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Research Article

Climate Change As a Significant Factor to the Aggravation of Coronary Artery Disease Among Elderly: A Basis for Emphasizing Community-based Self-care Measures

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Abstract

Background: This research study explored the lived experience of the elderly with coronary artery disease (CAD) relevant to the effects of climate change as a basis for enhanced and strengthened community-based self-care measures.

Methods: A descriptive phenomenological design was employed in the study. Consented face-to-face interview sessions with audio recordings were conducted to gather rich information. The data collected from 28 participants were analyzed using the modified Stevick-Colaizzi-Keen method.

Results: Three themes emerged upon a thorough analysis of the results: (1) elucidating the elderly's perception of climate change; (2) unveiling the effects of climate change on CAD; and (3) managing health-related behaviors in a changing environment. Evidence has revealed that climate change causes and aggravates this disease. CAD manifestations worsen when an elderly person is exposed to sudden changes in weather conditions, where various signs and symptoms are evident.

Conclusion: In conclusion, elderly clients have an awareness of the concept of climate change and its physiologic effects on CAD; hence, employment of practical self-care measures and practices in managing manifestations, significantly helps them adapt and cope with the adverse effects climate change brings.

Keywords: climate change, coronary artery disease, elderly, phenomenology, adaptation, coping, geriatric nursing, self-care, community-based interventions

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1. Introduction

Communities live in an aggressive competitive relationship with nature. The persistent quest for advancement, relief, and refuge has intensified the stress on the environment. As a result, the life-supporting environment has been forced to change more swiftly than ever. The consequences of this have brought problematic issues arising around

the globe; eventually resulting in an environmental crisis and ultimately affecting the human population and life-sustaining schemes. Climate change steers the wheel toward disease migration, exacerbating present and developing health concerns; thus, putting the health status of the people at risk. Literature contends that a change in environmental temperature aggravates cardiovascular diseases, such as coronary artery disease (CAD) [1, 2].

Climate change plays a crucial role in how the general population scrutinizes nature as well as the changes happening in it [3]. This change persists as time evolves and is deemed to be a major catastrophe of the new millennium [4, 5]. It was further asserted that climate change covers a multitude of climatic variations as a product of extensive emission of greenhouse gases [6]. This resultant alteration is primarily relevant to human activities [1, 6, 7].

CAD is a complex disorder that involves a significant interaction of inherent and environmental factors. Even though there are advanced and modernized ways of treatment to manage this disease, it is still recognized as the world's leading cause of mortality among adults and the elderly [2, 8]. The effects of alternating weather conditions and extremely high or low temperatures on health are well known, and cardiac effects are a major component [1]. Managing the health effects of temperature in response to climate change is a global public challenge [9]. Elderly clients both with and without cardiovascular conditions are vulnerable due to immune system deterioration. Furthermore, the researchers posit that people, especially the elderly are not often aware of the negative impacts of climate change on their health and certain existing diseases, while they frequently go unmindful that the latter is a significant factor in the development or aggravation of CAD. There is little evidence of elderly awareness and perception of climate change; hence, they and the public remain ambivalent regarding this environmental issue and its effects on human health [4, 5]. The authors also added that this can be a result of individual differences (e.g., political orientation, science, educational attainment, and social media). Increasing public awareness of the risks posed by climate change is an important predictor and catalyzes to attain adaptation.

Once the common manifestations are identified through the implementation of community-based strategies, it will safeguard the health of the public, more especially, the elderly by mitigating the negative effects of climate change. On that note, the theory of Sister Callista Roy's extended adaptation model in the community is employed by the elderly [10]. The framework explicates that human is biopsychosocial and is enforced to adapt stimuli from the external environment as a compensatory process to preserve the physiologic function of the human system. In order to achieve this, healthcare providers

should utilize measures to empower adaptive and coping mechanisms through health promotion and disease prevention to enhance individual functioning.

With the foregoing explications, the researchers explored the lived experiences of the elderly on climate change, which is considered as a significant risk factor in the aggravation of coronary artery disease. Through this study, the elderly and the community would gain awareness and improve practices to manage and cope with the aggravated signs and symptoms of CAD during climate change; thus, also advancing geriatric nursing knowledge.

