

POPULATION GLUT AS IMPEDIMENT TO FOOD SECURITY IN NIGERIA: THE WAY OUT*

Abstract

Nigeria which used to have food surplus - enough for total domestic consumption and a remarkable excess for export – is now facing food insecurity to the point of depending more on importation than local production. Apart from the myriad of factors militating against domestic food production, one of the major extraneous challenges is the rapid population growth in the nation which has defied all strategies applied to strike an equilibrium between them over the years. The aim of this study was to analyse the factors underlying population explosion in Nigeria with a view to ascertain the strength of their impact on sustainable food consumption in this age. It also focused on the forces decelerating progress in food production to overcome the recurring insecurity. The research found that, principally, the massive demographic rise in the country is caused by lack of an effective population policy, excessive births, reduced death rate and inclination to beliefs. The situation is aggravated by continuous neglect of the agriculture sector. The study therefore recommended, among others, that stern measures be taken to stop further explosion of the population including influx of illegal immigrants, a procreation enlightenment campaign programme be launched to cover the entire country, and a religious education be carried out by blending the natural child-bearing right with divine obligation to cater for the children. In addition, during this interval, food production should be improved to cover the gap.

Key words: Population glut, Food insecurity, Domestic food production, Sustainable food consumption.

1. Introduction

As a formula to secure posterity, humanity is as passionate about the availability of food for the sustenance of the present population as it is committed to the earth's perpetual fertility to satisfy the food needs of future generations. Due to the fundamental importance of food to human life, global attention is concentrated on the perennial cultivation of the land for ceaseless supply of quality food. An imperative of this objective is to keep the human population within the planet's carrying capacity at any given time.¹ It also makes society's investment in food security an essential domestic and international responsibility.

In keeping with global values, Nigeria initially made food production a priority.² Its record showed abundance of food, relative to the population up to the first two decades after independence in 1960, when it had about 45.1m people. Thereafter, the quest for accelerated industrialisation and the dividends of oil boom distracted it to the point of utter neglect for agriculture, resulting in her relegation to a food-importing nation. From that era, food production began to decline while the population grew exponentially, thereby creating an unmanageable gap between them in the country. As at 2005, the situation was so critical that the food deficit degenerated to a food crisis leaving over 40 % of the population unable to

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¹ K Davies & M S Mikhail (eds.), *Resources, Environment and Population: Present Knowledge, Future Options* (New York: Oxford University Press, 1991) 315-322; B Zaba & J Clarke (eds.), *Environment and Population Change* (Liege: Ordina Editions, 1994) 197-219.

² K E Uma and others, 'Stimulating Food Production in Nigeria for Sustainable Development: Lessons from China', (2014) 5 (3) *American Journal of Scientific and Industrial Research*, 88-96; P A Okuneye, 'Rising Cost of Food Prices and Food Insecurity in Nigeria and Its Implications For Poverty Reduction', (2001) 39 (4) *CBN Economic & Financial Review*, 1-3.

afford two “bare” meals daily.³ This study addressed the factors responsible for this uneven rise in population alongside the possible solutions to food inadequacy.

2. Concept of Population

Population, also known as population size, refers to the number of individual’s resident within a subjectively designated geographic area during a material period.⁴ It is the most important parameter in the demographic evaluation, but other factors like density, age distribution or structure, fecundity, mortality, and sex ratio are also relevant.⁵ Their correlation, driven by dynamic tendencies, has a significant effect on the overall population. For instance, peak fecundity is normally a constant for populations, but actual fecundity changes with time based on the size, density, and structure of the population, as well as food availability.⁶

2.1 World Population Trend Since 1900

In general, the twentieth century was a period which combined scientific and technological advancement as well as economic growth with an explosive increase in world population. Accordingly, the global population of 950 million in 1800 grew to 1.65 billion in 1900. During the initial half of the 1900s, the average yearly population growth rate increased to about 1%, making the world population 2.51 billion in 1950. In the second half of the century, the average annual population growth rate from 1950 to 1955 was 1.79%; it rose to 2.04% in the period from 1965 to 1970. In 1987 the number rose beyond 5 billion and reached 6 billion in 1999.⁷ There have also been some unexpected declines in the growth rate but UN World Population Projections in June 2019 estimated the population to hit about 9.8 billion by 2050,⁸ having exceeded 7.9 billion in November 2021.

2.2 Nigeria Population Growth Pattern

In 2021, Nigeria had an estimated population of 213 million. Between 1965 and 2021 the number of people living in the country increased at a rate above 2%, the highest being 2.58% in 2020. Since 1950 it has been having a steady rise in population – 1950 (37,859,748); 1955 (41,086,100); 1960 (45,138,458); 1965 (50,127,921); 1970 (55,982,144); 1975 (63,374,298); 1980 (73,423,633); 1985 (83,562,785); 1990 (95,212,450); 1995 (107,948,335); 2000 (122,283,850); 2005 (138,865,016); 2010 (158,503,197);⁹ 2020 (206,140,000).¹⁰

2.3 Over-Population

Over-population means the condition of having more people than can live a comfortable, happy and healthy life without exhausting any part of the earth’s resources meant for the enjoyment

³ R A Sanusi and others, ‘Measuring Household Food Insecurity in Selected Local Government Areas of Lagos and Ibadan, Nigeria’, (2006) (5) *Pakistan Journal of Nutrition*, 62-67.

⁴ R Tarsi & T Tuff, ‘Introduction to Population Demographics’, (2012) 3 (11) *Nature Education Knowledge*, 3; J D Lebreton and others, ‘Modeling Survival and Testing Biological Hypotheses Using Marked Animals: A Unified Approach with Case Studies’, (1992) (62) *Ecological Monographs*, 67-118; C S Sanchez, ‘Introduction: The Concept of Population’, (1996) 11 (2-4) *International Journal of Anthropology*, 15-18.

⁵ T E Martin, ‘Avian Life History Evolution in Relation to Nest Site, Nest Predation, and Food’, (1995) (65) *Ecological Monographs*, 101-127; G E Hutchison, ‘Population Studies: Animal Ecology and Demography’, (1991) (53) *Bulletin of Mathematical Biology*, 193-213.

