

Knowledge and Attitudes of Residents in 4 Districts of Kinshasa City-Province Regarding Climate Change: A descriptive Cross-Sectional Study (2024)

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Abstract

Background: Climate change is a serious global issue, with effects being felt everywhere. This topic is rarely addressed in the City-Province of Kinshasa, and scientific literature remains silent on the matter, even though the city is already experiencing the impacts of climate change including flooding, irregular rainfall, extreme heat, and shifts in agricultural seasons. Paradoxically, while Kinshasa's residents suffer the consequences, the term "climate change" remains vague to many. Furthermore, their lifestyles and practices regarding waste and vegetation management do little to help resolve the situation; the population lacks awareness regarding behaviors that directly or indirectly contribute to worsening the climate crisis.

Objective: We aimed to assess the knowledge and attitudes of residents across four administrative districts of the City-Province of Kinshasa regarding climate change.

Methods: A descriptive cross-sectional study was conducted involving 322 residents from 12 communes of the City-Province of Kinshasa. Data were collected via interviews and self-administered questionnaires (for literate respondents who lacked the time for face-to-face interviews). The data were compiled and organized using Excel, and statistical analysis was performed using SPSS software.

Results: The results show that 71.4% had a higher level of education; 51.9% had never heard of climate change; 29.5% had received information about it through television; 58.7% felt they did not have nearly enough information on climate change; 52.2% of respondents wanted to have all the necessary information on climate change. 48% of

respondents are willing to take measures to combat climate change, while 52% do not know what to do; 55.9% of respondents are very concerned about this phenomenon, compared to 3.1% who are not at all concerned, and 51.9% do not

know what actions to take to combat it, while 18.6% plan to plant trees.

Conclusion: Residents of the city of Kinshasa demonstrate significant gaps in knowledge and uncertainty regarding the actions needed to combat climate change; this highlights the need for targeted climate change education and public awareness initiatives to enable them to take appropriate measures.

Keywords: Attitudes; Climate change; Knowledge; Residents; Kinshasa.

1. Introduction

The world is facing the effects of climate change; no country can consider itself immune to this phenomenon, which is growing in scale and requires significant input from all scientists to develop resilience measures. A country's climate is one of its fundamental natural resources. Indeed, all climatic factors are ecological factors, and it is these factors that determine a given ecosystem [1]. Climate change, defined as a variation in the state of the climate that persists over long periods of time, is part of global change. Global change, sometimes referred to as global environmental change, has been defined by the expert working group as the set of major environmental and societal changes on a global scale, caused by both human activities and natural factors [2]. The world is facing the effects of climate change; no country can believe itself to be immune to this phenomenon, which is gaining momentum and requires significant contributions from all scientists to develop resilience measures.

The climate system is complex, and its study begins with observation. The vast amount of data collected and its subsequent analysis has enabled researchers to make spectacular progress. Data is gathered from weather stations, ships, satellites, and other sources [3]. Climate change refers to changes in the climate accompanied by a general increase in average temperatures on a global scale. These changes are due to the increase in the concentration of greenhouse gases in the atmosphere. These are climate changes that are directly or indirectly attributed to human activity

altering the composition of the global atmosphere and that are in addition to the natural variability of the climate observed over comparable periods [4]. According to the Intergovernmental Panel on Climate Change (IPCC), climate change refers to a change in the state of the climate that can be detected through changes in the mean and/or variability of its properties and that persists over a long period of time, generally decades or longer. It refers to any change in the climate over time, whether due to natural variability or human activity [5]. The causes of climate change are well-documented; the primary source of the increase in atmospheric carbon dioxide concentrations since preindustrial times stems from the use of fossil fuels, with changes in land use constituting another significant but smaller contributor; Deforestation and livestock farming are having an increasing impact on the Earth's climate and temperature:

- The burning of coal, oil, and natural gas produces carbon dioxide and nitrous oxide.
- Deforestation. Trees help regulate the climate by absorbing carbon dioxide (CO₂) from the atmosphere. When they are cut down, this beneficial effect is lost, and the carbon stored in the trees is released into the atmosphere, exacerbating the greenhouse effect.
- The expansion of livestock farming. Cattle and sheep produce large amounts of methane when they digest their food.
- Nitrogen-containing fertilizers produce nitrous oxide emissions.

• Fluorinated gases are emitted by equipment and products that use these gases. These emissions have a significant warming effect up to 23,000 times greater than that of CO₂ and annual emissions of fossil carbon dioxide have increased by 6.4 (from 6.0 to 6.8). These activities release enormous quantities of greenhouse gases, which add to those naturally present in the atmosphere, thereby intensifying the greenhouse effect and global warming [6]; [7]. In its synthesis report on climate change, the IPCC confirms that human influence on the climate system is evident and growing, and that its impacts are being observed on every continent and in every ocean. The number of changes observed since the 1950s is unprecedented in decades, if not millennia, and the IPCC is 95% certain that human activities, carried out to ensure survival, are the primary cause of current global warming. The report notes that human activities are disrupting the climate, and that there is a high risk of serious, widespread, and irreversible consequences for humans and ecosystems, as well as long-term changes to all components of the climate system [6]; [8]; [9]. CO₂ produced by human activities is the primary cause of global warming. By 2020, its concentration in the atmosphere had risen to 48% above pre-industrial levels [10]; As the climate crisis intensifies, its various impacts on public health are also worsening. It threatens the essential building blocks of good health clean air, safe drinking water, a nutritious food supply, and safe workplaces and homes. Climate change poses the greatest threat to global health, and health professionals in the Region are already responding to the harmful effects of this crisis. Delayed action on climate and health could undermine decades of progress in public health [11]. The general public should have a thorough understanding of climate change in order to contribute effectively to combating it, as well as to know what steps to take to address the harmful effects already being felt across different countries. Like many other cities, Kinshasa is expected to experience higher

