

## Self-Care Guidelines towards Older Adults' Protective Measures about Climate Change

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### Abstract

**Background:** Climate change poses a significant threat to global health, particularly impacting vulnerable populations such as the elderly. The risks associated with climate change are not solely linked to age; rather, they intersect with various factors including gender, socioeconomic status, mental health, and physical or cognitive abilities, rendering older adults especially at risk. The consequences can manifest as increased morbidity and mortality due to the rising frequency of extreme weather events like heatwaves and storms, as well as heightened exposure to zoonotic diseases and food, water, and vector-borne illnesses. **Aims:** This study aims to assess the effectiveness of self-care guidelines designed to enhance protective measures for older adults in the context of climate change. **Research design:** A quasi-experimental design was employed, incorporating pre- and post-intervention assessments of the self-care guidelines. A multistage random sampling technique was utilized to select geriatric homes, with a convenience sample of all participants on the data collection day included. **Setting:** The research was conducted in geriatric homes located in the Giza governorate, specifically at the House of Umm Hani in Imbaba and the House of Islamic Acquaintance in the Mohandessin area of Giza, Egypt. **Subjects:** A total of 96 older adults were included in the study, representing all individuals available during the data collection period at the specified locations. **Tools:** A structured interview questionnaire was developed, consisting of four sections socio-demographic details of older adults, their health status, awareness of climate change, and older adults reported protective measures practices regarding their adaption towards climate change. **Results:** The findings revealed that 56.3% of participants, aged between 60 and under 75 years, had a mean age of 72.24 years (SD = 7.02). Following the implementation of the program, 61.5% of the elderly participants demonstrated a good understanding of climate change ( $p=0.01$ ), while the mean score for adequate protective practices was 68.35 (SD = 23.81), also showing statistical significance ( $p=0.01$ ). **Conclusion:** indicates a statistically significant and strong positive correlation between the total knowledge scores and the overall practice scores among the elderly participants. **Recommendation:** It is recommended to develop an educational program for elderly individuals with chronic diseases to enhance their ability to cope with climate change.

**Keywords:** climate change, older adults, self-care guideline, protective measures

### Introduction

An older adult is typically characterized as an individual aged 60 years or older, experiencing significant physical and cognitive transformations. Aging is understood through various lenses, including chronological age and biological indicators such as reduced visual and auditory capabilities, skin elasticity loss, and increased fatigue, all of which signify the most

rapidly expanding demographic segment globally. Nevertheless, families and communities frequently employ alternative socio-cultural criteria to delineate age, which may encompass familial roles (such as being a grandparent), physical characteristics, or health conditions associated with aging (Kohli *et al.*, 2020).

The global population of older adults is experiencing significant growth, with

projections indicating that by 2030, one in six individuals worldwide will be aged 60 or older. This demographic shift will see the number of older adults increase from 1 billion in 2020 to approximately 1.4 billion. Furthermore, by the year 2050, it is projected that the number of individuals aged 60 and older will increase twofold, totaling approximately 2.1 billion. Notably, the segment of the population aged 80 years and older is expected to see a threefold increase from 2020 to 2050, culminating in an estimated 426 million individuals in this age group (*WHO, 2021*).

Climate change refers to the long-term alteration of the climate system across extensive regions, driven by both natural phenomena and anthropogenic activities. While natural processes play a minor role in these changes, human activities serve as the primary catalyst for climate change. Moreover, climate change is closely associated with global economic patterns that influence the progress of industrialization, especially through the rise in greenhouse gas emissions (*Intergovernmental Panel on Climate Change (IPCC), 2018*).

The effects of climate change extend to both ecological systems and human populations. This phenomenon is currently influencing health through various mechanisms, notably by contributing to mortality and morbidity associated with the rising frequency of severe weather phenomena, including heat waves and cold spells. Additionally, climate change disrupts food supply chains and exacerbates the incidence of zoonotic diseases, as well as illnesses transmitted through food, water, and vectors. The health risks associated with these climate-related changes are particularly pronounced among the most vulnerable segments of the population, including the elderly and individuals with pre-existing health issues (*Singer et al., 2022*).