2. Methods

2.1. Research design

The research study is limited to exploring and describing the perceptions of elderly clients on the effects of extreme temperature changes in the environment as a significant factor in the aggravation of CAD. Hence, the researchers employed a descriptive phenomenological design to elicit information on the lived experiences of the elderly.

2.2. Locale of the study

This research study was conducted in the province of Cagayan situated in Northern Philippines.

2.3. Study participants

The number of samples needed in qualitative research depends on data saturation. The researchers used purposive sampling to elicit information [11, 12]. Eligibility of the participants were based on the following criteria: (1) elderly diagnosed with CAD for at least 6 months since the time data gathering was conducted; (2) elderly aging from 60-85 years old; (3) elderly who could comprehend and articulate easily in their local dialect as well as Filipino and/or English; and, (4) who manifest interest in partaking in the study.

The researchers reached data saturation with the 16^{th} respondent; however, they continued gathering data up to the 28^{th} participant to draw out more information to enrich the co-creation of data.

2.4. Data collection procedure

Before gathering the data, the researchers sought necessary permits and consent and each participant was given an informed consent form after explaining the purpose of the study. The researchers explored the lived experiences of the participants through face-to-face in-depth interviews along with consented audio recordings. Semi-structured open-ended guide questions were asked to obtain the necessary information. Field notes were jotted down during each interview session, the latter lasted an average of 34 min. Likewise, all of them were notified about the confidentiality of the data and their right to any time withdraw it.

2.5. Data analysis

Data were analyzed utilizing the Stevick-Colaizzi-Keen method [13, 14]. The authors emphasized the importance of spending sufficient time with the participants to obtain a complete understanding of the situation being studied. Completeness of data will be attained by using different perspectives of data gathering. In this study, the researchers conducted interview sessions along with jotting down significant cues. Member checking was performed in order to validate the accuracy and completeness of data. Constant communication with participants was done to ensure that they are updated on the analysis phase of the research process. It is worth noting that the informants' verbalizations were carefully translated into the English language with the help of two English professors. Original transcripts were a combination of either Filipino and/or the participants' local dialect.

3. Results

Twenty-eight participants participated. Upon in-depth analysis, the researchers yielded the following themes: (1) elucidating the individual's perception on climate change; (2) unveiling the cardiovascular effects of climate change; and (3) managing health-related behaviors in a changing environment.

Theme 1: Elucidating the elderly's perception of climate change. 27 of the participants stated that they have previously encountered the term climate change and global warming. In addition to that some also mentioned and included the perceived causes and factors that contribute to climate change.

1001: [Of course. That is characterized by sudden changes in weather conditions from warm to cold temperatures. It's somehow unpredictable.]

1003: [Yes. I've heard it before. That it is characterized by a sudden shifting of climate from warm to cold. One presumed cause of climate change is burning of plastic material.]

1006: [Yes. This is characterized by the sudden shifting of warm to cold climate. The latter causes cough and colds.]

1007: [Yes, I've heard that already. It's the change in our weather conditions due to pollution.]

1009: [Okay. Yes. Climate change or global warming is the alteration of weather conditions and environmental temperature. It greatly affects our body.]

1011: [Yes. That is characterized by the sudden change in climate that may bring certain diseases.]

1016: [Yes. Climate change has a very broad meaning. It means, there are a lot of factors that contribute to climate change such as destruction of ozone layers due to nuclear bomb testing. It gets hot when it is hot and chilly during the cold season. It gets warmer and warmer during the summer season, to extremes.]

Theme 2: Unveiling the effects of climate change on CAD. When asked if changes in the weather condition impose negative effects on human health, 26 participants commonly shared various physiologic manifestations like difficulty of breathing, easy fatigability, palpitations, fainting, dizziness, headache, and chest pain.

1002: [Before I was hospitalized, I experience worse difficulty of breathing because of hot and cold weather conditions.]

1003: [Warm and cold temperatures have a significant effect on the condition of my heart. During the warm season, there is an unexplainable feeling of intense warmth. I also experience palpitation and I get tired easily.]

