AN EXAMINATION OF THE HUMAN RIGHTS IMPLICATIONS OF GENETICALLY MODIFIED FOODS (GMFs) IN NIGERIA

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Abstract

Achieving food self-sufficiency and maintaining a balance of citizens' right to health are challenges which many countries in Africa, including Nigeria are struggling with. A citizen's right to health encompasses a right to healthy, nutritious and affordable food. How this food is cultivated and made available to the general growing population underpins the genetically modified food controversies. The approval of genetically modified foods is one way the Nigerian government is tackling the issue of hunger and food insecurity which is exacerbated by the Boko haram insurgency that has led to the loss of farmlands and livestock. Genetically Modified crops are acclaimed to increase crop production, combat the negative effects of climate change and promote the elimination of hunger and poverty since food essentially is money. However, critics of Genetically Modified Foods (GMFs) have raised health and safety concerns to the effect that GMFs are not the silver bullets to the raging food insecurity in Nigeria. Some have even called for the total ban of GMFs in Nigeria. Relying on the doctrinal research methodology, this paper investigated the human rights implications of GMFs in Nigeria and found that GMFs have been in existence for a very long time. It further found that one way or another, majority of Nigerians may have consumed GMFs as a result of heavy reliance on the consumption of imported foods in the country and that it is not easy to ascertain how such imported foods were cultivated. Therefore, the paper recommended that paramountcy to citizens' right to

health implies that the government focus more on risk assessment of GM crops, as well as their regulation and control to better protect the citizens.

Keywords: Human Rights, Genetically Modified Organisms, GMFs, Nigeria

1. Introduction

The advent of biotechnology has ushered in an era of unprecedented advancements in agriculture, with genetic modification (GM) emerging as a pivotal tool. While proponents extol the potential of GM crops to address food security challenges, particularly in developing countries like Nigeria, opponents have raised concerns about their safety, environmental impact, and socio-economic implications.

With a population of over 220 million people, Nigeria is the most populated country in Africa and is one of the countries struggling to feed its citizens.[1] An estimated 26.5 million people across the country were projected to face acute hunger from June to August 2024.[2] Conflict in the Northern region and insecurity as well as rising inflation and the environmental impact of climate change are said to be factors driving hunger in the country. Furthermore, food inflation in the country reached an all-time high of 40.87 percent in June 2024.[3]

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1 World Food Programme, 'Nigeria Country Brief'< https://docs.wfp.org/api/documents/WFP0000160465/download/?_ga=2.152588337.947471752.1722106652-591471721.1722106652> accessed 27 July 2024.

2 *ibid*

3 Trading Economics, 'Nigeria Food Inflation' < https://tradingeconomics.com/nigeria/food-inflation> accessed 27 July 2024; The Nigerian Economic Summit Group, 'Nigeria's Inflation Rate Rose to a 28-year High in June 2024' (July 17, 2024) < https://nesgroup.org/blog/Nigeria%E2%80%99s-inflation-rate-rose-to-a-28-year-high-in-June

Even with fertile lands and abundant natural resources, food shortages and food security remain major challenges in the country. To address this challenging situation, the Nigerian government is embracing a more non-traditional mode of farming by commercialising the farming of genetically modified food (GMF).[4] The approval of GM cowpea (beans) - one of the most important grain legumes and a major source of protein to millions of people indicates the government's enthusiasm to reduce the country's reliance on imports and achieve food security. With this comes the crucial question, can we secure a future where everyone has enough to eat without future medical and environmental consequences?

Nigeria is not the only country turning to GM foods for agricultural productivity and food security. Ten other African countries have also approved the use of GMFs and they include: Burkina Faso, Egypt, eSwatini, Malawi, Ethiopia, Ghana, Kenya, South Africa, Sudan and Zambia.[5] Out of the fifty-four (54) African countries, only eleven have approved the cultivation of GM crops, indicating the continent's scepticism towards biotechnology. The introduction of these crops has sparked public outcries and debates about their long-term human health implications, as well as their overall impacts on environmental degradation and food safety.[6] Potential health risks such as cancer, antibiotic resistance, allergic reactions and reproductive issues are cited as cautionary tales.[7]

2024#:~:text=The%20headline%20inflation%20rate%20rose,2.3%20percent%20in%20May%202024.> accessed 27 July 2024.

[4] N Isaac and J Conrow, 'Nigeria Approves its First GMO Food Crop' *Alliance for Science* <https://allianceforscience.org/blog/2019/01/nigeria-approves-first-gmo-food-crop/> accessed 27 July 2024.

[5] G S Mmbando, 'The Adoption of Genetically Modified Crops in Africa: The Public's Current Perception, the Regulatory Obstacles, and Ethical Challenges' (2024) 15 (1) *GM Crops & Food* <https://allianceforscience.org/blog/2019/01/nigeria-approves-first-gmo-food-crop/> accessed 27 July 2024

[6] J Kwen, 'Genetically Modified Crops Not Wanted in Nigeria Now-Lawmakers' *Leadership* (July 27 2024) <https://leadership.ng/genetically-modified-crops-not-wanted-in-nigeria-now-lawmakers/> accessed 28 July 2024

[7] *Ibid*

Now, the right to health is the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, which extends to ensuring clean water, sanitation, food, and nutrition through a comprehensive healthcare system.[8] Therefore, while GMFs hold the promise of improving food security and nutrition, their potential risk must be carefully weighed against the fundamental right to health.

