

Impact of Narrative versus Didactic Information on Pregnant Women's Knowledge, Attitude and Perception Regarding Climate Change

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Abstract

Background: Climate change is a worldwide danger that affect pregnant women and their growing fetus seriously. Teaching the pregnant women about the hazards of these changes may enhance maternal and neonatal health outcomes. **Aim of the study** to compare between the effect of narrative versus didactic information on pregnant women's knowledge, attitude, and perception regarding climate change. **Subjects and Methods:** Quazi-Experimental design two groups with (pre-post intervention test) was utilize in the current study. Setting; the study was conducted at the outpatient antenatal clinics in El-Minia university hospital for maternity and children. **A purposive sample** of One hundred pregnant women was included in this study. **Data was collected** through a structured interviewing questionnaire that had a number of questions regarding the expectations of women's knowledge, attitude and perception, the women also received a manual (brochure), its content was developed based on the pregnant women identified needs post the pre assessment. **Results:** The current study clarified that, the narrative group got a good level of knowledge, positive attitude, and a higher level of perception after implementing the intervention compared to the deductive group, with statistically significant differences as P value <0.001, <0.001 & 0.004, respectively. **Conclusion:** Implementation of narrative-based educational information is an effective way to inform the pregnant women about the effect of climate change on the pregnancy-related concerns. **Recommendations:** educational training, and communication activities about climate change and its effect on pregnancy should be conducted to the pregnant women in order to increase their level of information which well be reflected on their level of knowledge, perception, and healthy attitude to lessen the detrimental health effects induced by climate change on pregnancy.

Keywords: Narrative, Didactic, Pregnant Women's knowledge, attitude, perception, Climate change

Introduction

Climate change, from the researcher's point of view, is the greatest threat to world health in the 21st decade (Watts et al., 2018). There is a significant danger from global warming to the sexual wellness of women throughout their lifespans as well as the health of mature fetuses and neonates (American College of Nurse-Midwives, (2017) and Sorensen et al. (2018)). Pregnant women, maturing fetuses, and newborns constitute those who are most vulnerable to the adverse impacts of climate change, particularly if they reside in underdeveloped or urban areas (UNFCCC, 2020; Kuehn & McCormick, 2017).

Eight key impacts of the changing climate on health are identified by the United States

National Climate and Health Assessment, such as excessive heat, poor air quality outside (caused by pollutants and wildfires), severe thunderstorms, food and water associated infections, diseases transmitted by insects, malnutrition, and psychiatric effects. The majority of these health issues, particularly those brought on by frigid temperatures, contaminated air, illnesses caused by food, and significant effects on psychological well-being, affect pregnant women and their unborn foetuses. Three common obstetrical outcomes—preterm birth, infants with low birth weights, and stillbirth—are made worse by air pollution and scorching temperatures, respectively (Nathaniel DeNicola, 2020).

During pregnancy, women's ability to manage their body temperature is hindered, leaving them more susceptible to heat outbursts

(Kuehn, McCormick, 2017). Stress, notably high temperatures, raises levels of cortisol, all could result diminished availability of blood to the placenta as the blood stream is diverted to other important processes. As a result of lower oxygen levels to the fetus, this might have an impact on the fetal growth as well as the chance of intrapartum problems. High temperatures could cause high blood pressure and preeclampsia among pregnant women, which is one of the three leading causes of maternal mortality rate worldwide.

However, the research is equivocal as to whether extreme temperatures enhance the aggravation of hypertensive disorders or not, as exposure to heat could produce dilatation of the blood vessels and reduce blood pressure. While a few studies suggested that heat exposures during the first trimester increases the incidence of congenital abnormalities, so further research is needed. Furthermore, it is uncertain if maternal death rates rise during extreme heat conditions, as they do in other groups with thermal control issues (Say et al., 2014).

Extreme heat-related pregnancy problems could be diagnosed and managed with prompt prenatal and intrapartum care. The World Health Organization modified its prenatal and intrapartum care guidelines, recommending at least eight antenatal care visits (WHO., 2016). This method minimizes the perinatal mortality rate and diagnosed the pregnancy-related issues in a timely manner, allowing for sufficient and prompt treatment to avoid death and morbidity, with an emphasis on quality of care during delivery (WHO., 2018).

Using either the did active or the narrative technique, pregnant women should be taught about the effects of climate change on their pregnancy and developing of the fetus. Didactic information is a type of educational style that is commonly used to provide scientific knowledge to encourage audiences to modify their behavior and improve their awareness about the health issues (Dahlstrom, 2014).

Some research indicated that presenting danger information in a narrative manner through a story-driven framework could be more successful than doing so in a

conventional didactic approach (Morris et al., 2019). According to Panton, (2020), narration is a form of communication that attempts to convey to the audience, through expression, an obvious, colorful, and stimulating ordered a series of occurrences in such a way that their minds can reconstruct these events and they can live in imagination through the experiences described, either as participants or possibly as those taking part.

