has been reported that in Nigeria there is a drastic increase in diet related diseases⁵. These include overnutrition related diseases such as obesity, cardiovascular diseases, diabetes mellitus, cancer and arthritis as well as undernutrition related diseases such as protein energy malnutrition, stunting, wasting, severe acute malnutrition, micronutrient deficiency (hidden hunger) and many others^{5,6}.

Nutrition economics is also described as the integration of nutrition and health economics disciplines⁷. In nutrition economics, the effect of an individual's nutrition is evaluated to determine its cost effectiveness. It assesses whether a healthy diet consumed by individuals reduces healthcare expenditures and frequency of diseases⁷. More specifically, nutrition economics is defined as "a discipline dedicated to researching and characterizing health and economic

outcomes in nutrition for the benefit of society"⁸. Nutrition economics is a fusion of health economics and nutrition disciplines to assess the impact of diet on health and disease prevention. These studies, how specific dietary modifications and following dietary recommendations will yield a characteristic change in health and health expenditures⁸.

Nutrition economics is a new discipline that requires development to enhance effective policy making. Thus, the rationale for increasing research capacity and funding in nutrition economics includes its potential to offer a better comprehension of both nutrition, in the context of having a significant effect on health outcomes and health economics. Government and individuals desire to know how much in monetary terms they could gain from a transaction hence, nutrition economics research output will serve as a motivational basis for policies of government and actions of individuals to invest in nutrition because of its cost effectiveness⁸. Nutrition economics concept is a merger for health economics and the cost effectiveness of adequate nutrition to prevent diseases and attain optimal health. This emerging research field focuses on the interdependency between nutrition habits, health and public expenses⁷. Nutrition economics supports nutrition, health economics and health policy development in an evidence and health benefit-based manner⁸. Thus, it will enhance the understanding of nutrition's impact on health outcomes and of its absolute and relative economic effect⁷.

Economic principles: Gregory Mankiw in his book "Principles of Economics" outlined Ten Principles of Economics which include the following¹: (1) People face trade-offs, (2) The cost of something is what you give up to get it, (3) Rational people think at the margin, (4) People respond to incentives, (5) Trade can make everyone better off, (6) Markets are usually a good way to organize economic activity, (7) Governments can sometimes improve market outcomes, (8) A country's standard of living depends on its ability to produce goods and services, (9) Prices rise when the government prints too much money and (10) Society faces a short-run trade-off between Inflation and unemployment. These principles are categorised into three main groups: (1) The Principles of How People Make Decisions: This category includes principle 1 to principle 4 outlined above, (2) The Principles of How People Interact: This group is made up of principles 5, 6 and 7 outlined above, (3) The Principles of How the Economy as a Whole Works: Principles 8-10 outlined above are the components of this category.

RELATIONSHIP BETWEEN NUTRITION ECONOMICS AND ECONOMIC PRINCIPLES

The principles of how people make decisions

- **People face trade-offs:**

Everything people do including their decisions and actions involve trade-offs. Having more money to purchase more stuff requires working longer hours, or having other sources of income which leaves less time for leisure². "Society faces an important trade-off: efficiency vs. equality"². Efficiency is described as when society gets the most from its scarce resources while equality is achieved when prosperity is distributed uniformly among society's members². Thus, the trade-off here means "to achieve greater equality, redistribute income from wealthy to poor". But this reduces incentive to work and produce, which will invariably reduce the size of the economy as well²

Therefore, this principle is further explained as a situation that involves losing one quality or aspect of something in return for gaining another quality or aspect¹. Applying this to nutrition therefore is exemplified as follows: When the government or individuals invest in nutrition for children, there will be healthier children in the future. Mothers who breastfeed their children exclusively enjoy the benefits for the child, the mother and the society⁹⁻¹¹. Better nutrition in the first 1000 days of life means better brain development for the children and thus ensures a brighter future for the child and the nation at large¹². It has been reported that improving nutrition benefits, any nation by increasing productivity, economic development and poverty reduction through improvement in physical work capacity, cognitive development, school performance and health by reducing disease and mortality^{12,13}. On the other hand, it has been established that poor nutrition propagates the cycle of poverty and malnutrition through three major means: direct losses in productivity from poor physical status and losses caused by diseases related with malnutrition; indirect losses from poor cognitive development and losses in schooling; and losses caused by increased health care costs¹³.