temperatures, heavier rainfall, more severe flooding, and more frequent droughts in the near future all of which will hinder the productivity of businesses and industries [12]. This issue is not widely addressed in the City-Province of Kinshasa, and the scientific literature remains silent on the matter, even though Kinshasa is already suffering the effects of climate change and the population is unaware of how their behavior, in one way or another, contributes to the worsening of the climate situation. It was therefore essential to investigate the knowledge and attitudes of the population in four districts of the City-Province of Kinshasa regarding climate change in order to make the necessary recommendations to the various authorities. This study was conducted to determine the level of knowledge, attitudes, and practices of this population regarding climate change.

The objectives were:

- Describe the socioeconomic characteristics of the study participants in the City-Province of Kinshasa,
- Assess the knowledge of Kinshasa residents regarding climate change from June to November 2024,
- Describe the effects of climate change observed by the population in Kinshasa during the study period,
- Describe the attitudes of Kinshasa residents toward climate change.

2. Materials and Methods

2.1. Study Design and Setting

This is a descriptive cross-sectional study using quantitative methods, conducted in the 12 municipalities of 4 districts of the City-Province of Kinshasa among respondents who were over 18 years of age and literate enough to complete the self-administered questionnaire, from July to December 2024.

2.2. Sampling and Data Collection

The following formula was used to determine the number of subjects to include in the study:

$$n \geq \frac{(1.96)^2 \times 0.26 \times (1 - 0.26)}{0.05^2} = 296$$

With a prevalence of 26%, a precision level of 5%, and the 95% confidence coefficient for a two-tailed test (1.96). Based on this formula, the minimum sample size was estimated at 296, with a 10% safety margin; the sample size was 326 respondents, 4 questionnaires were lost to follow-up, and the final sample size was 322 respondents who participated in the survey. During this study, the sampling method used was as follows:

Convenience sampling was used to select the Province of Kinshasa, Exhaustive sampling allowed us to include all four districts that make up the administrative entities of the City-Province of Kinshasa, At the district level, we used simple random sampling to select 12 out of 24 communes, including:

- Tshangu District: Nsele and Masina;
- Mont-Amba District: Mont-Ngafula, Matete, Lemba, Kisenso, and Ngaba;
- Lukunga District: Ngaliema, Gombe, and Kinshasa
- Funa District: Makala and Kalamu.

- Next, within the selected municipalities, we randomly selected two neighborhoods,

- In the neighborhood, we used the random route method, and

Once on the avenue, we employed systematic sampling by selecting one out of every three households while walking from one end of the avenue to the other. Regarding the nature of the questionnaire responses, we used three methods: single-answer questions, multiple-answer questions, and open-ended questions where the respondent could provide explanations based on their knowledge and understanding of the topic. Data were collected using two methods: interviews conducted by interviewers (20 in total), who were selected and trained in data collection, and a self-administered questionnaire, in which respondents completed the questionnaire at their convenience and returned it to the interviewer; The purpose of

these interviews was to explore knowledge and attitudes regarding climate change.

2.3. Study Variables

The following variables were taken into account, based on the studies [7], [11] :

1. Socioeconomic variables of the City-Province of Kinshasa:

- District of residence: Tshangu, Mont-Amba, Lukunga, and Funa
- Municipality of residence: Nsele, Masina, Mont-Ngafula, Matete, Lemba, Kisenso, Ngaba, Ngaliema, Gombe, Kinshasa, Makala, and Kalamu
- Gender: Gender differences among respondents
- Education: Educational level, access to information
- Occupation: Respondent's professional occupation

2. Knowledge of Climate Change:

- Knowledge: Body of knowledge regarding climate change
- Information: Level of information on climate change, sources from which this information is obtained,
- Sources of information: Range of sources through which the population can access information on climate change,
- Most vulnerable gender: Identification of the gender most vulnerable to climate change.

2.4. Data Processing and Analysis

After the data was received via the hard-copy form, it was sorted, and the survey forms were categorized by district and then, within each district, by municipality to facilitate data entry into Excel. The initial data quality check was conducted in the field during data collection to ensure the data was complete. After entering the data into the Excel database, it was exported to SPSS version 27 for analysis. Descriptive statistics and statistical inference tests were applied to analyze our data.

2.5. Ethical Considerations: We submitted a request for authorization to the ethics committee

via letter Ref. No.: 007/JTK/M.RDC/2024 dated June 24, 2024, and received approval via Approval Letter No.: ESP/CE/166/2024 dated June 26, 2024. The study took into account issues related to respect for the individual, data confidentiality, and non-maleficence, which are ethical principles.