Narrative information, in particular, is easier to understand, more effectively captures attention than didactic information, and it is more rapidly and properly kept. When the educational content is given in a narrative manner, it is less likely to elicit arguments to counter them, making it more persuasive and encouraging behaviors and attitudes to change. Shaffer and colleagues provide three major factors that impact the degree of storytelling impression in order to clarify both the effectiveness of stories and their varied usefulness (i.e., why certain narratives are more effective than others): The audience participate their empathy regarding point of view-taking, and their characters ; as well the curiosity which included the trustworthiness of the source as well as realistic portrayal and the enjoyment of the content; also it include commitment which involved with the narrative immersion in it, and the chance to exercise itin portrayed way (Shaffer et al., 2018).

Significance of the study:

The Intergovernmental Panel on Climate Change (IPCC) assessment in 2022 portrays an unfavorable scenario of the coming years of life on Earth, with environmental disintegration disappearance of species, and climate risks which including scorching temperatures and rainfall. All of these are related to physical and mental health issues, with immediate and secondary implications of increasing death and disability (Atwoli et al., 2023).

The exchange of knowledge, thoughts, and points of view between specialists and medical care personals, economics, or overall well-being is known as risk communication. The main goal of communicating risks is to empower the vulnerable personal to make knowledgeable choices that will safeguard their family members. Risk-based advertising is

unsuccessful in grabbing and holding the interest of audiences which consequently unlikely to be effective. There had been several research studies done to look at the qualities of a rapid but efficient transmission of danger data throughout these situations. Furthermore, good risk-based storytelling typically reveals people's need for more knowledge in order to receive the answers they need and reduce their worry. As a result, an ensuing desire for information is often viewed as an indication of an effective risk communication strategies (WHO, 2020).

Nevertheless, a growing body of studies indicated that conveying risky information in a narrative style - one based on a story-driven structure—might be superior to doing so in a conventional lecturing approach. Although some stories feature nonhuman creatures, the majority of stories revolve around people, both real and/or imaginary. Additionally, those who are told stories to those who are already familiar with its themes are inclined to understand them. In addition, narrative content often engages listeners on an emotional and intellectual level, with an influence on arguments caused by empathy (Alam, So, 2020).

Furthermore, as stated in the preceding citation, a narrative's affective flow - described as the "a way to describe the experience of an emotional reaction throughout being exposed to an advertisement message" - can significantly improve the transmission of the story by piquing interest in the primary theme. Even while some authors emphasised the value of utilising tales to promote deeper comprehension and involvement with the topic of change in the climate (Howarth, 2017), there had been very little empirical research to evaluate the success of the narrative method in this context (Bieniek-Tobasco et al., 2019). Other research had found that story messages boost interest, studying, and behavioral objectives for a variety of health conditions.

In this study, the impact of concise dramatic information regarding the risks to the health of mothers and children associated with climate change were compared with material of a similar nature provided in an educational manner. Great indicators in our study included

awareness of the risks that climate change poses on the health of pregnant women and their unborn babies, a sense of personal threat, an emotional assessment of the consequences of changes in the climate, confidence in one's ability to reduce those risks, an intention to take risk-reducing steps, as well as their willingness to be engaged in the data-seeking behavior (Bieniek-Tobasco, 2020).

Aim of the current study was:

- To evaluate the impact of narrative versus didactic information on pregnant women's knowledge, attitude and perception regarding climate change.

Research Hypothesis:

The researcher tested the following hypotheses:

- Narrative Method will be more effective than deductive method in enhancing pregnant women's understanding and response to the maternal and child health risks of climate change.

Methods:

Research design:

In this study quasi- experimental research design was used.

Setting of the study:

The study was carried out at Minia University Hospital for Maternity and Children's outpatient Antenatal care clinics.

Sampling:

Sample type and size:

The researchers selected (100) pregnant women based on the specific criteria for inclusion to participate in the study and assigned them into two groups (each group included 50 study participants to predict the sample size on/absolute error and 5% type 1 error:

$$n = \frac{(Z_{1-\alpha/2})^2 \cdot P(1-P)}{d^2}$$

Where, $Z_{1-\alpha/2}$ at 5% type 1 error ($p < 0.05$) is 1.96, P is the expected proportion in population based on previous studies and d is the absolute error or precision. Therefore, sample size

$$n = \frac{(1.96)^2(0.33)(1-0.33)}{(0.03765)^2} = 100.$$

The calculation suggested that a sample size of 100 pregnant women was necessary for the investigation.

Inclusion criteria: Pregnant women between the ages of 20 and 35 years old who were free of any medical or psychiatric disorders.

