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ECOLOGICAL CHANGE AND HEALTH SECURITY IN NORTH CENTRAL REGION OF NIGERIA

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Abstract

The change in our ecosystem today has creates a lot social challenges. Climate change which is one of the major causes of ecological change is attributed to both the nature and human causes. The issue has resulted in many soft security issues such as health related security issue, food security issue and socio-economic issue. This study examines how ecological change has affected health security of the people in the study area. The study use a sample of three states in the North central zone of Nigeria. The study uses an observation of 385 and the data collected were analyses using Kendell tau test of concordance. The study has found that ecological changes have significant effect on health security in the study area. The study notes that ecological change increase vulnerability to diseases such as malaria, typhoid and zoonosis. These happening thus creates health related issues in the affected areas. On the basis of the finding, it is recommended people in the affect areas should need to be health cautious by treating their drinking water and using anti-mosquitos nets and to equally avoid contact with unfamiliar animals.

Keywords: Ecological change, health security and test of concordance

Introduction

The aggregate human impact on the environment now exceeds the limits of absorption or regeneration of various major biophysical systems, at global and regional levels. The resultant global environmental changes include altered atmospheric composition, widespread land degradation, and depletion of fisheries, freshwater shortages, and biodiversity losses. The drive for further social and economic development, plus an unavoidable substantial increase in population size by 2050 - especially in less developed countries - will tend to augment these large-scale environmental problems.

Disturbances of the Earth's life-support systems (the source of climatic stability, food, freshwater, and robust ecosystems) will affect disproportionately the resource-poor and geographically vulnerable populations in many tropical countries. Ecological disturbances will alter the pattern of various pests and pathogens in plants, livestock and humans. Overall, these large-scale environmental changes are likely to increase the range and seasonally of various infectious diseases, food insecurity, of water stress, and of population displacement with its various adverse health consequences.

Ecological change will increasingly affect climate-sensitive diseases through its adverse effects on factors such as water availability, food security, air quality, pathogen and vector dynamics, vector distribution and human habitat. Many of the major causes of mortality, including malnutrition, diarrhoeal diseases, respiratory diseases and vector-borne diseases, are climate sensitive and will be most affected. Ecological change also poses direct threats to health through heat-related mortality, and injuries, mortality and other effects of climate-related natural disasters. The direct and indirect impacts on health constitute a hazard to health security, especially in developing countries and among vulnerable populations: the elderly, chronically ill, children and women. These impacts have considerable potential to cause significant loss of life, affect communities, burden the health systems, increase health care costs and reduce economic productivity. There is compelling evidence that these mechanisms played the central role in initial outbreaks of HIV and Ebola virus, as well as several lesser-known zoonosis (Hahn Shaw, De Cock, Sharp, 2000).

Based on the facts above, this study set out to examine the relationship between ecological change and health security in the North central Nigeria. The major health challenges the study focus on is malaria, typhoid, zoonosis and others.

The remaining part of this work address the literature, methodology, result and discussion, and recommendation.

Literature Review

Ecology is a system comprising of leaving things and how they interact with the environment. The relationship of the leaving things and the environment is a flexible one in the sense that it frequently changes. The change in the ecology usually off-set the system as their behavior and relationship will be caused to change. This change in an ecosystem usually results in a kind of gain and loss for the bios in the system. The change in the ecosystem can be cause by a human made factor or natural factors. Irrespective of how the change happens, it has security consequences for the biotics. The security challenges includes loss of life, health challenges and other social interactions constraints.

Changes to ecosystems as a result of climate change are likely to have significant and often negative social, cultural and economic consequences. However, there is still uncertainty about the extent and speed at which climate change will impact biodiversity and ecosystem services, and the thresholds of climate change above which ecosystems are irreversibly changed and no longer function in their current form. Tipping points are points at which a system passes from one steady state to another. These are used for either climate tipping points or ecosystem tipping points. An example of the latter is Amazon forest dieback (Glick & Edelson, 2011).

