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EC EMERGENCY MEDICINE AND CRITICAL CARE
Research Article

The Health Benefits in the Use of Solar Energy for Sustainable Development in Nigeria

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Received: November 26, 2019; **Published:** January 28, 2020

Abstract

The use of solar energy and a lesser reliance on fossil fuels in Nigeria, which is in line with the United Nations Paris agreement will help to reduce the excessive emission of green house gases which are the major causes of global warming and climate change. Excessive emission of greenhouse gases has been discovered to affect the health of individuals, communities and institutions in Nigeria adversely.

This study identifies that the use of solar energy which is one of the climate change mitigation strategies will help to enhance good health and well being, increase environmental sustainability and also boost sustainable economic growth in Nigeria. This study further highlights the health and psychological benefits as well as the economic opportunities in the innovative use of solar energy in Nigeria. Through our literature review and participant observation, we have discovered that despite the recent remarkable advancements in solar energy technology, many individuals in Nigeria are still unaware of the health, environmental, economical and psychological benefits that solar energy provides. There is therefore a great need to educate individuals, communities and institutions in Nigeria on the economic, environmental, psychological and health benefits in the innovative use of solar energy in Nigeria.

Keywords: *Climate Change; Health; Mitigation; Solar Energy; Sustainable Development*

Introduction

Renewable energy (RE) and sustainable development (SD) are two key expressions of human beings since fossil fuels tend to exhaustion have higher and higher prices that are going to be unbearable for humanity and are the main factors responsible for greenhouse gas (GHG) emissions. Renewable energies, on the contrary, among other things, are clean and safe and are fundamental for sustainable development, the one that preserves resources for the future generations [1].

Climate change has been described as an existential threat to human well-being. It significantly affects the social and environmental determinants of health: clean air, safe drinking water, sufficient food and secure shelter. The effects of climate change are far-reaching and include heat waves and severe weather, deteriorated air quality, displacement and migration of vectors resulting in an increase in a range of diseases related to water and ecological factors. Increasing incidences of mental health issues are being recorded and identified as a consequence of environmental change [2,3]. Generally, climate change is caused by natural and human activities. Human activities are subdivided into those that either emit large amounts of greenhouse gases into the atmosphere, contributing to the ozone layer depletion or activities that result in reduced carbon absorption from the atmosphere. In the first category are industrialization, burning of fossil

fuels, gas flaring, urbanization and agriculture. The latter includes deforestation, alterations in land use, water pollution and agricultural practices [2,3]. Furthermore, due to its negative effects on economic activities, climate change has transcended the realm of just environmental to being a developmental issue. Its impact is far reaching traversing agriculture (Crops and Livestock), freshwater resources, coastal water resources and fisheries, forests, biodiversity, health and sanitation, human settlements and housing, transport and communication, energy, industry and commerce, disaster, migration and security, livelihood, vulnerable groups and education [2,3].

In the recent past, Nigeria has witnessed a series of climate-related disasters, ranging from the increased health risk, declining agricultural productivity, biodiversity loss, drying lakes, famine, conflicts or social unrest, poverty, worsening food insecurity situation, heat stress, declining soil capacity for agricultural production, increased natural disaster, extreme weather events, among others. These have resulted in huge ecological and economic losses and efforts must be improved to stem the tide of its effects [2,4].

Generally, this paper aimed to examine the health, environmental, and psychological benefits in the use of solar energy which is a climate change mitigation strategy for sustainable development in Nigeria. This paper examined current progress with the use of solar energy which is a climate change mitigation strategy in Nigeria through existing literature review.

Methodology

Data used for this study is derived from published works, including academic journal articles, conference papers, textbooks and internet materials. The researchers gathered a lot of materials for the research but summarized the characteristics of the papers that centered more on "the health benefits in the use of solar energy for sustainable development in Nigeria". This enabled the researchers to generate the synthesis of various researchers' views on the subject matter.