The principle of informed consent was upheld, and respondents had the right to agree to or refuse participation in the survey. Instances of refusal were recorded, and the respondents' decisions were respected by the interviewers..

3. RESULTS

3.1. Respondent characteristics

Table I: Socioeconomic Characteristics of Respondents

Variables	Categories	Frequency	Percentage
Gender	1. Male	210	65.2
	2. Female	112	34.8
Age Group	1. 18–25 years	54	16.8
	2. 25–30 years old	69	21.4
	3. 31–45 years old	85	26.4
	4. 46–60 years old	57	17.7
	5. Over 60 years old	57	17.7
Education	1. None	0	0
	2. Elementary school	11	3.4
	3. High school	81	25.2
	4. Higher education and college	230	71.4
Occupation	1. Employee	89	27.6
	2. Student	59	18.3
	3. Unemployed	19	5.9
	4. Other	155	48.1
District	1. Tshangu	51	15.8
	2. Mont-Amba	117	36.3
	3. Lukunga	111	34.5
	4. Funa	43	13.4
Municipality	1. Nsele	11	3.4
	2. Masina	40	12.4
	3. Mont-Ngafula	29	9.0
	4. Matete	16	5.0
	5. Lemba	32	9.9
	6. Kisenso	16	5.0
	7. Ngaba	24	7.5
	8. Ngaliema	61	18.9
	9. Gombe	22	6.8
	10. Kinshasa	28	8.7
	11. Makala	28	8.7
	12. Kalamu	15	4.7

The Table I shows the majority of respondents were men (65.2%), while 34.8% were women. The largest proportion of participants fell into the 31–45 age group (26.4%)n whereas only 16.8% were in the 18–25 age group. Most respondents were well-educated, with 71.4% having attained higher or university-level education, while only 3.4% had only a primary education. We found that 48.1% of our respondents did not have a specific profession, while only 5.9% were unemployed. The majority of respondents resided in the Mont-Amba District (36.3%), whereas only 13.4% were in the Funa District. Among the 12 communes

where the survey was conducted, the Ngaliema commune accounted for the largest share of respondents (18.9%), while the Nsele commune accounted for only 3.4%.

3.2. Knowledge of Climate Change

Table II: Knowledge of Climate Change

Variables	Categories	Frequency	Percentage
Have you heard of climate change?	1. Yes	155	48.1
	2. No	167	51.9
Meaning of climate change	0. Don't know	167	51.9
	1. Change in climate	32	10
	2. Rising temperatures	92	28.6
	3. Changes in temperature and weather	31	9.6
Causes of climate change	1. Don't know	167	51.9
	2. Deforestation	60	18.6
	3. Human activities	14	4.3
	4. Air pollution	24	7.5
	5. Increase in greenhouse gas emissions	37	11.5
	6. Industrialization	20	6.2
Impact of climate change on health	1. Yes	167	51.9
	2. No	51	15.8
	3. Don't know	104	32.3
Observed climate change	1. Increased heat	129	40.0
	2. Disrupted seasons	84	26.1
	3. Floods	109	33.9
Observed impacts of climate change	0. Don't know	94	29.2
	1. Vector-borne diseases	38	11.8
	2. Diarrheal diseases	27	8.4
	3. Respiratory diseases	37	11.5
	4. Effects related to malnutrition	51	15.8
	5. Dehydration	75	23.3
Gender most exposed to the effects of climate change	0. Don't know	87	27.0
	1. Men	9	2.8
	2. Women	158	49.1
	3. Both genders	68	21.1
Aware of climate change	1. Yes	155	48.1
	2. No	167	51.9
Source of information	0. Not informed	168	52.2
	1. Television	95	29.5
	2. Internet	35	10.9
	3. Education and training	24	7.4
Level of information on climate change	1. Very sufficient	5	1.5
	2. Somewhat sufficient	53	16.5
	3. Sufficient	27	8.4
	4. Less than sufficient	48	14.9
	5. Not at all sufficient	189	58.7

Table II shows the general trend regarding the knowledge of residents of the City-Province of Kinshasa about climate change: the majority of respondents 51.9% were unaware of climate change, compared to 48.1% who were aware of it; Regarding the meaning of climate change, 51.9% were unaware of it, while 9.6% said it refers to variations in temperature and weather. 51.9% of respondents are unaware of the causes of climate change, while 4.3% believe that human activities are the cause; 51.9% of respondents

confirm that climate change has an impact on health, while 15.8% believe that climate change has no impact on health. Regarding climate change, 39.9% have noticed an increase in heat, 33.9% mentioned flooding, and 26.2% have observed disruptions to the seasons; According to 49.1% of respondents, women are the gender most exposed to the effects of climate change, while 21.1% believe that men and women are equally exposed, and only 2.8% believe that men are the most exposed. 51.9% of respondents had not followed any news about climate change, compared to 48.1%; the source of this information on climate change was television for 29.5% of respondents, and 10.9% cited the internet (including social media) and 7.5% were in academic programs and training workshops. And 58.7% of respondents believe their level of knowledge about climate change is not at all sufficient, while 1.6% believe their level of knowledge is very sufficient

