ENVIRONMENTAL HEALTH IMPLICATIONS OF POPULATION DYNAMICS IN THE 21ST CENTURY

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ABSTRACT

The sustained rapid increase in the world's population in the 21st Century has really become a source of worry, considering several environmental health issues as well as other social problems that usually characterize large population. This paper therefore, examined the relationships between population size and the environment, population distribution and the environment and population composition and the environment, bringing-out their health implications on individuals. The paper recommends that governments of various countries should initiate and implement measures reflecting changes in population size, population distribution and population composition. Such measures should include effective family planning methods and teaching of sex education at all levels of education to curb the rate of population increase and development of rural areas to curtail rural-urban migration.

Keywords: *Population; Environment and Health*

Introduction

The sustained increase in global population in the 21st Century has become a major issue of public concern worldwide considering several environmental

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health problems that characterize large population. The united Nations' Report of 1999, showed that between 1960 and 1999, the world's population doubled from 3 billion to 6 billion people. Today, over six billion people exist on earth and an increase of about 97 million people occurs annually (Speidel, 2013).

Although, the annual rate of population increase varies from country to country. On average the world population is growing at 1.5% every year (Leonardo, 2014). If this growth rate continues, the world population will hit 12 billion by 2050. In Nigeria, the total population was last recorded at 166.2 million people in 2012 from 45.2 million in 1960, changing 268 percent during the last 50 years (National Bureau of statistics, 2012). The population of Nigeria represents 2.35 percent of the world total population today. This means that one person in every 43 people on the planet is resident in Nigeria.

An increasing population can be attributed to several variables. In developing countries, the growth could be attributed to increased immigration or lack of migration; lack of education on contraceptive use and the need or desire for more children. In developed countries, however, population increase can be attributed to better medical care, thus a longer life span and or fewer deaths.

In many ways, population increase reflects good news for humanity. It means mortality rate has reduced, life expectancy has increased and people are on average, healthier and better nourished than at any time in history. However, during this same period, changes in the environment will begin to accelerate. For example, environmental pollution is likely to be heightened, resource depletion will speed up and the threat of global warming is likely to result from excessive human activities.

Population dynamics according to Hunter (2000), means changes in population size, population distribution and population composition. It has to do with the description of the number of individuals in a particular place, the

pattern of where they live and their description according to characteristics such as age and sex and of course their socio-economic status. The desire of humans to understand the relationship between population dynamics and the environment started several decades ago. For example, Malthus (1798), studied the relationship between population and environmental resources. Malthus hypothesized that population numbers tend to grow exponentially, while food production grows linearly never quite keeping pace with population and thus resulting in natural checks (such as famine) to further growth. Although, the subject was periodically taken up again in the following decades, with for example, Perkins in Hunter (2000), expressing concern over human-induced soil depletion and environmental pollution in colonial Africa.

In 1960s, a significant research interest in the relationship between population dynamics and the environment was rekindled. In 1963, the US National Academy of sciences published the growth of world population, a report that reflected scientific concern about the consequences of global population growth, which was then reaching it's peak at annual rate of two percent (Green, 1992).

It has now become increasingly clear that human populations have a powerful effect on the environment. Yet, the exact relationship between population dynamics and the environment is complex and not well understood. This paper therefore, examines the relationship between population size and the environment; population distribution and the environment and population composition and the environment (Population Dynamics) with the aim of bringing-out the threats posed to the environment as they are capable of harming human health.

Population Size and the Environment

Population size refers to the number of individuals living in a given geographical area. The rapid increase in the global population has led to increase in the population size in

almost all the settlements on earth (Leonardo & Zoe, 2014).

No simple relationship exists between population size and the environment. As population size increases, there is depletion of environmental resources such as arable land, portable water, forests and fisheries. Hunter (2000), observed that, in the second half of the 20th Century, the decreasing farmland that accompanied population increase contributed to growing concern about limits to global food production, per capital land requirements for food production and the limits of fertile land over the course of the 21st Century. Butler (1994), noted that continued increase in population size prompts accelerating demand for water. He observed that global water consumption rose sixfold between 1900 and 1995, more than double the rate of population increase.