This paper delves into the complex interplay between genetically modified foods (GMFs) and the right to health in Nigeria, examining the potential benefits, risks, and ethical considerations surrounding its recent approval for commercialisation and consumption. In the first part, a brief history of how GMOs have been around for a long period is undertaken - indicating that the world has moved from the issue of acceptance of GMOs to emphasis on regulation and risk assessment and management. In the second part, the development of the GMO concept in Nigeria is traced, followed by the establishment of the right to health in the third part. The challenges of food insecurity and the implications of GMO cultivation are discussed in the fourth and fifth parts consecutively to arrive at recommendations and conclusions.

2. The Concept of Genetically Modified Foods?

The National Biosafety Management Agency Act (NBMA)[9] is the principal legislation on the regulation of biosafety standards in Nigeria and regulates the production, application and consumption of biotechnological products in the country. The NBMA Act did not define the term 'Genetically Modified Foods' (GMFs) but however defines 'genetically modified organisms' (GMOs) as "any organism living or non-living that possesses a novel combination of genetic material obtained through the use of modern biotechnology."[10] This definition of GMOs accommodates both plants and animals and extends to even non-living organisms. The NBMA Act provides for the application of

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8 National Human Rights Commission, 'Right to Health' (Thematic Team) <https://www.nigeriarights.gov.ng/focus-areas/right-to-health.html#:~:text=Nationally%2C%20it%20is%20guaranteed%20under,Scheme%20Act%20(1999)%20etc> accessed 28 July 2024.

9 National Biosafety Management Agency Act, 2015 (NBMA Act)

10 *Ibid*, s 43

measures, policies, knowledge, techniques, equipment and procedures for minimising potential risks that modern biotechnology may pose to the environment and human health.

GMFs are products of the application of biotechnology in food production. GMOs should be distinguished from GMFs. While GMOs include all living things that have been genetically changed intentionally in a laboratory setting through the use of biotechnology,[11] GMFs are particularly crops that are created from plants that have undergone genetic alterations.[12] They are crops that are equipped with what they naturally do not have in them. For instance, if scientists wanted to genetically modify bitter leaf to be sweet, they would identify what makes sugarcane sweet and then move that particular characteristic into bitter leaf, and the bitter leaf would become sweet.[13] The sweet bitter leaf would then become a specifically genetically modified crop or GMF. Although GMO is a common term used by the general population to describe foods that have been modified through genetic engineering, it is much broader than GMF and includes plants, animals and microorganisms.

Genetic modification (GM) of organisms has existed for thousands of years and indeed since the birth of agriculture. In the past, traditional methods of modification, such as selective breeding and cross-breeding of plants and animals were used to create more desirable crops and animals. For example, if a farmer wanted to create a sweeter apple through a traditional method of modification, the farmer would have to

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[11] G. S. Mmbando, 'The Adoption of Genetically Modified Crops in Africa: The Public's Current Perception, the Regulatory Obstacles, and Ethical Challenges' (2024) 15 (1) *GM Crops & Food* <https://allianceforscience.org/blog/2019/01/nigeria-approves-first-gmo-food-crop/> accessed 27 July 2024

[12] M. Abdul Aziz and others, 'Genetically Engineered Crops for Sustainably Enhanced Food Production Systems' (2022) (13) (8) *Front Plant Sci* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9680014/> accessed 27 July 2004.

[13] Channels Television, 'How Nigeria is Regulating GMO Foods in the Country' Y*ouTube* (May 2 2024) <https://www.youtube.com/watch?v=39FWkM0exwo&ab_channel=ChannelsTelevision> accessed 28 July 2024

plant two apples with sweet traits and hope that the next generation might produce even sweeter apple fruits.[14] However, modifying plants and animals through traditional methods takes a very long time and is often uncertain.

With the advent of genetic engineering in the 1970s, scientists were able to make similar modifications with specific results in a much shorter time, using the process of genome editing.[15] The technique of gene editing is more precise as it uses specific genes from one plant or organism to modify the genetic code of another. The process of genome editing tools, such as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) have been used for over 40 years and scientists use these newer genome editing tools to make crops more nutritious, drought tolerant and resistant to insects, pests and diseases.[16]

3. Historical Development of GMFS through Genetic Engineering

Genetic engineering has long been used in combination with traditional breeding methods to produce the crops we see and appreciate today. To illustrate, the modern day maize has evolved through a process known as selective breeding or artificial selection of a grass called teosinte, which looks very different from maize today.[17] But at deoxyribonucleic acid (DNA) level, the two crops have the same chromosomes and a similar arrangement of genes.[18] Ancient farmers about 10,000 years ago in what is now known as Mexico are credited with taking the first steps to domestication of the maize crop by simply choosing which kernels to

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[14] Our Changing Climate, 'The Real Problem with GMO Food' *YouTube* (October 9 2020 <https://www.youtube.com/watch?v=h4_t4Xgd4CA&ab_channel=OurChangingClimate> accessed 28 July 2024

[15] U.S. Food and Drug Administration, 'Science and History of GMOs and Other Food Modification Processes' Agricultural Biotechnology' <https://www.fda.gov/food/agricultural-biotechnology/science-and-history-gmos-and-other-food-modification-processes> accessed 28 July 2024.

