

# **REVIEW: ROLE OF LIFESTYLE AND NUTRITIONAL HABITS IN MITIGATING IMPACTS OF ENVIRONMENTAL STRESSORS IN NIGERIA**

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## **ABSTRACT**

Even though humans have the genetic potential to live up to 120 years or thereabout in relatively good health, yet average life expectancy in Africa leaves much to be desired. According to the latest data provided by the World Health Organization, there is no single African country among the best 50 countries in the world in terms of longevity. This paper examines the contributors to Nigeria's poor life expectancy statistics from genetic and environmental perspectives. While Nigeria generally shares the environmental stressors common to humanity everywhere, peculiar to Nigeria is the combination of stressors, which show a higher concentration of the types that are easily controlled in well-planned and orderly societies. Government's failure to manage the (social and physical) environment appropriately compounds the ability of the average Nigerian to cope. On the genetics side, it is known that only about 25% of our genes automatically express irrespective of what we do or refuse to do. The remaining 75% have to be triggered before they express. It is also well established that the external environment of a person can impact on his internal environment in significant ways such that it becomes conducive for the expression of genetic time bombs that had remained dormant all along. There is adequate scientific knowledge which, if applied in a disciplined and sensible way, could enable the individual to exercise substantial control over all forms of stressors. This includes knowledge of the stressors, preventive steps that can be adopted through lifestyle modifications and dietary adjustments, natural nutritional remedies, understanding how to change our perception of issues and challenges, and so on. Our main focus in this review is to identify nutritional and lifestyle strategies which could mitigate the impact of environmental stressors on our health and longevity.

Keywords: Longevity. Environmental stressors. Lifestyle. Nutrition.

## **INTRODUCTION**

Science and the Bible both agree on the human life potential in this dispensation. Whereas the Bible categorically states in Genesis 6:3 that man has the potential to live in good health to age 120, science, on the other hand postulates that most animals have the potential to live for up to five times the length of time it takes to mature (Millar and Zammuto, 1983; Weigl, 2005; Trepanowski *et al.*, 2011). For example, if it takes an animal specie five years to mature biologically, then that animal specie has the potential to live for up to 25 years. It takes a human infant somewhere between 17 and 25 years to fully mature biologically (Tanner and Tanner 1990). The implication is that human beings have the genetic potential to live as long as between 85 and 125 years.

Even though we can live for 120 years or thereabout, all things being equal, yet the reality on ground is that we seldom reach our full potential. Most humans die before they even reach two-thirds of their potential. According to the Nigerian population figures as cited in the CIA Factbook (2014), only about 3% of Nigerians grow older than 65 years and only about 6.1% of Nigerians live to mark their 55<sup>th</sup> birthday.

In this paper, we examine first the determinants of a full and fulfilled life with a view to understanding the modifiable risk factors involved, in the context of our country, Nigeria. Next, we review, based on currently available scientific evidences, nutritional and lifestyle habits that could radically make a difference in modifying those risk factors.

## **MODIFIABLE RISKS FACTORS IN LONGEVITY**

### **Governments' attitude and actions**

Ideally, our health project should be a joint venture between governments (the three tiers of government in Nigeria) and the people. Government has her role to play while the people have theirs. When both parties (government and the people) play their respective parts, things get better. However, when one party fails, our full potential can never be realized. One of the areas that government needs to address is improving healthcare facilities, equipment, and well-trained and motivated personnel to support and care for the sick. Individuals too need to eat right and live right.

While the amounts of money that governments budget and actually spend on healthcare do not necessarily translate to better health for the people, yet it goes a long way to indicate how seriously the government is thinking about the welfare and well-being of the people. For example, according to WHO statistics, while a country like Japan spent 10.2% of her gross domestic product (GDP) on health in 2014, Nigeria spent only a meager 3.7% of hers (WHO 2016). In that same year, the United States spent 17.1%, both Switzerland and Germany spent 11.7%, and Tunisia spent 7% of their respective GDPs on health. The reflection of the relatively low priority given to health in Nigeria on availability of healthcare facilities, equipment, well-trained and motivated personnel, and ultimately, Life expectancy of the citizens is shown in Table 1. In Table 2, Nigeria's budgetary allocations to healthcare over four years are compared with those from the five countries previously mentioned.

