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ORIGINAL ARTICLE

Climate change and biosafety in times of COVID-19

Cambio climático y bioseguridad en tiempos de la COVID

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ABSTRACT

Introduction: climate change is an undeniable reality, with an effect on human beings and healthcare services. Biosafety is a valuable weapon to face the challenges set out to the healthcare services by climate change.
Objective: to describe the relationships among human beings, climate change and biosafety.
Development: for years, the effects of climate change on human beings have been warned. Since then, institutions were created in Cuba for the rational use and exploitation of natural resources, as well as for the development of measures to mitigate the effects of climate change. The modifications in the dynamics of the environment, the habitats of the living beings, desertification and drought cause variations in the patterns of behavior of diseases, causing reemergence of some eradicated ones, mutations and new strains of others, turning them into a latent danger for the species. The accomplishment of institutional biosafety and social measures to manage COVID-19 has shown efficiency.
Conclusions: the compliance of biosafety norms in healthcare institutions has a synergic effect along with Life Task (Tarea Vida), through the control of biological risk. Biosafety standards allow facing the changes in ecosystems and preserving human health, much more in times of COVID-19 pandemic.

Keywords: Climate Change; Containment Of Biohazards; Environment; Covid-19; Pandemics.

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RESUMEN

Introducción: el cambio climático constituye una realidad innegable, con efecto sobre el hombre y los servicios de salud. La bioseguridad constituye un arma de valor indudable para enfrentar los retos planteados a los servicios de salud por el cambio climático.
Objetivo: describir la relación del hombre, el cambio climático y la bioseguridad en tiempos de la COVID-19.
Desarrollo: hace años se alertó de los efectos del cambio climático para el hombre, desde ese momento, en Cuba se crearon instituciones para el uso racional y aprovechamiento de los recursos naturales, así como para el desarrollo de medidas para a amortiguar los efectos del cambio climático. Las modificaciones en la dinámica del medio ambiente, los hábitats de las especies, la desertificación, la sequía causan variaciones en los patrones de comportamiento de las enfermedades, causando reemergencia de algunas erradicadas, mutaciones y nuevas cepas de otras, convirtiéndolas en peligro latente para la especie. El cumplimiento de las medidas de bioseguridad institucional y social para el enfrentamiento de la COVID ha demandado su necesaria eficiencia.
Conclusiones: la satisfacción de las normas de bioseguridad en las instituciones de salud tiene efecto sinérgico con la Tarea Vida, mediante el control del riesgo biológico que junto a las normas de bioseguridad permiten enfrentar las modificaciones en los ecosistemas, y preservar la salud del hombre, aún más en momentos de la pandemia por la COVID.

Palabras clave: Cambio Climático, Bioseguridad, Medio Ambiente, Covid-19, Pandemias.

INTRODUCTION

Climate change (CC) is an imminent reality; the temperature of the planet has increased since the first records in 1880 whose effects are verifiable. Habitats and ecosystems that disappear or show abnormal behavior, the increased frequency of respiratory diseases and their severity, as well as the shortage of water, food and reduced crops are evidence of this. Cuba is very vulnerable in these aspects due to its insular condition.[1]

At the Rio Summit in Brazil, Fidel presented the world with several reasons that should be considered as a call to care for and protect the environment. "...a biological species is in serious danger of disappearing: the human species..., it is almost too late to prevent it, the forests are disappearing, the deserts are increasing, fertile land is going to the sea, many species are becoming extinct, the solution to these problems is not to prevent the development of poor countries but to avoid damage to the ecology, use science to avoid pollution, tomorrow it will be too late to do what we should have done a long time ago".[2]

Several countries signed the final manifesto of that summit, Cuba among them. However, highly developed countries, responsible for the great danger facing our planet, such as the United States, refused to sign. If one looks at the world contribution of polluting emissions, Cuba is a country that practically does not contribute to environmental pollution, and therefore, to the CC. However, being under the effects of this phenomenon, it develops the ambitious plan known as Task Life (Tarea Vida) for the protection, preservation and recovery of environmental vitality.