[16] *Ibid*

[17] Learn.Genetics, 'Evolution of Corn' <https://learn.genetics.utah.edu/content/evolution/corn/> accessed 29 July 2024

[18] *Ibid*

plant.[19] Over the years, maize cobs have become larger over time with more rows of kernels, a range of colours, sizes and sweetness.

Among the countries growing GM crops in the world today, the USA is leading with a total of 70.9 million hectares (Mha) of land used to grow GM crops, followed closely by Brazil 44.2 (Mha), Argentina 24.5 (Mha), India 11.6 (Mha) and Canada 11 (Mha).[20] The history of GMOs is traced back to Circa 8000 BCE when humans used traditional modification methods like selective breeding and cross-breeding to breed plants and animals with more desirable traits.[21] In 1866, Gregor Mendel, an Austrian monk, bred two different types of peas and identified the basic process of genetics. 56 years later in 1922, the first hybrid corn was produced and sold commercially. Later in 1940, plant breeders learned to use radiation or chemicals to randomly change an organism's DNA. After that, in 1953, building on the discoveries of chemist Rosalind Franklin, scientists James Watson and Francis Crick identified the structure of DNA. Subsequently, in 1973, biochemists Herbert Boyer and Stanley Cohen developed genetic engineering by inserting DNA from one bacterium into another. A timeline of genetic modification in agriculture in America will now be illustrated using the picture attached below.

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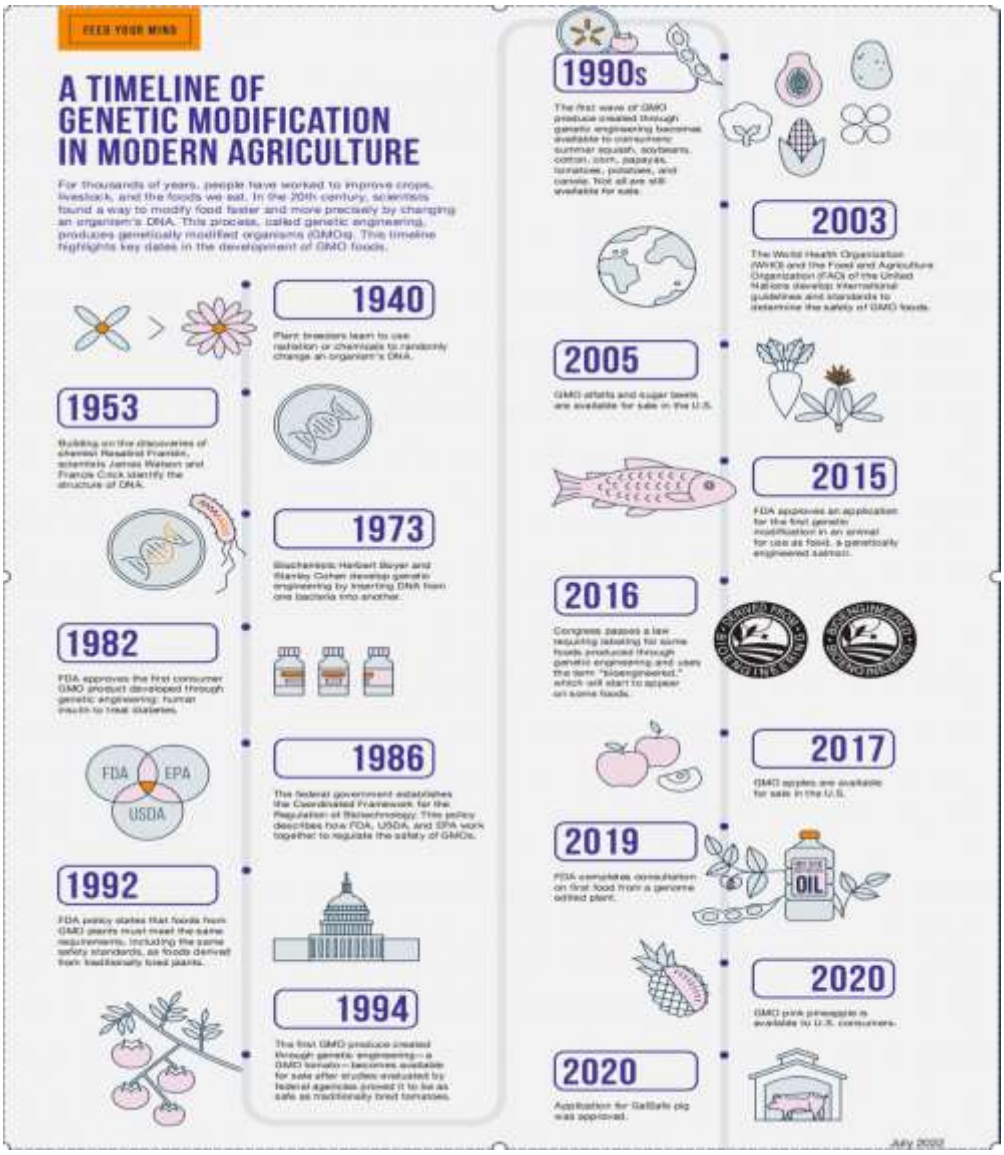
19 *Ibid*

