Climate change and its impact on the population of Northern Lima

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Abstract

Introduction: The impact caused by climate change at present presents a high risk in the health field with consequences in the social and environmental fields. For example, there has been an increase in illnesses and social concern due to the lack of information among citizens.
Aim: This study seeks to explain why climate change is having an impact on the population of Puente Piedra.
Methods: The research is explanatory and quantitative. For this reason, a survey was used to find out how informed citizens are about this issue and thus be able to describe the impact on health and recognize the effects on the social and environmental surroundings.
Results: The survey showed the lack of knowledge of citizens on the subject, concern about the increase in temperatures and lack of awareness to take action and address this problem.
Conclusions: It is suggested to carry out more studies taking the other cones of the capital as references to obtain better information at regional level.

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1. Introduction

Climate change has become extremely important today, and its impact on the population and the environment is becoming increasingly evident [1,2]. Historically, climate variation was not considered an issue of great importance, since the Earth maintained a natural stability thanks to the greenhouse effect, a phenomenon that retains part of the heat emitted by the sun and thus maintains an average temperature that allows life as we know it. However, with the advent of the Industrial Revolution in the 18th century, the industrial boom brought with it the uncontrolled emission of toxic gases, such as carbon dioxide (CO_2), which led to progressive temperature increases and the onset of global warming [3].

Global warming is a direct consequence of human activity, particularly the burning of fossil fuels such as oil, coal and natural gas, which release large amounts of CO_2 and other greenhouse gases into the atmosphere. These gases act as a "blanket" around the planet, trapping heat and causing the global average temperature to rise. In addition, deforestation and changes in land use also contribute to the increase in CO_2 emissions and the alteration of ecosystems [4,5].

In the context of climate change, it has been observed that precipitation patterns are changing, temperatures are

rising and extreme weather events, such as heavy rains, are increasing in frequency and severity in various regions. Latin America has not been immune to these changes, and their effects have become evident in several countries in the region [6,7].

In the specific case of Peru, a country with great geographic and climatic diversity, global warming has had significant impacts. The accelerated melting of Andean glaciers is one of the most visible and alarming changes. According to the National Water Agency (ANA), 51% of the glacier surface in Peru has disappeared in the last 50 years, forming new lakes and endangering the water supply in several regions of the country. The Ancash region, located in the north of the country and home to the emblematic Huascarán National Park, has been one of the most affected by this phenomenon, with more than 50% of its glacier surface melting [8].

In addition to impacts on ecosystems and water resources, climate change is also directly affecting the Peruvian population, especially in the districts of northern Lima, such as Comas, Independencia, San Martin de Porres, Ventanilla, Puente Piedra, Los Olivos and Carabayllo. These densely populated urban areas are experiencing a notable increase in temperature in recent years, which is affecting the health and well-being of their inhabitants.

The effects of climate change on the population of Puente Piedra are already manifesting themselves, mainly in the form of increased temperatures and heat waves. This has led to an increase in cases of heat-related illnesses such as skin cancer, allergies, heart and respiratory diseases. Social impacts have also been observed, such as the migration of people seeking better living conditions in less affected areas, and environmental consequences, such as the loss of biodiversity and the degradation of local ecosystems.

Given this situation, it is necessary to address the impact of climate change on the population of Puente Piedra and understand its implications in terms of health, social welfare and environment. In this sense, this thesis aims to analyze in detail the effects of climate change on the inhabitants of Puente Piedra, in order to raise awareness about the importance of taking measures to mitigate and adapt to these inevitable changes.

Climate change has significant impacts on people's health. Rising temperatures due to global warming can trigger a range of health problems, such as cardiovascular [9,10] and respiratory diseases [11–13]. More frequent and intense heat waves can lead to an increase in heat-related deaths and increased heat stress on the body. In addition, climate change may influence the spread of vector-borne diseases, such as dengue fever and malaria [6,6,12,14], as favorable climatic conditions allow insect vectors to survive and reproduce.

Another important aspect is the impact on air quality. Climate change may contribute to an increase in the concentration of air pollutants, such as ozone and fine particulate matter, which are related to respiratory problems such as asthma and chronic lung diseases. In addition, extreme weather events, such as storms and droughts, can lead to the release of toxic substances and increase exposure to air pollution, further aggravating health problems [15].

In addition, climate change can have consequences for food security and nutrition. Alterations in rainfall patterns and droughts can affect agricultural production and food availability, which can lead to food shortages and malnutrition. Likewise, climate change may affect food quality, as climatic conditions may favor the proliferation of foodborne diseases and food contamination [16,17].

The main objective of this research is to describe and analyze the effects of climate change on the inhabitants of Puente Piedra, with emphasis on its impact on health, as well as social and environmental aspects. Through research involving data analysis and review of scientific and specialized literature on the subject, it is expected to obtain results and conclusions that contribute to the knowledge and understanding of the effects of climate change on the population of Puente Piedra.

In addition, it is hoped that the findings of this research will serve as a basis for the formulation of policies and concrete actions that contribute to minimize the negative impacts of climate change in the community of Puente Piedra. It is also expected to foster cooperation between the community, local authorities and relevant organizations to develop sustainable solutions and promote resilience to the challenges posed by climate change.

2. Methods

This research is framed within a descriptive and quantitative approach with the objective of analyzing the current situation of climate change in Puente Piedra. For this purpose, a methodology was used to obtain applied knowledge on the subject. Virtual surveys were applied as a data collection technique, taking advantage of the benefits provided by current technology, using applications such as WhatsApp and Google. These made it possible to reach a larger number of people without the need to be physically present.