⁶ R Tarsi & T Tuff, *supra*, (n. 4) 6

⁷ Worldometer, ‘World Population Clock’, *worldometers.info* accessed 10 December 2021; UN Population Division, ‘World Population Prospects’, *esa.un.org* accessed 10 December 2021; M Roser and others, ‘World Population Growth’, *ourworldindata.org* accessed 10 December 2021; J V Bavel, ‘The World Population Explosion: Causes, Backgrounds and Projections for the Future’, *ncbi.nlm.nih.gov* accessed 1 January 2022.

⁸ J Hawks and others, ‘Population Bottlenecks and Pleistocene Human Evolution’, (2000) 17 (1) *Molecular Biology and Evolution*, 2-22.

⁹ Statista, ‘Population of Nigeria 1950-2021’, *statista.com* accessed 2 January 2022.

¹⁰ Statista, ‘Population of Africa 2020 By Country’, *statista.com* accessed 2 January 2022.

of future generations.¹¹ It has become a subject of global importance because of its potential to trigger environmental degradation and deflate natural resources to the detriment of the vast biodiversity.¹²

3. Causes of Rapid Population Growth in Nigeria

In Nigeria there are numerous causes of rapid population growth. The leading ones are examined below –

a. Lack of Birth Control Law

There is no law regulating births in the country. As a result, child-bearing is loose since there is no minimum age for a girl to have children. In addition, restrictions are not observed in terms of maximum children a mother can have. The freedom makes every family, especially the Nigerian woman or girl, assume an unlimited right to procreate to the peak of fertility.¹³

b. High Birth Rate

Statistics show that the birth rate in the country is high. For instance, a report from the Population Reference Bureau indicated that the rate of natural increase in the country was 2.5%, meaning that the population would rise to 261.7 million in 2030 and 396.5 million in mid-2050.¹⁴ What compounds this is the common traditional practice of early marriage of girls in numerous tribes and clans in the country.¹⁵

c. Reduced Death

Due, largely, to improved health care for mothers and infants, in addition to advances in medical provisions, the rate of deaths in the country has reduced relatively in recent times. This has led to the survival and longevity of an overwhelming majority of inhabitants of all ages.¹⁶

d. Religious Beliefs

Another cause of this problem is the religious belief of the nationals and residents. Generally, Nigerians practise Christianity, Islam and African traditional religion. Christians regard abortion as murder as it is equated to shedding of blood of the foetus – another being. The effect is to compel every pregnancy to mature and produce a baby,

¹¹ C Kinder, 'The Population Explosion: Causes and Consequences', (1998) (7) *Yale – New Haven Teachers Institute*, 1-11; R P Singh and others, *Environmental Issues Surrounding Human Overpopulation* (Hershey: IGI Global, 2017) 1-3; H D Vinod, 'Newborn Sex Selection and India's Overpopulation Problem', (2013) (4) *Modern Economy*, 102-108; S I Edet and others, 'Impact of Overpopulation on the Biological Diversity Conservation in Boki Local Government Area of Cross River State, Nigeria', (2014) 4 (5) *American Journal of Environmental Engineering*, 94-98; P R Ehrlich & J P Holden, 'Impact of Population Growth', (1971) 171 (3977) *Science New Series*, 1212-1217.

¹² S H Hamisi, 'The Negative Consequences of a Rapid Population Growth', (2019) 7 (4) *Global Scientific Journals*, 21-33; R Mittal & C G Mittal, 'Impact of Population Explosion on Environment', (2013) 1 (1) *The National Journal*, 1.

¹³ J Campbell, 'Nigeria Faces a Crippling Population Boom', <https://www.cfr.org/blogs/nigeria> accessed 2 May 2019; T E Ingiabuna & E Uzobo, *infra*, n.14.

¹⁴ T E Ingiabuna & E Uzobo, 'Population and Development in Nigeria: An Assessment of the National Policy on Population and Sustainable Development', (2016) (11) *International Journal of Development and Management Review*, 80-102.

¹⁵ J Aduwa, 'Population Explosion in Nigeria: Causes, its Effects on Educational Sector and the Ways Forward', <https://www.ajol.info> accessed 12 December 2021.

¹⁶ J Aduwa, *ibid*; F A Fan & B J Besong, 'Implications of Population Growth for Nigeria's Development', (2010) 13 (1) *African Journal of Philosophy*, or (2010) 13 (1) *Sophia*, 85-90.

wanted or otherwise.¹⁷ Moslem men are inclined to obey a religious injunction of having four wives each. Complemented by the other belief that the woman's duty is to keep the home, child-bearing is a competition among the wives and a determinant of their relevance in the family. With the advantages of early marriage, some wives are able to make babies from about age 15 until they clock 40 years, in quick succession.¹⁸ For the practitioners of African Traditional Religion, abortion is a taboo. Consequently, every pregnancy produces a child.¹⁹

3.1 Consequences of Over-population on Food Security in Nigeria

It is only natural for a nation's population growth to affect the inhabitants' access to food, but the gravity of the impact was postulated by Thomas Malthus.²⁰ He argued that a population will outgrow its resources unless it is checked through the preventive method like the moral restraint of postponing marriage, and positive means such as famine, disease and warfare.²¹ There are projections that global population growth will make it imperative to raise food production needs by about 70% in 2050 as a result of pressure on food quality standards.²² Across the world unsustainable population growth has been the main threat to food security²³ as it is responsible for the malnourishment and unhealthy living condition of a significant proportion of the population.²⁴

Food security was initially interpreted as the practical provision of food produced locally to feed all or a substantial majority of the inhabitants of any nation. The meaning has now been modified by the evolution of trade and international specialty to cover worldwide food production for the access of nations with disadvantageous conditions.²⁵ Availability of food is now determined more by income than local production, thereby altering the dynamics of food self-sufficiency. For instance, the United Kingdom which does not have any serious threat of food insecurity has been depending on food import to meet the needs of its population for more than a century.²⁶ There are several other nations which also augment their local food demand by importing, aided by economic advantage and superior gross domestic product.²⁷ Impacts of rapid population growth on the Nigerian populace with regard to food security are visible as

¹⁷ E K Odusina, 'Fertility Preferences Among Couples in Nigeria: A Cross Sectional Study; (2020) 17 (92) *Reproductive Health*, 1.

¹⁸ I T Oramah, 'The Effects of Population Growth in Nigeria', (2006) (6) *Journal of Applied Sciences*, 1332-1337.

¹⁹ E Osam, 'Analysis of the Social Consequences of Overpopulation in Nigeria', (2019) 8 (1) *Multi-Disciplinary Journal of Research and Devt*, 173-195.