20 The Royal Society, 'What GM crops are Currently Being Groen and Where?' <https://royalsociety.org/news-resources/projects/gm-plants/what-gm-crops-are-currently-being-grown-and-where/#:~:text=GM%20crops%20made%20up%2029,Mha)%20are%20the%20largest%20users> accessed 29 July 2024.

21 GS Mmbando (n 12)



Source:[22]

In 2020, just 4 years ago, GMO pink pineapple was made available to US consumers and approval for GalSafe pig was equally given. GalSafe pigs are genetically modified pigs that are raised for both food and

[22] U.S. Food and Drug Administration (n 13)

medical uses.[23] The pigs are named for their lack of alpha-gal, a sugar molecule found on the surface of porcine cells that can trigger allergic reactions.[24] These pigs were bioengineered so they do not produce alpha-gal sugars and so people with alpha-gal syndrome can consume them safely.[25]

Most recently, in 2022, the FDA announced it would allow the marketing of genome-edited beef cattle.[26] This intentional genomic alteration of beef cattle is done through a process known as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR).[27] Where the PRLR-SLICK gene is inserted into cattle embryos and results in slick-haired animals or cattle with slick coats that can better withstand hot weather.[28] From the foregoing, it is clear that GMOs are still evolving and developed countries have moved their focus from the acceptance of GMOs to a more serious issue of regulation and safety of GMO cultivation and consumption. Attention will now shift to the development of GMOs in Nigeria

4. Development of GMFS Through Genetic Engineering in Nigeria

The concept, 'genetically modified foods', was first introduced into Nigeria in 2001 and in 2004, Nigeria signed a memorandum of understanding with the US government to support genetically modified crops.[29] Nigeria has been receiving food aid from the US government and the World Food Programme that uses genetically modified seeds to

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[23] The National Agricultural Law Center, 'First there was AquAdvantage Salmon, then there was GalSafe Pigs and now there's PRL-SLICK Cattle' < https://nationalaglawcenter.org/first-there-was-aquadvantage-salmon-then-there-was-galsafe-pigs-and-now-theres-prlr-slick-cattle/#:~:text=GalSafe%20pigs%20are%20bioengineered%20so,they%20consume%20alpha%2Dgal%20sugar.> accessed 30 July 2024

[24] *Ibid*

[25] *Ibid*

[26] The Royal Society (n 22)

[27] *Ibid*

[28] *Ibid*

[29] J. Kwen (n 6)

grow crops.[30] In 2003, the African Union (AU) developed a Biosafety Law called the African Model Law on Safety in Biotechnology, now renamed the African Model Law on Biosafety.[31] It was developed to robustly regulate GMOs and guide the drafting of domestic biosafety frameworks and legislation in African States.

It was only in 2015 that Nigeria developed its own domestic legal framework by signing into law the National Biosafety Management Agency Act.[32] This Act also established the National Biosafety Management Agency (NBMA). The Health of Mother Earth Foundation (HOMEF), a Nigerian based environmental think-tank and advocacy organisation which is also a member of the Alliance for Food Sovereignty in Africa (AFSA), has accused the NBMA of allowing for the free flow of GMOs in Nigeria by issuing a frenzy of permits for the commercial release of GMOs into the market.[33] This allegation from HOMEF is concerning as the core responsibility of this government agency is to provide a regulatory framework and safeguard human health and the environment from potential adverse effects of modern biotechnology.

In 2019, the NBMA approved the first homegrown genetically modified crops - the pod borer-resistant cowpea, popularly known as beans and the GM cotton.[34] Both GMFs were developed to be more pest-resistant

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30 B. Ezeamalu, 'Nigeria: Genetically Modified Maize Launched Amidst Food Crisis, but Safety Concerns Remain' June 24 2024, The African Report) <https://www.theafricareport.com/352534/nigeria-genetically-modified-maize-launched-amidst-food-crisis-but-safety-concerns-remain/> accessed 1 August 2024

31 The Revised African Model Law on Biosafety and the African Biosafety Strategy, ACB Briefing Paper No. 9 (Haidee Swanby, June 2009) <https://acbio.org.za/wp-content/uploads/2022/03/AU_Biosafety-brief.pdf> accessed 1 August 2024.