1006: [Warm and cold seasons influence my cardiac status. Say for an instance, during extremely hot weather you will get tired easily, whereas during the cold season you will suffer from cough and colds.]

1007: [Of course! During the warm season, I experience easy fatigability, headache, and palpitation. When the weather is too cold my body freezes. I think the cold and warm season has the same effect.]

1008: [Both warm and cold climates affect the condition of the heart. I experience more difficulty of breathing, palpitation, easy fatigability, and sweating of both hands. During cold weather, I usually shiver more and sometimes have difficulty in breathing.]

1022: [There is an effect on my cardiac status. When the weather is cold, I experience palpitations. During the warm season, I also suffer from severe palpitations, headache, dizziness, easy fatigability, and nape pain. For me it is more favorable to have cold rather than warm weather because the latter imposes a worse effect like persistent hypertension, more nape pain, palpitations, and increased frequency of headache.]

Theme 3: Managing health-related behaviors in a changing environment. The participants gave numerous answers on how they should manage climate change. Twenty-three mentioned that the following self-care measures combat the effects of warm weather conditions: (1) taking a bath two or more times per day, especially during the warm season to release body heat; (2) staying indoors to avoid prolonged exposure to sunlight; (3) drinking plenty of water as long as the body can tolerate and if there is no underlying contraindication; (4) staying under the shade of trees; (5) use of an electric fan in rotating mode; (6) using light clothing during warm weather while using sweater and socks during cold weather; and, (7) alternating activities of daily living and rest periods.

On the other hand, practices involved in managing the effects of cold weather conditions according to all participants include: (1) staying indoors to avoid prolonged exposure to the cold wind breeze; (2) drinking warm water; (3) regular exercise; (4) use jackets, pants, and socks; and (5) oil application on the body.

1002: [Every morning upon waking up, refrain from going outside so that you do not get sick because of the fog. During warm weather conditions, you should also avoid going out to prevent too much heat exposure whereas during cold season they are advised to exercise such as jogging or walking.]

1003: [During hot days, I make sure I get enough ventilation and take a bath maybe once or twice. When the weather is extremely cold, if possible, you need to take a warm bath, drink warm water and avoid alcoholic beverages.]

1005: [I usually drink water coming from earthenware if the weather is hot.]

1006: [If it is cold, refrain from going out. Just like me, I put on socks, jacket, pants or even a hood during this kind of weather. You could also apply oil. On the other hand, if it is warm, you may take a bath a couple of times daily. They should also wear light clothing. We also avoid going out beyond 11 o'clock. If you are a farmer, just like us, we often go to the field early in the morning most probably at 3:30-4:00 a.m., and then we will go home at 9:30 in the evening.]

1009: [We need to have a regular bath and rest during the hot season. Regular consultations and check-ups with the doctor are also very important. Elderly people are recommended to stay inside their houses or under the trees to get fresh air. They may

also use electric fans if they wish to. During the cold season, we need to wear thick sweaters, hoods, and socks, and may also use heaters to make the body warm. They should also refrain from going outside their houses during this time.]

1016: [During the hot season, they must avoid going outside. They must stay in places having good ventilation or they can stay under the trees. They should also avoid overworking and staying in the field during this time. When the cold season strikes, they must employ remedies to make their body warm such as wearing layers of clothing, hoods, socks, and making a bonfire.]

1028: [I would suggest people with cardiovascular malfunctioning to carefully take good care of themselves by eating fresh fruits during warm weather in which they can be getting vitamins and drinking lots of water. Likewise, it is not advisable for them to be tired, so rest is very important. During cold weather, it is safe to keep the body warm and also to take supplementary vitamins to keep the body going. Hot milk or hot chocolate will do so the body will be healthy and strong.]