²⁰ T Malthus, *An Essay on the Principle of Population* (London: J. Johnson, 1798) 1-30.

²¹ R Harley, 'Malthusian Theory of Population Growth: Definition & Overview', *study.com* accessed 1 January 2022.

²² K Askew, 'Population Growth: A Threat to Food Quality', *foodnavigator.com* accessed 10 June 2021; J Ranganathan and others, 'How to Sustainably Feed 10 Billion People by 2050, in 21 Charts', *wri.org* accessed 10 December 2020; FAO, *The Future of Food and Agriculture – Trends and Challenges* (Rome: FAO 2017) 146-140.

²³ M Kwasek, 'Threats to Food Security and Common Agricultural Policy', (2012) 59 (4) *Economics of Agriculture*, 701-713; S Abdulrahman, *supra*, (n. 22) 41-53.

²⁴ J Boongarts, 'Population Pressure and the Food Supply System in the Developing World', (1996) 22 (3) *Population and Development Review*, 483-503; C Butler, 'Food Security in the Asia – Pacific: Malthus, Limits and Environmental Challenges', (2009) 18 (4) *Asia Pacific Journal of Clinical Nutrition*, 577-584; A Ehrlich & P Ehrlich, 'The Population Bomb: Revisited', (2009) 1 (3) *The Electronic Journal of Sustainable Development*, 63-71.

²⁵ M Kwasek, (n. 23) 701.

²⁶ D Barling and others, *Rethinking Britain's Food Security* (London: Centre for Food Policy 2008) 1-4.

²⁷ C I Jones & P J Klenow, 'Beyond GDP? Welfare across Countries and Time', (2016) 106 (9) *American Economic Review*, 2426-2457; K Dynan & L Sheiner, 'GDP As a Measure of Economic Well-being', <https://www.brookings.edu/research/gdp-as-a-measure-of-economic-well-being> accessed 12 January 2022.

the nation, battling with poverty, is unable to cover the demand gap with imports.²⁸ The following are the major effects population growth has on food security in Nigeria.

3.1.1 Malnutrition

In recent history there has been an unusual rate of undernourishment or malnutrition in Nigeria, even though there was a drop from 19.3% in 1990 to 8.5% in 2010 to 2012. For instance, the number of victims increased from approximately 10 million people in 2010 to about 14 million in 2016.²⁹ The condition in the conflict-prone north-eastern zone of the country is even more severe.³⁰ Annually about 1 million Nigerian children die before they reach age 5.³¹ About half of these deaths are caused by malnutrition.³² Secondly, it causes varying rates of stunting among children in the country.³³ Significantly, stunting, a main indicator of malnutrition, makes children too short for their age. Stunted children have poor physical growth and impaired brain development which prevent them from thriving and attaining full potential. Nigeria, with over 11 million stunted children, has the second highest number in the world, behind India.³⁴ Thirdly, nearly 30% of Nigerian children are underweight: their weight is not enough for their age, an irregular proportion³⁵ compared to Ghana.³⁶

3.1.2 Mental Impairment

On the long run, poor nutrition during the early formative years has been linked to impairments of intellectual performance, work capacity, reproductive outcomes, and overall health.³⁷ For the adult category, the major impact is the prevalence of overweight mothers.³⁸ In adults, the effect of malnutrition is measured by the body mass index (BMI) data.³⁹ It revealed prevalence of thinness among women of reproductive age (of between 15 – 49 years) a BMI less than 18.5kg/m², and among adolescent girls (15 – 19 years) a BMI less than 18.5 kg/m².⁴⁰ Malnutrition has also been traced to anaemia among some adult Nigerians.⁴¹ The impact on

²⁸ B Aderounmu and others, 'Poverty Drivers and Nigeria's Development: Implications for Policy Intervention', (2021) (8) *Cogent Arts & Humanities*, 1-12; J C Anyanwu, 'The Correlates of Poverty in Nigeria and Policy Implications', (2013) 2 (1) *African J. Economic and Sustainable Development*, 23-52.

²⁹ FAO, *The State of Food Security and Nutrition in the World-Building Resilience for Peace and Food Security* (Rome: FAO, 2017) 1.

³⁰ N S Owoo, 'Demographic Considerations and Food Security in Nigeria', (2021) (23) *Journal of Social and Economic Development*, 128-167.

³¹ United Nations, *World Population Prospects: The 2012 Revision* (New York: UN, 2013) 1; Nigeria National Population Commission and ICF International, *Nigeria Demographic and Health Survey 2013: Preliminary Report, 2013* (Calverton, MD: ICF International, 2013) 1.

³² R E Black and others, 'Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries', (2013) 382 (9890) *Lancet*, 427-451.

³³ Nigeria National Population Commission and ICF International, (n. 31).

³⁴ United Nations Children Fund, *Improving Child Nutrition: The Achievable Imperative for Global Progress* (New York: UNICEF, 2013) 1 *et seq.*

³⁵ Nigeria National Population Commission and ICF International, (n. 31).

³⁶ Ghana Statistical Service, Ghana Health Service and ICF International, *Ghana Demographic and Health Survey 2008* (Calverton, MD: ICF International, 2009) 1.

³⁷ K G Dewey & K Begum, 'Long-term Consequences of Stunting in Early Life', (2011) (7) *Maternal and Child Nutrition*, 5-18.

³⁸ E O Alamu and others, 'Double Burden of Malnutrition: Evidence from a Selected Nigerian Population', (2020) (20) *Journal of Nutrition and Metabolism*, 1-6.

³⁹ K V Bailey and others, 'Use of Body Mass Index of Adults in Assessing Individual and Community Nutritional Status', (1995) 73 (5) *Bull World Health Organ.*, 673-680.

⁴⁰ USAID, 'Nigeria: Nutrition Profile', <https://www.usaid.gov> accessed 10 July, 2021.