Result and Discussion

The impacts of climate change on Nigeria's health sector

Climate change are already having significant impacts on the health sector in Nigeria, and these impacts are expected to increase in the future. Unfortunately, some degree of climate change is inevitable, therefore nations must actively learn and implement adaptation and mitigation strategies to adjust to these changes to protect the populace from its adverse effects.

For each potential impact of climate change, the health sector is particularly adversely affected by it, leaving the patients vulnerable to disease and injury. The level of vulnerability of those communities depends on factors such as population density, level of economic development, food availability, income level and distribution, local environmental conditions, pre-existing health status, and the quality and availability of public health care. For instance, those most at risk of being harmed by thermal extremes include socially isolated city dwellers, the elderly and the poor.

Impacts of climate crisis on Nigerian health sector include but not limited to the following;

i) Hunger and malnutrition due to increased food insecurity.

ii) Increase in water borne diseases such as diarrhea due to water scarcity.

iii) Increase in vector borne diseases such as malaria due to high temperatures.

iv) Mortality and morbidity due to extreme events.

v) Flooding of primary health centers.

Understanding of the impacts of climate change and variability in human health in Nigeria has increased considerably in recent years. The use of solar energy which has health benefits will immensely help communities and institutions in Nigeria to adapt and mitigate the impacts of climate change on Nigeria's health sector.

Health has been identified as a precondition for and an outcome and indicator of the social, environmental and economic dimensions of sustainable development. Health in this context has been expanded to specifically include universal health coverage, the state of physical, mental and social well-being, and reducing air, water and chemical pollution [3].

Just about 59.3% of Nigerians have access to electricity which is not stable and most are forced to resort to rely on alternate sources of energy which are unclean and have deleterious climatic effects. Similarly, only about 28.2% of the population primarily rely on clean energy and technologies for cooking. This however is not surprising as 62.6% of Nigerians were recorded as living below the poverty line and for this subset of the population, the primary concern would be survival and food security rather than the choice of technology for cooking due to cost [5]. Recognizing the consequences and adverse impact of climate change on Nigeria, the country joined the global community to adopt treaties developed to tackle climate change. Nigeria became a Party to the UNFCCC in 1992 and ratified the Convention in 1994, it also became a Party to the Kyoto Protocol in 2004. Nigeria ratified the Paris Agreement (PA) in March 2017, which was approved by the UNFCCC on the 16th May 2017 and entered into force on 15th June 2017 [1]. In June 2017, the Federal Government of Nigeria and the United Nations Development Program (UNDP) flagged off a $218 million renewable energy project. This project was aimed at reducing greenhouse gas emissions by meeting the energy targets set in the NDC [6].

The Health benefits in the use of solar energy in Nigeria

Solar energy are radiant light and heat from the Sun that is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, solar thermal energy, solar architecture, molten salt power plants and artificial photosynthesis. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power [7].

A recent World Energy Council study found that without any change in our current practice, the world energy demand in 2020 would be 50 - 80% higher than the 1990 levels. Annual energy demand will almost duplicate the energy needs by 2020 (DOE - USA Department of Energy report). The world's energy consumption is expected to increase from the today's 22 billion kWh per year to 53 billion kWh by 2020. Such ever-increasing demand could place significant tension on the current energy infrastructure and potentially damage world environmental health by effluent gas emissions and global warming. Finding solutions to the environmental issues that we face today requires long-term planning actions for sustainable development, and renewable energy resources are the most efficient and effective solutions given the close relationship between renewable energy and sustainable development [1]. Rational energy use has been discovered as an important way to convert today's excessive use of fossil fuels to another world of clean and safe energy, and advanced use of solar energy technology for sustainable development in Nigeria.

Solar energy is the most promising of the renewable energy sources in view of its apparent limitless potential [8]. The use of modern renewable energy technologies produces less pollution than burning fossil fuels-especially with respect to net emissions of greenhouse gases. Indigenous solar energy resources also represent a secure and stable source of energy for our country and a potential source of jobs and economic development.