Table 1: Global ranking of Nigeria's Health Expenditure and Health-related Indices in 2014 (WHO 2016)

Index	Nigeria's Statistics	Nigeria's Ranking in the world
Health Expenditure as % of GDP	3.7	127 <sup>th</sup>
Physicians Density	0.4 Physicians/ <u>1,000</u> population	130 <sup>th</sup>
Hospital Bed Density	0.53 beds/1,000 population	176 <sup>th</sup>
Life Expectancy	54.5 years	183 <sup>rd</sup>

Table 2: Comparing Nigeria’s Financial Commitment to Health over 4 years with some other countries (WHO 2016)

Country	Percentage of GDP Committed to Health			
	2011	2012	2013	2014
Nigeria	3.7%	3.3%	3.7%	3.7%
Japan	10.1%	10.2%	10.2%	10.2%
Tunisia	7.2%	7.2%	7.3%	7.0%
Switzerland	11.2%	11.6%	11.7%	11.7%
USA	17.1%	17.0%	16.9%	17.1%
Germany	10.9%	11.0%	11.2%	11.3%

Nigeria’s relatively low average life expectancy of 54.5yrs is reflected in the demography showing that the population is comprised mostly of young people. The age structure of the Nigerian population in 2014 (estimated total 138,004,450) is shown in Table 3. It is apparent from the Table that even though we have a high fertility potential as a country, yet our life expectancy is quite poor. For instance, it can be inferred from the population structure in the Table, that 62.5% of Nigerians are under 25 years of age and only 6.1% of Nigerians make it to age 55;

Table 3: Age Structure of the Nigerian Population (2014): (Source: CIA, 2014)

Age range	Fraction of total population	Number of Males	Number of Females
0-14 years	43.2%	39,151,304	37,353,737
15-24 years	19.3%	17,486,117	16,732,533
25-54 years	30.5%	27,697,644	26,285,816
55-64 years	3.1%	3,393,631	3,571,301
65 years and over	3%	2,621,845	2,861,826

## Genes Triggers

The factors that influence our longevity as a people can be genetic and environmental. Some of these factors are beyond our control. However, we can do something about most of them. For example, whereas we may not be able to do anything about our genetic make-up, yet we can do something about our genetic environment.

It has been shown that only about 25% of our genes automatically express irrespective of what we do or refuse to do. The remaining 75% of our genes have to be triggered before they express. (Lobo, 2008; Adams, J. 2008, Lim *et al.*, 2013). According to Shah (Stein, 2015), “Genetics is the “loaded gun”, but it is our “diet and lifestyle” that pull the “trigger.” All life processes take place inside of our cells, and the deoxy-ribonucleic acid (DNA) contains all the instructions necessary to set these processes in motion. The fact, however, is that DNA is NOT solely responsible for the fate of cells. Different cellular environments give different instructions to genes. For example, our body’s pH gives instructions to our genes. The same gene will express differently when our body’s pH is alkaline than when our body is acidic.(De Bernardis *et. al*, 1998; Lobo, 2008). This implies that by changing the environment

of our cells, we can actually change how our genes function. The controlling factor therefore, is not the genes themselves, but the environment that we create for them (acidic or alkaline, oxygenated or oxygen-deprived, toxic or clean, etc). The point being made here is that our genes are not cast in concrete. Genes do not always have predetermined outcomes. They only offer a range of options. Even though genes make the disease process possible, yet they do not cause it. Genes only indicate what can be, not what will be. For a disease to emerge, the protective genes need to be turned “off”, while those promoting the disease are turned “on”.