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In all these changes the hand of man is present, the indiscriminate use of industry and its polluting emissions. The health services are not unaware of influencing these changes, and they are contributing with sequels that have reached the climax in the pandemic that the world is facing today.[4]

The world has worsened its situation much more with the onset of SARS-CoV-2 and COVID-19 disease, which adds a greater demand in the compliance of the terms for an effective biosafety.

This article aims to address the relationship between humans, climate change and biosafety in times of COVID-19.

DEVELOPMENT

Environmental pollution has led to the disappearance of species and placed others in danger due to the loss of their habitat or food source. The migrations of these species have produced modifications in the ecosystem, leading to changes such as the re-emergence of diseases that have already disappeared. New germs appear and/or become more virulent and resistant to the usual treatments and new zoonoses appear. In view of these phenomena of climate change and its influence on human health, Cuba has not been unaware of putting into practice concrete actions as it appears in the following statement debated in the Assembly of the People's Power:

"The joint work of research centers and Cuban authorities strengthens initiatives undertaken as part of the state program (Task Life-Tarea Vida), to face climate change. This is a State Plan to face the precipitated change, supported by multidisciplinary scientific groups. Task Life contemplates a set of 5 strategic actions and 11 tasks aimed at counteracting the effects on vulnerable areas. It was approved on April 25, 2017 by the Council of Ministers and since then it is an exponent of the country's environmentalist priority".[2,5]

In 1991, a preliminary study on the impacts of climate change in Cuba was carried out and it was considered that there were conditions for the country to have a high level of vulnerability. Since then, structures and institutions have been created to mitigate this impact, among them the Institute of Meteorology, the Institute of Hydraulic Resources, the Civil Defense System; as well as the thematic networks (hydro-meteorological, radiological and sanitary, among others). The creation in 1994 of the Ministry of Science, Technology and Environment (CITMA) was a milestone, as it had an institution that regulated science, technology and the environment. This led to the enactment of Law 81 on the Environment. In addition, in 2005, Directive No. 1 for Civil Defense Disaster Reduction was created, which was updated in 2010. [5,6,7]

The Task Life to face the climate change constitutes one of the great priorities of the Ministry of Public Health in Cuba (MINSAP), if we take into account the challenges that the world faces since a remarkable increase of deaths due to the effects of CC are expected in the next years. For this reason, the health sector in Cuba determined an action plan that contemplates 47 activities, which are inserted in the tasks approved in the State Plan.[2,5]

Thirty-nine (39) research projects are currently in progress related to the impact of climate change and health, some closely related to communicable diseases. Among them are those related to the increase in temperature that favors the proliferation of AedesAegypti mosquito, with the effect of increasing diseases such as dengue, zika and yellow fever, among other arboviruses.

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Likewise, researches are being carried out that relate climate change with non-communicable diseases such as thermal stress, renal, cardiovascular and respiratory diseases that have a high incidence in Cuba.[5]

Similarly, the environmentalist approach added to the study plans of the Medical Sciences majors, and the training of specialists in Public Health, Hygiene and Epidemiology, which have a favorable effect in this task.

The provincial groups of Life Task and Health are in charge of identifying health institutions located in vulnerable areas and managing the implementation of measures and actions by MINSAP. Recently, the idea of the creation of intelligent hospitals arose, that is, the union of several green hospitals into safe hospitals. Currently, a pilot study projected in the north coast of Cuba, which will be inserted in international collaboration with the United Nations Fund, the Program for Development and the Pan-American Health Organization. These intelligent hospitals are more ecologically developed, with a much more sustainable self-supply, safer practices and friendlier engineering systems.[8]

In the healthcare services we work with multiple risk factors, among them are the radioactive risk of radiology services and nuclear medicine centers, the chemical risk of laboratories and reagent production centers due to the use of high concentration chemical substances, the physical risk given by the use of high electric consumption equipment that can cause accidents and the biological risk. They are more present in some than in others, but common to all laboratories and hospital services at the different levels of action.[9,10]