Solar electricity may be used for power supply for remote villages and location not connected to the national grid. It may also be used to generate power for feeding into the national grid. Other areas of application of solar

electricity include low and medium power application such as water pumping, village electrification, rural clinic and schools power supply, vaccine refrigeration, traffic lighting and lighting of road signs, etc. Several pilot projects, surveys and studies have been undertaken by the Sokoto Energy Research Center (SERC) and the National Center for Energy Research and Development (NCERD) under the

supervision of the Energy Commission of Nigeria [9].

Solar energy is the prototype of an environmentally friendly energy source. It consumes none of our precious energy resources, makes no contribution to air, water, or noise pollution, does not pose a health hazard, and contributes no harmful waste products to the environment.

Solar energy not only helps to protect the environment around us, but it also provides a variety of health benefits. Common energy sources, such as oil, coal and gas, emit chemicals like sulfur dioxide and nitrous oxide into the air. Studies show that these dangerous pollutants can cause several severe respiratory problems, including asthma, bronchitis, pulmonary inflammation and chronic respiratory disease, as well as cardiovascular health issues, such as heart attack and stroke.

Water contamination due to standard energy waste causes additional health risks. For example, coal produces the largest amount of mercury emissions into the air. These mercury particles eventually make their way into the groundwater and then into nearby streams, lakes and oceans, affecting the fish in the water. Not only does this affect drinking water, but when humans consume mercury-contaminated fish, it can cause irreversible neurological damage, especially in pregnant women and young children. This is so damaging that the US Environmental Protection Agency (EPA) recommends women and young children to limit their consumption of certain types of fish.

Installing solar panels in homes will help to reduce reliance on non-renewable energy sources that pollute both the air and water. This will create a healthier environment for communities and institutions in Nigeria. More importantly, as more and more homeowners make the choice to switch to cleaner solar energy technology, it can help to reduce the risk of chronic respiratory and cardiac diseases, as well as neurological damage.

Entrepreneurial opportunities in solar power include wholesale, supply, retail and installation service contracting. When an entrepreneur engages in these opportunities, psychologically, it boosts self esteem and ego. Installation service contracting fosters cognitive and psychomotor development as it takes sound knowledge and practical skills to provide installation services. This also reduces tension, stress and anxiety as installation contractors may require little or no capital to run their business as long they have the technical know-how.

The Solar Power System offers silent operations, which offers a lot of psychological benefits to those individuals who understand the therapeutic benefits of tranquillity and serenity. The reduced electricity bills and the low cost of running a solar power system will now help individuals and institutions to avoid over-spending and unnecessary borrowing which enhances their self-fulfillment in life.

Furthermore, Solar energy is known to have a favorable impact on the environment which can help the individuals to live in a satisfied, happy and healthy manner thereby ensuring the sustainable development of the nation [10-16].

Recommendations

The Nigerian government should:

- Undertake risk assessment and risk reduction measures to increase resilience of the Solar energy industry in Nigeria.
- Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply through the solar energy technology.
- Encourage and fund further research projects to enable researchers and scientists to fully explore the health, psychological and

economic benefits in the use of solar energy which is also a climate change mitigation strategy in Nigeria.

- Communities and institutions in Nigeria should be well educated using innovative tools such as poetry, climate change educators, social media, etc. on the health benefits in the use of solar energy for our sustainable development.

Conclusion

Impact investments are needed for further research activities on the health benefits and innovative use of solar energy for sustainable development in Nigeria. The required type of financing is long-term and involves both foreign and domestic financing resources. The Government should provide financial frameworks aimed at stimulating the expansion of the renewable electricity market. Considering the risk element involved in financing renewable electricity projects, government investments should enhance rates of return and develop new policies in order to attract more investors into the solar energy industry. Furthermore, poetry which also has therapeutic benefits

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Volume 4 Issue 2 February 2020