Human activity has already transformed an estimated 10% of the earth's surface from forest or rangeland into desert. The productive capacity of 25% of all agricultural lands, an area equal to the size of India and China combined, has already been degraded (Greep, 1998). Projected populated growth in Africa, South Asia and other developing countries, together with declining availability of water from aquifers, threatens the food security of more than one billion people in developing countries (Green, 1992). Other large countries where rapid population increase and declining crop land per person threaten food security include Nigeria and Pakistan. If Nigeria's population increases from the current 166.2 million to a projected 244 million in 2050, grain land per capital will decline from 0.15 to 0.07 hectares (UN, 2007).

The health implication of this trend is that the unproductive land and food scarcity will contribute to malnutrition across nations with infants and children suffering the most serious health consequences. Water scarcity will also impair health as fresh water supplies for human use will become polluted with toxic materials and pathogens. Proper treatment of human wastes is currently not available for most Nigerians and many people are

at risk of water borne diseases because they lack access to pure drinking water.

Most of the environmental damages being experienced in Nigeria today are due to growing number of people. They are cutting down forests, hunting wildlife in a reckless manner, causing environmental pollution and creating a host of problems. In the area of environmental degradation, the over-use of oil, local and natural gas has started producing some serious effects on human health. Rise in number of vehicles and industries has badly affected the quality of oxygen (O_2). Rise in amount of carbonmonoxide, emission from vehicles and industries leads to global warming which has harmful effects on human health. Melting of polar ice caps, changing climate patterns, rise in sea level are few of the consequences that we are facing today due to environmental pollution from excessive human activities.

In Nigeria, due to rapid increase in population size, people have had to settle in flood prone valleys and on unstable hillsides, where deforestation and climate change have increased their vulnerability to disasters such as hurricane and some infections.

Population Distribution and the Environment

Population distribution is the arrangement of population across space or population's relative geographic location (Hunter, 2000). Population density (number of people per km^2) is often used to indicate variation in distribution across regions and as such, population distribution is closely related to population size.

Population distribution is influenced by two factors (1) variation in natural increase that shift the relative proportions of population across localities and (2) migration. Norman (2001), asserted that migration is a complex process driven by many factors. Individuals can be motivated to migrate by the "pull" factors of possible destination areas, including improved employment prospects, the possibility of joining family members or other desirable economic amenities. On the other hand, lack of

employment opportunities in the villages or other negative characteristics can act as "push" factors motivating rural-urban migration which result in over-population of urban areas. Omofonwan (2000), observed that, the past 40 years have witnessed remarkable changes in the distribution of humans across Nigerian cities. In particular, the increasingly urban concentration of population is a prominent contemporary demographic trend.

One aspect of population distribution to be related to the environment is urbanization. According to Hunter (2000), the process of urbanization fastened in the 20th Century and is expected to continue well into the 21st Century. This is true as developing nations of the world including Nigeria have increasingly witnessed high rate of urbanization in the last one and half decades into the 21st century. It has been projected that between, 1990 and 2025, the number of people living in urban areas will double, with the vast majority of this urban growth taking place in developing countries (UN, 1998). As a result of this high level of urban concentration, several cities have reached unprecedented levels of concentration. The number of mega-cities with 10 million or more inhabitants has increased very rapidly mostly in developing nations (Sajini, 2011).

The environmental health implications of this kind of population distribution by which urban areas are over-populated cannot be over-emphasized. At least, three general areas of environmental consequences result from the high population densities accompanying urban development. First the wastes produced by such densities is beyond the absorption capacity of the surrounding environment, resulting in high concentrations of pollutions. The high level of air pollution characterizing many megacities testifies to the inability of the environment to absorb the wastes produced by high densities of consumers and processes.