3.3. Attitudes Toward Climate Change

Table III: Attitudes Toward Climate Change

Variables	Categories	Frequency	Percentage
Type of easily accessible communication	1. Awareness-raising	83	25.8
	2. Radio and television	126	39.1
	3. Articles and posters	12	3.7
	4. Internet	101	31.4
Information Needed on Climate Change	1. All information	178	55.3
	2. Stabilization of climate parameters	18	5.6
	3. Prevention and mitigation measures	39	12.1
	4. Prevention of health effects	30	9.3
	5. Effects on health and agriculture	25	7.8
	6. Impact of deforestation on climate change	32	9.9
Preferred means of communication	1. Awareness campaigns	107	33.2
	2. Television	102	31.7
	3. Articles and brochures	25	7.8
	4. Social media	88	27.3
Concerned about climate change	1. Very concerned	180	55.9
	2. Somewhat concerned	27	8.4
	3. Concerned	14	4.3
	4.. Less concerned	91	28.3
	5. Not at all concerned	10	3.1
Measures to combat climate change	0. Don't know	167	51.9
	1. Raise public awareness	32	9.9
	2. Penalize harmful actions	38	11.8
	3. Enforce existing pollution laws	25	7.8
	4. Plant trees	60	18.6
Willing to take action to combat climate change	0. Yes	156	48.4
	1. Don't know	166	51.6

The Table III shows, The attitudes of Kinshasa residents toward climate change depend on the information they have regarding this issue. Regarding the information, they need, 52.2% of respondents want to have all the necessary information on climate change, compared to 7.3% who want information on ways to stabilize climate parameters. Thus, 55.9% of respondents say they are very concerned about climate change, compared to 3.1% who say they are not at all concerned about this phenomenon. Regarding

measures to combat climate change, 51.9% are unaware of any specific measures, 18.6% advocate for tree planting, 11.8% call for penalties against environmentally harmful actions, 9.9% call for public awareness campaigns on the issue, and 7.8% call for the enforcement of existing laws against polluters; 51.6% of respondents do not know if they are willing to take individual measures to combat climate change, while 48.4% are willing to take the necessary measures to combat climate change.