The quality of our diet, water, and air combine to help determine how our genes express.(Sharpley *et al.*, 1994; Gonzalez 2005; Kampa and Castanas 2008; Sun *et al.*, 2009; Xu *et al.* 2010). Other gene triggers include: toxins (endo- and exo-toxins), nutritional deficiencies, acidosis (low pH within the body), dehydration, overweight or obesity, stress, sleep deprivation, sedentary living, even intrusive thoughts and beliefs. (Causton *et al.*, 2001, Clement 2011, Verkuil and Brosschot 2013). Since these triggers are now well-known, individuals could decide to take appropriate actions to checkmate them before they activate negative gene expression. In particular, the specific nutrients present in our diet can help in neutralizing the impact of certain environmental triggers of disease. For example, antioxidant nutrients can help neutralize the impact of free radicals that invade our bodies from the environment (Valko *et al.*, 2006, 2007).

### **Epigenetic Changes**

Mutation represents actual damage or changes to the coding of genes. It permanently alters the functions of mutated cells. On the other hand, when the function of genes are altered without necessarily changing the coding itself, this is referred to as epigenetic changes (Waterland and Jirtle, 2003) Epigenetic changes result from environmental chemicals interacting with genes and interfering with their normal expression. Different factors can cause epigenetic changes in our body. These include toxins, poor nutrition, and Genetically Modified Organisms-based food (GMO foods) (Landrigan and Benbrook 2015). A mother’s poor diet, while not necessarily mutating her genes, can nevertheless permanently alter the expression of genes in her offspring (Barker, 1994, Richardson 2014).

### **Lifestyle and other socio-economic factors**

The role of lifestyle and several socio-economic factors in longevity has been extensively researched and studied. For example, the risk factors for development of cancers have been so well established, that it is now possible to attribute figures to the contribution of each factor to the overall burden of cancer.. One such categorization, compiled by the Institute of Medicine (IOM 2007) is shown in Table 4. Currently available strategies for primary prevention of the various types of cancer are also shown on the Table. The Population Attributable Fractions (PAF) indicated on the Table, is the proportional reduction in disease that would occur if population exposure to the risk factor were reduced to the theoretical minimum risk level. It has been estimated that the modifiable risk factors are responsible for up to 70% of all cancers (Doll and Peto, 1981; Lichtenstein *et al.*, 2000, Donato *et al.*, 2006, Irigaray *et al.*, 2007, Ana *et al.* 2010, USDHHS, 2010).

TABLE 4 Leading Risk Factors for Cancer Deaths in Developing Countries and Primary Prevention Strategies (Adapted from: IOM 2007)

Cancer Type (number of deaths in Developing Countries in 2002)	Main Risk Factors	Primary Prevention: Currently Available Strategies	PAF %
Lung, trachea, and bronchus (770,938)	Tobacco use	Tobacco control as outlined in Framework Convention on Tobacco Control (FCTC)	60
	Low fruit and vegetable intake	Dietary improvements	13
	Urban air pollution	Regulation of automobile exhaust and industrial combustion products	7
	Indoor smoke from cooking and heating	Ventilation and improved low- technology heating and cooking	2
	Radon in buildings (from the earth)	Building regulations to avoid radon seepage into enclosed buildings, mainly in cold climates	Not Available
Stomach (695,426)	Various occupational exposures	Workplace regulation and controls	9
	Chronic infection with <i>Helicobacter pylori</i>	Improved living conditions (nonspecific) Future: Vaccine to prevent infection? Future: Drugs to clear infection?	74
	Low fruit and vegetable intake	Dietary improvements	19
Liver (504,407)	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	11
	Chronic hepatitis B ( <u>HBV</u> ), mainly from infection in infancy and childhood; co- factors, such as fungal toxins (e.g., aflatoxin)	Hepatitis B vaccination in infancy Reduced fungal contamination of stored grains Future: Cure of chronic <u>HBV</u> ?	59
	Chronic hepatitis C ( <u>HCV</u> ) from contaminated blood and unsafe injections, and person to person; co- factors such as fungal toxins (e.g., aflatoxin)	Blood supply and injection safety and measures Future: Cure of chronic <u>HCV</u> ?	33 <sup>a</sup>