During periods of extreme heat, elderly individuals face a heightened vulnerability to negative health outcomes, such as dehydration and the worsening of pre-existing medical conditions, including respiratory and cardiovascular disorders. These challenges arise from inherent biophysical differences that diminish their capacity for effective temperature regulation, which is crucial for managing both extreme heat and cold. The challenges associated with managing high temperatures are especially significant for older adults, particularly those with pre-existing health conditions impairing their ability to regulate body temperature. These conditions include chronic cardiovascular diseases, respiratory ailments, and diabetes

Self-care encompasses a collection of knowledge, the motivation to engage in self-care, and the necessary skills among elderly individuals (*WHO, 2024*). The guidelines for self-care serve as interventions designed to empower older adults to actively engage in their own disease management, thereby promoting optimal functioning. These guidelines involve the acquisition of relevant information and a blend of independent monitoring of signs and symptoms, effective medication management, and the enhancement of problem-solving and decision-making abilities related to medical care. Additionally, they emphasize the importance of managing and modifying physical activity, dietary practices, and smoking habits (*Mohamed et al., 2022*).

Older adults can mitigate the health effects associated with climate change through various proactive measures. It is essential to maintain a cool and hydrated state by consuming adequate amounts of water, donning loose-fitting, light-colored attire, and seeking refuge in air-conditioned environments whenever feasible. The utilization of air purifiers can significantly diminish indoor air pollution, particularly during periods of wildfires or elevated pollution levels. Additionally, ensuring proper

ventilation within the home is crucial for sustaining optimal air quality (*WHO, 2024*).

Community health nurses and senior nurses are essential in Educating older adults regarding the health hazards posed by extreme weather events, such as heat waves, cold spells, poor air quality, and the increased incidence of food, water-borne, and vector-borne diseases. Nurses need to counsel older individuals to refrain from outdoor activities during periods of extreme heat and elevated air pollution. Furthermore, it is essential to highlight the significance of adequate hydration and a nutritious diet, as well as the necessity of ensuring proper ventilation in living environments. The use of fans and air conditioning should also be considered when needed to reduce potential health hazards (*Casanueva et al., 2019*).

### **Significance of the study:**

Climate change contributes to rising temperatures and adversely impacts air quality, potable water sources, and food security, while also exacerbating the prevalence of vector-borne diseases, all of which pose significant health risks to older adults. This demographic is particularly susceptible to the effects of climate change due to various factors, including the physiological changes that occur with aging. Additionally, individuals with pre-existing chronic health conditions, such as diabetes, face heightened vulnerabilities in the context of a changing climate (*Patella et al., 2018*).

In Egypt, the current population of senior citizens is estimated to be around 7 million, representing 7.1% of the total population. Projections indicate that this figure will increase significantly, reaching 17.9% by the year 2052. In the elderly demographic, there are 3.5 million males, accounting for 6.9% of the overall male population. Similarly, the female elderly population also stands at 3.5 million, corresponding to 7.3% of the total female population (*Central Agency for Public*

*Mobilization and Statistics (CAPMAS), 2020*).

In 2017, approximately 157 million individuals, particularly older adults, were subjected to heat waves that had detrimental effects on their health. Projections indicate that between 2030 and 2050, Climate change is projected to result in approximately 250,000 additional deaths each year, attributable to factors including malnutrition, malaria, diarrhea, and heat stress (*WHO, 2021*).

### **Aim of the Study**

The current study aimed to evaluate the effectiveness of Self-care guidelines toward older adults' protective measures about climate change:

1. Assessing the impact of climate change on older adults' health status including health systems (cardiac, respiratory, and gastrointestinal systems).
2. Assessing older adults' knowledge regarding climate change and its effect on health.
3. Assessing older adults' reported practices regarding their protective measurement towards climate changes
4. Developing and implementing Self-care guidelines for older adults protective measures about climate change
5. Evaluating the effect of Self-care guidelines towards older adults' protective measures about climate change.

### **Research Hypothesis:**

Implementing Self-care guidelines towards older adults' protective measures about climate change will improve their knowledge and reported practices toward adaptation to climate change.

## Subjects and Methods

### Technical design:

The technical design included research designs, settings, subjects, and tools for data collection.

### Research design:

A quasi-experimental design (pre and post-test) was used to fulfill the aim of the study.