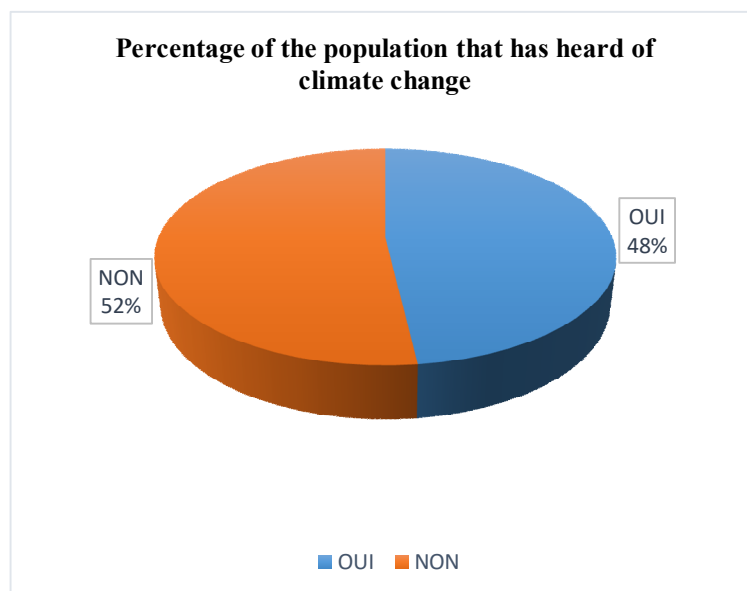


Figure 1: The population that has already heard of climate change

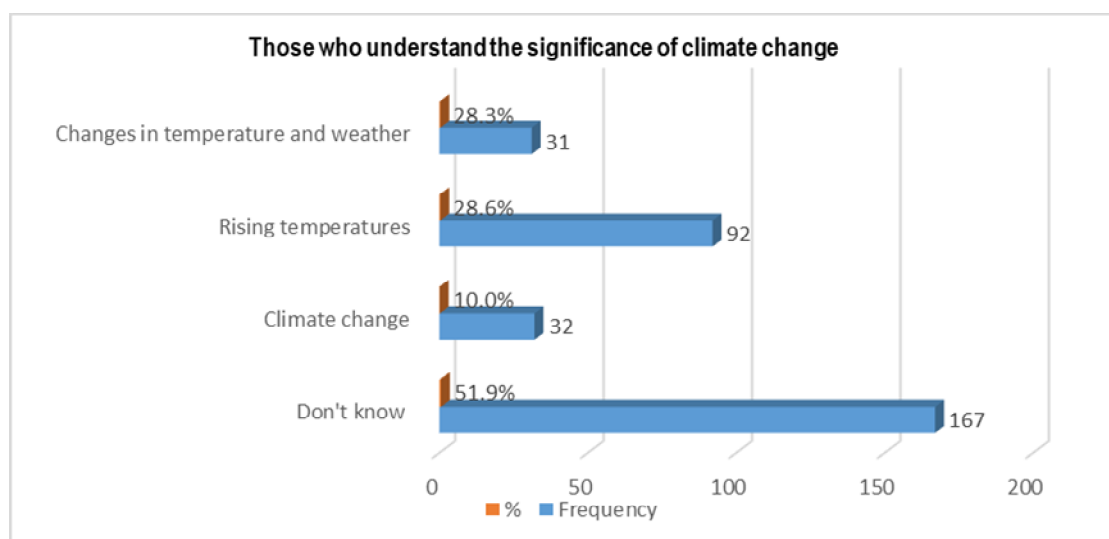
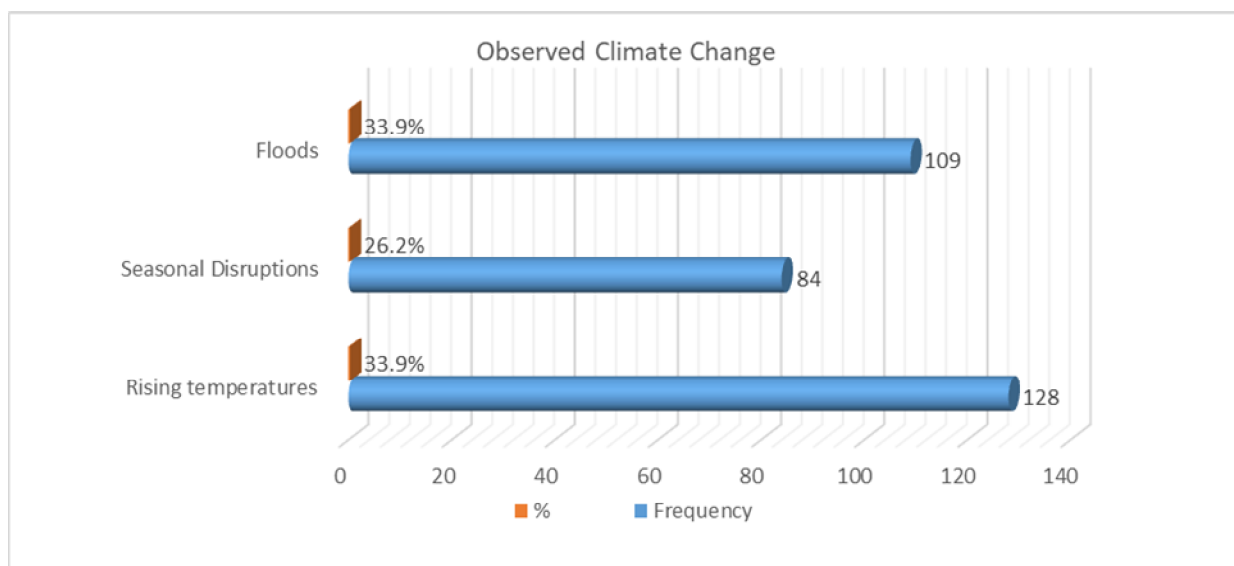
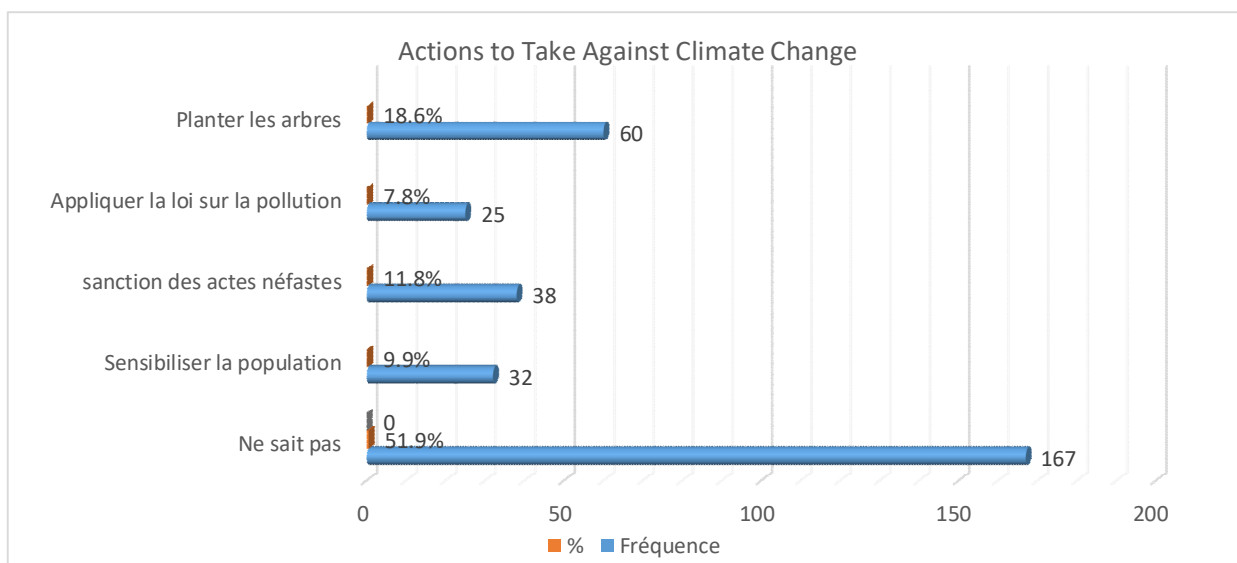


Figure 2: The population those who understand the significance of climate change

**Figure 3 :** Observed climate change**Figure 4 :** Residents willing to take actions to combat climate change**Figure 5 :** Actions to combat climate change