Study participants divided into two groups:

Group I: Narrative group. It was made up of 50 pregnant women. Narration, a time-honored technique for oral conveyance of knowledge, aided pregnant women in learning rapidly by making the subject matter attractive and simple to understand. The researchers use narrative teaching to present stories about climate change and its impact on pregnant women and their growing fetus.

Group II: Deductive group. The group was made up of 50 pregnant women. The researchers first talked about how pregnancy and the developing foetus are affected by changes in the climate. Didactic information, which adheres to a primarily scientific—or information deficit model—educative strategy, is the traditional informative format for transferring information to increase client and community understanding regarding medical threats and urge listeners to make changes in their behaviours.

Data Collection Tools:

Data from pregnant women was collected using the four main tools. The study tools were narrowed, and each one came with an Arabic translation. **It was composed of:**

Tool I: A structured interviewing questionnaire. After reading the relevant literature, the researchers created this tool to collect data from the pregnant women. **It encompassed two main parts:**

Part I: Concerned with pregnant women demographic characteristics: such as age, occupation, residence, and education.

Part II: Included women's obstetric history as: number of gravidity and parity, mode of previous birth if multiparous, season

of occurrence of abortion if she had history, and the gestational age of the current pregnancy.

Tool II- it used to assess the investigated women's knowledge about climate change. It was adopted from (**Lopez and Malay, 2019**) It included (5) multiple choice questions about the definition of "climate change" referred to changes in weather patterns throughout time, the climate was constantly changing and shifting throughout time, hearing about it, type of change in climate, and causes/reasons for it.

Scoring system:

Knowledge: scores range from 0 – 10, marks less than 50% (score less than 5 marks) considered poor level of knowledge, scores between 50% and 65% (between 5 – 6 marks inclusive) is considered fair level of knowledge, and scores from 65% or higher (score 7 – 10 marks) considered good level of knowledge.

Tool III- Concerned with the evaluation of women's Attitude towards climate change. It was adopted from (**Lopez and Malay, 2019**) It included (5) multiple choice questions about the opinions of the studied participants regarding climate change, which was a really serious issue, reading news and updates about climate change, disseminating knowledge about climate change, it was something that really worry, taking part in initiatives to combat climate change.

Scoring System:

Attitude: scores range from 5 – 50, scores less than 60% (scores range from 5 – 31) are considered negative and scores that are 60% or higher (ranging from 32 – 50) are considered positive

Tool IV: It concerned with the assessment of the investigated women's perception. It was adopted from (**Adebayo et al., 2020**) included (9) multiple choice questions about pregnant women which were negatively impacted by climate change, the effects of climate change on the growing fetuses, as well do climate change might be harmful to you and your newborn baby, do

they and their growing fetuses might be harmed by the including heat waves:

Changes in the climate's impact which might harm the pregnant women or her developing fetus, how to keep herself and her developing fetus safe from the danger that heat waves may inflict, the ways to avoid harm from air pollution for her and her developing fetus, do climate change produced longer and harsher heat waves, do pregnant mothers and their growing babies could be harmed by air pollution, do pregnant mothers and their growing fetuses might be harmed by the heat waves.

Scoring System:

Perception: scores range from 14 – 70, scores less than 60% (scores range from 14 – 47 marks) are considered low level and scores that are 60% or higher (ranging from 48 – 70 marks) are considered high level of perception.

Validity of the study tools:

Five experts from the public health, obstetrics, and women's health departments of Minia University's nursing professors made up the jury committee. They reviewed the tool for simplicity, significances, comprehensiveness, comprehension, and applicability as well as the goal of the current study.

Reliability:

The Cronbach's alpha value was used to assess tool's reliability. So, the reliability of the women's knowledge is 0.902, and of the women's attitude is 0.894, and of the women's perception is 0.897.

Ethical considerations:

The pilot study and subsequent complete study were both authorized and confirmed in writing by the ethics committee of Minia University's faculty of nursing and the administrator of the hospital for maternity and children there. The women in reproductive age who were selected to take part in the study verbally agreed to participate in the study after they were informed orally about the study aim and background. The participants were informed that they had the right to withdraw from the study at any time. Also, they were assured that there was no danger to her health

or to the feats as well as all data collected will be used for the aim of the study only. As agreed, all information submitted by participants was kept strictly secret.

Pilot Study:

In order to assess the effectiveness of the current research instruments in terms of clarity, validity, and application time, as well as to determine the time required to complete out the study tools, a pilot study was carried out on 10% (10 women) of the pregnant women who enrolled in the study. The sample from the pilot research was used in both the main study sample and the final analysis because there was no need to modify the equipment.