The annual economic costs of malnutrition have been estimated to amount to several billion dollars in terms of lost gross domestic product (GDP)¹³. In Nigeria, there are losses of over US\$1.5 billion in GDP to vitamin and mineral deficiencies yearly^{14,15}. While the cost of scaling up core micronutrient interventions is estimated to be less than US\$188 million per year¹⁵. The economic returns to investing in nutrition are very high¹³. Thus, in the principle of people face tradeoffs as

applied to nutrition means that people will lose one quality (money) or aspect of something (time, care, food and nutrition security) in return for gaining another quality or aspect (such as all the benefits of good nutrition including the health and economic benefits as well as national development).

- **The cost of something is what you give up to get it:**

"There is no free lunch" is a popular adage. This principle means nothing comes for free in this world thus, one needs to give up something in order to gain something else¹. Making decisions requires one to compare the costs and benefits of alternative courses of action. This principle introduces the concept of opportunity cost which is defined as what you give up to get another. It is the relevant cost for decision making². This principle is applicable in nutrition economics such as when a nation desires to have a healthy and well-nourished populace, there is need to allocate resources for improved nutrition, ensure food security as well as, equip the healthcare system. It is therefore important to prioritize the budgetary allocation to nutrition programme implementation to facilitate the reduction in the burden of diseases related to nutrition. This will help in preventing nutrition related diseases through healthy diet, nutrition education and food and nutrition security by all people.

It has been reported that malnourished children require more health services and more expensive types of care than children who are not malnourished¹³. Malnourished children present poorer academic performance and may repeat years more frequently¹⁶, thereby increasing the cost of education. The World Bank has reported that developing countries spends an average of 2-7% of their health care budgets on direct costs for treatment of obesity and related chronic diseases and the obesity problem is speedily increasing in the society¹³. In Nigeria, government is the largest employer of labour, thus, to actualize extensive coverage on the prevention of malnutrition and its co-morbidities, then government at all levels (local, state and federal) needs to make finance available for implementation of nutrition programmes that will help to cut cost on health treatment¹³.

- **Rational people think at the margin:**

Rational people strategically decide to do the best they can to realize their aims². This principle implies that people make decisions by evaluating costs and benefits of marginal changes, adjustments to a current plan². That is, they make

decisions “only if the marginal benefit of the action exceeds the marginal cost”¹. Thinking from the margin means to plan and strategize on future plans and the next line of action. The word “marginal” means “additional.” For example, the first glass of water on a hot day quenches your thirst but the next glass, may not be much. “If you think at the margin, you are thinking about what the next or additional action means for you”¹

Applying this principle to nutrition economics means “what will be the cost of preventing malnutrition and how much additionally will a nation benefit by preventing malnutrition?”. Experts have reported that all forms of malnutrition impose high cost to individuals, families and to entire nations. The estimated effect of malnutrition on the world economy is attributed to be as high as US\$3.5 trillion per year, or US\$500 per individual¹⁶. The high spending on treatment is as a result of lack of enough budgetary allocation and implementation of nutrition programmes that would prevent malnutrition. About 45% of diseases have been linked to poor nutrition, as well as premature adult death-related to diet-related non-communicable diseases (NCDs)^{17,18}. Other consequences of malnutrition include: impaired learning potential, poor school performance, low productivity and increased health care costs¹⁸.

It is reported that undernutrition among mothers and children contributes to more than 10% of the global disease burden¹⁹. At least 2.6 million people have been reported to die each year as a result of being overweight or obese¹⁸. Experts have therefore stated that it is essential that addressing all forms of malnutrition becomes a top priority for policy makers in every country¹⁸. This is because a continuous reduction in all forms of malnutrition will play a major role in poverty reduction, enhance development and save cost incurred in the treatment of malnutrition-related diseases¹⁸.

Choosing the right set of actions to resolve malnutrition demands good evidence of what works in policy terms¹⁸. It is highly recommended that policymakers make their decisions based on the known cost-effectiveness of immediate actions, bearing in mind future accrued costs if appropriate actions are delayed¹⁸. Thus, reducing malnutrition in developing and developed countries needs an intelligent, visionary and strategically sound leadership that would consider the cost effectiveness of preventing and fighting malnutrition.