### Setting:

The research was conducted in geriatric facilities located in the Giza governorate, specifically at the Umm Hani home in Imbaba, northern Giza, which accommodates 50 elderly individuals and is designed for those from low socioeconomic backgrounds due to its affordable monthly fees. In contrast, the Islamic Acquaintance home situated in the Mohandessin area of the central district of Giza houses 72 older adults and caters to individuals from higher socioeconomic statuses, ultimately resulting in a total resident population of 122 elderly individuals across both facilities.

### Subjects:

- **Sample type:** purposive sample according to inclusion criteria.
- **Sample technique:** Multistage random sample technique to choose the geriatric homes. A convenience sample was obtained, (all participants available on the day of data collection.
- **Sample criteria:** The sample was selected according to older adults aged 60 years old and over of both sexes and mentally intact.
- **Sample size:** The estimated sample size is 96 out of 122 older adults aged 60 years old and over from both sexes according to the power analysis equation (*Yamme, 1967*).

$$n = \frac{N \times p(1-p)}{[N-1 \times (d^2 \div z^2)] + p(1-p)}$$

N: population target

n: sample

z: The standard score corresponding to the significance level 0.95 is equal to 1.96

d: The error rate is equal to 0.05

p: Property availability and neutral ratio = 0.50

### Tools of data collection:

To collect the necessary data, the tool was used in this study(pre/post-program).

### Tool: A structured interview:

It included the following parts:

#### Part (1): Socio-demographic data of older adults to assess their Socio-demographic characteristics: -

Covered the elderly's socio-demographic characteristics, which include age, sex, marital status, family income, level of education, and number of years of living in the geriatric home

#### Part (2): Health Status of Older Adults: It was adapted from (*Wardekker.,2011*) which includes (**smoking** include (2 items): types of smoking as regular cigarette, shisha and electronic cigarette and times of smoking per day, **chronic diseases** include(7 items): hypertension, diabetes, heart disease, lung diseases, infectious diseases, diseases of the digestive system, and others as rheumatoid, roughness, arthralgia and arthritis, **nervous system** include (6 items): headache, fever, stress and depression, exertion, insomnia and exposure to heat stroke, **cardiac system** include (6 items): Elevated blood pressure, decreased blood pressure, elevated cholesterol levels, irregular heartbeat, weakness of the heart muscle and poor peripheral blood circulation, **respiratory system** include (5 items): cold and flu, sinusitis, asthma, pneumonia and narrowing of the airways, **gastrointestinal system** include (10 items): malnutrition or anemia, loss of appetite,

indigestion, weight loss, diarrhea, constipation, nausea or regurgitation, abdominal pain, dizziness and dehydration.

**Musculoskeletal systems** include (4 items): Osteomalacia, muscle weakness, roughness, and joint pain.

**Part (3): Older Adults' Knowledge Regarding Climate Change (pre/post-self-care guidelines):**

It was modified by *the Ministry of Agriculture, Fisheries, Forestry, the Environment and Sustainable Development (2015)*. The questionnaire consisted of six closed-ended questions. Include (the meaning of climate changes, causes of climate changes, impacts of climate changes on human health, environment, and society, and the difference between climate and weather.

**Scoring system of knowledge: -**

- The correct answer was scored as one point.
- Incorrect answers and didn't know scored as zero point.

These scores were summed up and converted into a percentage score.

**The total score for knowledge was calculated as follows:**

- Good knowledge: If score  $\geq 75\%$ .
- Fair knowledge: If score from 50 to less than 75%.
- Poor knowledge: If score  $< 50\%$ .

**Part (4): Older adults reported protective measures practices regarding their adaption towards climate change (pre/post-self-care guidelines):**

It was modified by (Cook et al. 2019). It was composed of 5 items:

1. **Protective measures that were taken during a high temperature (10 statements)**, include: Avoiding exposure to direct sunlight, not going out of the geriatric home during the high temperature, Drinking a lot of cold liquids, especially water (at least 8 glasses), Eating snacks that contain natural refreshments such as (watermelon, strawberry, cucumber, carrots), Closing the blinds and lampshades, Wear light thin cotton clothes, Taking a shower with cold water, Turn on the fans, Turn on the air conditioners, & Commit to being in a well-ventilated place.
2. **Protective measures that were practiced during severe cold waves (11 statements)**, include Warm the room well, Drink warm fluids, eating vegetables and fruits rich in vitamin C, eating foods rich in proteins and carbohydrates, eating healthy fats, Wearing heavy clothes Wear socks, Cover the floors of the room well with carpets, using heaters, & stay active in the geriatric home (doing exercises).
3. **protective measures that were practiced during the high rate of air pollution in the atmosphere (6 statements)**, include: Ventilate the room well, avoiding spraying insecticides unless necessary, getting rid of wood stoves used for heating, avoiding setting fire by garbage or dry leaves, moving by walking or cycling, & placing natural flowers in the room to purify the air.
4. **Measures that were practiced against infectious diseases (11 statements)**, include: Wearing long-sleeved clothes, paying attention to personal hygiene, avoiding contact with people with contagious diseases, Use of mosquito nets, Mosquito control by spraying pesticides, putting a net with narrow openings on the doors and windows, cook food well, covering foods, keeping foods refrigerated, & Receive vaccinations such as (flu vaccine).
5. **Protective measures during the winter rains (5 statements)**, include: Being inside the geriatric home during the rains, closing doors and windows, not turning on the electrical appliances or lighting the room, disconnecting all electrical switches, &

avoiding touching electrical switches with wet hands.

#### **Scoring system of practice:**

According to the answers obtained from the participants each done was scored (1), and not done was scored (zero). These scores were summed up and converted into a percentage score.

#### **The total score for reported practice was calculated as follows:**

- Adequate practice:  $\geq 60\%$
- Inadequate practice:  $< 60\%$

#### **Operational design: -**

Included the preparatory phase, content validity, reliability, pilot study, and fieldwork.

#### **A- Preparatory Phase:**

It included reviewing related literature and theoretical knowledge of various aspects of the study using books, articles, internet periodicals, and magazines to develop the theoretical part of the study and data collection tools.

#### **B- Validity of the study tool:**

The study tools were tested for face and content validity by a jury of five experts in the field of Community Health Nursing before conducting the study.

#### **Pilot study**

A pilot study was conducted by the researchers involving 10% of the sample, specifically nine older adults, to evaluate the clarity and applicability of the research tools. As well as to identify potential challenges that might arise during the data collection process. Following this pilot study, no modifications were deemed necessary. Consequently, these nine older adults were incorporated into the main study.

#### **Reliability of the study tools was done by:**

The internal consistency of the study instrument was assessed using Cronbach's

Alpha, yielding a reliability coefficient of 0.750 for the knowledge assessment and 0.710 for the reported practices.

#### **Administrative Design:**

Before conducting the study, an official correspondence was sent from the Dean of the Faculty of Nursing to the Director of the senior homes to obtain permission to facilitate the work of the researchers to gather data from the selected settings.

#### **Ethical and legal considerations:**

- Before the initiation of the study, ethical approval was secured from the Faculty of Nursing's ethical committee at Ain Shams University (24.08.344).
- All participants selected for the study provided informed consent after receiving a thorough explanation of the research objectives.
- The researchers took measures to guarantee that the study's design did not inflict any harm or discomfort on any of the participants.
- All participants were guaranteed that their personal information would be handled with the utmost privacy and confidentiality.

#### **Field Work:**

- The researchers gathered the data over six months, commencing in March 2024 and concluding at the end of August 2024.
- Participants provided written consent to participate in the study following a thorough explanation of its objectives.
- The data was collected during the time frame of 10:00 AM to 2:00 PM, with each participant engaging in the process for approximately 45 to 60 minutes. On average, 2 to 4 older adults were involved each day, with

sessions conducted twice weekly on Mondays and Tuesdays.

- The study was done through four phases: the initial phase involved interviewing and recruiting participants, followed by an assessment phase, then the implementation phase, and finally, the evaluation phase.

### **Self-care guidelines development phases:**

#### **Phase I: Interviewing and Recruitment:**

Following the development of the pre-program assessment instrument, the researchers conducted interviews with participants who satisfied the inclusion criteria. During these interviews, the researchers elucidated the aims of the study were clearly defined, and informed consent for participation was secured. Data collection was carried out bi-weekly using the pre-program assessment tool, wherein each elderly participant was interviewed to gather essential demographic information and medical history. Each interview lasted approximately 45 to 60 minutes

#### **Phase II: Assessment and Development phase:**

The researchers assessed the preliminary data for older adult's socio-demographic characteristics and their health history. The data gathered during this phase was considered the baseline for further comparisons to evaluate the effect of Self-care guidelines on studied participants. Additionally, it was a guide for the self-care guidelines.