Field work:

- The researchers review the relevant literature from various perspectives of the research topic. This helped the researchers to become acquainted with the magnitude of the issues and guided them in developing the appropriate data collection tools. The researchers evaluated the tool's content, validity, reliability, and appropriateness through using an expert team of obstetrics and gynecological in the field of the nursing specialists as well by using statistical test.
- The study was carried out in the outpatient of antenatal care clinics that were open six days a week, from Saturday to Thursday. The narrative teaching approach and the deductive teaching method were used to educate the participants in the both group about the climate change and its impact on pregnant women and their growing fetuses on Saturday and Monday for the first method, and Sunday and Tuesday for the second way. This study included pregnant women who went to the prenatal clinic for a check-up during their pregnancy for managing their pregnancy issues.
- The researchers conducted two or three interviews per day with women who met the inclusion criteria. In which 2–3 women each day were interviewed (8–12 women per week). Data collection started from the first of January 2023 to the end of March 2023, and after implementation of the study intervention, participants level of knowledge

was evaluated during the next antenatal visit to follow up her pregnancy.

- The interviews started with a brief introduction of the researchers, a kind greeting, and a clarification of the objectives of the study and the teaching strategy that will be used to the study group. After obtaining participant's verbal consent, the researchers distributed the study tools (pretest) then collected after filling it by each participant. Women were given plenty of time to answer questions in the questionnaire if they intended to take part in the study. The questionnaire took an average of 15 to 20 minutes to be completed. The replies that each participant provided were only accessible to the researchers.
- Before providing information about the climate change and its effects using either the narrative or deductive methods, the researchers evaluated the pregnant women's understanding of the topic and its impact on their developing fetus.
- The Environmental Protection Agency (EPA) released a brochure titled "Climate Change and the Health of Pregnant Women" that was shortened for the didactic teaching approach. After reading the brochure, the researchers eliminated the content that was extraneous or confusing and focused only on the points that fit with the participants identified needs from the pretest. There is a copy of the modified brochure with the supplementary materials.
- The researchers then used data from the modified EPA brochure to construct the narrative presentation sessions, which was formatted as a full-color comic book. This was a fundamental element of the research's design since it ensured the veracity of the data presented in both teaching situations.
- The narrative presentation, which took the form of a full-color comic book, was then created by the researchers using the actual data from the amended EPA booklet. The homogeneity of the content offered in both teaching techniques was ensured by this design element, which was important for our study. The comic book's main characters were a pregnant woman, her husband, their child, and one of the family's cares. The

narrative illustrated her interactions with her nurse, her infant, and her entire household. She was informed by her nurse about the risks that climate change poses to the mothers and their children health through these encounters, and she shared this knowledge with her kids and friends. The mother also counselled her child to avoid engaging in risky activities.

- These meetings were held at Minia University Hospital for Maternity and Children in the waiting areas of the outpatient antenatal clinics. In every session, the researchers concluded and gave the woman a chance to raise any remaining questions.

Evaluation and monitoring performance Phase

Before a guideline is implemented for the first time, women were examined (the pretest) using the assessment instruments 1, 2, 3, and 4. The investigators conducted two times of evaluation (pre and post implementation of the intervention)

- The second round of testing (the posttest) employing the evaluation tool 2, to determine women's familiarity with the recommendations and evaluated how well the pregnant women understood the climate change and how it affected the development of their fetuses which was carried out three months after they had been put into practice.

Statistical analysis design:

For all statistical evaluations, SPSS for Windows version 20.0 (SPSS, Chicago, IL) was utilized. The continuously variable data was presented as mean with a standard deviation (SD) and had a normal distribution. Categorical data were presented using numbers and percentages. To compare variables using categorical data, the chi-square test (or, if appropriate, the Fisher's exact test) was used. The accuracy of the (internal consistency) test for the surveys utilized in the study was calculated statistically.

Results

Table 1: It displays that; there were no statistically significant differences between participants in both groups regarding their age,

occupation, residence, and education where P-value was 0.351, 0.151, 0.313, and 0.210 respectively. Moreover, the same table showed comparison between the participants in the narrative and deductive group regarding the obstetric history and reveal that there is a statistically significant differences between participants in both groups and their parity as P-value equal 0.012. However, the same table displayed that there were no statistically significant differences between participants in both groups regarding their gravidity, mode of previous birth, history of abortion & in what season of the year it happen, as well the gestational age of the current pregnancy, where P-value were 0.138, 0.499, 0.899, and 0.546 respectively.

Fig. 1: Indicates that the comparison between the women's knowledge levels during the pre and post intervention among the narrative and did active group. It is clear that the women's level of knowledge was similar between the two groups in the pre-intervention test, with poor level as the percentage was 60 and 66 among the deductive and narrative groups, respectively. While a clear improvement appeared in the women's level of knowledge in the pos-intervention test as the narrative group represented good level of knowledge with 66% compared to the deductive group, which documented only 14% with a statistically significant differences between participants among both groups after implementation of the intervention as P-value was <0.001.

