

Nutrition Transition in Developing Countries: A Review

Azuike EC, Emelumadu OF, Adinma ED, Ifeadike CO, Ebenebe UE, Adogu PU

ABSTRACT

Background: *Over the centuries there have been changes in the diet of man. This is accompanied by changes in the level of activity and body composition. These changes have effects on the health of man. Modern science has continued to reveal the relationship between the changes in diet, physical activity, body composition of man and his health and the general effect on his life expectancy and quality of life. These changes occur at different rates in different parts of the world.*

Objective: *This paper aims at studying these shifts in pattern of diet, physical activity and body composition with special interest in developing countries.*

Method: *Relevant literature was reviewed from medical journals, library search, PubMed search, google search and search using other internet search engines. The key words employed were: Nutrition transition, with particular emphasis on developing countries.*

Result: *Several studies have given perspectives on nutrition transition, the factors that are responsible for the transition, the effects on the health of man, the scenarios in developed world and in the developing countries. Also highlighted are the challenges it poses to humanity and possible measures to arrest the situation.*

Conclusion: *It is obvious that nutrition transition is a reality that is present with humanity. In the developing world we have more problems on our hands as we have not succeeded in controlling the communicable diseases and the non-communicable diseases most of which are nutrition related are becoming predominant. This calls for action to prevent the dire consequences of inaction.*

Keywords: *Nutrition Transition, Developing countries.*

INTRODUCTION

Many changes in diet and in physical activity are occurring simultaneously in the developing world.¹ The world in general has experienced a marked shift in the global Body Mass Index (BMI) distribution towards reduced undernutrition and increased obesity.¹ The collision between human biology shaped over the millennia and modern technology, globalization,

government policies and food industry practices have worked to create far-reaching energy imbalance across the globe.¹ While it is very clear that this transition from natural foods and high physical activity to highly processed food and low physical activity is more in the developed countries, it must be noted that the developing countries are following suit.²

Foods rich in vitamins, minerals and micronutrients such as fruits, vegetables and whole grains have been substituted by foods heavy in added sugar, saturated fat and sodium.

Nutrition transition is malnutrition resulting not merely from the need for food, but the need for high quality nourishment.³ Nutrition transition is also described as a shift from lack of food, to a rising problem of overabundance and obesity.⁴

Nutrition transition cannot be fully discussed without mentioning the other two well known transitions in public health. They are "Epidemiologic transition" and "Demographic transition". Epidemiologic transition is the shift from a pattern of prevalent infectious diseases associated with malnutrition, periodic famine and poor environmental sanitation to a pattern of prevalent non-communicable, chronic and degenerative diseases associated with urban industrial lifestyle.⁵ The stages of the epidemiologic transition include: The age of pestilence and famine, The age of receding pandemics and the age of degenerative and man-made diseases.⁶

Presently most developing countries are experiencing this epidemiologic transition as reflected in the growing burden of non-communicable diseases.⁷ It is estimated that nearly half the disease burden in low and middle income countries is from non-communicable diseases and more than 21% of deaths in such countries are due to cardiovascular diseases.⁶ The incidence of cancer in developing countries is increasing. In year 2000, 80% of new cases of cervical cancer occurred in the developing world.⁷

On the other hand demographic transition is the shift from a pattern of high fertility and high mortality to low fertility and low mortality.⁵ The developing countries are undergoing this transition but at a slower pace. There is improvement in child survival, increase in life expectancy at birth and decreasing fertility in developing countries.⁶

STAGES OF NUTRITION TRANSITION

Nutrition transition has been described to occur in 5 stages which are also called "Patterns".^{5,8,9} The stages include:

Hunter-Gatherers (Paleolithic man) stage
 Monoculture period
 Industrialization/Receding famine
 Nutrition-related Non-communicable diseases
 Behavioral change

The hunter-gatherers (Paleolithic man) stage is characterized by a diet made up of wild plants and animals.^{8,9} The physical activity is labor intensive. It is the stage of the early men that were mainly hunters and gather plant products in the bush. They have a lean stature. Their diet is low in fat and high in fiber. There is low fertility and low life expectancy.^{8,9}

The second stage is the monoculture period. This stage is characterized by a system of agriculture in which they plant one type of crop (monoculture). The diet is dominated by cereals and high water intake. The activity pattern is labor intensive. Nutritional deficiencies are common. There is high fertility and high mortality with low life expectancy.^{8,9}

The third stage is the stage of industrialization/receding famine. The diet is starchy with low variety, low fat, high fiber. Activity pattern is labor intensive both for work and leisure but there is beginning to be a change towards inactivity. Micronutrient deficiencies are common. There is gradual and slow decline in mortality.^{8,9}