The researchers created a printed Arabic booklet containing self-care guidelines aimed at addressing the knowledge and skill gaps among older adults regarding protective measures related to climate change. This initiative was informed by an assessment of the specific needs of the

elderly population and a thorough review of contemporary literature on the subject.

The general objective of the self-care guidelines was to improve the older adults' knowledge and reported practices. The guidelines encompassed various aspects, including the meaning of climate change, its underlying causes, and its effects on human health, the environment, and society at large. Additionally, older adults shared their reported practices concerning protective strategies against climate change, which included measures to adopt during extreme heat, severe cold spells, elevated air pollution levels that could exacerbate infectious diseases and winter precipitation. Furthermore, the guidelines addressed hygiene practices, emphasizing the importance of hand washing and the proper cleaning of fruits and vegetables.

#### **Phase III: Implementation of the program:**

Implementation of the Self-care guidelines including theoretical and practical sessions was carried out at geriatric homes presented at Giza Governorate (house of Umm Hani in Imbaba and House of Islamic Acquaintance in the Mohandessin area.

The guidelines were applied throughout health education sessions. At the beginning of the first session, an orientation to the self-care guidelines and their purpose was presented. Each session started with a summary of what had been given through the previous sessions and the objectives of the new session, taking into consideration the use of simple language to suit the level of patients.

The theoretical component of the self-care guidelines was delivered across three sessions, encompassing knowledge about climate change, including its definition, underlying causes, and the effects it has on

humans, the environment, and society. Additionally, the sessions covered practices related to protective measures against climate change, focusing on preventive strategies to adopt during extreme temperatures, severe cold spells, elevated air pollution levels, and winter rainfall, all presented through lectures and discussions. This was followed by a practical session that included demonstrations and re-demonstrations of essential skills such as proper handwashing, washing fruits and vegetables, and breathing techniques to mitigate the effects of air pollution, utilizing video resources for clarity. The implementation phase commenced promptly, informed by the pretest assessment of the elderly's needs, and employed various illustrative media, including PowerPoint presentations, posters, and brochures, to effectively communicate protective practices against climate change. Furthermore, researchers created an illustrated booklet for elderly individuals to serve as a reference following the implementation of the self-care guidelines.

#### **Phase IV: Evaluation:**

The evaluation phase was done directly following the implementation of the self-care guidelines (post-test), by using the same pretest tool to compare changes in the knowledge and practices of older adults.

#### **Statistical analysis:**

- The collected data underwent a systematic process of coding, organization, and analysis utilizing the Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative findings were presented as mean values accompanied by standard deviation (SD), employing t-tests, and chi-square tests

for statistical evaluation. In contrast, qualitative data were reported in terms of frequency and percentage to provide a comprehensive overview of the results.

#### ■ **Probability (P-value)**

- P-value < 0.05 was considered significant.
- P-value < 0.001 was considered as highly significant.
- P-value > 0.05 was considered insignificant.

### **Results**

Table (1) reveals that 56.3 % of the study participants were aged from 60 to <75 years old with a mean age of 72.24+7.02years, 62.5% of them were females, 34.3% were divorced, 32.3% had secondary education, and 78.2% have enough income per monthly. Also, 44.8% lived in a senior home for 5-9 years.

Table (2) displays that, 94.8 % of older adults suffered from cold and flu. 86.5% of older adults suffered from low blood pressure and the same percentage suffered from joint pain. 56.2% of older adults had a fever and 62.5% had a headache. 55.2% of older adults suffer from Loss of appetite.

Figure (1) The findings indicate that before the implementation of the self-care guidelines, 50% of the elderly participants demonstrated a solid understanding of climate change. Following the introduction of these guidelines, this figure increased to 61.5%, with a statistically significant p-value of 0.01.

Table (3) reported that there was a statistical improvement in the self-reported practices related to protective measures among the study participants regarding their adaption to climate change including the following items: a high temperature, severe cold weather, high rate of air



pollution in the atmosphere, against infectious diseases & the winter rains.

Table (4): shows that the Mean±SD was 41.27±18.10 of the studied elderly had adequate practice pre-implementation of the self-care guidelines, while the Mean±SD was 68.35±23.81 of them had competent practices of protective

measures after the self-care guidelines implementation.