Table 2: It portrays that; 76 % of the narrative group got a positive attitude after intervention compared to only 40% of the deductive group. Similarly, the narrative group had a higher level of perception (74%) after intervention compared to the deductive group (46%), with statistically significant variations between the participants in both groups regarding their attitude and perception as P-value was <0.001 & 0.004, respectively.

Table 3: Illustrates, a clear positive correlation between the level knowledge, attitude, and perception of women in both groups. Importantly, the disparities among the

participants in the two groups were statistically significant among the narrative group and their attitude as well as perception which related to women's knowledge as P-value was 0.003 & <0.001 respectively. Also, there was statistically significant difference between women's attitude and perception as P-value was <0.001.

Table 4: Highlights an association between the women's demographic characteristics and their knowledge level among the two groups after intervention implementation. It demonstrates that no statistically significant differences exist between the participants in both groups related to women's level of knowledge and their age, occupation, and residence, where P-value were 0.726, 0.649, and 0.428, respectively. However, the same table proved that there were statistically significant differences between participants in both groups related to women's level of knowledge and their education as P-value was 0.003.

Table 5: It explains that there were no statistically significant differences between the participants in both groups that related to women's attitude and their age, occupation, and residence, where P-value were 0.299, 0.910, and 0.243, respectively. However, the same table demonstrated that the existence of statistically significant differences between the participants in both groups in relation to women's attitude and their education with P-value was 0.001.

Table 6: shows an association between women's demographic characteristics and their perception level among the two groups after intervention implementation. Also demonstrates that there were insignificant statistically differences between participants in both groups related to women's perception and their age, occupation, and residence, where P-values were 0.492, 0.423, and 0.424, respectively. However, the same table display that there was statistically significant difference between participants in both groups related to women's perception and their education with P-value was 0.003.

Table1: Comparison between the demographic characteristics & obstetric history of the women among the two groups

	Total (n=100)		Deductive (n=50)		Narrative (n=50)		Chi-Square / Fisher's exact test	
	n	%	n	%	n	%	X ²	P
Age (Years)								
18 – <21	25	25.0	13	26.0	12	24.0		
21 – <26	21	21.0	7	14.0	14	28.0		
26 – <31	24	24.0	15	30.0	9	18.0		
31 – <36	18	18.0	10	20.0	8	16.0		
36 or More	12	12.0	5	10.0	7	14.0	4.429	0.351
Occupation								
Unemployed	61	61.0	27	54.0	34	68.0		
Employee	39	39.0	23	46.0	16	32.0	2.060	0.151
Residence								
Urban	57	57.0	31	62.0	26	52.0		
Rural	43	43.0	19	38.0	24	48.0	1.020	0.313
Education								
No Formal Education	32	32.0	13	26.0	19	38.0		
Primary Education	34	34.0	21	42.0	13	26.0		
Secondary or Higher Education	34	34.0	16	32.0	18	36.0	3.125	0.210
Gravidity								
Primigravida	64	64.0	29	58.0	35	70.0		
Multigravida	36	36.0	21	42.0	15	30.0	2.202	0.138
Parity			(n=21)		(n=15)			
Primiparous	13	36.0	4	19.0	9	60.0		
Multiparous	23	63.8	17	81.0	6	40.0	6.361	0.012*
Mode of previous birth if Multiparous			(n=17)		(n=6)			
Vaginal birth without episiotomy	2	8.6	1	5.9	1	16.7		
Vaginal birth with episiotomy	3	13.0	3	17.6	0	0.0		
Vaginal birth without Perineal tears	4	17.3	2	11.8	2	33.3		
Vaginal birth with Perineal tears	7	30.4	5	29.4	2	33.3		
Cesarean section	7	30.4	6	35.3	1	16.7	3.366	0.499
If you have history of abortion, when did it happen?			(n=15)		(n=5)			
Winter	8	40.0	6	40.0	2	40.0		
Summer	6	30.0	4	26.6	2	40.0		
Fall	4	20.0	3	20.0	1	20.0		
Spring	2	10.0	2	13.3	0	0.0	0.589	0.899
Gestational Age of the current pregnancy (Weeks)								
1 – <13	25	25.0	13	26.0	12	24.0		
13 – <26	24	24.0	14	28.0	10	20.0		
26 – <40	37	37.0	13	26.0	12	24.0		
40 and above	26	26.0	10	20.0	16	32.0	2.131	0.546