32 National Biosafety Management Agency Act, 2015

33 N. Bassey, 'GMOs in Nigeria-Do the Masses Have a Choice?' *Opinion Rural 21 02/18* <https://www.rural21.com/fileadmin/downloads/2018/en-02/rural2018_02-S28-29.pdf> accessed 1 August 2024.

34 N. Isaac and J. Conrow (n 4)

to a destructive pod borer pest called *maruca vitrata*.[35] Although scientists claim that these crops have a built-in resistance to pests and will significantly reduce the use of pesticides, they did not give any warnings as to the health risks if any. Scientists simply informed the public that the GMF rely on a gene from Bacillus thuringiensis (BT), a naturally occurring soil-borne bacteria used in organic agriculture to control pests and has passed through all safety tests.[36]

Again, in January 2024, the government further approved the open cultivation of TELA maize in four varieties.[37] It is claimed that 'T maize' - being genetically engineered, is pest-resistant, drought tolerant and delivers high yields for farmers.[38] These government approvals seem like a desperate move to improve the living conditions of the citizens and to fight hunger. However, there have been push backs and the commercialisation of GMFs has sparked several debates and controversies.

5. The Right to Health and Access to Safe and Nutritious Food in Global Human Rights Jurisprudence

At the heart of the debate for and against the cultivation and consumption of GMFs is the issue of health, safety and suspicions of GMF being responsible for future cancers and other chronic health-related problems. Environmental sustainability, the nation's agricultural sovereignty, food security and the economy are other pointers in this intense controversy. The right to health is everyone's right to the enjoyment of the highest attainable standard of physical and mental

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35 N Isaac and J Conrow (n 4)
36 *Ibid*
37 A. Mojeed, 'Criticisms Trail Nigeria's approval of GMO corn for Planting' *Premium Times* (April 23 2024) <https://www.premiumtimesng.com/agriculture/688581-criticisms-trail-nigerias-approval-of-gmo-corn-for-planting.html> accessed 1 August 2024.
38 *Ibid*

health.[39] This right extends to the government guaranteeing clean water, sanitation, food, nutrition and a comprehensive healthcare system.

Firstly, the Universal Declaration of Human Rights[40] declares the right to health as a right to an adequate standard of living.[41] The International Covenant on Economic, Social and Cultural Rights[42] was the first international instrument to have recognised health as a human right in 1966. It puts forward the idea that the right to health is an inclusive right, based on underlying determinants of health such as safe drinking water and adequate sanitation; safe food; adequate nutrition and housing; healthy working and environmental conditions; health-related education and information; and gender equality.[43]

Secondly, the right to health is provided for regionally under the African Charter on Human and Peoples' Rights.[44] Thirdly, the right to health has been provided under Chapter II of the Constitution of the Federal Republic of Nigeria,[45] which is devoted to socio-economic and cultural rights as distinguished from the fundamental rights contained in Chapter IV of the same CFRN. Although, these socio-economic rights entitled, 'Fundamental Objectives and Directive Principles of State Policy,' in Chapter II seem to have been rendered non-justiciable by Section 6(6)(c) of the CFRN which makes the rights therein unenforceable in a court of law, the domestication of the ACHPR into Nigeria's legal system gives these socio-economic rights an established enforceability

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39 National Human Rights Commission, 'Right to Health' <https://www.nigeriarights.gov.ng/focus-areas/right-to-health.html#:~:text=Regionally%2C%20the%20Right%20to%20Health,Scheme%20Act%20(1999)%20etc> accessed 4 August 2024

40 1948 (UDHR)

41 *Ibid*, art 25

42 Adopted on the 16th December 1966 (ICESCR)

43 Office of the United Nations High Commissioner for Human Rights & World Health Organisation, 'The Right to Health' *Factsheet 3*1 <https://www.ohchr.org/sites/default/files/Documents/Publications/Factsheet31.pdf> accessed 5 August 2024.

44 Art 16 ACHPR 1981

45 1999 (as Amended) (CFRN)

in Nigerian courts. The Court of Appeal in the case of *Ubani v Director SSS*[46] agreed with the arguments above. where it held thus:

> … the African Charter is applicable in this country. The Charter entrenched the social-economic rights of persons. The court is enjoined to ensure the observation of these. A dispute concerning socio-economic rights such as the right to medical attention requires the Court to evaluate State policies and give judgment consistent with the Constitution.

From the foregoing, it seems clear that the right to health which is a constitutional socio-economic right is enforceable and cannot be separated from the fundamental rights which are categorised as civil and political rights. Consequently, the rights in Chapter II are interconnected with the rights in Chapter IV of the CFRN and one cannot be fully achieved without the other.[47] The implication then is that the right to life and dignity of the human person cannot be fully enjoyed without the right to access to quality health-care and access to medical facilities at an affordable rate.[48] Two more fundamental health legislation safeguard the right to health in Nigeria namely: the National Health Act[49] and the National Health Insurance Authority Act.[50] In essence, the right to health is an obligation of the Nigerian government to ensure universal health coverage for its citizens.