As noted by Alkemade, et.al (2009), because of climate changes, species may no longer be adapted to the set of environmental conditions in a given region and could therefore fall outside its climatic niche. As other components of the ecological niche of species are not supposed to change directly. In order to persist, individuals, populations or species must produce adaptive responses, which can be of several types, and are provided by two categories of mechanisms.

Nigeria, with a vast land space of 923,768 sq km, spanning across different climatic regions is understood to be highly vulnerable to climate change. There is no gain saying the fact that the country is threatened with extinction by a myriad of environmental problems, especially those triggered by climate change. Indeed, each of the 36 States and the Federal Capital is beset by one climate change problem or the other.

There is desert encroachment and extreme droughts in the northern states as well as serious problems of flooding and erosion in the littoral southern states which are mingling to threaten Nigeria with shrinkage and collapse. Increasing climate uncertainties, sheet erosion, gully erosion, periodic flooding, biodiversity depletion, agricultural land degradation and general decline in yields of agricultural produce are now common norms in the country. All of these are both direct and indirect consequences of climate change and affects the entire 179m population whose major occupation is agriculture, which, before the discovery of oil, accounts for about 80% of the country's GDP and currently accounts for 90% of the non-oil export earnings.

Agriculture is essentially a man-made adjunct to natural ecosystems and is weather and climate dependent. In northern Nigeria today, drought in April and May, which is accepted as normal, prevents timely land preparation and tillage. It further delays sowing and broadcasting of seeds as well as affects the transplanting of other crops. As drought extends into early June, it destroys all crops and harvests become very poor. Inadequate rains through July to October cause severe hardship to the entire country. This trend is further compounded by the fact that most of the large-scale irrigation projects are moribund. Increasing climatic uncertainties are additional threats in these drought-prone areas and also some of the major factors in risk averseness. It forces farmers to depend on low-input and low-risk technologies. Shunning new technologies to derive maximum gains during favourable seasons delays recovery after

disasters. Even government investments made for poverty reduction are often lost within these high risk areas of northern Nigeria due to the persisting impacts of climate change, thus, further undermining development efforts and aggravating poverty. For subsistent farmers, who constitute more than 75% of the farming population and who find adjustments to climate change as a costly option due to the required investments, they resort to disposing or mortgaging their assets and eventually emigrating.

High intense rainfall as forecasted in the southern part of the country has resulted in increased flooding and sedimentation of floodplains, making them less productive. The encroaching salinity due to sea level rise has further degraded the meagre agricultural areas.

Other array of threats by the adverse impacts of climate change in Nigeria include those evident in water resources and supplies (dwindling), health (unpredictable), energy (erratic), transportation (unreliable), education (in distress), recreation and tourism (in shambles), geographical boundaries of agro-ecosystems as well as species composition and performance (changing). Other non-economic resources such as biodiversity, air and water quality are also affected by adverse impacts of climate change. For example, many of the country's plant resources are diminishing as traditional herbalists now have to do with inferior alternatives. Migratory pattern of fish stocks have changed markedly, just as the catch has declined. Prominent animal species such as rodents, reptiles, birds and fishes and other marine organisms that were a primary source of protein for millions of citizens especially in the south are being endangered.

Related Literature on Ecological Changes and Health Security

Uzzoli (2016) assessed health impacts of the climate change through projected trends in climate-change-related health. The model of heat-health vulnerability is focusing particularly on the vulnerability of society to the impacts of heatwaves on human health. It is observed that 10 °C increase in the mean daily temperature raised the risk of emergency ambulance calls due to cardiovascular diseases by 6%. Also, The expected increase in the number of excess death rate due to heat waves involves mainly the population aged 65 and above. Therefore, close attention must be paid during heat alerts to the most-at-risk chronically ill elderly, who are one of the most vulnerable groups affected by climate change.