Climate change is a multi-faceted environmental issue. This dilemma brings catastrophic events and implications, especially to human health and well-being. As such, it poses a great risk to the vulnerable population, particularly the elderly. Awareness, therefore, is essential in order to address this issue by employing adaptive self-care measures. Awareness of the complexities of climate change results in recognition of its potential effects. To manage this, people tend to implement and formulate effective measures to adapt to it. In return, these interventions will prevent the worsening of pre-existing medical conditions and future occurrences of disease such as in the case of coronary artery disease (CAD). On the latter note, creating awareness will greatly aid elderly clients to be cognizant with the impacts of climate change on health, specifically the cardiovascular system. Hence, conscientious planning, organization, and application of adaptive measures will be employed as a turning point to improve and strengthen the prevention of CAD aggravation.

4. Discussion

Climate change is undeniably the biggest environmental problem that the world faces today. It is believed to be the root cause of various catastrophic phenomena that were documented. It affects the public and posits negative impressions on health in numerous ways. It is presumed to worsen and beget devastating, enormous, and dreadful consequences in the future unless efforts are made to control its effects [16-18].

Salience is vital in addressing the adverse effects of climate change [19]. The result of this research study shows that most of the participants positively claimed that they have previous knowledge on climate change. This evidence is consistent with previous research that there is an increasing level of public awareness when it comes to observing and perceiving either vast or little changes in the weather condition [1, 6, 20]. This is predominantly due to the widespread use of electronic media such as television, radio, the internet, and other telecommunication devices.

In this research study, participants identified several contributory factors of climate change like burning of plastic material and pollution [5, 18, 21]. Climate change has a strong correlation with the declining state of wellness among individuals. It imposes significant threats and aggravates predefined health issues [1, 18]. The incidence of cardiovascular diseases such as CAD has largely escalated due to varying weather conditions. The rising number of environmental-related issues affects every individual. Similar to the result of this research study, the most vulnerable population includes the elderly with or without pre-existing cardiovascular medical conditions [4, 22]. Literature illustrated several reasons for this: (1) weakened physiologic ability to maintain thermoregulation; and (2) decreased capacity to adapt to the situation and the environment [6, 9, 20]. Anent this, the study has considered the age of the participants as a significant variable that greatly affects their vulnerability. Also, participants who were exposed to heavy workloads often experience more pronounced effects compared to those with minimal activity. Increased activity imposes greater demand on the heart; thus, limiting its capability to function normally or cope with demands [1]. Lastly, all the participants were living in the urban area, thereby predisposing them to acquire climate change-related problems such as CAD [1, 4, 23].

Generally, the results show that the participants have been experiencing a series of manifestations associated with the cardiovascular system, specifically those who were diagnosed with CAD experienced worst conditions when exposed to alternating weather conditions. It was recorded that higher incidence of CAD occurs during extreme environmental temperature conditions [23, 24]. Participants claimed that during warm weather conditions, they often experience fainting, shortness of breath, severe palpitation, headache, dizziness, and fatigue. Literature contends that these manifestations are primarily due to impaired thermoregulation, elevated cholesterol level, increased blood viscosity and pressure, and change in the body's sweating threshold [1, 6].

On the other hand, participants claimed that signs and symptoms were also experienced during cold weather conditions like palpitations, shortness of breath, fatigue, and dizziness. This is a result of increased blood pressure, heart rate, elevated cholesterol

level, and marked peripheral vasoconstriction [6]. This is also supported by a study [25] that the signs and symptoms are triggered during extreme low temperatures. However, results also revealed that few of them did not recognize any significant effect during cold climates.

The necessity is to address the impacts of climate change on the health of the elderly to prevent a more complex adverse effect in the future. Understanding the complexities of climate change would make the public more resilient [21]. The participants enumerated several practical self-care measures to adapt to or mitigate the consequences of the changing climate. During the upsurge of temperature, they mentioned the following: (i) accomplish tasks before the temperature gets too high; (ii) stay indoors; (iii) alternate rest and activity period; (iv) drink plenty of water as tolerated; (v) wearing light and loose clothes, (vi) taking cold shower or bath two or more times per day; (vii) avoid too much alcohol; (viii) recognize effects to CAD; and, (ix) staying in a cool environment. All these are consistent with existing knowledge on people and not only on elderly who have CAD [2, 18, 21].Whereas, during cold exposure, the participants suggested the following adaptive strategies as they find them efficient and effective: (i) drink plenty of water; (ii) refrain from going outside the house when the breeze is cold; (iii) take a warm shower; iv) oil application; and (v) wear thick clothes. Effective management on the effects of climate change through the utilization of adaptive coping strategies greatly helps the public to be resilient, especially those at risk and/or with existing cardiovascular medical conditions.