The potential for the approval of GMFs is probably rooted in claims that GMFs can offer more affordable nutritious foods and can even be used for mass vaccination of the general public against diseases. For instance, scientists have genetically modified the canola plant to produce a blood

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[46] (1999) 11 NWLR (Pt 625) 129

[47] Q. C. Ukpo, 'The Right to Health: A Case for its Full Realization and Enforcement Under the Nigerian Legal Framework' SSRN 26 (7) 2022 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4173011> accessed 13 August, 2024.

[48] *Ibid*

[49] NHA 2014

[50] NHIAA 2021

anticoagulant.[51] Anticoagulants are commonly known as blood thinners that stop blood from clotting easily thereby preventing blood clots and heart-threatening diseases, such as heart attacks, strokes and pulmonary embolisms.[52] Again, scientists have also put forward the idea that any raw fruit can be bioengineered to vaccinate against a wide range of diseases which in turn is a cheap source of protection in developing countries.[53]

In like manner, a rare variety of rice called golden rice was genetically modified to contain a daffodil gene which produces beta-carotene that forms vitamin A when absorbed by the human body.[54] Deficiency in vitamin A is the leading cause of blindness around the world and so the consumption of golden rice could prevent consumers from the risk of blindness caused by vitamin A deficiency. In other words, GM foods are engineered to be healthier and more nutritious for the consumer. Likewise, the potatoes have been modified to grow sweeter with increased starch proportions and reduced water content which enables the potatoes to absorb less oil when frying.[55] Similarly, rapeseed and sunflower oil have been enhanced to contain linolenic acids that produce more stable nutritious oils with low saturated fat in high temperatures.[56]

6. Food Insecurity in Nigeria: A Justification for GMOS?

In May 2024, the International Rescue Committee (IRC) and its partners estimated that 16 percent of Nigerians would face severe food insecurity or hunger between June and August 2024. This figure is higher than in 2023 and indicates a worsening living situation in Nigeria and other

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[51] SA Olaniyan, et al., 'Genetically modified Foods in Nigeria" A Long-lasting Solution to Hunger?' (2007) 29 (67) *Estudos de Biologia* P 191-202

[52] Cleveland clinic, 'Anticoagulants' <https://my.clevelandclinic.org/health/treatments/22288-anticoagulants> accessed 13 August 2024.

[53] J. Carpenter & L. Gianessi, 'Why US Farmers Have Adopted Genetically Modified Crops and the Impact on US Agriculture' (2001) (3) *AgBiotectNet* 63

[54] *Ibid*

[55] SA Olaniyan (n 56)

[56] *Ibid*

parts of West and Central Africa.[57] The Boko Haram insurgency is greatly to blame for the food insecurity in the country.[58] The destruction of farmlands, farmer-herder crisis and banditry have significantly affected food production across the Northwest and North-Central regions of the country.

Food security is essentially a human right and it entails having access to an adequate amount of food that is nutritious could be seen as the most basic of all human rights.[59] Ultimately, the issue of food security gained national recognition through its recent insertion into the Constitution of the Federal Republic of Nigeria by the Fifth Alteration Act, (No. 34) of 2023. Section 16A (1) of the constitution mandates the Nigerian government to direct its policy towards ensuring the following:

> That strategies that guarantee food security of the nation regarding availability, accessibility and affordability of food to the citizens are initiated, undertaken and implemented;[60]
> The means of production, conversation and distribution of food are upgraded and improved upon on the continuous basis; and[61]
> Adequate measures are provided to ensure that food security of the nation is not compromised by the any individual, group or institution. [62]
> The state shall promote and sustain activities that enhance food security.[63]

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[57] A. Udi, 'IRC Report: An Estimated 16% of Nigerians to face "Severe" Food Insecurity by June 2024' Nairametrics < https://nairametrics.com/2024/05/07/irc-report-an-estimated-16-of-nigerians-to-face-severe- food-insecurity-by-june-2024/> accessed 16 August 2024

[58] *Ibid*

[59] A. Fahy, 'What is Food Security?' *Concern Worldwide US* (November 2022) <https://concernusa.org/news/what-is-food-security/> accessed 16 August 2024

[60] CFRN, s 16A (1)(a)

[61] *Ibid*, s 16A (1)(b)

[62] *Ibid*, s 16A (1)(c)

[63] *Ibid*, s 16A (1)(d)

The provisions of the CFRN above elicits the question: what is food security? Food security according to the World Bank Group is when all people, at all times, have physical and economic access to sufficient safe and nutritious food.[64] The World Bank Group identifies four main dimensions of food security often referred to as the four pillars of food security. The first dimension entails the physical availability of food which speaks to the supply chain of food that is determined by the level of food production, stock levels and net trade of food.[65] The second dimension is the economic and physical access to food. This dimension is concerned with the lack of access to food due to low income of households, high expenditure and market prices in achieving food security. The third dimension of food security is the utilisation of food which is understood as the way the body makes good biological use of food consumed that determines the nutritional status of individuals that consume the food. The last dimension is the stability of all three dimensions over time. In effect, for Nigeria to achieve its food security objectives outlined in Section 16A (1)(a)-(d) of the CFRN, all four dimensions of food security as categorised by the World Bank Group must be fulfilled simultaneously. Perhaps, it could be argued that approving GMFs is part of the Nigerian government's commitment towards the realisation of its directive policy to guarantee food security for the nation. However, how Nigeria goes about achieving food security is the root of the heated GMFs debate, which has cropped up against the backdrop of the right of Nigerians to safe food. Attention will now be given to the human rights as well as the health implications of these genetically modified foods.