Table (5): shows that a positive correlation of statistical significance was identified between the overall knowledge scores of the elderly participants and their all-total reported practice scores.

**Table (1):** Distribution of older adults regarding their demographic characteristics (N=96).

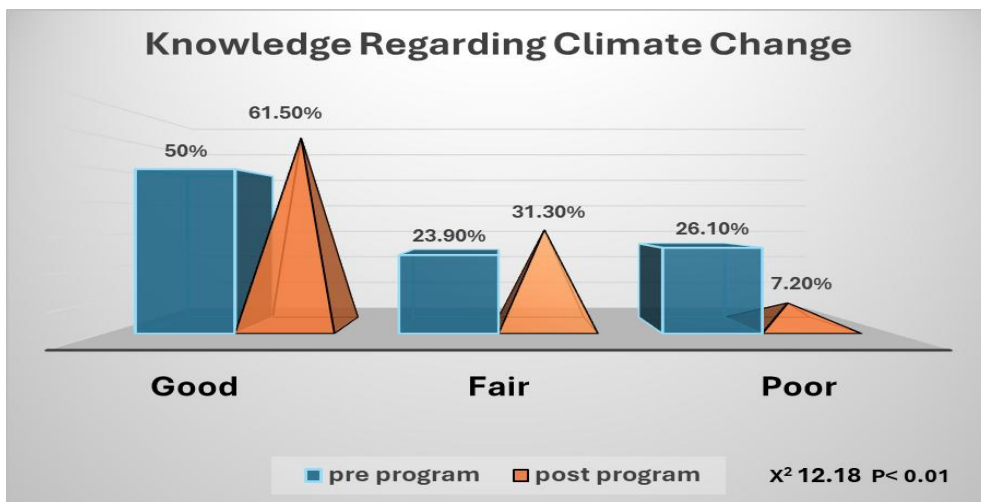
Socio-demographic data	No	%
<b>Age(years)</b>		
60 <75 years	54	56.3
75≤85 years	42	43.7
Mean a+ SD =72.24+7.02		
<b>Sex</b>		
Male	36	37.5
Female	60	62.5
<b>Marital status</b>		
Single	13	13.6
Married	29	30.2
Divorced	33	34.3
Widow	21	21.9
<b>Educational level</b>		
Not read& write	9	9.4
Elementary	23	24
Preparatory	23	24
Secondary	31	32.3
University	10	10.3
<b>Monthly Income</b>		
Enough	75	78.2
Not enough	21	21.8
<b>Years of living in a Senior Home</b>		
<one year	11	11.5
1-<5 years	27	28.1
5-<10 years	43	44.8
≥10	15	15.6

**Table (2):** Distribution of older adults regarding the impact of climate changes on their body systems (N=96):

Items	No	%
<b>Nervous system*</b>		
Headache	60	62.5
Fever	54	56.2
Stress and depression	11	11.5
Exertion	36	37.5
Insomnia	43	44.8
Exposure to heat stroke	8	8.3
<b>Cardiovascular system*</b>		
High blood pressure	31	32.2
Low blood pressure	83	86.5
Increase in cholesterol	11	11.5
Irregular heartbeat	42	43.7
Weakness of the heart muscle	11	11.5
Poor peripheral blood circulation	9	9.3
<b>Respiratory system*</b>		
Cold and flu	91	94.8

Sinusitis	48	50.0
Asthma	17	17.7
Pneumonia	10	10.4
Narrowing of the airways	9	9.3
<b>Digestive system*</b>		
Malnutrition or anemia	4	4.1
Loss of appetite	53	55.2
Indigestion	11	11.5
Weight loss	23	23.9
Diarrheal	42	43.7
Constipation	6	6.2
Nausea or regurgitation	14	14.5
Abdominal pain	46	47.9
Dizziness	39	40.6
Dryness	7	7.2
<b>Musculoskeletal system*</b>		
Osteomalacia	5	5.2
muscle weakness	18	18.7
Roughness	62	64.5
joint pain	83	86.4

\* Answers are not mutually exclusive



**Figure (1):** Distribution of Older Adults according to their total knowledge regarding climate change.

**Table (3):** Distribution of Older Adults Regarding Their Adequate Level for Reported Practice Related to Protective Measures Pre/post-self-care guidelines implementation: (N=96)

Older adults reported practice of protective measures regarding their adaption to climate change during	pre		post		Chi-square	
	No.	%	No.	%	X2	P-value
1. A high temperature	31	32.2	71	73.9	33.46	< 0.01
2. Severe Cold Weather	43	44.8	67	69.8	12.26	< 0.01
3. High Rate of Air Pollution in The Atmosphere	58	60.4	83	86.4	16.68	< 0.01
4. Against Infectious Diseases	43	44.8	59	61.4	5.35	0.02*
5. The Winter Rains	66	68.7	81	84.4	6.53	0.0106*

**Table (4):** Comparison of reported practices means scores of older adults between pre/post-self-care guidelines implementation (N=96).