<b>Cancer Type (number of deaths in Developing Countries in 2002)</b>	<b>Main Risk Factors</b>	<b>Primary Prevention: Currently Available Strategies</b>	<b><u>PAF</u> %</b>
Colon and rectum (356,949)	Alcohol use	Reduced alcohol use	23
	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	11
	Physical inactivity	Lifestyle changes	15
	Overweight and obesity	Dietary improvements and exercise	9
Esophagus (379,760)	Low fruit and vegetable intake	Dietary improvements	2
	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	37
	Alcohol use	Reduced alcohol use	24
Breast (317,195)	Low fruit and vegetable intake	Dietary improvements and exercise	19
	Physical inactivity	Exercise	10
	Overweight and obesity	Dietary improvements and exercise	7
	Alcohol use	Reduced alcohol use	4
Mouth and oropharynx (271,074)	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	37
	Alcohol use	Reduced alcohol use	14
Uterine cervix (218,064)	Chronic infection with specific strains of human papillomavirus ( <u>HPV</u> )	Screening for precancerous stages Vaccination against <u>HPV</u> in infancy or adolescence	100
	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	2
Lymphomas and multiple myelom	Burkitt's lymphoma (7,800 cases in children in less developed countries): chronic infection with Epstein-Barr virus	None apparent	Not Available
Leukemia (190,059)	Ionizing radiation (natural and medical)	Improved medical practices Improved building practices to exclude radon	<u>Not Available</u>
	Tobacco use	Tobacco control as outlined in <u>FCTC</u>	6
	Various occupational exposures	Workplace regulation and controls	2

Risk factors, modifiable via nutrition and healthy lifestyle, have also been identified for the other (non-cancer) diseases (Neugut *et al.*, 1998, Murray *et al.*, 2013, Vos *et al.* 2013). According to the WHO (2017) Non Communicable Diseases including heart disease, stroke, cancer, diabetes and chronic lung disease, are collectively responsible for almost 70% of all deaths worldwide. Almost three quarters of these deaths and 82% of the 16 million people who died prematurely, or before reaching 70 years of age, occur in developing countries.

It is then clear that if only we begin to address the modifiable risk factors, we can actually reduce the incidence of diseases and premature death by as much as 70-90%. (Jekel, *et al.*, 2007)..

### **Mitigating Adverse Impacts Of Environmental Stressors - Actionable Plans For Individual Members Of The Public**

There are principally three stakeholders in our health destiny: God, Government, and the Individual. Our focus here is to address what individuals need to do by themselves and for themselves to help mitigate the effects of environmental stressors on our health. God, on His part, has done all that He needs to do for us. He created a beautiful and sustainable planet for us to live in. He has also given us intelligence to cultivate and take care of our planet. Drawing both on my experience in over a decade of practice as a healthy living practitioner, and established Literature, I now hereby identify a set of ten dietary and lifestyle factors individuals could modify to mitigate the impact of environmental stressors on their health. I believe that health does not flow from a bottle or a syringe. Instead, health is largely the product of lifelong decisions and choices.

#### **i. Avoidance of Destructive Habits and High-Risk Behaviour.**

These include use of tobacco and hard drugs, consumption of alcohol, sexual promiscuity, self-medication, among others (IOM 2001)

#### **ii. Eating in alignment with Body Cycles**

It is well known that biochemical and physiological activities that go on in our body everyday have some biorhythm to them; and that adverse metabolic and cardiovascular consequences could attend circadian misalignment.(Scheer *et al.*, 2009). There are three principal biochemical and physiological activities that go on in our body everyday: Detoxification, Assimilation, and Rejuvenation (the D.A.R. Cycle.) At every given time of the day, only one of these three activities is the predominant activity, while the other two are at the background. Between 4 am and 12 noon, the predominant activity is Detoxification; between 12 noon and 8 pm, Assimilation is the predominant activity, while Rejuvenation is the predominant activity between 8 pm and 4 am.