4. Discussion

The average age of our respondents was in the 18–25 age group, accounting for 16.8%; whereas for John Kotcher and his colleagues [13], it was 51 years old, and for Cyrielle Guillot and his colleagues [14], the 18–35 age group constituted the majority; this difference can be explained by the fact that this age group consists largely of students, who are more readily available to participate in a study. and possess a high level of scientific curiosity

Thus, 48.1% of respondents in our study did not have a specific occupation; 27.6% were employees, followed by students at 18.3% and the unemployed at 5.9%, this aspect can be explained by the fact that the majority of respondents did not have a fixed or specific job, they relied on various makeshift means to meet the needs of their dependents; which differs from the study conducted by John Kotcher and his colleagues., in which 95% of respondents were doctors and thus public servants while the study conducted at the University of Montreal by Cyrielle Guillot and his colleagues. consisted entirely of students (100%).

He notes that while 48.1% of our respondents had at least heard of this phenomenon, 51.9% had never heard of it; the level of knowledge regarding this topic is low, a fact attributable to minimal television and radio news consumption and the fact that the majority are preoccupied with income-generating activities and busy schedules; whereas in the study by John Kotcher and his colleagues , 95% of the participants had knowledge of climate change and confirmed that it is already occurring, compared to 2% who were unaware and another 2% who stated that climate change has not yet occurred; in that same study, 41% believed that their lack of knowledge about climate change was one of the factors reducing their willingness to communicate sufficiently about climate change. According to Sarah DUHAUTOIS and his colleagues, 71% of respondents believed they knew what it takes to

combat climate change and had knowledge about the phenomenon.

According to the study conducted by Valériane CHAMPAGNE St Arnaud and Ghislain SAMBON, more than 25% of young people are the most likely to have a good understanding of climate change and to know what to do to reduce their environmental impact.

Moreover, the Ministry of the Environment confirms that scientific knowledge regarding climate change in the Democratic Republic of the Congo could only truly yield results once shared with society at large; this highlights the immense effort required to explain the issue of climate change to the population [17].

Regarding knowledge of the causes of climate change, 51.9% of the study's respondents were unaware of the actual causes; this lack of knowledge stems from the fact that the subject is not addressed in various settings including professional, academic, or even school environments and is rarely discussed in the media; this is consistent with the conclusion reached by the WHO, which states that a great deal of evidence available today shows that the planet's climate is changing rapidly and that human activity is the primary cause of this change. Rising temperatures, sea-level rise, changes in precipitation patterns, and the frequency and intensity of extreme events are expected to have largely adverse effects on key determinants of human health, including air and water quality, food security, and housing [7]. This has been further confirmed by the IPCC in the synthesis of the Sixth Assessment Report (AR6), following the public summary of the Summary for Policymakers (SPM) of the AR6, released on March 20, 2023 “The influence of humans on the warming of the atmosphere, oceans, and continents is unequivocal and primarily due to GHG emissions.” [18].

The study conducted by Jean Kotcher and his colleagues [13], 81% of participants also believe that climate change is primarily or entirely caused

by human activities, while 14% believe it is caused equally by human activities and natural causes, and 5% believe it is primarily or entirely caused by natural causes or that it is not happening at all. In another study [19] conducted by Vincent Zoma and colleagues, 70% of respondent's state that humans are the causes of climate change, while 26% consider god to be cause of the phenomenon. In our survey, 48.1% of respondents were aware of climate change; 39.9% reported noticing an increase in heat, 33.9% reported noticing flooding, and 26.3% reported noticing seasonal shifts, These same changes have been documented in various studies, including that conducted by ORECC [20], which found that signs of climate change include an increase in the intensity and frequency of heat waves with an annual rise of 2°C and a resulting increase in summer mortality of up to 3%, In another article by Jean Kotcher and colleagues [13], 48% cited extreme weather events resulting in the loss of housing for displaced residents as the observed changes, along with physical or mental harm caused by droughts (46%); While in another article [15]; Sarah DUHAUTOIS and colleagues found that 41% of their respondents had observed extreme weather events with 69% identifying heatwaves as the most frequently observed phenomenon across all zones and 49% citing seasonal disruptions a similar pattern emerged in the study by Vincent Zoma and colleagues [19], where 89% of participants pointed to extreme weather events, including changes in wind patterns; similarly, Bartelett S. [21] found that flooding causes significant human impact as a result of observed climate change, while Shanathana MIKE and colleagues [7] identified natural disasters specifically droughts, floods, and storms as the most commonly observed effects. Regarding sources of information on climate change, 29.5% of respondents obtained information via television, 10.9% via the internet (particularly social media), and 7.5% through formal education or training, highlighting the various channels through which information can

