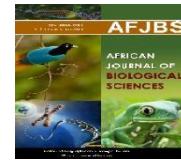




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Knowledge and Attitude Regarding Climate Change Health Risks among Rural Older Adults

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Abstract: Background: Climate change poses significant health risks to various populations, particularly vulnerable groups such as rural older adults. Understanding the knowledge and attitudes of rural older adults regarding these climate change-related health risks is crucial for developing effective public health strategies and interventions. Thus, the aim of this study was to assess older adults' knowledge and attitude regarding climate change health risks. Design: A cross-sectional descriptive research. The study was conducted at Sheiba village, which was randomly selected from 75 village which also was selected from the 21 districts of Sharkia governorate. The study conducted on 170 elderly. Tools for data collection: An Interview questionnaire consisted of three parts Socio-demographic characteristics of the elderly, older adult's knowledge related to their adaptation towards climate change consequences, and older adults' attitude toward efforts to combat climate change. The results revealed that 38.2% of the studied elderly had total satisfactory knowledge about climate change while 61.8% of them had total unsatisfactory knowledge. Also, 58.3% of the studied elderly had negative attitudes towards combating climate change while, 71.7% of them had positive ones. Conclusion: less than two-thirds of the studied elderly had total unsatisfactory knowledge about climate change. Meanwhile, more than half of the studied elderly had negative attitudes towards combating climate change. Recommendations Developing and implementing educational programs and campaigns to raise elderly's awareness concerning climate change health risks especially among the rural residents.

Keywords: Attitude, Climate Change, health Risks, Knowledge, Older Adults, Rural.

Introduction

The older adult is defined as a person who is over 60 years of age accompanied by major physical and cognitive changes. The process of aging is perceived in multiple ways including chronological age and biological markers such as impairment in vision and hearing, wrinkling skin, and fatigue, who represent the fastest-growing segment of populations throughout the world. However, families and communities often use other socio- cultural referents to define age, including family status (grandparents), physical appearance, or age-related health conditions (Kohli et al., 2020).

Climate change, characterized by rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events, poses significant health risks globally. Among the most vulnerable populations are rural older adults, whose health and livelihoods are directly influenced by environmental conditions. Understanding their knowledge and attitudes regarding these risks is crucial for developing effective public health strategies and interventions (Elzohairy et al., 2024).

Rural communities often face unique challenges related to climate change due to their geographical isolation, limited access to healthcare, and reliance on agriculture and natural resources for their livelihoods. These factors can exacerbate the health impacts of climate change, such as heat-related illnesses, vector-borne diseases, and respiratory conditions. Furthermore, older adults in these areas may have pre-existing health conditions that make them more susceptible to environmental stressors (Lykins et al., 2024).

Knowledge about climate change and its health impacts is a critical component in mitigating risks and enhancing adaptive capacities. However, there is a significant knowledge gap among rural older adults regarding the causes and consequences of climate change. This gap can hinder their ability to take preventive measures or seek timely medical assistance, thereby increasing their vulnerability to health risks (Almulhim, 2021).

Attitudes towards climate change also play a pivotal role in shaping community responses and individual behaviors. Positive attitudes and a strong sense of environmental stewardship can drive proactive measures to reduce exposure to health risks. Conversely, skepticism or indifference towards climate change can lead to complacency and a lack of preparedness. Understanding these attitudes is essential for tailoring communication and educational efforts to effectively engage this demographic (Ibrahim et al., 2023).

Public health interventions aimed at rural older adults must consider the interplay between knowledge, attitudes, and behaviors. Educational programs should be designed to improve awareness and understanding of climate change health risks, emphasizing the direct impacts on personal and community well-being. These programs should also address common misconceptions and provide practical guidance on how to reduce vulnerability and enhance resilience (de Moura Brito Júnior et al., 2023).

Gerontology nurses also educate older adults and their families about the importance of preparedness for extreme weather events, such as staying hydrated during heatwaves and having a plan for emergencies. Furthermore, they advocate for improved healthcare policies and resources to support older adults, including better access to cooling centers, transportation, and emergency healthcare services. By collaborating with community organizations and healthcare providers, gerontology nurses ensure that older adults receive the support and resources needed to enhance their resilience against the impacts of climate change (Carlson et al., 2024).