In hospitals, we are constantly exposed to biological risk, due to the manipulation of biological samples. Furthermore, this risk has greater implications, as medical science students are trained in these institutions. For this reason, healthcare institutions should be trainers and educators in the need for biosafety and environmental awareness, in order to avoid contamination and harmful action of biological agents. Biosafety is a weapon of necessary use to face the new challenges of climate change.[11]

Before tackling diseases efficiently, we must first address the existing gaps in health systems. Among them are risk behaviors and lack of perception of them, failures in the epidemiological surveillance system, water supply crisis, approach of wild fauna and increase of zoonosis, insufficient control of vectors and their migration.[12]

There are several elements to take into account in the control of biological agents. The survival of a biological agent is influenced by changes in habitat, feeding environments and the disappearance of the ecological balance with the extinction of species. The biological balance has been broken and in some cases the reproduction rhythm of biological agents has been modified in search of subsistence. The aerial dispersion in many viruses determines the possibility of becoming biological contaminants, especially from the contaminating aerosols. Several factors produce changes in the environment, and therefore in the dynamics of biological agents. These include changes in temperature (global warming due to loss of forests), humidity, light and air in an accelerated manner, and food.[13,14]

The health services can carry out actions of positive impact for Task Life through the correct application of the pillars of biosafety. Biosafety measures must be universal, that is, they apply to all people, whether they have diseases or not. Barriers should be used as appropriate to avoid contact with body fluids. Disposal measures for biological material and waste must be properly managed.

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The promotion and application of good practices in the handling of pathogenic and toxic agents and continuing education of personnel in their compliance, support the measures of Task Life (Tarea Vida). On the contrary, if these measures are not fulfilled in a stable and conscious way, the projects established in it will not have the proposed effect.

We cannot fail to mention that one of the factors that can positively or negatively influence the accomplishment of the objectives of Task Life (Tarea Vida) is the perception of risk; that acts a as a reflection of man´s consciousness respect to objects and phenomena, acting directly on the sense organs, where the regulation and unification of isolated sensations occurs. If man does not perceive the risks, does not deals with them correctly; then continuous training must be accomplished by those responsible for this activity.[15,16]

If these elements are taken into account, and they comply with the State Programs for dealing with climate change and its harmful effects on human existence and for the survival of the future generations, these programs will be supported. On the contrary, the contravention of what is established in this respect in any of its aspects would be the cause of healthcare services interfering with the protection of life on the planet, that is to say, for our country with the Task Life (Tarea Vida).

Currently the world is characterized by the emergence and re-emergence of epidemiological events: arboviruses, intestinal parasitism and pulmonary tuberculosis, among others. Microbial resistance has increased, due to the change in antimicrobial maps and pathogenicity of viruses, the increase of bacteremia and septicemias. New infectious diseases have emerged such as Ebola, Bubonic Plague, febrile syndromes of unknown etiology and severity; and more recently the new coronavirus of severe acute respiratory syndrome (SARS-CoV-2) provoking coronavirus disease 2019 (COVID-19).

Among the characteristics of COVID-19 is that it can be transmitted in all areas (including hot and humid climates), the virus can remain active up to three days on different surfaces (plastic, fabric, metal, glass, paper), in the air up to 30 minutes and travel up to 4.5 meters.[17]

Surprising and devastating, the pandemic has invaded the closely interconnected world, in the short time has elapsed it and has left us with lessons that we are forced to assimilate, because for the first time the whole humanity has bordered on collapse. Climate change, accelerated by the predominance of the notion of material development for the benefit of a few, can stop and perhaps reversed to some degree if the political will of the State places the salvation of the human species above the pursuit of profit.

CONCLUSIONS

The climate change product to the irresponsible activity of man has brought harmful consequences for the ecosystems and in turn for the health of mankind. Compliance with biosecurity standards in healthcare institutions has a synergistic effect with Task Life (Tarea Vida), through the control of biological risk. Biosafety standards allow for the management of changes in ecosystems and the preservation of human health.

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Conflict of Interest
The authors declare that there is no conflict of interest.

Declaration of Authorship
All authors participated in the conceptualization, formal analysis project management, writing, and original draft-writing, writing-revising, editing and approval of the final manuscript.

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