• **People respond to incentives:**

Incentive is something that induces a person to act, i.e. the prospect of a reward or punishment². For example, when

cigarette taxes increase, teen smoking reduces because it will increase the cost². People respond to incentive because they make their decision by comparing costs effectiveness of their action¹. In the study of economics, incentive plays a central role and is fundamental to analysing how market work¹. When the price of food reduces, there is increase in food security, thus even the poor can afford to have access to food. During fruits season in Nigeria, the cost of buying fruits reduces, many people tend to eat more fruits. The more fruits consumption means more intake of micronutrients and thus, more reduction or prevention of “hidden hunger” (micronutrient deficiency). Many people do not have the knowledge of good nutrition and therefore, this impedes the actualization of optimal nutrition status for the populace in Nigeria. If the government will make adequate budgetary allocation to nutrition education and strategically implement same through different media such as television, radio, focus group presentation, extension services as well as research and development, there will certainly be a positive response by reduction in the incidence and prevalence of malnutrition in Nigeria

People respond to incentives, this principle could also be applied in how health and nutrition workers are encouraged. Capacity building of health workers on nutrition will enhance performance and better output by workers. Nutrition workers will have inner persuasion to work and to achieve excellent results when incentives are given for their performance. Such incentives could be national award, training, monetary rewards, promotion and many other ways. The incentives given to people will certainly return better economic benefits. Nutrition is at the fulcrum of any developmental progress of a nation. If the populace feed well, they will think better, be more innovative in problem solving and enhance the national development in the long run.

The principles of how people interact

• **Trade can make everyone better off:**

Globalization of trade has made it that rather than being self-sufficient; people can specialize in producing goods or services and exchange it for other goods or services². This economic principle means that trade allows each person to specialize in the activities he or she does best¹. Thus, by trading with others, people can buy a greater variety of goods or services at a cheaper rate and easier^{1,2}. In Nigeria, application of this principle abounds in our various health facilities. If a dietitian-nutritionist is employed to provide nutrition counselling services and nutrition education, the patients/clients will be better off. It will also increase

effectiveness and efficiency in patients' management. Thus, this encourages division of labour that when each member of the health care team performs their respective professional duties, patient management will be holistic and better. The work each member of the health care team performs will not be difficult and will equally consume less time for each professional as each of them have been adequately trained to perform those functions. Trade can make everyone better off. It could be applied to countries where one specializes in one skill or produces a particular therapeutic food product and another country buys it and employ the services or the skill developed in that country to make everyone better off.

- **Markets are usually a good way to organize economic activity:**

Market is a group of buyers and sellers, it does not need to be in a single location². In today's market, it could be online via Facebook, telephone, websites, Skype and other social media. To organize economic activity means determining what goods to produce, how to produce them, how much of each to produce and who gets them². The interaction of buyers and sellers determine the prices of goods and services. Each price reflects the goods value to buyers and the cost of producing the goods². Adam Smith stated that households and firms interacting in markets act as if guided by an "invisible hand." Because households and firms look at prices when deciding what to buy and sell, they unknowingly take into account the social costs of their actions. As a result, prices guide decision makers to reach outcomes that tend to maximize the welfare of society as a whole¹

In nutrition economics, locating markets in various communities will enhance people's accessibility to cheaper food products since it is a place of convergence of sellers and buyers and the law of demand and supply play a major role in controlling the price of goods and services. When the demand exceeds supply, price naturally goes up and vice versa. Seasonal food products are brought to the market for sale at a cheaper rate for consumers. The proximity of market location plays an essential role in enhancing individuals to frequently make their purchases at the market, thus maximizing the use of their resources.

- **Governments can sometimes improve market outcomes:**

This principle is simply described as "when a market fails to allocate resources efficiently, the government can change the outcome through public policy"¹. Such as policies against

monopolies in goods and services¹. The federal government of Nigeria has from time to time privatized its companies in order to break monopoly. One of the most successful of such policies was the deregulation of telephone services that introduced mobile phones and other networks into Nigeria. This made telephone services available to the poor local farmer. Today, information is not hidden or gotten to the local farmer late because of the telephone services available to them. However, there are challenges of poor network in some rural communities

Individuals are less motivated to work, produce, invest, or purchase if there is a large risk of losing their property². Government makes policies that increase security and safety of people's assets, when the means of livelihood is stolen, nutrition of the individual will certainly be affected through food insecurity, nutrition insecurity, lack of resources for education (lack of nutrition education) and invariably poor nutritional status outcome.

This principle could also be applied to when government makes policy to buy produce from farmers during harvest and safely store to make it available to the people during planting season so that food will be available all year round, this minimizes economic loss, pollution that would have resulted from disposal of spoiled agricultural produce, scarcity of foods and thus motivates farmers to produce more because they already have market for their produce. When this policy is not in place, a single buyer or seller has significant impact on market price (monopoly) but public policy may enhance efficiency². Thus, government may change market outcome to promote equity². In addition, if the market's distribution of economic well-being is not appropriate, tax or welfare policies can alter how the economic "pie" is divided².