⁴¹ E I Ugwuja and others, 'Anaemia in Relation to Body Mass Index (BMI) and Socio-Demographic Characteristics in Adult Nigerians in Ebonyi State', (2015) 9 (1) *Journal of Clinical and Diagnostic Research*, 4-7; E Olayemi & NKD Halim, 'Anaemia in Apparently Healthy Nigerians', (2005) 10 (1) *Journal of College of Medicine*, 31-33.

children also has grave consequences for the nation. For instance, scholars have discovered that childhood mental and developmental disorders are an accumulation of neurodevelopmental, emotional, and behavioural disorders which have numerous adverse effects on psychological and social composition. In most cases, unless intensively handled, the disorders persist into adulthood.⁴² There are ample chances for these children to experience a compromised developmental trajectory with high need for medical and disability attention.⁴³ Childhood mental and behavioural disorders commonly manifest as anxiety ailments which are characterised by excessive or inappropriate fear connected to behavioural disturbances that impair functioning. Such children exhibit anxiety and avoidance of dreaded objects.⁴⁴

3.1.3 Hunger

Overpopulation contributes to the deterioration of the quality of life of Nigerians in all spheres, bespecially through hunger.⁴⁵ Going by the 2021 Global Hunger Index (GHI), Nigeria is the 103rd out of the 116 nations. With a score of 28.3, it has a critical level of hunger.⁴⁶ The outcome is linked to the inevitable impact of overpopulation which causes widespread hunger in addition to over-use of resources, erosion of land, shortages of water, exhaustion of fuel supplies and destruction of forests.⁴⁷ Due to the fact that the present pace of food production is unable to meet the rate of population growth, hunger among the populace is escalating.⁴⁸ It corroborates the finding that increased population at a rate beyond agricultural production impedes productivity and triggers hunger.⁴⁹

3.1.4 Reproductive dysfunction

Studies have revealed that improved nutritional status in childhood normally results in higher fertility and earlier pregnancy via accelerated maturation in adolescence. Prompt maturation and first birth subsequently lengthen child-bearing time for a woman and affords her discretion to plan and space out childbearing.⁵⁰ Childhood micronutrient and macronutrient deficiencies often result in a net negative association with cumulative fertility.⁵¹ On the other hand, male reproductive disorders from malnutrition in childhood could lead to testicular cancer, disorders of sex development, cryptorchidism (a condition in which one or both of the testes fail to

⁴² G Polanczyk & L A Rohde, 'Epidemiology Attention – Deficit/Hyperactivity Disorder Across the Lifespan', (2007) (20) *Current Opinion in Psychiatry*, 386-392; M Shaw and others, 'A Systematic Review and Analysis of Long-Term Outcomes in Attention Deficit Hyperactivity Disorder: Effects of Treatment and Non-Treatment', (2012) (10) *BMC Medicine*, 99.

⁴³ J G Scott and others, 'Childhood Mental and Developmental Disorders (Mental, Neurological, and Substance Use Disorders: Disease Control Priorities)', in V Patel and others (eds.), *Mental, Neurological, and Substance Use Disorders: Disease Control Priorities* (Washington, DC: The World Bank, 2016) 145-161.

⁴⁴ K Beesdo and others, 'Anxiety and Anxiety Disorders in Children and Adolescents: Developmental Issues and Implications for DSM – V', (2009) (32) *Psychiatric Clinics of North America*, 483-524.

⁴⁵ A O Adewole, 'Effect of Overpopulation on Economic Development in Nigeria: A Qualitative Assessment', (2012) 2 (5) *International Journal of Physical and Social Science*, 1; O O Awe, 'Population, Family Planning and HIV/ADS in Sub-Saharan Africa', (2009) 1 (3) *African Journal of Sociology, Psychology and Anthropology in Practice*, 134-144.

⁴⁶ GHI, 'Nigeria – Global Hunger Index', <https://www.globalhungerindex.org> accessed 20 January 2022.

⁴⁷ The Oklahoman, 'Starvation Result of World Overpopulation', <https://oklahoman.com> accessed 2 June 2021.

⁴⁸ I Aina and others, 'The Effect of Population Growth on the Agricultural Production in Nigeria (1961-2013)', (2019) 11 (2) *Croatian Journal of Food Science and Technology*, 230-236.

⁴⁹ K F Omotesho and others, 'The Potential of Moringa Tree for Poverty Alleviation and Rural Development: Review of Evidences on Usage and Efficacy', (2013) 2 (2) *International Journal of Development and Sustainability*, 799-813.

⁵⁰ M Graff and others, 'Childhood Nutrition and Later Fertility: Pathways through Education and Pre-pregnant Nutritional Status', (2010) 47 (1) *Demography*, 125-144.

⁵¹ R Frisch, 'Nutrition, Fatness, Puberty, and Fertility', (1981) (7) *Comprehensive Therapy*, 15-23.

descend from the abdomen into the scrotum before birth),⁵² hypospadias (a birth defect in boys in which the opening of the urethra is not located at the tip of the penis),⁵³ low testosterone (steroid hormone that stimulates male secondary sexual characteristics)⁵⁴ levels, poor semen quality, among others.⁵⁵ Nutrition is equally important for the adult male's reproductive function. Intake of a diet rich in carbohydrates, fibre, folate, and lycopene as well as fruits and vegetables contributes to improved semen quality.⁵⁶ Food rich in antioxidants such as citrus fruits, tomatoes, paw-paw, and mangoes are potentially beneficial for fertility while concentration on high protein and fatty foods impact negatively on fertility.⁵⁷

3.1.5 Inadequate Infrastructure

Another major impact of overpopulation in the nation is the depletion of resources meant for infrastructure after provision is made for other competing needs, leading to substandard infrastructure.⁵⁸ Furthermore, the pressure of rapid population growth renders the infrastructural facilities dilapidated and often obsolete.⁵⁹ Analysis of three indicators will substantiate this conclusion. The first is the provision of water and sanitation. Demographic pressure has left a constant poor management and utilisation of renewable water resources. In 2015, for instance, 69% of Nigeria's total population enjoyed access to safe drinking water, amounting to 85% of urban and 53% rural dwellers.⁶⁰ While commemorating the World Water Day, UNICEF lamented that more than 86% of Nigerians do not have access to safe drinking water.⁶¹ The projection is that by 2040 when there will be accelerated urbanisation and migration to the cities, the water deficit would be much worse.⁶²

The next is energy. In 2017, only about 54% of the total population had access to electricity, consisting of 87% urban and 22% rural populace. The nation's energy sector is dominated by deficient infrastructure.⁶³ As a result, the generation-demand gap is widening in line with

⁵² N E Skakkebaek et al; J K Gurney and others, 'Risk Factors for Cryptorchidism', (2017) 14 (9) *Nat Rev Urol*, 534-548.

⁵³ N E Skakkebaek et al, *ibid*, X Y Zhu and others, 'Hypospadias in Male Infants – A Review', (2017) 21 (4 Suppl) *European Review for Medical and Pharmacological Sciences*, 1-3.