The implication of this Cycle is that we should never eat a heavy meal in the morning so as not to interfere with the body's attempt to clean house. Therefore fresh fruits are the best for breakfast. They are high in water content, contain glucose for energy, are rich in minerals and antioxidants, and are very easy to digest. Furthermore, they do not task the body's energy too much, so they do not distract the body from its cleansing work in the morning hours. These fruits can be eaten in the form of fruit salads or blended into smoothies. A good recipe for smoothies is to blend immature coconut flesh, coconut water, avocado pear, and banana

together in a blender for breakfast smoothie. Equally, we should not eat heavy meals late into the night so as not to interfere with the rejuvenation phase. The best time to eat our heavy meals is between 12 and 7pm. This is what is meant by eating in alignment with our body cycles. Once our body is able to get rid of toxins that came into the body, provide nutrients to nourish the body, and we are able to rejuvenate periodically, then our health will spring forth like the noontide.

### iii. Eating Intelligently:

According to Rochefoucauld (Fisher and Reardon, 2004) “To eat is a necessity, but to eat intelligently is an art.” Avoiding foods that will further compromise our health while, at the same time consuming foods that will exert detoxification, anti-inflammatory, antioxidant, and immune boosting effects on our body is wisdom indeed. Consequently, we should eat more of the following: fresh fruits, raw vegetables and raw nuts (salads and vegetable juices), organic foods and whole grains, a balanced diet (fats and oil, protein, carbohydrates, etc). We should at the same time avoid the following: processed and refined foods, fast foods and fried foods, sugar, soft drinks, packaged fruit juices, alcoholic beverages, Genetically-Modified foods, etc.

### iv. Maintenance of an Ideal Body Weight:

Endeavouring to maintain our ideal body weight is a great way to minimize the impact of environmental toxins on our body because adipose tissues (fats) are a warehouse for toxins. Keeping excess body fat is therefore not a good idea. According to the WHO, the ideal Body Mass Index (BMI) is between 18.5 and 24.9 (Ojo *et al.*, 2011). Following an appropriate diet and engaging in regular moderate exercises will help us to achieve our ideal body weight and BMI.

### v. Minimizing Exposure to Toxins

Our modern world is far more toxic than the one our forefathers lived in. (Campbell and Campbell 2006). We have to therefore make special efforts to minimize our exposure to the myriads of toxins that are lurking in our environment. (Landrigan and Benbrooks 2015). These include but are not limited to, Ionizing radiation, MSG (Monosodium Glutamate) used in food seasonings, Chemicals in our foods and environment (pesticides, herbicides, food preservatives, etc.), Heavy metals / Other Metals (Mercury, Lead, Arsenic, Cadmium, Aluminum, etc.)

We must likewise protect ourselves from Workplace Hazards – fumes, asbestos, chemicals, etc, by wearing masks and protective wears as appropriate.

### vi. Exercising Moderately and Regularly:

Thirty minutes exercise 4-5 days a week is a good place to start from. Each individual can start a convenient level and scale up progressively at personal pace. Examples of exercise types are: Brisk Walking, Swimming, Skipping Rope, Trampoline, Aerobics, Stretching, Press-Up, Etc. When we exercise, we sweat out waste products, improve blood and lymph circulation, and all of these lead to improved health. (Wu *et al.*, 1987)

### vii. Stress Management:

Stress contributes to at least 6 out of the 10 leading killers in the world. We should therefore pay particular attention to stress management. There is no amount of water that can drown a boat as long as the water does not get into the boat (Bunker *et al.*, 1992.)