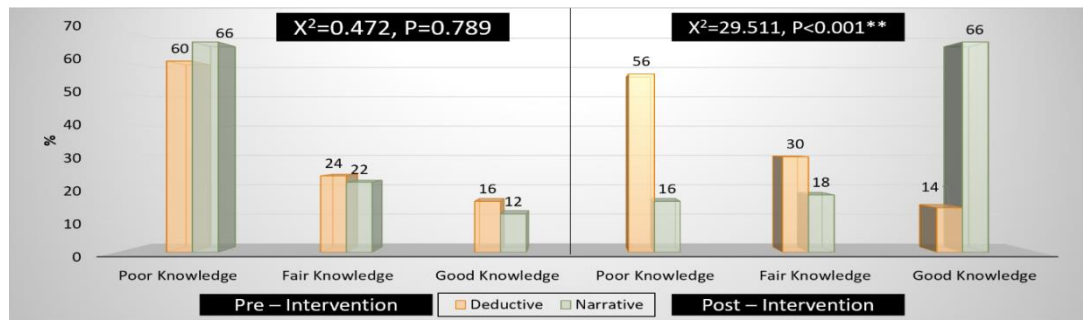


Figure 1: Comparison between women’s knowledge level during pre and post intervention test among the two groups regarding climate change

Table 2: Comparison between women’s attitude and perception scores among the two groups after intervention implementation.

	Deductive (n=50)		Narrative (n=50)		Chi-Square	
	n	%	N	%	X ²	P
Women’s Attitude						
Negative Attitude	30	60.0	12	24.0	13.300	<0.001**
Positive Attitude	20	40.0	38	76.0		
Women’s Perception						
Low Perception	27	54.0	13	26.0	8.167	0.004*
High Perception	23	46.0	37	74.0		

Table 3: Correlation between women’s Knowledge, Attitude and Perception scores after intervention implementation

	Deductive (n=50)						Narrative (n=50)					
	Knowledge		Attitude		Perception		Knowledge		Attitude		Perception	
	r	p	r	p	r	p	r	P	r	p	r	P
Knowledge	-	-	0.037	0.798	0.029	0.843	-	-	0.413	0.003*	0.516	<0.001**
Attitude	0.037	0.798	-	-	0.057	0.695	0.413	0.003*	-	-	0.454	<0.001**
Perception	0.029	0.843	0.057	0.695	-	-	0.516	<0.001**	0.454	<0.001**	-	-

Table 4: Association between women’s demographic characteristics and their knowledge level among the two groups after intervention implementation

	Deductive (n=50)						Narrative (n=50)					
	Poor Knowledge		Fair Knowledge		Good Knowledge		Poor Knowledge		Fair Knowledge		Good Knowledge	
	n	%	n	%	N	%	N	%	n	%	n	%
Age (Years)												
18 – <21	10	35.7	1	6.7	2	28.6	1	12.5	2	22.2	9	27.3
21 – <26	2	7.1	5	33.3	0	0.0	4	50.0	1	11.1	9	27.3
26 – <31	7	25.0	5	33.3	3	42.9	1	12.5	2	22.2	6	18.2
31 – <36	6	21.4	2	13.3	2	28.6	1	12.5	3	33.3	4	12.1
36 or More	3	10.7	2	13.3	0	0.0	1	12.5	1	11.1	5	15.2
Chi – Square	X ² =11.290, P=0.186						X ² =5.289, P=0.726					
Occupation												
Unemployed	14	50.0	9	60.0	4	57.1	6	75.0	5	55.6	23	69.7
Employee	14	50.0	6	40.0	3	42.9	2	25.0	4	44.4	10	30.3
Fisher’s exact test	X ² =0.426, P=0.808						X ² =0.864, P=0.649					
Residence												
Urban	16	57.1	10	66.7	5	71.4	5	62.5	3	33.3	18	54.5
Rural	12	42.9	5	33.3	2	28.6	3	37.5	6	66.7	15	45.5
Fisher’s exact test	X ² =0.683, P=0.711						X ² =1.695, P=0.428					
Education												
No Formal Education	10	35.7	1	6.7	2	28.6	8	100.0	2	22.2	9	27.3
Primary Education	9	32.1	9	60.0	3	42.9	0	0.0	3	33.3	10	30.3
Secondary or Higher Education	9	32.1	5	33.3	2	28.6	0	0.0	4	44.4	14	42.4
Chi – Square	X ² =5.031, P=0.284						X ² =15.619, P=0.003*					

Table 5. Association between women's demographic characteristics and their attitude scores among the two groups after implementation of the intervention