The fourth stage is the stage of Nutrition-related non-communicable diseases. It is seen in most high income societies. The diet is high in total fat, cholesterol, sugar and other refined carbohydrates. There is marked reduction in physical activity. Life is mainly sedentary. Work is replaced by machines. Leisure also becomes sedentary e.g. watching TV and playing computer games. The result is increased prevalence of obesity and degenerative diseases. Cardiovascular diseases and bone density problems are common. There is increase in life expectancy but increased disability period.^{8,9}

The fifth stage is the stage of Behavioral change. It is an emerging stage. It is driven by a conscious desire to prevent or delay degenerative diseases and prolong health. The diet involves reduced fat, increased fruits, vegetables and fiber, decreased caloric beverages with increased water intake. Sedentarianism is replaced with purposeful changes in recreation and other activity. All these result in decreased obesity and other nutrition-related non-communicable diseases. There is accompanied healthy ageing.

The focus is mainly on stages (patterns) 3, 4 and 5, in particular, on the rapid shift in much of the world's low and moderate income countries from the stage of receding famine to Nutrition-related non-communicable diseases. The concern about this period is so great that the term "nutrition transition" is synonymous for many with the shift from stage 3 to 4.

FACTORS THAT FUEL THE NUTRITION TRANSITION

Nutrition transition is fueled by several factors including urbanization, economic growth, technological changes in work and leisure, food processing, mass media growth, excessive intake of caloric beverages, excessive snacking.

Urbanization acts in many ways. Increased urbanization translates to increased sedentary white collar jobs as against the previous labor intensive jobs. With urbanization the previous modes of transportation that are labor intensive are replaced by sedentary modes of transportation e.g. buses and trains.^{8,9} Urbanization is also associated with increased income which increases spending on food.⁴ A study in China revealed that the overweight prevalence is higher in urban than in rural areas.⁸

Economic growth is also a factor that fuels the nutrition transition. With increased economic growth, there is higher per capita income, hence greater population can afford to spend more on edibles leading to excessive consumption which leads to obesity and nutrition-related non-communicable diseases. Research has shown that increased income per capita for a country is linked with increased intake of animal products and fat.¹⁰ It was also noticed that increased per capita income also increases ability to afford modern leisure gadgets and hence inactivity.^{4,8,9}

Technological changes also fuel the nutrition transition because chores that were previously manually done are now done by machines. Examples include the use of washing machines for laundry as against hand wash, use of vacuum cleaners instead of manual sweeping. Technology has also affected leisure, thus children that used to run around and play now sit down and watch TV and play computer games. Apart from inactivity there is increased snacking and beverage intake while watching TV.^{4,8,9} Agriculture is also mechanized, hence making it less manual.

Food processing and increased intake of animal source foods are also factors fueling nutrition transition. Increased food processing leads to production of high fat and high sugar foods and increased availability of

caloric beverages. These are convenient for the fast paced life that goes with urbanization. Research has shown that the diet that increases the risk of chronic diseases is relatively high in total fat, sugar, salt, alcohol, refined grains and foods of animal origin.¹⁰ Research has also shown that when we drink a beverage based on fat, carbohydrates or protein, we do not compensate by reducing food intake.¹ However, when we eat solid food we reduce intake of other food.¹

Mass media growth has been noted as another factor that fuels nutrition transition. There is aggressive marketing by food processing companies. The adverts are designed to convince people to consume processed foods and caloric beverages. Some of these adverts, especially in developing countries are misleading. They give false information about the contents of their products.¹

EFFECTS OF NUTRITION TRANSITION IN DEVELOPING COUNTRIES:

Nutrition transition has led to increase in the prevalence of Nutrition-related non-communicable diseases including obesity, childhood obesity, cardiovascular diseases, cancers, etc.^{1,2,4,7-10}

Obesity is a major outcome of nutrition transition. It is also a predisposing factor to many other nutrition-related non-communicable diseases including cardiovascular diseases, diabetes and cancers. There have been reported increase in obesity prevalence in the developing countries as depicted by a study in sub-Saharan Africa which reported that 10 to 15% of adults in sub-Saharan Africa are overweight.⁴ There is a general increase in obesity worldwide. However, it is sad to note that prevalence in developing countries is increasing. Overweight tripled among Chinese men and doubled among Chinese women between 1989 and 2004.⁸ A study In Brazil also revealed that the prevalence of obesity among the lowest socioeconomic group women increased from 6.6% in 1975 to 15% in 1997.⁸ Also there is increase in the prevalence of overweight among the poor in developing countries.¹¹ The Nigeria Demographic and health survey (NDHS) 2008 reveals that nearly 1 in 4 women in Nigeria is either overweight or obese (16% overweight and 6% obese).¹² The NDHS also reported that more urban women (31%) than rural women (17%) are overweight or obese.¹² It also revealed that overweight and obesity increase with increasing wealth.¹² A meta-analysis of the prevalence of and time trend in obesity in west Africa done in 2007 reported that prevalence of obesity in urban west Africa more than doubled (114%) over 15 years.¹³ A study in India reported an overweight prevalence of 28%.² Studies have revealed that the

prevalence of childhood obesity is increasing in developing countries.¹⁴ According to a study done in Sagamu Nigeria the prevalence of overweight among male adolescents was 0 to 8.1% and for females 1.3 to 8.1%. The figures were considered high.¹⁵