7. Implications of GMO Cultivation

Sceptics of bioengineering in Africa have raised several concerns about the potential impacts of the cultivation of GMFs. These fears often centre around health, environment, socioeconomic issues and ethical considerations. Sceptics worry that GMOs could introduce new

[64] World Bank Group, 'What is Food Security?'< https://www.worldbank.org/en/topic/agriculture/brief/food-security-update/what-is-food-security > accessed 16 August 2024

[65] *Ibid*

allergens or toxins into the food supply leading to health problems.[66] There are also concerns about long-term consumption of GMOs which could have unknown health consequences.[67] To illustrate, scientists fear that genetically modified foods could transfer antibiotic-resistant genes to people making it difficult to treat people with common modern day antibiotic drugs simply because people have become resistant to the medications.[68] Equally problematic is the concern that consumers might experience food allergic reactions or other health effects due to the fact that inserting genes from organisms into food may result in new proteins being introduced into human and animal food chains.[69] Although the WHO has not found any risk associated with the consumption of GMFs, it has stated that foods currently in the international market have passed risk assessments and are not likely to pose risks to human health.[70] Yet fears, concerns and misinformation abound especially in Nigeria.

Secondly, sceptics raise socio-economic concerns that the development and commercialisation of GMOs are largely controlled by multinational corporations, which could lead to increased dependence and reduced food sovereignty.[71] Some also fear that GMOs could put small-scale farmers at a disadvantage, as they may not have the resources to afford GMO seeds or the technology to grow them. This is consequent upon the fact that around the world, there are only four (4) big corporations controlling 50 percent of the global seed market with Bayer (formerly Monsanto) and Corteva alone claiming 40 percent of that power.[72] This

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66 G. Ewepu, 'GMOs Not Panacea to Hunger in Nigeria-HOMEF' (July 31 2024, Vanguard) <https://www.vanguardngr.com/2024/07/gmos-not-panacea-to-hunger-in-nigeria-homef/> accessed 8 September 2024.

67 G Ewepu (n 72)

68 SA Olaniyan (n 56)

69 SL Hefle, J.A. Nordlee & Anor, 'Allergenic Foods' (1996) 36 *Crit Rev Food Sci Nutr.* P 69-89

70 World Health Organisation, 'Food, Genetically Modified' (2014) <https://www.who.int/news- room/questions-and-answers/item/food-genetically-modified> accessed 9 September 2024

71 N. Bassey (n 34)

72 Food & Power, 'Gmos & Seeds' <https://www.foodandpower.net/gmos-<seeds#:~:text=In%202020%2C%20the%20top%20four,Corteva%20alone%20claiming%20roughly%2040%25 accessed 10 September 2024; E. Elsheikm

indicates that the GMO business is already controlled by an oligopoly.[73] In Nigeria and South Africa for instance, it is Monsanto that was issued permits in 2015 to do research and produce the GMO crops which are presently in the market.

The fears of sceptics are not totally unfounded considering that Monsanto patents GMO seeds that are sterile and unable to reproduce. Thus, these GMO seeds are modified in such a way that their natural evolution is limited so that they cannot produce a second-generation - a phenomenon known as terminator seed.[74] This then prevents the farmer from replanting GMO seeds thereby forcing the farmers to return to these big agribiotechnology corporations to buy more seeds every planting season.[75] The company has also been accused of aggressively marketing its seeds to uneducated farmers unable to see through the scientific claims.[76] This has resulted in ethical concerns about the creation and use of GMOs, particularly about the potential for the occurrence of unintended consequences. Perhaps man is beginning to play God and not allowing nature to evolve or natural selection to take its course. Sceptics have argued that man's impatience has pushed man to genetic modification.

The foregoing concerns when put against the potential benefits such as increased food supply with less farmland requirement and reduced chemicals; Job and wealth creation, and industrial growth leading to an improved economy have demonstrated that GMOs have become a critical component of national food production. Finding a balance to

'Bowman v Monsanto: The Monopoly Over the Global Food System' (March 4, 2015) < https://belonging.berkeley.edu/bowman-v-monsanto-monopoly-over-global-food-system> accessed 10 September 2024.

[73] Greenpeace, 'Monsanto in South Africa: The True Cost of Our Food' (March 8 2022) <https://www.greenpeace.org/africa/en/blogs/50635/monsanto-in-south-africathe-true-cost-of-our-food/> accessed 10 September 2024.

[74] The University of British Columbia, 'Monsanto and Terminator Seeds' <https://cases.open.ubc.ca/monsanto-and-terminator-seeds/> accessed 10 September 2024

[75] *Ibid*

[76] Ibid

achieve the benefits of progressive science without losing so much to corporate greed might be the best approach.