	Deductive (n=50)				Narrative (n=50)			
	Negative Attitude		Positive Attitude		Negative Attitude		Positive Attitude	
	n	%	n	%	n	%	n	%
Age (Years)								
18 – <21	6	20.0	7	35.0	3	25.0	9	23.7
21 – <26	2	6.7	5	25.0	5	41.7	9	23.7
26 – <31	11	36.7	4	20.0	1	8.3	8	21.1
31 – <36	6	20.0	4	20.0	3	25.0	5	13.2
36 or More	5	16.7	0	0.0	0	0.0	7	18.4
Fisher's exact test	X ² =8.364, P=0.079				X ² =4.889, P=0.299			
Occupation								
Unemployed	20	66.7	7	35.0	8	66.7	26	68.4
Employee	10	33.3	13	65.0	4	33.3	12	31.6
Fisher's exact test	X ² =4.844, P=0.028*				X ² =0.013, P=0.910			
Residence								
Urban	16	53.3	15	75.0	8	66.7	18	47.4
Rural	14	46.7	5	25.0	4	33.3	20	52.6
Fisher's exact test	X ² =2.391, P=0.122				X ² =1.361, P=0.243			
Education								
No Formal Education	6	20.0	7	35.0	10	83.3	9	23.7
Primary Education	13	43.3	8	40.0	2	16.7	11	28.9
Secondary or Higher Education	11	36.7	5	25.0	0	0.0	18	47.4
Fisher's exact test	X ² =1.581, P=0.454				X ² =14.752, P<0.001***			

Table 6. Association between women's demographic characteristics and their perception level among the two groups after intervention implementation

	Deductive (n=50)				Narrative (n=50)			
	Low Perception		High Perception		Low Perception		High Perception	
	N	%	N	%	n	%	n	%
Age (Years)								
18 – <21	8	29.6	5	21.7	3	23.1	9	24.3
21 – <26	3	11.1	4	17.4	5	38.5	9	24.3
26 – <31	7	25.9	8	34.8	3	23.1	6	16.2
31 – <36	8	29.6	2	8.7	2	15.4	6	16.2
36 or More	1	3.7	4	17.4	0	0.0	7	18.9
Fisher's exact test	X ² =6.020, P=0.198				X ² =3.408, P=0.492			
Occupation								
Unemployed	15	55.6	12	52.2	10	76.9	24	64.9
Employee	12	44.4	11	47.8	3	23.1	13	35.1
Fisher's exact test	X ² =0.057, P=0.811				X ² =0.643, P=0.423			
Residence								
Urban	16	59.3	15	65.2	8	61.5	18	48.6
Rural	11	40.7	8	34.8	5	38.5	19	51.4
Fisher's exact test	X ² =0.187, P=0.665				X ² =0.640, P=0.424			
Education								
No Formal Education	8	29.6	5	21.7	10	76.9	9	24.3
Primary Education	10	37.0	11	47.8	2	15.4	11	29.7
Secondary or Higher Education	9	33.3	7	30.4	1	7.7	17	45.9
Fisher's exact test	X ² =0.674, P=0.714				X ² =11.676, P=0.003*			

Discussion

The health crisis caused by climate change is severe, because of numerous social and physiological changes, pregnant women and growing fetuses are thought to be among the most at-risk groups for the negative health climate change consequences. (Atkin et al., 2023). The advantages of narrative-driven information to

hold audiences' attention and persuasively spread knowledge about risk reduction might possibly have significant benefits on environment and health with such attention- and time-limited contexts. (Adebayo et al., 2020). The current study aimed to test the impact of narrative versus didactic information on pregnant women's

knowledge, attitude and perception regarding climate change.

The present study findings illustrated that the demographic characteristics of the women in both groups (narrative and deductive), nearly were the same as over the half of the women were between 18 – 30 years old, from urban area, and graduated from primary or secondary schools and higher education. The current research's findings were completely concordant with (Verweij et al., 2019) who noticed that 35 % of the women mean age was 36.8 ± 12.6 and 65% of them had university education or more. However this result was not completely comparable to the finding of (Eltelt et al., 2023) who brought up that the studied pregnant women were < 20 years old, with mean age (19.8 ± 7.3 years), one third of them had basic education, diploma, or higher education, and three quarter were residing in cities. Additionally, according to the findings at hand, there was no significant difference regarding the demographic characteristics of the women in both groups (narrative and deductive) which was the baseline for the study.

Regarding the obstetric history of the sample, the current study findings illustrated that more than one third of the women were multigravida and two thirds their mode of birth was vaginal with perinatal tears and cesarean section with a significant notable difference between both groups regarding to women parity. These findings agree with the finding of (Eltelt et al., 2023 and Malley et al., 2019) who perform revealed research in which almost half of the pregnant women had 2 pregnancies and, in the majority, the birth was by caesarean section respectively.