⁵⁴ N E Skakkebaek et al, (n. 52); P K Fazeli & A Klibanski, 'Determinants of Growth Hormone Resistance in Malnutrition', (2014) 220 (3) *J Endocrinol.*, R57-R65.

⁵⁵ N E Skakkebaek et al, *ibid*.

⁵⁶ P O Uadia & A M Emokpae, 'Male Infertility in Nigeria: A Neglected Reproductive Health Issue Requiring Attention', (2015) 4 (2) *Journal of Basic and Clinical Reproductive Sciences*, 45-53; W Y Wong and others, 'New Evidence of the Influence of Exogenous and Endogenous Factors on Sperm Count in Man'. (2003) 10 (110) *Reprod Biol*, 49-54.

⁵⁷ C A Onyeka and others, 'Semen Analysis of 263 Sample Men from Infertility Clinic in Western Nigeria', (2012) *West Afr J Assist Reprod*, 1-16.

⁵⁸ F A Fan & B J Besong, 'Implications of Population Growth for Nigeria's Development', (2010) 13 (1) *Sophia: an African Journal of Philosophy*,

⁵⁹ U Princewill and others, 'Effects of Population Pressure on Port Harcourt Neighbourhood Infrastructure and Facilities', (2020) 7 (3) *International Journal of Research and Scientific Innovation*, 220-226

⁶⁰ UNICEF/WHO, *Progress on Household Drinking Water, Sanitation and Hygiene: 2000-2017 Special Focus on Inequalities* (New York: UNICEF and WHO, 2019) 1-20; R A Price, *The Effects of Rapid Demographic Changes on Water, Energy, and Transport Infrastructure in Nigeria, K4D Help Desk Report* (Brighton: Institute of Development Studies, 2019) 2.

⁶¹ S Oko, 'Over 86% of Nigerians Lack Access to Safe Drinking Water – UNICEF', *Vanguard* (22 March 2021) 10.

⁶² B Macheve and others, *State Water Agencies in Nigeria: A Performance Assessment-Directions in Development Infrastructure* (Washington, DC: World Bank, 2015) 1; I R Abubakar, 'Quality Dimensions of Public Water Services in Abuja, Nigeria', (2016) (38) *Utilities Policy*, 43-51.

⁶³ J Bello-Schunemann & A Porter, n. 75; M Mukhtar and others, 'Effect of Inadequate Electrification on Nigeria's Economic Development and Environmental Sustainability', (2021) (13) *Sustainability*, 1-24.

population growth.⁶⁴ Years after the privatisation of the electricity sector, a reasonable fraction of the population still cannot access energy. The third is transport infrastructure (roads, rail, ports and airports). Only 16% of roads in the country are paved with a low road density at 21km per 100km².⁶⁵ There is regular deterioration due to rising traffic volumes. Scholars hold the view that high population growth is the main cause of infrastructure dilapidation in this sector.⁶⁶

3.2 Solutions to Population/Food Imbalance in Nigeria

Despite the perennial duration of the adverse impact of rapid population rise on food security in Nigeria and the seeming intractability of the quagmires, experiences of other nations show that solutions are available. This section of the study analyses the possible remedies to this problem.

3.2.1 Increased Food Production

Production of crops, livestock and fish being the major sources of food consumed in the country, needs to be increased massively⁶⁷ as a first step to cover the population – food gap. For, inasmuch as it is desirable to cut down the rate of population increase as time progresses, the present population and reduced additions still have to be fed while adjustments are implemented. Furthermore, all analyses of securing food for the growing human population have always focused on raising productivity, even though related factors of facilitating access to markets, reducing waste and changing diets are also considered.⁶⁸ This is also a fundamental objective because the sustainable development goals and other international commitments to attain food security involve modern technologies as an indispensable tool for eradicating hunger and food deficiencies. The strategy covers every component of the food system – from farm to market – for potential improvement with the application of science and technology. Accordingly the amount of food produced can be increased by applying new and existing technologies to combat biotic and abiotic stresses, including the planting of disease – or pest – resistant crops, rust resistant wheat varieties, tilling machines, herbicides, and pesticides for the biotic, and salt-tolerant crops (like potato, quinoa) and climate resistant crops (like early-maturing cereal crop varieties, heat-tolerant varieties, drought-tolerant legumes or tuber crops, crops or varieties with enhanced salinity tolerance, or rice with submergence tolerance) for the abiotic stresses.⁶⁹

⁶⁴ O Bamisile and others, 'An Approach for Sustainable Energy Planning Towards 100% Electrification of Nigeria by 2030', (2020) (197) *Energy*, 117172; S Olowosejeje and others, 'The Economic Cost of Unreliable Grid Power in Nigeria', (2019) 11 (2) *African Journal of Science, Technology, Innovation and Development*, 149-159.

⁶⁵ Federal Republic of Nigeria, National Planning Commission, 'National Integrated Infrastructure Master Plan', https://nesgroup.org/storage/app/public/policies/National-Integrated-Infrastructure-Master-Plan-2015-2043-compressed_1562697068.pdf.

⁶⁶ P C Onokala & C J Olajide, 'Problems and Challenges Facing the Nigerian Transportation System Which Affect Their Contribution to the Economic Development of the Country in the 21st Century', (2020) (48) *Transportation Research Procedia*, 2945-2962; J Olawale, 'Problems of Road Transportation in Nigeria', *Legit* (3 November 2017)1.

⁶⁷ A K Osu, 'Population Dynamics and Food Security in Nigeria', (2017) 5 (2) *International Journal of Advanced Studies in Economics and Public Sector Management*, 129-139.

⁶⁸ E Crist and others, 'The Interaction of Human Population, Food Production, and Biodiversity Protection', (2017) (356) *Science*, 260-264.

⁶⁹ M Acevedo and others, 'A Scoping Review of Adoption of Climate-Resilient Crops by Small-Scale Producers in Low-and Middle-Income Countries', (2020) (6) *Nature Plants*, 1231-1241; O P Dhankher & C H Foyer, 'Climate Resilient Crops for Improving Global Food Security and Safety', (2018) (41) *Plant Cell Environ.*, 877-884.