Aim of study:

The current study aimed to assess older adults' knowledge and attitude regarding climate change health risks.

Research Questions:

- What is the level of older adults' knowledge regarding climate change health risks?
- What is the attitude of rural older adults toward effort to combat climate change health risks?

Subjects and Methods:**Research design:**

A cross-sectional descriptive research design was adopted to carry out this study.

Study setting:

The existing study was conducted at Sheiba village, which was selected by multi stage cluster sampling from 75 villages of Zagazig city.

Study Subjects:

A purposive sample of 170 elderly selected from the above mentioned village according to the following inclusion criteria;

- Aged 60 years or more.
- Accept to participate in the study (oral consent).
- Able to communicate.

Sample size calculation:

The sample size was calculated based on assuming the frequency of average knowledge about climate change was 18.4% vs 3.8% in those 66-74 years old vs 75-79 years old (Abdullah et al., 2022) . By using software EPI- Info Package, with confidence 95% and power of the test 80%, the sample size was calculated to be 170 elderly persons.

Tool for data collection:

An Interview questionnaire consisted of three parts;

Part 1 Socio-economic data: It was used to assess the socio-demographic characteristics of the elderly. It entails data about elderly's age, sex, educational level, occupation, monthly income, crowding index.....etc.

Part 2: Older Adult Knowledge Regarding to Climate Changes and its Related Health Consequences:

This part was developed by the researcher to collect data of knowledge about climate change guided by Abdallah et al. (2022). It contains 17 questions to assess the older adults' knowledge about climate changes and its health consequences.

Scoring systems of knowledge: The scores were one for correct response and zero for incorrect response. These scores were summed and converted into a percentage score. The participants were considered to have satisfactory knowledge if the total score obtained was 60% or above. While the total score less than 60% were considered unsatisfactory knowledge.

Part 3: Older Adult's Attitude Toward Efforts to Combat Climate Change:

This part is modified by the researcher guided by Salem et al. (2022). It consists of 10 items to assess the attitude of elderly toward efforts to combat climate changes.

Scoring system of attitude:

A five-point Likert type scale scored from strongly disagree to strongly agree. The scores were 0 for "strongly disagree", 1 for "agree", 2 for "sometimes" and 3 for "disagree" and 4 for "strongly disagree". The scoring was reversed for negative items. The highest score is 40 points. The final score of participants' responses was either 60% and above indicating positive attitude. The score less than 60% indicating negative attitude.

Content Validity and Reliability:

For testing the content validity of the study tool, three experts in community health nursing revised it and some modifications were done according to their opinion. The content validity of the study tools was measured to evaluate the individual items as well as it is relevant and appropriate to test what they wanted to measure. The reliability of tools was tested by measuring their internal Consistency, knowledge 0.833 and Attitude 0.819.

Field work:

Once the permission was granted to proceed with the study, the researcher started to prepare a schedule for collecting the data. Each elderly was interviewed individually by the researcher who introduced herself

and explained the aim of study briefly, and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research.

After that, the oral approval was obtained to collect the necessary data. The researcher used to go to Sheiba village for interviewing the elderly who fulfilling the criteria. The study tools were answered by each elderly during the interview and the time needed ranged from 20 to 30 minutes, according to understanding and cooperation of the elderly. The field work was executed over Six months from the May 2023 to the end of November 2023, two days per week (Saturday and Friday) from 12 pm to 8 pm

Pilot study:

A pilot study was carried out on a sample of 17 elderly randomly selected from the selected village and they were excluded from the total number of subjects to insure the clarity and comprehensiveness of the tool.

Administration and Ethical consideration:

Firstly, the study proposal was approved by the research Ethics committee (REC) and post graduate committee of the faculty of Nursing at zagazig University. Then, oral informed consent for participation was obtained from each subject after full explanation of the aim of the study.