Second, the rapid pace of urban growth occurring in developing nations, in addition to the sheer size of megacities, greatly hinders the

development of adequate infrastructure or regulation mechanisms to handle the environment impacts of human concentration. For example, rapidly increasing population densities completely overwhelmed the sewage system in the Karadi town, Pakistan (with a population of over 10 million people), often operating at only 15 percent capacity as a result of breakdowns and clogged pipes. Much of the sewage eventually contaminated drinking water wells because it had leaked into the surrounding soil (Rahman, 1995). Such contamination is responsible for many water borne diseases including diarrhea, cholera, typhoid and hepatitis A and B. Especially in developing nations, many water borns diseases are the principal causes of child mortality (Rahman, 1995):

Third, over-concentration of population in urban areas results in alteration of local climate pattern. Construction of artificial surfaces such as bricks and concrete, replace natural ground and alter heat exchange patterns, thereby creating heat islands (Norman, 2001). In cities with more than 10 million people, the mean annual minimum temperature can be as much as 4 degrees Fahrenheit higher than in nearby rural areas, (O'Neil Mackellar & Hutz, 2001). These changes can affect climate, water flows and plants as well as animal and human health as heat cramps, heat stroke and even death could result.

Population Composition and the Environment

Population composition according to Hunter (2000), refers to the characteristics of a particular group of people. These characteristics include the distribution of a population across age categories and the number of men relative to the number of women. Age and sex composition are the most often considered aspects of population composition.

Today's global population is characterized by the largest-ever generation of young people on every continent except Europe, as a result of recent high fertility levels (Norman, 2001).

Age composition has important

implications for future population because, younger population possess greater growth momentum. In other words, even if fertility were to immediately fall to replacement levels of approximately two children per woman in all nations, population would for a mean-time, continue to increase because of the large number of women in reproductive age.

Consideration of demographic factors such as age composition, can help us understand the mechanisms through which population relates to environmental conditions that have implications on human health. For example, migration propensities vary by age, with young adults exhibiting the highest likelihood of migrating from rural areas to urban areas. This is because, much of this movement is fueled by desire for education and employment prospects, as young adults leave the parental homes in search for new opportunities.

Given the relatively large younger generation characterizing many developing nations today, we should anticipate increasing levels of urbanization and the health consequences thereof. Rahman (1995) rightly observed that diseases caused by contaminated environment, human wastes and airborne diseases from excessive human activities form the core of disease pattern in major towns of developing nations, Nigeria inclusive. It is worthy of note that young people are likely to engage in activities that could cause environmental degradation and pollution more than older generation. This means that contaminated environment due to excessive human activities will result in several cases of ill-health, morbidity and shortening of lifespan of urban dwellers in Nigeria, as the urban areas are dominated by the younger generation.

Conclusion

Rapid increase in population size and over-concentration of human population in urban areas in the 21st Century remain a major threat to the environment which have implications on human health. Devising important strategies of mitigating these threats to the environment as well as human health is therefore, an urgent as well

as an important task.

Recommendations

The following recommendations are made:

1. The governments of various nations should make safe and effective family_planning knowledge and gadgets accessible by all citizens irrespective of gender and marital status. This will help curb the rate of population growth.

2. The governments of various nations should introduce and make the teaching_of sex education compulsory at all levels of education. Imparting knowledge of sex education to kids at elementary levels of education may prevent them from going out to look for sex information on internet or discussing it with their peers which may eventually result in early sex experimentation with consequent unwanted pregnancies. This will also help curb the rate of population increase since many children are products of early and unwanted pregnancies.

3. The governments of all nations, non-governmental organizations as well as well-to-do individuals should develop infrastructures such as good roads, electricity, schools, hospitals, and portable water in rural areas and agriculture should be given a boost to provide massive employment for young adults residing in rural areas to stem the rate of rural-urban migration which results in over-population of urban areas with serious environmental health implications.

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