Simone, Anna, Subhrendu and Erin (2014) combined municipal-level panel data on diseases, public health services, climatic factors, demographics, conservation policies, and other drivers of land-use change in the Brazilian Amazon. Random-effects and quantile regression models of disease incidence was used for the estimation. The study discovered that malaria, acute respiratory infection (ARI), and diarrhea incidence are significantly and negatively correlated with the area under strict environmental protection. Results vary by disease for other types of Protected Areas (PAs), roads, and mining. The relationships between diseases and land-use change drivers also vary by quantile of the disease distribution. Conservation scenarios based on estimated regression results suggest that malaria, ARI, and diarrhea incidence would be reduced by expanding strict PAs, and malaria could be further reduced by restricting roads and mining. This study did not cover other possible diseases such as zoonosis and typhoid.

Bosello, Roson and Tol (2006) examines how ecological change affects health security. The study applied a general equilibrium macroeconomic model to infer costs estimates relating to cardiovascular and respiratory disorders, diarrhoea, malaria, dengue fever and schistosomiasis occurrences through changes in labour productivity and demand for health care. Consistent with the study, results imply the welfare costs (or benefits) of health impacts contribute substantially to the total costs of climate change both in terms of GDP and investment. Again, the study did not cover other possible diseases such as zoonosis and typhoid.

Confalonieri, Marinho and Rodriguez (2009) determined the national quantitative assessment of the vulnerability of the Brazilian population to the health impacts of climate. A conceptual framework of vulnerability in the health sector, according to a modified general 'exposure-response' model, was adopted. A new methodology was used to develop a synthetic (composite) general vulnerability index from averages

of specific indices of vulnerability in 3 areas: socio-economic, epidemiological and climatological. The study found that the greatest influence on the general vulnerability index (of the most vulnerable states) was from the socio-economic vulnerability index. The approach used also demonstrated that the northeast is the most vulnerable Brazilian region to the health impacts of a changing climate.

Tseng, Chen, Chang and Chu (2009) examine the health effects from illnesses associated with climate change by using the dengue fever in Taiwan as a case study. The relationship between climate conditions and the number of people infected by dengue fever was first established and the monetary assessment was then attempted applying a contingent valuation study. Results indicate that people would pay € 15.78, € 70.35 and € 111.62 per year in order to reduce the probabilities of dengue fever inflection by 12%, 43%, and 87%, respectively. This study was carried out in another region. The result might not be obtainable in Nigeria.

McCarthy, Biddulph, Utley, Ferguson and Gallivan (2002) identify environmental health risk estimates for these developments from the epidemiological literature and to develop, and apply these within, a mathematical health impact assessment model in the UK. Broad quantifiable risks were identified for four—air, chemicals, noise, and road traffic—of 14 standard environmental effects. A mathematical model was constructed that is based on people moving between different health states over their lifetime. Age related hazard functions are applied to cause specific measures of mortality and morbidity. It was environmental changes have effect on health changes of people in the UK.

Samuel, Myers, Lynne, Christopher, Richard, Kent, Taylor, Will and Steven (2012) examines the human health implications of changes in the structure and function of natural systems and propose that these changes are affecting human health in a variety of important ways that are profound, pervasive, and accelerating. This transformation is generating a suite of health impacts that remain, in many instances, poorly characterized. However, ample evidence exists that nearly every dimension of human health is being affected, and it is likely that the disease burden associated with these aggregate ecosystem alterations is large and growing.

Bell, Davis, Cifuentes, Krupnick, Morgenstern and Thurston (2008) studied the health consequences from greenhouse gases. Results from multiple studies provide strong evidence that the public health benefits related to greenhouse gases mitigation strategies are substantial. The review, however, is restricted to health benefits from air pollution exposure.

Burtraw, Krupnick, Palmer, Paul, Toman and Bloyd (2003) examined the US electricity sector and value changes to human health resulting from carbon emissions based on concentration response functions. Results indicate carbon emission is a significant factor affecting the public health of people. The study failed to account for other health challenges like malaria, typhoid and zoonosis.