Participants were given the opportunity to refuse participation and they were notified that they could withdraw at any stage of filling the questionnaire sheet and anonymity of each elderly was protected by the allocation of code number for each elderly, they were assured that the information would be confidential and use for research purpose only. Before starting any step in the study, an official letter containing the aim of the study was issued to faculty of nursing Zagazig University to mayor of Sheiba village explaining the nature and aim of this study and seeking facilitating the role of researcher.

Statistical Analysis:

Data collected from the studied sample was revised, coded, and entered using Personal Computer (PC). Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies, percentages, and Mean SD. A correlation coefficient "Pearson correlation" is a numerical measure of some type of correlation, meaning a statistical relationship between two variables. Chi-square (χ^2) is a statistical test used to determine the relationship between categorical variables. It is commonly employed to assess the independence or association between two categorical variables in a sample. Linear regression analysis is used to predict the value of a variable based on the value of another variable.

Results:

Table 1 shows that the studied elderly` mean age was 93.68 ± 5.63 years and 61.2% of them their ages ranged from 60 to less than 65 years old. Also, 75.9% of them were males and 70% of them were married. As regards education level, 44.1% of them had high school education and 16.5% of them had basic education. Concerning employment, 13.5% of them did not work. Regarding monthly income, 64.7% of the elderly had insufficient income for their daily needs. Regarding crowding index, 64.1% of elderly had two persons or more in the room. Moreover, 64.2% of them owned their houses. Also, 95.9% of the studied elderly lived with their families, and 62.9% of them were cared by their husbands/ wives.

Figure 1 reveals that 38.2% of the studied elderly had total satisfactory knowledge about climate change while 61.8% of them had total unsatisfactory knowledge.

Figure 2 displays that 58.3% of the studied elderly had negative attitudes towards combating climate change while, 71.7% of them had positive ones.

Table (2) reveals that, there is a highly statistically significant association between the studied elderly` total knowledge and their education level with ($P = .000$) and profession with ($P = .001$). Moreover, there is a statistically significant association between the studied elderly` total knowledge and their gender with ($P =$

.031), While it shows that there is a no statistically significant association between the studied elderly` total knowledge and their age, marital status, and monthly with ($p > 0.05$).

Table (3) demonstrates that, there is a highly statistically significant association between the studied elderly` total attitude and their age with ($P = .0001$), and gender with ($P = .003$), and marital status with ($P = .002$). Furthermore, there is a statistically significant association between the studied elderly` total attitude and their education level with ($P = .031$) and monthly income with ($P = .018$). On the other hand, there was no statistically significant association between the studied elderly` total practice and their profession with ($p > 0.05$).

Table (4) indicates that the multivariate analysis identified that elderly's profession was the only statistically significant negative predictor of their knowledge scores. On the other hand, gender and educational level were the negative ones. The model explains that 40% of knowledge scores as shown by the value of r-square.

Table (5) the multivariate analysis identified that elderly's educational level, gender and marital status were the positive predictors of their attitude scores. Conversely, elderly's age and monthly income were the negative predictors. The model explains that 43% of attitude score as shown by the value of r-square.

Table (1): Distribution of the studied elderly according to their demographic characteristics (n=170).

Personal information	N	%
Age		
60 - < 65 years	104	61.2
65 - 70 years	59	34.7
>70 years	7	4.1
Mean± SD 63.98±5.63		
Gender		
Male	129	75.9
Female	41	24.1
Marital status		
Married	119	70
Divorced	6	3.5
Widow	45	26.5
Employment		
Unemployed\housewife	23	13.5
Employee	147	86.5
Monthly income		
Sufficient	46	27.1
Sufficient and saving	14	8.2
Insufficient	110	64.7
Crowding Index		
Less than two persons	61	35.9
Two persons or more	109	64.1
Residence		
Ownership	106	64.2
Rental	64	35.8
Live		
Alone	7	4.1
With the family	163	95.9
*Who cares for		

Husband/ wife	107	62.9
Brother / Sister	7	4.1
Son /daughter	54	31.8
Neighbor	2	1.2