Dealing with the vast and complex health effects of climate change is incredibly challenging. This study is an eye-opener not only for the nursing profession but more especially for the elderly and those living with elderly people.

The results of this research study significantly add to the existing body of knowledge that climate change is a phenomenon that everyone must deal with, regardless of age, educational attainment, culture, or place of residence. Specifically, the elderly, even though they do not have formal awareness of the theory or framework, are already self-guided on Roy's extended Adaptation Model. This research study demonstrated that they implement practical self-care strategies as they compensate for the physiological effects of climate change on their CAD; henceforth, explicitly presenting or showing that simple community-based interventions in day-to-day living and as needed are vital to be emphasized to help the elderly cope with their condition. Furthermore, this study proves and emphasizes to the elderly diagnosed with CAD that they can prevent occurrences or manage their manifestations well during extreme environmental temperature conditions.

The results of the study are important in the field of research, elderly nursing, and community health nursing. It serves as a basis to influence healthcare workers like nurses, the elderly, and their respective families to be more aware of climate change consequences. Relevantly, nurses and the community health workers must enhance their capabilities and potential to educate for the benefit of community people through health promotion and health restoration. This research study demonstrated approaches that may be helpful in developing effective interventions, which aid in establishing nursing care strategies and substantial guidance in nursing education, elderly care, geriatric nursing, and community health nursing.

Study limitations

Within the lens of phenomenological research design and utilizing Roy's extended adaptation model, this research study is focused on describing the lived experiences of the elderly diagnosed with CAD, specifically, on the effects of climate change on their condition. This was only conducted in one Northern province of the Philippines; hence, the context and perception on the effects of climate change on their existing CAD might be culturally or medically different from other provinces and countries.

5. Conclusion

This research study concludes that elderly clients have an awareness of climate change brought about by global warming and that it aggravates physiologic manifestations of CAD. This further concludes that elderly people residing in urban areas who are exposed to sudden changes involving extreme environmental temperatures are at risk of an aggravated CAD condition. Significantly, employment of simple community-based and practical self-care measures and practices as an adaptation to climate change helps the elderly prevent and control the manifestations of CAD.

Climate change because of environmental and atmospheric changes possess a great impact on the health of every individual; hence, it is recommended that the community, together with the nursing profession and other health sectors to continuously collaborate and strengthen their commitment toward educating and raising awareness, especially of and for the elderly. Public health organizations should implement adaptation strategies to minimize the health effects of prolonged hot and cold environmental exposure.

The following community-based recommendations manage manifestations of CAD:

1. During warm weather conditions, self-care measures must be employed such as the following:
2. accomplishing tasks before the temperature gets too high
3. staying indoors
4. alternating rest and activity period
5. drinking plenty of water as tolerated
6. wearing loose fitting clothes
7. taking cold shower or bath two or more times per day
8. avoiding liquor beverages
9. recognizing effects of health-related diseases, and
10. staying in a cool environment
11. During cold weather conditions, adaptive strategies are to be more emphasized, such as:
12. drinking warm water as tolerated and without medical contraindication.
13. refraining from going outside the house, especially when the breeze is cold
14. taking warm showers
15. applying oil on the body, and
16. wearing protective clothing such as sweater, jacket, and socks

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Ethical Considerations

Ethical clearance #6052, for this research study, was granted by the University Research Ethics Board (UREB) of the University of Saint Louis Tuguegarao, Philippines. The researchers guaranteed that the rights of the participants were guarded through informed consent. The latter served as evidence that the participants fully understood

and agreed with the content of the study [15]. The participants were informed that the interview sessions were recorded.

The researchers ensured that confidentiality was maintained for all the data and anonymity of participants identities. A designated code for each respondent was used to avoid disclosure of their identity. The materials used during the study were destroyed upon the conclusion of the study.

Competing Interests

The authors do not declare any potential conflict of interest.

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