Items	Pre	Post	Paired t-test	P-value
	Mean±SD	Mean±SD		
Total reported practices related to climate changes	41.27±18.10	68.35±23.81	9.184	0.000 p < 0.01

## Discussion

Older adults exhibit a multifaceted interaction with their surroundings, characterized by heightened sensitivity to environmental changes and pathogens. This increased vulnerability stems from diminished physiological reserve, a decelerated metabolic rate, and an immune system that responds more sluggishly. Consequently, the cumulative impact of these factors results in certain organ systems being less equipped to endure stressors (Mohr et al., 2020).

Older adults experience adverse health effects from climate changes such as high temperatures, cold waves, vector-borne infection, and The levels of air pollutants in the atmosphere have significant implications for public health, particularly among the

elderly population. Elevated concentrations of these pollutants are associated with a heightened risk of cardiovascular and respiratory diseases in older individuals. Furthermore, the interplay of elevated ambient temperatures and humidity, coupled with the reduced capacity of older adults to regulate their body temperature, can lead to dangerously high core body temperatures, posing severe health risks, including potential mortality (McDermott-Levy, et al., 2021).

Nowadays, Egypt is dealing with several environmental issues as climate change. Since the relationship between climate change and human practices is not recognized, the Egyptian people have knowledge deficiencies about the exact causes of climate change (Salem et al.,

2022). Gerontological nurses must understand the implications of climate change and advocate for strategies that mitigate its impact and the associated health risks (Harkness & DeMarco, 2016). Consequently, increasing elderly awareness about climate change is essential circumstantial to deal with climate change and health-related effects (Anu et al., 2023). This research sought to assess the impact of self-care guidelines on the protective strategies employed by older adults in response to climate change.

Regarding the impact of climate change on older adults' health status including health systems. shows that 94.8 % of older adults suffer from cold and flu. 86.5% of older adults suffered from low blood pressure and the same percentage suffered from joint pain. 56.2% of older adults had a fever and 62.5% had a headache. 55.2% of older adults suffer from Loss of appetite caused by climate change. Similarly, the study conducted in Europe by Zammit et al., (2020) The examination of neurological disorders concerning climate change has revealed that elderly individuals exhibit heightened susceptibility to extreme weather conditions. This increased vulnerability can be attributed to the natural decline of the immune system associated with aging, as well as a reduced ability to perceive thirst, which often leads to dehydration due to lower overall body fluid levels.

Numerous studies have been conducted in various regions, including the United States and Australia, to investigate the impact of extreme weather events on health. For instance, Weinharter et al., (2021) conducted a systematic review focusing on the health consequences of extreme weather events in Europe, while Liu et al., (2021) examined the correlation between elevated temperatures and adverse mental health outcomes in Australia. Their findings indicate that older adults suffering from chronic health issues—such as

cardiovascular disease, hypertension, obesity, type 2 diabetes, and chronic kidney disease—are particularly vulnerable to exacerbations of their conditions during periods of extreme temperatures, heightened stress, and resource scarcity. Additionally, elderly individuals with dementia, including Alzheimer's disease and vascular dementia, face an increased risk of cognitive decline and hospitalization during episodes of extreme heat.

Regarding knowledge of Older Adults about Climate Change, the present study illustrated a statistically significant relation between totally good knowledge regarding climate change with a P-value <0.01 pre/post implementation of the self-care guidelines. This is congruent with previous studies done research conducted in Brazil by Tibola da Rocha et al., (2020) focused on climate change education within schools, examining aspects such as knowledge, behavior, and attitudes. Similarly, Ibrahim et al., (2022) investigated the effectiveness of educational interventions related to sustainable development among nursing students in Egypt. Their findings indicated that a significant portion of the participants initially possessed inadequate knowledge regarding climate change before the implementation of the self-care guidelines. However, the guidelines demonstrated a marked enhancement in the participants' understanding of climate change and sustainable development following the interventions.