*more than one answer

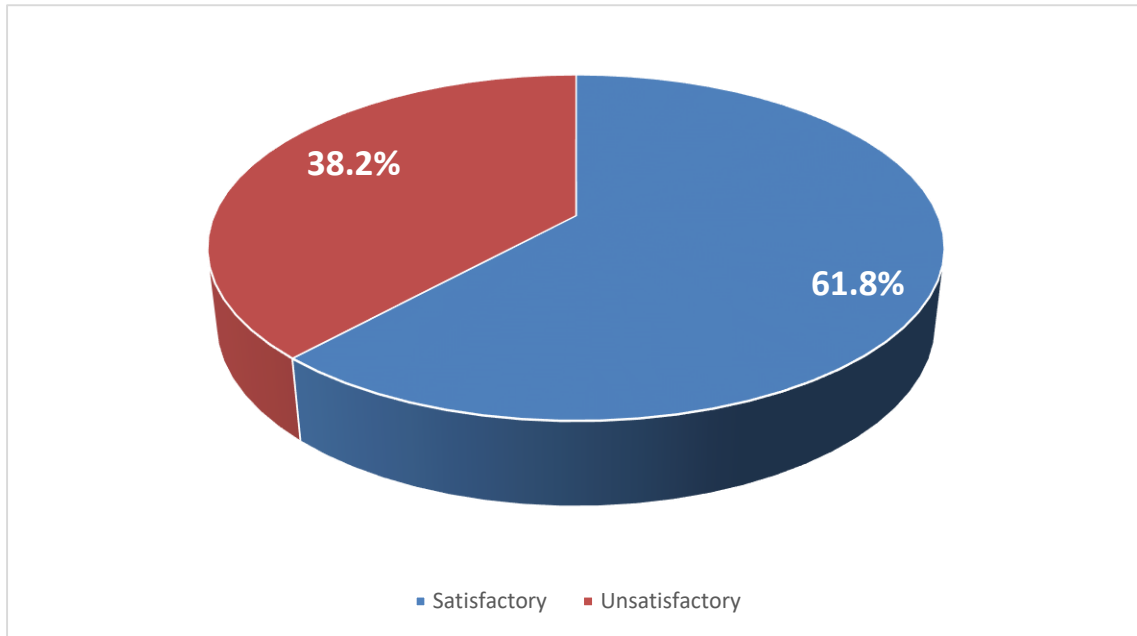


Figure (1): Percentage distribution of the studied elderly according to their total knowledge (n=170).