Theoretical Framework

The theory that guides this work is the securitization theory. The theory was first propounded by Wæver (1995). The theory places emphasis upon the social aspects of security, and looks at the process by which any given topic is moved from the ordinary realm of politics and defined as a security matter. It calls for “...an increasingly precise understanding of who securitizes, on what issues (threats), for whom (referent objects), why, with what results, and not least, under what conditions.

Wæver (1995) sees security as a concept and a word, connected to certain social processes and also “as a speech act” where talking about something as a security issue makes it a security issue. Securitization begins when the securitizing actor, usually some authoritative figure, identifies something as a threat to the audience, usually the public. It was noted that issues suited for treatment are developments that threaten

the sovereignty or independence of a state in a particularly rapid or dramatic fashion, and deprive it of the capacity to manage by itself.

This open-ended nature of securitization has been the source of many criticisms and warnings. While some welcome the broadening of the security concept to include more items. Others are concerned that the operational effectiveness will be lost. The argument is thus that authority should provide securitization on perceived threat to it citizenry. Ecological change will result in security challenges in the area of health, food and social security. Thus, the threats must be identified and resolved.

Methodology

This study uses survey research design. This design is used because it allows for the data to be collected from primary source. The population of this study is all the six (6) states in the north central Nigeria. The choice of north central Nigeria is due to the fact that the zone has been affected by climate change in a number of ways. First, ecological change brought about flooding which has destroyed homes and farm land thus putting the life of the people in the area in danger. This has also brought about health related challenges.

Out of the total number of states in the region, states like Kogi, Benue and Niger are sampled due to the fact that they are most affected by ecological change (especially flooding). While these three states formed the sampled states, the number of people affected is infinite thus there is no exact number of sample elements. When the definite number of population is not known, the minimum number of sample to be used at 5% precision is 385 (Glenn, 1992).

The variables were measured using Likert questions where each of the respondents rate the extent to which ecological change has affected their health. The study sought to find out how the respondents agree on the level at which ecological change factors affects health. To achieve this goal, conducted inferential test using Kendall's tau test of concordance.

The model used is specified below:

$$\text{Kendall's tau} = \frac{C - D}{C + D}$$

C = Equal to number of Concordant pair

D = Number of Discordant

The significant value for test of significant is computed using the following test statistics

$$Z = \frac{3 \times T \sqrt{N(N-1)}}{\sqrt{2(2N+5)}}$$

Results and Discussion

The result of inferential statistics test is hereby presented in this section. The concordance of the respondents is shown in the tables below. The computation was done using SPSS version 25.

Table 4.1 Ranks of Religion Factors

	Mean Rank
OTH	4.30
MAL	4.76
TYP	4.54
ZNT	4.40

The result in table 4.1 shows the ranking of the various constructs of the health issues relating to ecological change. The result shows that Malaria (MAL) with the mean value of 4.76 is the most health challenge as

a result of ecological change. It is followed by typhoid which has a mean value of 4.54. Zoonosis (ZNT) is ranked third with a mean value of 4.4 while other disease have a mean value of 4.30. Table 4.2 below is used to test the hypothesis of the study.

Table 4.2 Test Statistics

N	614
Kendall's W ^a	.740
Chi-Square	73.723
Df	3
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

The result in table 4.2 shows the result of Kendall's coefficient of concordance. The result shows a concordance value of 74% which implies that the respondents are in agreement up to the magnitude of 74% that ecological change affects health security. The result shows a significant value (p-value) of 0.000 which is less than the 5% test criteria. This result therefore implies that ecological change has significant effect on health security in the North Central region in Nigeria.

Conclusion and Recommendation

This study examine the relationship between ecological change and health security. The study has found that ecological changes have significant effect on health security in the study area. The study notes that ecological change increase vulnerability to diseases such as malaria, typhoid and zoonosis. These happening thus creates health related issues in the affected areas. On the basis of the finding, it is recommended people in the affect areas should need to be health cautious by treating their drinking water and using anti-mosquitos nets and to equally avoid contact with unfamiliar animals.

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