The principles of how the economy as a whole works

- **Country's standard of living depends on its ability to produce goods and services:**

There is a wide gap in living standards across countries and over time². Thus, as a nation's productivity increases, so does its average income¹. The high-income country's standard of living is reported to be better than that of low-income countries by more than ten times². A typical example is United States of America. It is reported that U.S. standard of living today exceeds their standard of living 100 years ago by about eight times². The resources available to a country determines what they will be able to produce. Thus, the most essential determinants of living standard include: productivity, the amount of goods and services produced per unit of labour².

On the other hand, the available equipment, skills and technology determine productivity. Other factors which have been attributed to have far less effect on standard of living include: labour unions and competition from abroad²

The standard of living of any country is mostly first demonstrated by the nutrition status of that population. Nations with low standard of living will have high malnutrition index especially undernutrition such as stunting, wasting, underweight, severe acute malnutrition (SAM) and micronutrient deficiencies. However, overnutrition will not be lacking in those nations as most of the low-income countries have double burden of malnutrition and some with triple burden. For instance, in Nigeria, 37% of children under age 5 were reported to be short for their age or stunted, 18% of children were wasted or too thin for their height and 29% of children are underweight (low weight-for-age)²⁰. All the listed are forms of undernutrition occurring in Nigeria but there are also cases of overnutrition in the form of obesity which is one of the major risk factors for the increasing diet related non-communicable diseases⁵.

However, the agricultural production of a country determines the level of food security in that nation. When a country depends on its locally produced foods for most staple foods, the less resources they spend on food import duties on foods, the more food secure and the country will enjoy better nutrition security. Citizens of the country will also cultivate those major staples to provide for their family as well as sell to others. Export of goods and services increases a country's income, gross domestic product (GDP) and serves as a means of livelihood for the people. It has been stated that "countries whose workers produce a large quantity of goods and services per unit of time enjoy a high standard of living"¹. As a country's productivity increases, so does its average income increase^{1,2}. A typical life example is found in the United States of America which is a highly productive country, the citizens of America are highly paid thus, this grants them the capacity and ability to afford better standards of living: they can buy more household gadgets, cars and maintain better nutrition and healthcare^{1,2}. Thus, this validates this principle in nutrition economics that a "country's standard of living depends on its ability to produce goods and services"².

- **Prices rise when the government prints too much money:**

When a government prints large quantities of the country's money, the money value falls, thus resulting in increase in prices, demanding more of the same money to

purchase goods and services¹. In other words, inflation results when government prints too much money. Inflation is simply defined as increase in the general level of prices². The precipitator of inflation is almost always excessive growth in the quantity of money, which causes the value of money to fall². Thus, the faster the government prints money, the greater the inflation rate². Singh¹ documented a typical life illustration, when there is large quantity of money in circulation in the economy with a corresponding increase in the consumer's income (e.g. increase in minimum wage of workers), it results to increase demand for goods and services. Therefore, increase in purchasing power leads to excess demand that the producer may not be able to supply, thus, resulting to increase in the prices of goods and services i.e. inflation¹

Unfortunately, the increase in purchasing power of people in the country during inflation is not evenly distributed. Some people have no job or regular source of income in Nigeria, most individuals work for private firms which do not consider inflation rate in the salaries and wages of their workers during inflation, thus most of these people are low income earners who were struggling to feed themselves and families when there was no inflation, so during inflation, they are highly predisposed to food insecurity, nutrition insecurity and undernutrition. Increase in the prices of goods especially food stuffs will result in economic hardship for the retired elderly individuals, unemployed and low-income earners.

Government intervention during inflation and economic recession to ensure food security for everyone is needed to sustain adequate nutrition, optimal nutrition status and thus development of the country. A nation that its citizens feed well is a happy, healthy and high-income nation because the nutrition status of the people determines performance at school, intelligent quotient and productivity^{18,21}.

- **Society faces a short-run trade-off between inflation and unemployment:**

The principle states that there is an inverse relation between unemployment and inflation¹. In the short-run (1-2 years), many economic policies push inflation and unemployment in opposite directions². Recently, Nigeria experienced economic recession which resulted in massive unemployment, underpayment and/or lack of payment of workers' salaries and wages and a hike in the prices of goods and services. This is a practical example of the trade-off between inflation and unemployment that society faces.

During this period, there was high level of food insecurity which could precipitate undernutrition and poverty subsequently

CONCLUSION

This review has considered the meaning of nutrition economics, economic principles and the relationship between economic principles and nutrition economics. The findings showed that it is cheaper and better to prevent malnutrition than to treat it. It is equally more economically viable to adopt strategies that would encourage intake of adequate diet, food security and maintenance of optimal nutrition status to facilitate economic and developmental growth in any country.

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