3.2.2 Integrating Nutrient-rich Crops into the Food System

Another clue is the method which combines the improvement of agricultural productivity and reduction of malnutrition by way of integrating nutrient-rich crops into the food system. Nutrient- enrichment of crops or bio fortification is a process of breeding staple crops to boost their nutritional quality and profile. The crops are generally made to assimilate nutrients from the environment as a natural course of cultivation.⁷⁰ There is an improvement of the conventional biofortification via plant breeding by way of agronomic biofortification (the application of micronutrient-rich fertilizers through soil or leaves) and transgenic techniques.⁷¹

3.2.3 Health and Associated Benefits of Biofortification

Before this time, food fortification, diet diversification, and nutrient supplementation had been applied as public health strategies to cut down micronutrient loss-induced morbidity and mortality all over the world.⁷² The target of this agrotechnology includes the immense negative socio-economic impact of widespread micronutrient malnutrition at the personal, community and national levels.⁷³ The total health benefits are enormous. For instance, out of the 26 predominant risk factors of the global burden of disease estimates, iron deficiency ranks 9th, zinc deficiency 11th, and vitamin A deficiency 13th.⁷⁴ Around the world, zinc and iron deficiencies have induced micronutrient malnutrition in more than 3 billion people,⁷⁵ and are linked to the death of about 500,000 children below 5 years of age annually.⁷⁶ In addition, they lead to serious physical incapacity, mental impairment, decreased health, and parasitic diseases. Accordingly, combating malnutrition is an integral component of three sustainable goals, to wit, eradication of extreme poverty and hunger, reduction of child mortality, and improvement of maternal health.⁷⁷ Different studies have confirmed iron and zinc fortification as a therapy for hidden hunger. In Rwanda, for example, constant intake of iron-biofortified beans among women of childbearing age led to rise in haemoglobin, ferritin and total body iron in about 5 months. Other positive effects were improved memory, increased attentiveness and enhanced

⁷⁰ H Bouis and others, Biofortification: Evidence and Lessons Learned Linking Agriculture and Nutrition (Rome: FAO and WHO, 2013) 3-5; H E Bouis and others, 'Biofortification: A New Tool to Reduce Micronutrient Malnutrition', (2011) 32 (1) *Food and Nutrition Bulletin*, 31S-40S; C Hotz & B McClafferty, 'From Harvest to Health: Challenges for Developing Biofortified Staple Foods and Determining Their Impact on Micronutrient Status', (2007) 28 (2) *Food and Nutrition Bulletin*, S – 271-279.

⁷¹ FAO, *Nutrition-Sensitive Agriculture and Food Systems in Practice, Options for Intervention* (Rome: FAO, 2017) 26.

⁷² J Haider and others, 'Daily Versus Weekly Iron Supplementation and Prevention of Iron Deficiency Anemia in Lactating Women', (2003) (80) *East Afr. M. J.*, 11-16; K H Brown and others, 'Zinc Bioavailability From Zinc-Fortified Foods', (2007) (77) *Int. J. Vitam. Nutr. Res.*, 174-181; D Suharno and others, 'Supplementation With Vitamin A and Iron for Nutritional Anaemia in Pregnant Women in West Java, Indonesia', (1993) (27) *Lancet*, 1325-1328.

⁷³ I Darnton-Hill and others, 'Micronutrient Deficiencies and Gender: Social and Economic Costs', (2005) (81) *Am. J. Clin. Nutr.*, 198 S – 1205 S; A J Stein, 'Global Impacts of Human Mineral Nutrition', (2010) (335) *Plant Soil*, 133-154.

⁷⁴ M Ezzati and others, 'Selected Major Risk Factors and Global and Regional Burden of Disease', (2002) (360) *Lancet*, 1347-1360.

⁷⁵ S L Dwivedi and others, *Nutritionally Enhanced Staple Food Crops* (New Jersey: John Wiley & Sons Inc., 2012) 174.

⁷⁶ R E Black and others, 'Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences', (2008) (371) *Lancet*, 243-260.

⁷⁷ S L Dwivedi and others, (n.75) 175.

performance at work and school in other patients.⁷⁸ Adolescent children in India who ate iron bio-fortified pearl millet had the same experience.⁷⁹

3.2.4 Biofortification Prospects in Nigeria

The enrichment of staple foods with micronutrients has prospects of contributing tremendously to the eradication of the negative impacts of micronutrient deficiencies in Nigeria. For instance, Vitamin A is an essential mineral involved in vision, immune system, and cell differentiation, synthesis of glycoprotein, reproduction and general growth and development of the human body.⁸⁰ Yet in Nigeria over 24.8% of pre-school children and 13% of women of child-bearing age are Vitamin A-deficient.⁸¹ Furthermore, about 30% of under-5 children and 20% of pregnant women in the country suffer the same malnutrition.⁸² Through the development of biofortified crops, several international organisations, national programmes and private seed companies are collaborating to solve the hidden hunger problem using nutrient supplementation, home food fortification and condiments fortification of staple foods as well as biofortification.⁸³ The leading one is Harvest- Plus which undertakes the biofortification of cassava and maize as priority. With persistence, all the staple foods in the country, especially cassava, yam, sweet potato, cowpea, maize, rice, wheat, millet, and sorghum⁸⁴ can be covered to enhance availability of vitamins and minerals for majority of the populace whose diets are dominated by less dense nutrient food.⁸⁵

3.2.5 Infrastructure Improvement

Improvement of infrastructure in the agricultural field, in particular the rural settlements where farming is relatively concentrated, is important for increased food production. Facilities like good feeder roads will contribute to the evaluation of output and conveyance of inputs to farm sites. On- farm storage facilities are particularly appropriate for specific agricultural enterprises suitable for commercialised usage in the rural areas.⁸⁶ Another role of the road network is to

⁷⁸ J D Haas and others, 'Consuming Iron Fortified Beans Increases Iron Status in Rwandan Women after 128 Days in a Randomized Controlled Feeding Trial', (2016) 146 (8) *J. Nutr.*, 1586-1592.

⁷⁹ J L Finkelstein and others, 'A Randomized Trial of Iron-Biofortified Pearl Millet in School Children in India', (2015) 145 (7) *J Nutr.*, 1576-1581; S P Scott and others, 'Cognitive Performance in Indian School-Going Adolescents is Positively Affected by Consumption of Iron-Biofortified Pearl Millet: A 6-Month Randomized Controlled Efficacy Trial', (2016) 148 (9) *J Nutr.*, 1462-1471.