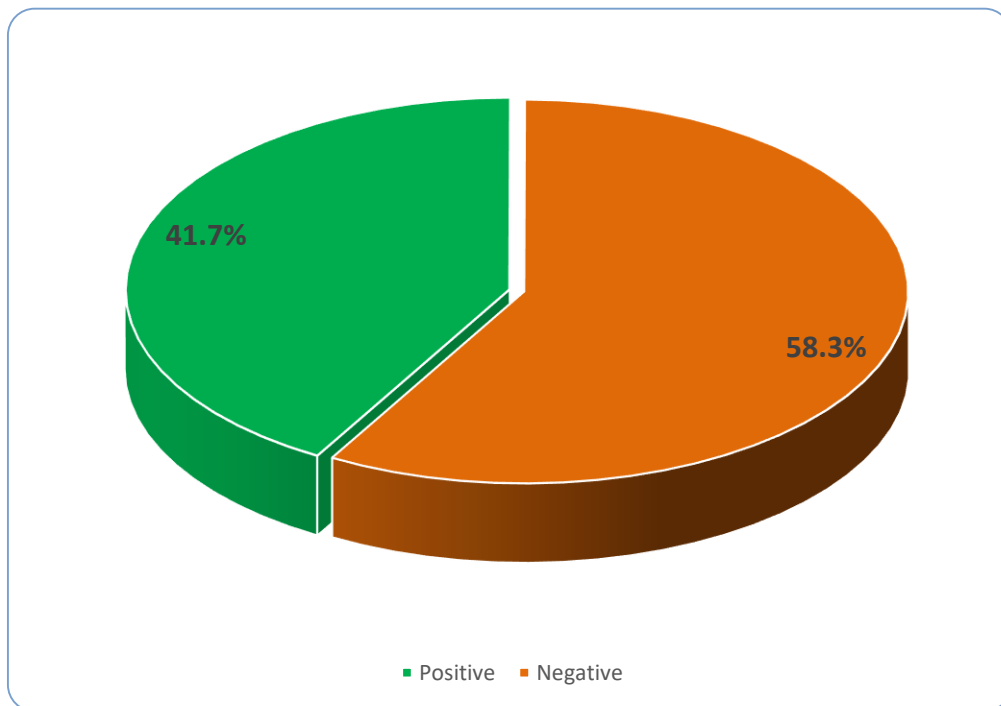


Figure (2): Percentage distribution of the studied elderly according to their total attitudes towards combating climate change (n=170).

Table (2):Relationship between socio-demographic characteristics of studied elderly and their total knowledge (n=170).

Items		Total knowledge				X ²	P-Value
		Satisfactory N= 105		Unsatisfactory N= 65			
		N	%	N	%		
Age	60 - < 65 years	55	32.4	49	28.8	2.68	0.24
	65 - 70 years	46	27.1	13	7.6		
	>70 years	4	2.4	3	1.8		
Gender	Male	92	54.1	37	21.8	6.235	0.031*
	Female	13	7.6	28	16.5		
Marital status	Married	73	42.9	46	27.1	1.795	0.36
	Divorced	1	0.6	5	2.9		
	Widow	31	18.2	14	8.2		
Educational level	Illiterate	7	4.1	10	5.9	11.372	0.000**
	Read & write	12	7.1	9	5.3		
	Basic education	18	10.6	10	5.9		
	High school education	48	28.2	27	15.9		
	University education	20	11.8	9	5.3		
Profession	Unemployed	10	5.9	13	7.6	10.285	0.001**
	Employed	95	94.1	52	92.4		
Monthly income	Sufficient	31	18.2	15	8.8	3.598	0.07
	Sufficient and saving	10	5.9	4	2.4		
	Insufficient	64	37.6	34	20		

*Significant at p <0.05. **Highly significant at p <0.01. Not significant at p>0.05

Table (3):Relationship between socio-demographic characteristics of studied elderly and their total attitude (n=170).

Items		Total attitude				X ²	P-Value
		Positive N= 71		Negative N= 99			
		N	%	N	%		
Age	60 - < 65 years	47	27.6	57	33.5	10.200	0.001**
	65 - 70 years	24	14.1	35	20.6		
	>70 years	0	0	7	4.1		
Gender	Male	43	25.3	86	50.6	8.487	0.003**
	Female	28	16.5	13	7.6		
Marital status	Single	0	0	0	0	9.236	0.002**
	Married	65	38.2	54	31.8		
	Divorced	0	0	6	3.5		
	Widow	6	3.5	39	22.9		
Educational level	Illiterate	1	0.6	16	9.4	3.358	0.031*
	Read & write	5	2.9	16	9.4		
	Basic education	11	6.5	17	10		
	High school education	36	21.1	39	23		
	University education	18	25.3	11	11.1		
Employeme	Unemployed	9	5.3	14	8.2	1.896	0.39

nt	Employed	62	14.7	85	91.8		
Monthly income	Sufficient	31	18.2	15	8.8	4.856	0.018*
	Sufficient and saving	11	6.5	3	1.8		
	Insufficient	29	17.1	81	47.6		

Table (4): Multiple Linear regression model for total knowledge

	Unstandardized Coefficients		standardized Coefficients		
	<i>B</i>		<i>B</i>	T	P. value
Gender (male)	.176		.120	3.768	.013*
Education level (High)	.314		.265	6.765	.006**
Profession (Doesn` t work)	-.172		.116	3.245	.029*

R-square=0.40 Model ANOVA F=7.504 p<0.001

- a. Dependent Variable: Total knowledge
- b. Predictors: (constant): Gender (Female) and Education level (High) and Profession (Doesn` t work)