### viii. Wise Use of Supplements:



As we get older, our DNA repair capability is reduced. It is helpful to support the body's efforts towards DNA repair by supplying appropriate nutrients. A balanced diet is key in all of this, but this could be supplemented with nutritional and herbal supplements that can help us cope with assaults from the environment (de Lorgeril *et al*, 1994; NIH, 1994; Giovannucci, 2002). These include: Antioxidants - e.g. Protandim, Selenium, Vitamins A, C, and E; Immune Modulators – e.d. Beta Glucan, Echinacea, etc; Probiotics – friendly intestinal flora; Omega-3 (Flaxseed Oil, Udo's Oil, or Fish Oil); Vitamin d3 (at least 2,000iu daily or Sunshine Exposure); Fibre (Psyllium Husk, etc); A good Multivitamin / Multimineral. B12, B6, and Folic Acid (in particular); Colloidal Trace Minerals – chromium, iodine, etc.; and Betain HCL and Digestive Enzymes. It is important to stress the importance of seeking professional advice before embarking on supplementation.

ix. Avoidance of Dehydration:

Dehydration is a major contributor to many diseases (Mayo, 2016). When we drink enough water, 6-8 glasses daily, we help the body in its effort to detoxify. Our water source must be pure however in order to avoid water-borne diseases. The best form of water to drink is water that is: purified, mineralized, alkaline, and structured. Contaminated water and hard water can be sources of health problems.

x. Caring For the Immediate Environment

We may not have absolute control over the entire landscape called Nigeria, but we can, at least, ensure that our own immediate environment is kept clean. We should all stop littering the environment with wastes – especially plastic and other non-biodegradable materials. It should be the duty of us all to: stop littering the environment, clean up our environment, dispose waste appropriately, and plant trees at available opportunities.

### **Mitigating Adverse Impacts of Environmental Stressors – Actionable Suggestions for the Government**

By way of ensuring completeness, a number of actionable points that can be implemented by the government (the three tiers in Nigeria) to help residents of the country counter environmental stressors are hereby suggested:

- i. Promote Green revolution, and address in particular, the issue of deforestation
- ii. Put appropriate policies and legislation in place to protect and preserve the environment
- iii. Enforce relevant laws on the environment. Government agencies should place more emphasis on enforcement than on revenue generation.
- iv. Protect the integrity of the food chain
- v. Provide infrastructure to improve health
- vi. Ensure effective border and importation control
- vii. Implement stress-reduction measures for the citizenry. These could include: Mass transit systems such as trains/rail transportation, available both intra- and inter-cities to alleviate the stress faced by commuters. The roads too should all be fixed. No one should need to spend more than a maximum of one hour to commute from home to work and vice versa.
- viii. Pay more attention to job creation and poverty alleviation. Retirement age could be lowered to 55 years, with adequate and appropriate training and empowerment provided for retiring work force, transforming them into

entrepreneurs and creators of jobs that will engage the younger generation. This will reduce unemployment and crime.

- ix. Promote landscaping: A culture of beauty should be created for the environment. Landscaping and horticulture should be taught as a subject right from Primary school to university level.
- x. Incorporate Healthy Living and Environmental Science into our school curricula right from Nursery/Primary Schools right up to tertiary institutions.
- xi. Improve healthcare facilities. Hospitals should be well equipped, well stocked, well staffed, and the equipment should be well maintained.
- xii. Pay special attention to environment-health impacts of agro-chemicals. Our farmers and indeed all Nigerians should be educated about the dangers of many of the chemicals currently being used on our crops and soil. Safer and more natural alternatives should be researched and provided. GMO crops should be banned from our food chain at best or at least food labeling laws should be passed at worst, so that consumers could have the right to know what they are buying. ( Carman *et al.*, 2013)

## CONCLUSIONS

In conclusion, I believe that if we (government and individual members of the public) all commit to doing our part, very soon, we will begin to see measurable and significant improvements in our health statistics and life expectancy in Nigeria. The environmental stressors in the country could be drastically reduced largely by government efforts, while the various available protective mechanisms inherent in the human body could be stimulated into action by well-informed and well-motivated individual members of the public.

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