readily circulate; notably, 58.7% stated that their level of knowledge regarding climate change was completely inadequate, whereas only 1.6% considered their knowledge level to be very adequate. The population generally felt that information on the subject was insufficient, largely because the topic is rarely discussed in depth; thus, 52.2% are likely to need all the necessary information on climate change, and the most accessible channel for 35.7% of respondents is television; 34.0% prefer social media, compared to 27.8% who prefer climate change awareness campaigns, and 3.1% who prefer articles and brochures which suggests that people in Kinshasa do not have a culture of reading such materials. In a study [13] conducted by Jean Kotcher and colleagues, 37% stated that they would be willing to participate if they had more information on climate change, and 76% of participants need ongoing training on climate change and health, while 65% also need educational materials on climate change, according to the study conducted by Valérie CHAMPAGNE St Arnaud and Ghislain SAMSON [16] more than 14% of participants need training on climate change in order to encourage those around them to take action, and more than 18% need to develop communication skills related to climate change. However, 49.1% of respondents believe that female sex is the most exposed, while 21.1% find that both sexes are exposed in the same way and only 2.8% find that the male sex is more affected; Canelon SP and Boland M.R.; [22] the study conducted in 2023 [11] found the same conclusion that women were more affected than men by the effects of climate change including flooding, compared to the male sex with 4.1% and in another study conducted in France [20] ORECC found that 58% of women were more exposed than men to the cutaneous effects due to climate change compared to 42% of men. In 2024 [7], the WHO noted that among the risks likely to be affected by climate change, there are gender differences, with natural disasters such as droughts, floods, and

storms causing more deaths among women than men. Climate change preparedness and response must take into account gender dimensions in healthcare (including mental health) and healthcare demand [21].

In our study, 55.9% of respondents reported being very concerned about climate change, compared to 3.1% who were not at all concerned. Those concerned about this phenomenon have more knowledge about the future consequences compared to those with no in-depth knowledge of the consequences of climate change. This percentage exceeds that of a study conducted by Sarah DUHAUTOIS and colleagues [15], who found that 41% of respondents reported being concerned about the environment, whereas respondents to the study by Jean Kotcher and colleagues [13]; 40% believed that climate change was important to them personally, and 35% stated that this issue was extremely important; 91% of participants are at least somewhat concerned about climate change, and 62% are very concerned. On the other hand, 66% of French participants believe that climate change will cause them moderate or significant harm personally, 57% said the same for people in their country, and 93% are very concerned about future generations [7].

Respondents to our survey demonstrated a strong sense of their participation in the struggle: 18.6% believe in planting trees to combat climate change, 11.8% prefer imposing penalties for actions that harm the environment, while 51.9% do not know what to do due to a lack of information and training on climate change; this commitment is more pronounced in a study conducted in Quebec by Cyrielle GUILLOT and colleagues [14], in which 97.98% believed that, as individuals, they had a responsibility to protect the environment (compared to 2.02%); regarding the translation of this commitment into action, 57.58% considered joining an environmental organization fighting climate change (compared to 42.42%). According to Campbell LENDRUM D. and Corvalan [23] Adaptation strategies can reduce the effects of

“heat islands,” improve opportunities for social interaction and physical activity, and increase resilience to flooding.

Furthermore, 9.9% of respondents in our study are committed to raising public awareness about the fight against climate change, this commitment is a contribution to strengthening the population’s capacity on the subject in order to gain their support for measures to combat climate change; however, this low percentage is due to the fact that several respondents did not have in-depth knowledge of climate change; whereas in the study conducted by Sarah DUHAUTOIS and colleagues [15], 51% believe that taking action at the individual level to combat climate change is not making significant progress, while 31% believe that the solution lies in technological progress and innovation; the study conducted by John Kotcher and colleagues [13] 26% of participants stated they were personally willing to participate in an advocacy campaign, while 37% said they might participate if they had more information about climate change;

In this study, 48.4% of respondents said they were willing to take the necessary steps to combat climate change, whereas in the study by John KOTCHER and colleagues [13], 76% of participants said they needed ongoing training on climate change and health, and 65% also said they needed educational materials on climate change.

In another study [16], Valériane CHAMPAGNE St Arnaud and Ghislain SAMSON found that more than 14% of participants considered themselves highly skilled at encouraging those around them to do their part in the fight against climate change after receiving training on the subject, while over 18% identified a need for communication skills, the creation of a peer network, and exposure to new project ideas to enhance their engagement.

5. Conclusion

This descriptive cross-sectional study, using quantitative methods, provides in-depth insight

into the knowledge and attitudes of the residents of Kinshasa regarding climate change.

The findings reveal significant gaps in knowledge and uncertainty among Kinshasa's residents regarding the actions needed to combat climate change; this highlights the need for targeted public education and awareness-raising interventions to enable them to take appropriate measures to address the issue.

The results provide essential information to guide public health policies and decision-makers, along with adaptation strategies aimed at improving climate change management and reducing residents' vulnerability to the effects of climate change.

Declarations:

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Ethics Approval and Consent to Participate:

Ethical approval for the study was obtained from the relevant ethics committee under Approval Letter No. ESP/CE/166/2024 dated June 26, 2024, following submission of request Ref. No. 007/JTK/M.RDC/2024 dated June 24, 2024. The study was conducted in accordance with applicable ethical principles. Informed consent was obtained from all participants, and

participation was voluntary; participants had the right to refuse participation.

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Competing Interests:

The authors declare that they have no competing interests.

Availability of Data and Materials:

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request, subject to applicable ethical and confidentiality requirements.

Use of Artificial Intelligence:

Artificial intelligence tools were used solely for language refinement, grammatical correction, and improvement of manuscript presentation. No artificial intelligence tool was used to generate, manipulate, or fabricate study data, statistical results, or scientific findings. The authors take full responsibility for the accuracy, integrity, interpretation, and final content of the manuscript.