Table (5): Multiple Linear regression model for Total attitude

	Unstandardized Coefficients		standardized Coefficients		
	<i>B</i>		<i>B</i>	T	P. value
Age	-.163		.126	2.856	.037*
Education level (High)	.287		.231	5.100	.007**
Monthly income (Not enough)	-.141		.083	2.367	.041*
Gender (Male)	.187		.126	2.999	.036*
Marital status (Married)	.164		.101	2.754	.039*

R-square=0.43 Model ANOVA F=7.449 p<0.000

- a. Dependent Variable: Total attitude
- b. Predictors: (constant): Ageand Education level (High), Monthly income (Not enough), Gender (Male) and Marital status (Married)

Discussion:

Climate change is a significant global threat to human health. Rural communities are particularly vulnerable to climate change (Austin et al., 2020). The older adults have a complex relationship to the environment and greatly affected by climate change as they are more sensitive to changes in the environment infectious agents. This greater sensitivity is a by-product of a lower physiological reserve capacity, slower metabolism, and a more slowly responding immune system. It is important to understand the climate change experiences of those most vulnerable in order to increase resilience and develop and implement effective adaptation responses (Mohr et al., 2020). Therefore, the aim of this study was to assess awareness of rural older adults regarding health risks of climate changes.

Considering knowledge about climate change of the studied elderly, the current study displayed that slightly more than three quarters of them heard about climate change from TV. As well, more than half of them reported knowing about global warming and weather conditions change over a long period of time,

respectively. This may be due to availability of television to everyone and is considered the fastest and easiest mean of communication and main source of information. This finding was consistent with a study done in Kenya by **Wetiba et al., (2021)** stated that about half of the the studied sample (57.9%) got their information about climate through televisions from long period of time.

Additionally, the present study portrayed that slightly more than half and nearly one quarter of the studied elderly noticed higher temperature, and colder weather as a result of climate change, respectively. Also, more than half of them mentioned the causes of climate change are cut down trees, burning fuel, and automobile exhaust, respectively.

In the same context, this result was supported by a study carried by **Yilmaz & Can, (2020)** in Turkey who found that 71.7% of the studied sample mentioned human activities such as the exhaust fumes of cars, followed by 68.2% mentioned industrial pollution, 66.3% burning of waste materials and 65.2% mentioned the burning of agricultural wastes as factors contributing to climate changes. On contrary, a study in Iran by **Zobeidi et al. (2020)** reported that more than two thirds (67%) of the studied respondents mentioned that climate change will decrease the sea level, and 66% of them reported that it will increase the droughts.

As well, the current study reflected that more than two thirds of the studied elderly reported that climate change affect them and most of them mentioned that it affect their health. Moreover, more than two fifths of them reported sunstroke problems as ways by which climate change threaten their health. These results were based on similar study conducted in Egypt by **Salem et al. (2022)**, which stated that 70% of the participants were knowledgeable about the issue of climate change and its effects.

Additionally, the current study showed that slightly more than three fifths of the studied elderly mentioned that climate change affect the environment and society and most of them stated that climate change lead to higher temperature and increasing the problem of water shortages and drought rates, respectively. Also, most of them noted that the climate pattern has changed during the past twenty years, and the phenomenon of climate change will become more complex in the future, respectively.

Consistently, a study performed by **Odonkor&Sallar, (2020)** in Ghana found that more than two-thirds of the participants (67.3%) were well-knowledgeable in all aspects of climate change's perilous consequences. The highest percentage of them (82%) predicted that extreme weather such as heat waves and extreme cold, ice melting, flood frequency, and climate change will be more severe in the future

Regarding the studied elderly' knowledge about impact of climate change on the body systems, the present study represented that more than half of them mentioned that climate change affects nervous system at exposure to sunstroke and headache, respectively. Moreover, more than two fifths of them stated that climate change affects heart and blood vessels in high blood pressure. Additionally, more than half of them demonstrated that climate change affects respiratory system in cold and runny nose, and chest allergies, respectively. These findings were in harmony with a study conducted by **Odonkor et al. (2022)** in Ghana, presented that about three quarters (74,5%) of the participants had knowledge about the impacts of climate change on body systems as well as future consequences.