8. Conclusion and Recommendations

Overall, on the face of it, it will appear that one cannot solve one problem without creating another. In the words of the former Minister of Agriculture and Rural Development, Dr Akinwumi Adesina who is now the President of the African Development Bank, "You can travel by plane or donkey. The former generates CO2, but everyone uses it to travel. Why not try travelling to Europe by donkey'.[77] In effect, to get out of hunger and malnutrition, a more modern approach to agriculture should be embraced and not feared or rejected.

Moreover, the recent government policy on duty-free importation of major food items, such as beans, rice, wheat and maize to tackle food prices albeit for a short period appears to be a giant leap towards ensuring food accessibility in Nigeria.[78] There is no guarantee that these food items imported were not cultivated using GM seeds. Therefore, it makes no sense to import genetically modified foods into the country because Nigeria's agricultural sector cannot safely support the growth of these foods on home soil - a development which will further reduce the market price of the foods. This policy of the government to encourage food imports has been criticised and it has been asserted that Nigeria cannot import its way out of food insecurity.[79] It has also been claimed that a nation that cannot feed itself is only independent in name.[80] Accordingly, Nigeria must produce more food to stabilise food

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[77] EnviroNews Nigeria (n 77)

[78] A. Mojeed, 'Updated: Nigeria's Agric Minister Confirms Duty-free Importation of Beans, Wheat, Rice' (July 10 2024, Premium Times) <https://www.premiumtimesng.com/news/top-news/711598-updated-nigerias-agric-minister-confirms-duty-free-importation-of-beans-wheat-rice.html> accessed 11 September 2024.

[79] African Development Bank Group, 'Nigeria's Food Importation Policy Could Destroy Country's Agriculture, Warns Akinwumi Adesina' (July 13 2024) <https://www.afdb.org/en/news-and-events/press-releases/nigerias-food-importation-policy-could-destroy-countrys-agriculture-warns-akinwumi-adesina-72662> accessed 11 September 2024.

[80] *Ibid*

prices while creating jobs and reducing foreign exchange spending which will stabilise the naira.

The ideal strategy put forward by the African Development Bank which aims to end hunger and malnutrition on the African continent by 2050 is not free from agricultural reforms that give a positive nod to the use of bioengineering to improve agricultural productivity and increase affordable and nutritious food.[81] However, it is essential for the government through the instrumentality of the national regulatory bodies for biosafety (NBMA) and the National Agency for Food, Drug Administration and Control (NAFDAC) to be cautious in approving the cultivation of GMFs in Nigeria. While it is true that GMFs have their benefits considering climate change and other factors, the future unforeseen long-term consequences of how the African genes would react should not be easily dismissed.

It is echoed that only in striking a balance between a citizen's right to health on the one hand and achieving food security in the cultivation and consumption of genetically modified foods that the Nigerian government can fulfil its responsibility towards economic growth and safety of its citizens.[82] Secondly, there should be established for the NBMA and the NAFDAC sophisticated laboratories to inspect and assess the risk and safety of GMFs in the Nigerian market. The requirement of the NBMA Act to have all GM food labelled accordingly should be fully adhered to. Since Nigerians may have no say on the approval of GMFs, at least they should be well informed to identify such foods in the market adequately.

The need for a more robust healthcare system cannot be over-emphasised now that there are concerns about future unforeseen health consequences of the consumption of GMFs. Again, to gain an edge in

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[81] National Roots Corps Research Institute, 'Akinwumi Adesina: Transforming African Agriculture and Ending Hunger' (January 11 2024) <https://nrcri.gov.ng/akinwumi-wins-wf-prize/> accessed 11 September 2024.

[82] JA Amimienrovbiye & TO Otasowie, 'Safety of Genetically Modified Foods and Food Security in Nigeria' (2020) 7 *Benin Journal of Public Law* 20-21

bioengineering, the Nigerian government is encouraged to train scientists to learn this technology by considering the uniqueness and peculiarities of the Nigerian climate to establish agricultural biotechnology companies such as Bayer (formerly Monsanto). While it is agreed that GMFs alone are not the silver bullet that will solve the food insecurity in the country, looking at the population and insecurity challenges faced by farmers, a more comprehensive public sensitisation between stakeholders, farmers and consumers about GMFs in Nigeria, is suggested to dispel fears of the government sneaking in GMFs into the country.

Ultimately, confronting the issues of insecurity in the northeast where most of Nigeria's food comes from might be a more effective strategy to tackle food insecurity. Reports of farmers abandoning their farmlands and losing livestock as a result of the Boko Haram insurgency are prevalent.[83] A significant positive impact on farmers' security and welfare would lead to increased crop/ food yields, without over-reliance on genetically modified seeds which in turn will lead to reduced food prices and an increase in the total economy of the country.

[83] MA Yau, FA Tahir & Anor, 'Boko Haram Insurgency and Farmers Income: A Study of Internally Displaced Farmers in Maiduguri, Borno State, Nigeria' (2020) 5 (4) *African Journal of Management, Dept. of Business Admin. University of Maiduguri* 139-151