⁸⁰ A Mandal, 'Vitamin A Functions', newsmedical.net accessed 1 December 2021; J E Dowling, 'Vitamin A: Its Many Roles-From Vision and Synaptic Plasticity to Infant Mortality', (2020) (206) *Journal of Comparative Physiology*, 389-399; J F Faustino and others, 'Vitamin A and the Eye: An Old Tale for Modern Times', (2016) 79 (1) *Arq Brass Oftalmol*, 56-61.

⁸¹ B Maziya-Dixon and others, *Nigerian Food Consumption and Nutrition Survey 2001 -2003 Summary* (Ibadan: International Institute for Tropical Agriculture, 2004) 1-20; B Maziya-Dixon and others, 'Vitamin A Deficiency is Prevalent in Children Less Than 5 Years of Age in Nigeria', (2006) (136) *J Nutr*, 2255-2261.

⁸² B Maziya-Dixon and others, 'Vitamin A Deficiency is Prevalent in Children Less Than 5 Years of Age in Nigeria', *ibid.*

⁸³ F N Uchendu and others, 'Stability of Vitamin A in Selected Nigeria Bread Made From Commercial Fortified Wheat Flour', (2012) (2) *Int J Appl Sci Technol*, 93-98; I C Okwuonu and others, 'Opportunities and Challenges For Biofortification of Cassava to Address Iron and Zinc Deficiency in Nigeria', (2021) (28) *Global Food Security*, 1-9.

⁸⁴ F M Harris & S Mohammed, 'Relying on Nature: Wild Foods in Northern Nigeria', (2003) 32 (1) *Ambio A J. Hum. Environ.*, 24-29.

⁸⁵ J V Meenakshi and others, 'How Cost-Effective is Biofortification in Combating Micronutrient Malnutrition? An *ex ante* Assessment', (2010) (38) *World Dev.*, 64-75; R U Onyeneke and others, 'Biofortification in Nigeria: A Systematic Review', (2019) 4 (4) *Aims Agriculture and Food*, 892-906.

⁸⁶ S B Fasoriyo & K A Taiwo, 'Strategies For Increasing Food Production and Food Security in Nigeria', (2012) 13 (4) *Journal of Agricultural and Food Information*, 338-355; P A Okuneye, 'Rural Poverty Assessment and Control in Africa', (An Invited Paper for the Specialization Course Presented at the United Nations, IDEP, Dakar, Senegal June 2001) 1.

facilitate the distribution of farm produce to various locations wherefrom final supply for consumption can be achieved or made feasible.⁸⁷ It also serves as a motivation for improved food production in that through the creation of easy access to the rural agriculture base, demand increases. This generates more income for farmers and adds to their net profit and investment⁸⁸.

3.2.6 Preservation of Surplus Foods

Another means by which this goal can be achieved is the improvement of preservation of surplus foods. It is a formula for cutting down post-harvest losses recorded under traditional agricultural practices where households have more than required quantities of foods but are not conversant with the technology to preserve them for a reasonable duration. In most cases, indigenous storage and preservation strategies are usually short compared to improving modern forms. This causes spoilage, substandard storage and increase in unconsumable foods in the country as well as other less developed countries.⁸⁹ The challenge is that these ancient practices which used to serve the people in the past is overwhelmed by the bloated population and the complication of reduced food production.⁹⁰ This formula has become a critical component of the food security quest because it seeks to plug the depleting channel in the insufficient overall food production. Related to it is the prevention of destruction by diseases and pests during storage and preservation. The improvement of storage and preservation technology is a guarantee for saving the loss through this means.⁹¹

3.2.7 Favourable Economy

Poverty is a major setback to food security. With food production regularly below demand, commodity price is unduly high – and continuously increasing – as a result of the rapid population growth.⁹² The clue here is to improve the general economy and facilitate individual financial capacity.⁹³ This is connected to availability of food by way of ready quantity for sale to consumers,⁹⁴ as well as employment opportunities for persons within the labour age.⁹⁵ Another mitigation is to quell the raging insecurity in the country for enterprises to thrive and

⁸⁷ A M Tunde & E E Adeniyi, 'Impact of Road Transport on Agricultural Development: A Nigerian Example', (2012) 5 (3) *Ethiopian Journal of Environmental Studies and Management*, 232-238.

⁸⁸ A M Tunde & E E Adeniyi, *supra*, (n. 127); A J Aderamo & S A Magaji, 'Rural Transportation and the Distribution of Public Facilities in Nigeria: A Case of Edu Local Government Area of Kwara State', (2010) 29 (3) *Journal of Human Ecology*, 171-179.

⁸⁹ S K Cheplogoi and others, 'Implications of Indigenous Food Storage and Preservation Strategies on Household Food Security in Baringo County, Kenya', (2021) 8 (4) *International Journal of Scientific Research and Innovative Technology*, 1-14; I S Asogwa and others, 'Promotion of Indigenous Food Preservation and Processing Knowledge and the Challenge of Food Security in Africa', (2017) 5 (3) *Journal of Food Security*, 75-87; S Umar & M W Musa, 'Determinants of the Use of Indigenous Coping Strategies Against Climate Change Among Small-holder Farmers in Katsina State, Nigeria', (2015) 3 (1) *Journal of Agriculture and Ecology Research International*, 24-32.

⁹⁰ C A Olurankinse, 'Strategies for Sustainable Food Processing and Preservation', (2014) 8 (6) *Journal of Environmental Science Toxicology and Food Technology*, 31-36.

⁹¹ V Ibeanu and others, 'Food Preservation and Security at Household Level in Rural Nsukka, Enugu State, Nigeria', (2011) 9 (2) *Agro-Science*, 125-130.

⁹² T S Akinyetun, 'Towards Achieving Food Security in Nigeria: The Economic Strains and Strategies for Way Forward', (2018) (2) (1) *Global Journal of Economics and Finance*, 7-23; O Eme and others, 'Challenges of Food Security in Nigeria: Options Before Government', (2014) 4 (1) *Arabian Journal of Business and Management Review*, 15-25.

⁹³ A E Obayelu, 'Comparative Analysis of Households' Socio-economic and Demographic Characteristics and Food Security Status in Urban and Rural Areas of Kwara and Kogi States of North-Central Nigeria', (2012) 12 (3) *African Journal of Food Agriculture, Nutrition and Development*, 6028-6054.

⁹⁴ A K Osu, 'Population Dynamics and Food Security in Nigeria', (2017) 5 (2) *IJASEPSM*, 129-139.