As well, the current study showed that slightly more than half of the studied elderly reported that climate change affects the locomotor system at pain in the joints. Moreover, less than half of them mentioned that climate change affects the digestive system in dryness, and dizziness, respectively, while minority of them demonstrated taking treatment for the previous symptoms and most of them took cataflam. On the other hand, these findings were inconsistent with a study conducted by **Hazo et al., (2019)**, in Nigeria,who found that less than three quarters (73%) of the respondents reported that climate change has a great risk to their body systems.

Understanding climate change and its health impacts can exacerbate elderly to comprehend their role in climate change alleviation by modifying their practices and decrease health impacts of climate changes on their health (**Lansbury et al., 2023**). Pertaining total knowledge of the studied elderly regarding climate change, the present study highlighted that more than one third of them had total satisfactory knowledge about climate change, while more than two third of them had total unsatisfactory knowledge.

From the research investigator point of view, the possible explanation is the variance in exposure to information sources about climate change. Individuals who have greater access to diverse sources of information such as educational programs, scientific literature, or media coverage may have a more comprehensive understanding of climate change. Additionally, socioeconomic factors might contribute to the disparities observed in knowledge levels. Individuals with higher levels of education and socioeconomic status may have had more opportunities to learn about climate change and its implications through formal education.

This result was congruent with a previous study done in Brazil by **Tibola da Rocha et al., (2020)** who stated that the majority of studied respondents (68.3%) had insufficient knowledge about climate change at Likewise, **Almulhim, (2021)** who carried out a study in Saudi Arabia concluded that above quarter of the respondents (28%) have good knowledge, understanding, and awareness of climate changes.

On the other hand, these findings disagreed with **Mohammed et al., (2022)** in Egypt stated that more than two fifths of older adults (43.2%) had poor knowledge and two fifths of them (40%) had moderate knowledge regarding climate change. This contradiction may be related to different demographic characteristics of the study subjects as level of knowledge, socioeconomic status and sources of information.

Concerning attitudes towards combating climate change among the studied elderly, the present study represented that slightly more than half and more than two fifths of them disagreed with the items “Commitment to the positive trends towards using environmentally friendly materials and towards rationalizing the use of air conditioners”, respectively. In contrast, a study in Egypt carried out by **Salem et al., (2022)**, reported that more than half of the studied participants (54.2%) had positive attitude towards reducing use of air conditioner and more than three fifths of them (61.2%) had positive attitude towards the materials used and direction of the construction.

In addition, the present study revealed that more than two fifths of the studied elderly disagreed about not being worried about climate change and climate change has serious impacts on where elderly live, respectively. On the other side, few of them strongly agreed with “climate change has serious impacts on where elderly live, and commit to the positive trend towards using electric cars”, respectively. In the same line, a study conducted by **Odonkor et al. (2020)** in Ghana, found that most of the studied (64.8%) participants had negative attitude toward climate change. In the opposite line, a study conducted by **Tiong et al., (2021)** in Northern Malaysia reported that most of the study subjects (72%) strongly believed that pollution has a negative impact on human health.

A bigger emphasis on holistic education leads to the development of climate change attitudes that can eventually foster persons’ willingness to act (**Kolenaty et al., 2022**). Pertaining total attitudes of the studied elderly towards climate change, the current study portrayed that more than half of the studied elderly had negative attitude towards combating climate change, while slightly more than two fifths of them had positive attitude. From the research investigator point of view, this may be attributed to lack of awareness or understanding about the urgency and severity of climate change might contribute to negative attitudes. Also, cultural beliefs and values, as well as socio-economic status, could also influence perceptions, with some elderly individuals feeling detached or unaffected by environmental issues.