References

1. Global Environment Facility. (n.d.). Climate change in the Democratic Republic of the Congo: Current status and outlook within the framework of the ANCR. Global Environment Facility.
2. Lafaye, M., Adam-Poupard, A., Chalvet-Monfray, K., et al. (2018). Évaluation des risques induits par le changement climatique sur la santé des travailleurs: Avis de l'Anses—Rapport d'expertise collective. Anses Éditions. <https://hal.science/hal-01790561v1>
3. Fellous, J.-L., & Gautier, C. (2007). Comprendre le changement climatique. Odile Jacob. <https://doi.org/10.3917/oj.fello.2007.01>

4. Guyet, R. (2026, May). Changement climatique: Définition, causes et conséquences. Carbo. <https://www.hellocarbo.com/blog/communaute/changement-climatique-definition/>
5. Rahhou, M. (2009). Climate change. Sidi Mohamed Ben Abdallah University.
6. Campagna, C., Ouimet, M.-J., Généreux, M., & Pétrin-Desrosiers, C. (2023). Changements climatiques. In I. Goupil-Sormany, M. Debia, P. Glorennec, J.-P. Gonzalez, & N. Noisel (Eds.), *Environnement et santé publique: Fondements et pratiques* (pp. 113–142). Presses de l'EHESP. <https://doi.org/10.3917/ehesp.goupi.2023.01.0113>
7. Shanahan, M., Shubert, W., Scherer, C., & Corcoran, T. (2014). Climate change in Africa: A guidebook for journalists. UNESCO.
8. United Nations Secretary-General's Advisory Group on Energy and Climate Change. (2010). Energy for a sustainable future. United Nations.
9. Pachauri, R. K., & Meyer, L. A. (Eds.). (2014). Climate change 2014: Synthesis report. Intergovernmental Panel on Climate Change.
10. European Commission. (n.d.). The causes of climate change. Directorate-General for Climate Action. <https://climate.ec.europa.eu/climate-change/causes-climate-change>
11. World Health Organization Regional Office for the Eastern Mediterranean. (2023). Climate change, health and the environment: Regional framework for action, 2023–2029. World Health Organization.
12. Banga, A., Kim, S., & Murthi, M. (2021, August 19). Why Kinshasa could be in the vanguard of megacities' climate resilience. World Bank. <https://www.worldbank.org/en/news/feature/2021/08/19/why-kinshasa-could-be-in-the-vanguard-of-megacities-climate-resilience>
13. Kotcher, J. E., Maibach, E. W., Miller, J., Campbell, E., Alqodmani, L., Maiero, M., & Wyns, A. (2021). Views of health professionals on climate change and health: A multinational survey study. *The Lancet Planetary Health*, 5(5), e316–e323. [https://doi.org/10.1016/S2542-5196\(21\)00053-X](https://doi.org/10.1016/S2542-5196(21)00053-X)
14. Guillot, C., Désilets, G., & Dufour, L.-P. (2019). Attitudes and knowledge regarding climate change among students at the University of Montreal. University of Montreal.
15. Duhautois, S., Troadec, S., & Witkowski, D. (2021). Obs'COP 2021: Presentation of the results of the International Climate and Public Opinion Observatory—Mobilization, concern, or indifference: Where do citizens in 30 countries stand on climate change? Ipsos & EDF.
16. Champagne St-Arnaud, V., & Sambon, G. (2022). Evaluating the effectiveness of climate change education in non-formal settings: A case study. *Environmental Education*, 17(1), 19–37. <https://doi.org/10.4000/ere.8097>
17. Ministry of Environment, Democratic Republic of the Congo. (2006). National action program on climate change adaptation of the Democratic Republic of the Congo. Ministry of Environment.
18. Beny, F., Canas, S., Chavanne, M., Deutsch, D., Persoz, L., & Tuel, A. (2022). Synthèse du rapport AR6 du GIEC publié le 04/04/2022: Synthèse vulgarisée du résumé aux décideurs du groupe de travail III de l'AR6. The Shifters.
19. Zoma, V., & Tarama, W. J. I. (2021). Perceptions et adaptation des populations de la commune de Seytenga au Burkina Faso face au changement climatique. *Della/Afrique*, Numéro spécial, 121–136. <https://hal.science/hal-03545746v1>
20. Observatoire Régional des Effets du Changement Climatique. (2015). État des connaissances: Santé et changement climatique en Rhône-Alpes. ORECC.

21. Bartlett, S. (2008). Climate change and urban children: Impacts and implications for adaptation in low- and middle-income countries. *Environment and Urbanization*, 20(2), 501–519. <https://doi.org/10.1177/0956247808096125>
22. Canelón, S. P., & Boland, M. R. (2020). A systematic literature review of factors affecting the timing of menarche: The potential for climate change to impact women's health. *International Journal of Environmental Research and Public Health*, 17(5), 1703. <https://doi.org/10.3390/ijerph17051703>
23. Campbell-Lendrum, D., & Corvalán, C. (2007). Climate change and developing-country cities: Implications for environmental health and equity. *Journal of Urban Health*, 84(Suppl. 1), 109–117. <https://doi.org/10.1007/s11524-007-9170-x>