Cardiovascular diseases are among nutrition related non-communicable diseases that are on the increase in developing countries. The prevalence of hypertension among high executives in Tanzania is as high as 48.9%.¹⁶ The prevalence of cardiovascular diseases has increased 10 fold in sub-Saharan Africa in the last 20 years.¹⁷ It has been estimated that 5.3 million deaths attributable to cardiovascular diseases occurred in the developed countries in 1990, whereas the corresponding figure for developing countries ranged from 8 to 9 million i.e. relative excess of 70%.¹⁸ In China, the proportion of cardiovascular disease deaths rose from 12.1% in 1957 to 35.8% in 1990.¹⁸

Diabetes mellitus is another nutrition related non-communicable disease that is on the increase in developing countries. Eighty percent of diabetes death occur in low to middle income countries.⁴ A study in Tanzania reported that the prevalence of diabetes in the urban population is 1.1% while that in the rural population is 0.2% which are both low. However the same study went ahead to report that the prevalence among the highest socio-economic group of Tanzanians is 12%, which is even higher than that of Europeans.¹⁶ The World Health Organization (WHO) projected that the most rapid increase in prevalence of diabetes mellitus will be in India where a rise is projected from the 1997 estimate of 20.8 million cases to 57.2 million in 2025.¹⁹ A study done in Port Harcourt, Nigeria revealed a high prevalence of type 2 diabetes mellitus, and also a male diabetes prevalence of 7.7% and 5.7% for females. The same study also reported that the BMI \geq 25, physical inactivity and high social status are associated with significantly higher prevalence of type 2 Diabetes.²⁰

Another Nutrition-related non-communicable disease that its prevalence is increasing in developing countries is cancer. Dietary factors are estimated to account for approximately 30% of cancers in western countries and the 20% in developing countries and is projected to increase.⁴ In 1970, approximately 15% of newly reported cancers were in developing countries. The figure increased to 56% in 2008 and is estimated to rise to 70% by 2030.²¹ Also Dr Margaret Chan, director-general of WHO stated that around 70% of cancer deaths occur in developing countries.²¹ Almost two-thirds of the 7.6 million deaths every year from cancer worldwide, occur in low-income and middle-income

countries.²² A study in Ibadan, Nigeria, reported that the prevalence of colon cancers increased by 81% between 1971 and 1990.²³

THE WAY FORWARD

From the foregoing it is clear that the nutrition transition is a reality in developing countries and that the effects are beginning to manifest. The following are the suggested as measures to handle the situation:

Public health education: This is very important because majority of the population are ignorant of nutritional transition effects. Many are unaware that a lot of what they eat are detrimental to their health. The people in the developing countries need to be educated on the gains of increasing the consumption of fruits, vegetables, high fiber diet, whole grains and exercise.

Paid media campaigns to promote consumption of healthy foods.

Duties and taxes on foods high in saturated fats to generate revenue to sponsor dietary change campaign.

Regulations compelling nutrition information and alerts on products high in saturated fats, added sugar and salt. The alerts should be on the packs just like tobacco companies are compelled to write "SMOKERS ARE LIABLE TO DIE YOUNG" on cigarette packs.

Regulations compelling restaurants to paste the caloric contents next to every item on the menu boards and menu sheets.

The young ones should be encouraged to embrace gardening and farming by resuscitating the "YOUNG FARMERS CLUB" in schools where they used to exist or instituting such a club in schools where they were not in existence.

Enactment of regulations to discourage the use of hydrogenated shortening, coconut oil and other atherogenic fats.

Price subsidies for fruits and vegetables and other healthy foods. This will make them more affordable and increase their consumption.

Cooking classes for pupils in primary and secondary schools. This will encourage them to embrace the habit of cooking at home, rather than buying already made fast food and canned foods.

Free fruits at schools. Students in the primary and secondary schools can be given fruits in school. This is to encourage the habit of eating fruits.

A surveillance and monitoring system to study the progress of interventions should be in place so as to re-strategize when necessary.

CONCLUSION

Nutrition transition in developing countries is an issue that must be looked into. All hands must be on deck. The citizens, parents, families, communities, non-governmental organizations and the government must be carried along. Investment into stemming the tide of the transition will surely be a gainful venture because the current trend has shown that the burden will be devastating in the future if nothing is done now.

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