Another study reported similar results done at Brighton by **Dunne et al., (2022)** stated that more than half of the respondents (54.2%) had negative attitudes towards climate change before implementation of a climatechange and sustainability online module. Correspondingly, this result agreed with the studies conducted in China by **Tang, (2022)** and in Spain by **Álvarez-Nieto et al., (2022)** who revealed that attitudes toward the importance of climate change and sustainability was negative among the highest percentage of the studied subjects (57.3%, 61%, respectively) before implementation of the education program.

Regarding relationship between socio-demographic characteristics of studied elderly and their total knowledge, the present study indicated that there was highly statistically significant association with their education level with($p = 0,000$) and profession with ($p = 0,001$) Also, there was statistically significant association with their gender, while there was no statistically significant association with their age, marital

status, and monthly with ($p > 0,005$) This can be interpreted as elderly who have high level of education, employed and males are more knowledgeable than others.

On the other hand, this result is in contrast with **Amin et al.,(2023)** in Egypt who found that several factors were significantly associated with climate change knowledge and risk perception such as the studied subjects' gender, education level and occupation. On the other hand, a study performed by **Steynor et al. (2021)** in the east African region, they discovered that perceptions of climate change risk were not significantly influenced by gender, occupation or education. This discrepancy may be attributed to the focus on psychological closeness and social norms in their study.

As regard relationship between socio-demographic characteristics of studied elderly and their total attitude, the present study displayed that there was highly statistically significant association with their age with ($p = 0,001$), gender with ($p = 0,003$) and marital status with ($p = 0,002$) Furthermore, there was statistically significant association with their education level with ($p = 0,031$) and monthly income with ($p = 0,018$), while there was no statistically significant association with their profession with ($p > 0,05$). These findings indicated that older adults, males and married who have high level of education and sufficient monthly income seem to have positive attitude towards climate change compared to others.

This finding is in agreement with the results reported by **Ofori et al. (2023)** in Ghana who presented that respondents' level of education, monthly income, age, gender and marital status had statistically significant association with their attitude toward aspects of climate change. On the contrary, **Álvarez-Nieto et al., (2022)** whose study in Spain found that there was no association between the studied respondents' level of attitude toward climate change and their age, gender and marital status.

Considering Multiple Linear regression model for total knowledge, the current study demonstrated that elderly' profession was the only statistically significant negative predictor of their knowledge scores. On the other hand, gender and educational level were the positive ones. This can be interpreted as elderly who don't work had a high level of knowledge about climate change. Conversely, factors such as gender and educational level emerged as positive predictors, implying that higher levels of education and being males were associated with greater knowledge about climate change among the elderly.

This finding was consistent with a study done in Egypt by **Amin et al, (2023)** stated that the significant predictors for climate change knowledge were university education, male gender, and employment. Similarly, **ÇİFTÇİ, (2022)** whose study in Mexico showed that socio-demographic factors are considered significant predictors of climate change knowledge and risk perception. College educated, males respondents and those who have full time job are more likely to be concerned about climate change issues.

Pertaining Multiple Linear regression model for total attitude, the current study reflected that elderly educational level, gender and marital status were the positive predictors of their attitude scores, while elderly age and monthly income were the negative predictors. The study suggests that higher educational attainment, being males, and being married are associated with more positive attitudes toward climate change among the elderly. Conversely, increasing age and insufficient monthly income appear to be linked with more negative attitudes.

These results were based on similar study conducted in Ghana by **Ofori et al. (2023)**, which reported that education, age, gender and economic status of the studied participants were significant predictors of their attitude towards climate change. Consistently, a study performed by **Zobeidi et al. (2020)** in Iran affirmed that education, age, economic and marital status were positive predictors of respondents' attitude towards climate change.

Conclusion:

On the light of results of the current study and answers of the research questions, it was concluded that less than two-thirds of the studied elderly had total unsatisfactory knowledge about climate change. Meanwhile, more than half of the studied elderly had negative attitudes towards combating climate change.

Recommendations:

- Developing and implementing educational programs and campaigns to raise elderly's awareness concerning climate change health risks especially among the rural residents.
- Conducting further similar studies on larger scale at different geographic regions in Egypt for more generalization of the findings.
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