The main study variable was the impact of climate change. It was conceptually defined as a perceptible and sustained change in climatic conditions due to natural variability or the impact of human activity. For its operationalization, virtual surveys were designed and adapted to the new technological system, using nominal and ordinal scales to measure the characteristics of the variable. Indicators such as informed population, prepared population, importance, causes, confidence in information sources, awareness of the problem, severity of the effects, environmental pollutants and favorable actions were established.

The target population of this research consisted of the inhabitants of Puente Piedra in Metropolitan Lima. According to the census conducted in 2017, it is estimated that this population has approximately 351 thousand

inhabitants. Inclusion criteria were established, such as being between 18 and 54 years old, being inhabitants of Metropolitan Lima "Puente Piedra" in the year 2023, being university students, professionals in general and people of Peruvian nationality. On the other hand, exclusion criteria were defined, such as being under 18 years of age, adults over 54 years of age, people with basic studies and foreigners.

The sample used in this research consisted of 58 people. This number was obtained by calculating the population proportion using the finite sample formula. A probabilistic-stratified sampling method was applied, dividing the sample into strata, Puente Piedra being one of them with its 351 thousand inhabitants. The unit of analysis was the population living in the area of northern Metropolitan Lima, aged between 18 and 54 years.

The main data collection technique used was the survey, due to its efficiency and speed in obtaining information. A validated questionnaire was used, extracted from the 2016 climate change survey developed in Santiago de Chile by the Faculty of Social Sciences of the University of Chile. The survey was applied virtually through the Google Forms platform. Ethical procedures were followed, such as discretion with the information obtained, informed consent of the participants, and use of the data for educational and statistical purposes without harming the respondents. The data obtained were analyzed using descriptive statistics, factor analysis and validity tests. The Cronbach's Alpha test coefficient was used to evaluate the reliability and internal consistency of the instruments used (Scale reliability statistics: 0.675).

3. Results and Discussion

To process the information obtained from a valid questionnaire applicable to residents of Puente Piedra, the JAMOVI statistical procedure was used and a descriptive analysis was carried out with a sample size >59, with the following results:

Table 1: Level of knowledge of the population. Northern Lima, 2023.

Levels		Frequency (n)	Total %
Health	Low	41	70.7
	Medium	17	29.3
	High	0	0
Environmental	Low	43	74.1
	Medium	15	25.9
	High	0	0
Social	Low	34	58.6
	Medium	23	39.7
	High	1	1.7
Climate Change	Low	38	65.5
	Medium	20	34.5
	High	0	0

Source: survey

Table 2: Descriptive

	Add_Health	Add_Environmental	Add_Social	Add_Climate Change
N	58	58	58	58
Lost	0	0	0	0
Media	13.0	14.6	16.2	43.8
Median	13.0	14.0	15.5	43.0
Mode	13.0	14.0	13.0	48.0
Standard deviation	3.19	3.48	4.31	8.46
Variance	10.2	12.1	18.6	71.5
Minimum	8	9	9	28
Maximum	20	23	27	68

Table 1 shows the level of knowledge of the population of northern Lima regarding the impact of climate change in different areas. We can observe that in general terms, the level of knowledge is relatively low in all the areas analyzed.

Regarding health knowledge, 70.7% of the population has a low level of knowledge, while 29.3% has a medium level. No individual was recorded with a high level of knowledge in this area [11-18]. This indicates that the majority of the surveyed population has limited knowledge about the impact of climate change on health. Similar results were obtained by other authors[19-23].

In the case of knowledge about environmental impact, 74.1% of the population has a low level of knowledge, while 25.9% has a medium level. As in the health area, no individual was recorded with a high level of knowledge about the environmental impact of climate change.

In the social area, 58.6% of the population has a low level of knowledge, 39.7% has a medium level and only 1.7% has a high level of knowledge. This indicates that the majority of respondents have limited knowledge about the social impact of climate change.

In relation to climate change itself, 65.5% of the population has a low level of knowledge, while 34.5% has a medium level. As in the other areas, no individual was recorded with a high level of knowledge in this area. Similar results were obtained by other authors [24-31].

The descriptive data in Table 2 provide information on the responses obtained in each area of the survey [32-37]. Some variability in responses is observed in all areas, especially in the Social and Climate Change areas, where the dispersion of responses is greater [38-42]. These data are useful for understanding the distribution and range of responses in each area, which can be considered when analyzing the results obtained and making interpretations about the level of knowledge in each of the areas evaluated [42-47].

These results show the need to improve dissemination and education on the impact of climate change in all the areas mentioned [48-53]. It is important to promote greater awareness and understanding of the effects of climate change on health, the environment, society and climate change itself [54-56]. This will enable people to take more informed action and adopt more sustainable practices to mitigate and adapt to climate change [20].

4. Conclusions

People in Puente Piedra believe that the diseases caused by climate change are related to human activity and lack of knowledge about the issue, which makes it difficult to raise awareness to address the problem. In addition, the environmental impact is reflected in the increase in temperature, which worries the inhabitants. There is agreement that the depletion of the ozone layer is caused by climate change, which generates insecurity. In summary, the impact of climate change in Puente Piedra is worrisome due to a lack of awareness and knowledge, which prevents effective measures from being taken to combat it and creates a sense of helplessness.

5. Recommendations

People should take individual and group actions to reduce climate change such as choosing sustainable transportation and using water efficiently. In the future, develop smart cities and support organizations committed to sustainable solutions.

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