⁹⁵ H Jacoby, 'Food Prices, Wages, and Welfare in Rural India', (2016) 54 (1) *Economic Inquiry*, 159-176.

enable entrepreneurs to freely engage suitable personnel.⁹⁶ The chain effect of all these remedies is an elevation of a reasonable proportion of the population from zero income earners to a stratified cadre of income recipients, sufficient to make a significant income in the poverty scale of the nation and the financial capacity of the citizens positively. It also regulates inflation which ordinarily degrades the quality and quantity of foods families are able to afford⁹⁷ to ensure constant food affordability.⁹⁸

3.2.8 Birth Control

In order to regulate population growth, births which constitute the predominant source, need to be controlled. Government has expressed determination to apply all reasonable and practicable methods to limit the number of children a couple can have.⁹⁹ In acknowledgement of this objective, President Muhammadu Buhari recently launched the Revised National Policy on Population for Sustainable Development where he stressed the need for prompt steps to control the nation's high fertility rate with the aid of contemporary contraceptive methods all over the country.¹⁰⁰

3.2.9 Immigration Regulation

In keeping with global policy, the country allows migration into its territory using local and international statutory backing.¹⁰¹ It has been contributing to the country's population increase over the years.¹⁰² However, there is need to check irregular immigration - those who enter the country by a legal means but overstay their visa period, and those who enter through unofficial routes. It has been observed that the porosity of the nation's borders has enabled the creation of numerous entry points through which a very high number of irregular immigrants infiltrate into the territory.¹⁰³ The significance of this addition to the nation's population can be assessed by the recurrence of demand for official deviation from this complacency

⁹⁶ J George & A Adelaja, 'Forced Displacement and Agriculture: Implications for Host Communities', (2021) (13) *Sustainability*, 5728.

⁹⁷ W Easterly & S Fischer, 'Inflation and the Poor', (2001) 33 (2) *Journal of Money, Credit and Banking*, 160-178; I A Ayinde and others, 'Can Food Calorie Be An Index For Poverty in a Rural Economy? An Extrapolation From Farm Households in Ogun State, Nigeria', (2012) 36 (6) *International Journal of Consumer Studies*, 688-695

⁹⁸ O Omorogiuwa and others, 'The Role of Agriculture in the Economic Development of Nigeria', (2014) (10) *European Scientific Journal*, 113-147.

⁹⁹ W O Fawole and others, 'Food Insecurity in Africa in Terms of Causes, Effects and Solutions: A Case Study of Nigeria', (2nd *International Conference on Sustainable Agriculture and Environment, Konya, Turkey, September 2015*) 1.

¹⁰⁰ T Daka, 'Buhari Moves Against High Fertility Rate, Launches Revised Population Policy', *The Guardian* (4 February 2022) 4.

¹⁰¹ Immigration Act, No. 8, 2015; Labour Act, Cap L 1, LFN 2004, Trafficking in Persons (Prohibition) Law Enforcement and Administrative Act, No. 24 of 14 July 2003; The Child Rights Act, of 2003; International Convention on the Protection of the Rights of All Migrant Workers and their Families (Ratification) Act 2009; Protocol Against the Smuggling of Migrants by Land, Sea and Air, Supplementing the United Nations Convention Against Transnational Organized crime of 2000; ILO Discrimination (Employment and Occupation) convention (No. 111) 1958; African Charter on Human and People's Rights of 1982; ECOWAS Protocol Relating to Free movement of Persons, Residence and Establishments of 1979; Convention Regulating Inter-State Road Transportation Between ECOWAS Members State of 1982, among others.

¹⁰² A Afolayan & IOM's Research Division, *Migration in Nigeria, A Country Profile 2009* (Geneva: International Organization for Migration, 2009) 65-66.

¹⁰³ A Afolayan & IOM's Research Division, *ibid*.

3.2.10 Family Planning

Family planning is one of the most effective methods of averting unintended pregnancies and reducing rapid population growth.¹⁰⁴ In July 2012, Nigeria attended the London Summit on Family Planning and endorsed a commitment to increase domestic funding for family planning.¹⁰⁵ There have been numerous calls by scholars and groups for the Government to regulate the hyper fertility rate with family planning strategies in the country.¹⁰⁶

4. Conclusion

Nigeria once passed through a phase when food production was synonymous with the national life of its citizenry. Food was in so much abundance that some had to be exported to neighbouring countries without hampering domestic consumption needs. Due to the commitment of the administration to agriculture in general, the gradual growth of the population did not have adverse impact on the agricultural output trend. When, however, Government became complacent about the food source and output level, population growth fast outpaced quantity of food produced. Thenceforth, the gap between the population and accessible food began to widen – and has become a crisis now. To prevent aggravation of this hardship on present and future generations, urgent action is needed not only to close the gap but also to reduce the rate of population growth and accelerate food production for the benefit of all.

5. Recommendations

The study therefore makes the following recommendations –

There should be a legislation on population control reducing births to 3 children per couple. Government should educate women on voluntary family planning and its benefits. Government should promote agriculture by quelling the insecurity in farms. There should be safety to enhance food distribution. Farmers should be guided to practise nutrient-enrichment of staple foods.

The economy has to be revamped to facilitate food accessibility through financial empowerment of the people.

Government needs to implement an aggressive agriculture programme for mass production of all local food types.

¹⁰⁴ E Lule and others, 'Global Trends in Fertility, Contraceptive Use and Unintended Pregnancies', in E Lule and others, *Fertility Regulation Behaviors and their Costs: Contraception and Unintended Pregnancies in Africa and Eastern Europe & Central Asia* (Washington DC: World Bank 2007) 8-39.

¹⁰⁵ Federal Ministry of Health, Nigeria Family Planning Blueprint (Scale-up Plan) October 2014, 1-2.

¹⁰⁶ T I Olawande & L T Fasasi, 'Family Planning Perceptions and Sustainable Development in Nigeria, (2016) 3rd International Conference on African Development Issues, 2016, 1-5; J C Fotso and others, Family Planning and Reproductive Health in Urban Nigeria: Levels, Trends and Differentials (Chapel Hill, NC: Measurement, Learning & Evaluation Project and National Population Commission, 2011) 35-63; U C Isiugo-Abanibe, 'Reproductive Motivation and Family Size Preferences Among Nigerian Men', (1994) 25 (3) *Stud Fam Planning*, 149-161; M Jinadu & B Ajuwan, 'Traditional Fertility Regulation Methods Among the Yoruba and Southwestern Nigeria', (1997) 1 (1) *African J Repro Health*, 65-73.