Another Study in Egypt by Ibrahim et al., (2023) in a research investigation focused on the intersection of climate change and health, specifically examining the impact of an awareness program on the knowledge, attitudes, and practices of elderly individuals living in the community, findings indicated a notable enhancement in knowledge following the program's implementation compared to the period before its introduction. Researchers attribute

the initially lower levels of knowledge among older adults regarding self-care guidelines to a deficiency in health education initiatives addressing climate change that are tailored to this demographic.

The present study stated that about two-fifths of the older adults studied had competent practices in pre-implementation of the self-care guidelines, while there was an improvement in those with competent practices of protective measures after the program implementation. Similarly, a study by *Tiong et al. (2021)* in Northern Malaysia, which explored the knowledge, risk perceptions, attitudes, and environmental health practices among university students, found that over 50% of the participants showed improved practices after the educational intervention compared to their pre-intervention status.

In the same direction, other studies done in the USA by *Lavey, (2019)* who studied teaching the health impacts of climate change in many American higher education programs, & by *Tibola da Rocha et al., (2020)* who studied Climate change education in school: knowledge, behavior, and attitude in Brazil and also study by *Kurup et al., (2021)* who assessed informed-decision regarding global warming and climate change among high school students in the United Kingdom and confirmed that educational interventions had a significant effect in improving self-reported practices related to climate change and its effect on the health of the study subjects than before. In addition, a study was done in Egypt by *Abdallah & Farag, (2022)* who carried out a study about the impact of awareness programs regarding the health consequences of climate change on knowledge, perception, and daily life practices among nursing students and the findings revealed that the participants' self-reported behaviors related to climate change exhibited a significant increase following the implementation of the educational program. Also, the study by

*Ibrahim et al., (2023)* showed that improvement in the studied elderly's practice score after the program implementation

Furthermore, climate change awareness is a chief step in attaining adaptation and alleviation approaches as increasing self-care guidelines would change behavior among older adults and help them to adapt to adverse impacts related to climate change (*Barreda, 2018*). Meanwhile, our study results confirmed there was a statistical significance in the effectiveness of Self-care guidelines towards older adults' protective measures about climate change than a pre-implementation self-care guideline. This result is in the same line with a study done in Saudi Arabia by *Almulhim, (2021)* stated that more than one-quarter of the studied subjects had a good awareness level about climate change at the post-test. Also, *Ghazy & Fathy, (2023)* in Egypt reported that significant improvement in most aspects of the studied sample's awareness about climate change pre the program application.

Additionally, other studies conducted in Italy by *Mebane et al., (2023)* and in the Philippines by *Adlit et al., (2023)* research indicate that interventions focused on climate change education significantly enhance the awareness levels of the participants involved in the study.

The present research revealed a statistically significant and robust positive correlation between the overall knowledge scores of the elderly participants and their total reported practice scores. This finding aligns with the research carried out by *Abdel Nabi et al., (2023)* in Egypt, which revealed a notably significant positive correlation between overall knowledge, reported practices, and attitudes related to climate change among the participants studied.

Also, the same result was reinforced by *Amin et al., (2023)* in Egypt who revealed that study subjects with satisfactory knowledge were four times more likely to

perceive danger as higher than participants with insufficient knowledge ( $P = 0.000^*$ ). Finally, A study conducted by *Ghazy, and Fathy, (2023)* in Egypt, revealed that there was a highly positive correlation between total participants' knowledge score level & attitudes and total daily life practices (at  $p < 0.001$ ). This result can be justified by the greater knowledge regarding climate change, the more the elderly demonstrate competent practices toward adaptation to climate change.

## **Conclusion**

The results of this study suggest that self-care guidelines play a crucial role in enhancing the knowledge and reported practices of older adults concerning protective measures against climate change.

## **Recommendations**

The results of the present study suggest the following recommendations:

- Developing educational programs for elderly with chronic diseases on how to deal with climate change.
- The implementation of various initiatives that work in harmony to combat climate change as training workshops, educational campaigns, and studies, that take advantage of the prominence of the internet, social media, and television channels for announcing and disseminating valid and credible information about climate change and promoting positive behavior change.

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