The current study revealed that at pre intervention, more than half of the two groups had unsatisfactory knowledge level about climate changes. This result might be due to the nature of the women life as more than half of them were unemployed which made them unable to exchange the information and knowledge about the existing global events with other knowledgeable and updating colleges like in climate changes, also, being unemployed help them to be away somewhat from the heat, sun burn and other bad effects of climate changes that made them uninterested in the climate issues. This agreed with the finding of study done by

(Morris et al., 2021) who stated that more than half of the sample (65%) had unsatisfactory knowledge level about climate changes, also the finding of study done by Jaklitsch, 2017 found that more than half of the sample had unsatisfactory knowledge about climate changes. However these results contradicted with (Ngwenya et al., 2018) whose result proved that the majority of the participants had satisfactory knowledge level about climate changes meanwhile the minority had unsatisfactory knowledge level. This contradiction might be as a result of conditions and culture differences.

Importantly, the study that was conducted compared how well narrative information affected pregnant women's views about climate change than conventional didactic material. It was discovered that material with a narrative focus performed much better than material with a didactic focus which influencing pregnant women's actual information as well as increasing women's knowledge; this could be observed through the results post intervention implementation, as more than half of the childbearing women in narrative group had satisfactory knowledge level about climate changes with significant differences between both the narrative and deductive groups. This could be explained that a rapidly expanding body of research indicated that it may be more successful and useful to convey hazardous facts through the narrative style, which uses a story-driven structure, than to do it in a typical didactic educational manner. (Morris et al., 2019). This finding is in line with (Dudley et al., 2023) who reached to the conclusion that information about health and science was best conveyed via narrative as 54 out of 78 research (69%) directly compared between the story and didactic communication discovered that introducing narrative increased efficacy of the teaching process.

According to the contrasting of the women's attitude and perception scores between the two groups after intervention implementation, the results revealed that three quarters of the women among the narrative group achieved a positive attitude and had a high perception level than in the deductive group with significant differences between both groups. This showed that pregnant women truly think that climate change is a major concern, that it is real, so that quick action is

needed to address it. This might be explained through gaining information via a dramatic way through attractive methods helped more to increase person's perception, activity and to develop a positive attitude toward such issues. As according to the theory, when someone experienced a narrative teaching, their attention, emotions, and visuals combine, causing them to mentally travel through the story.

Moreover, as the information is crucial for raising participant awareness about climate change, narratives may be especially well adapted to communicate about divisive subjects since they may lessen counter argumentation (Shi et al., 2016). This is also confirmed by (Shaffer et al., 2018) who mentioned that, compared to fact-based or didactic communication alone, narratives may also had more impact on knowledge retrieval, risk perceptions, intentions, and recollection. Also, Lopez & Malay (2019) is in congruent with this finding and concluded that, women are more worried and possess more positive attitudes toward environmental issues as climate change than men.

According to the current study, although, the findings illustrated that there were no statistically significant differences between women in deductive group and their knowledge about climate changes, attitude and perception level, fortunately, the results showed that the narrative group had a higher knowledge, attitude and perception than the deductive group. These findings could be explained as due to the big numbers of the studied women were educated which may encourage them to effectively respond to the deductive way in handling the knowledge to increase their level of information about the climate change. These findings are partially with same line of the finding of study done by (Adebayo et al., 2020) who found statistically significant differences between both groups regarding the perceived knowledge, and attitude with ($p = 0.04$, $p = 0.019$) respectively. Otherwise, the findings of (Bieniek-Tobasco et al., 2019) who reported that to possess concern and desire to take action could be generated via cinematic storytelling. The current study illustrated that there is a highly positive correlation between women's knowledge, attitude, and perception among the narrative group where, the most gained high level of knowledge and information about climate

changes raise the attitude and perception level among the women. The reason for that could be explained as people in general act in ways that contribute to the resolution of any problem like climate change when they are aware about it.

In respect to the association between women's demographic characteristics and their knowledge, attitude and perception level among the two groups after intervention implementation. Also there are insignificant statistically differences between participant women's demographic data among the two groups and their knowledge, attitude and perception except regarding their level of education. To justify this finding, it could be explained that the level of education helps more in perceiving any important knowledge and seeking for participation. This result is in the same line with the finding of Lopez & Malay, (2019) who indicated no significant age- or gender-related disparities regarding the respondents' awareness or attitudes towards climate change. While this result is not as the finding of the study which done by Mandal & Bose., 2019 who concluded that age, occupation, income, and education were positively related to the respondents' perceptions about the impact of climate change on childbearing period.

Conclusion

Pregnant women and their unborn children are an array of humanity who are particularly vulnerable to the consequences of climate change, according to the Intergovernmental Panel on Climate Change (IPCC). The study hypothesis was ratified in conjunction with the existing study's findings; which revealed that narrative information is persuasively superior to a typical didactic information format on a variety of crucial metrics, including knowledge, attitude and perception. This educational intervention may be beneficial for lowering pregnancy problems associated with climate change. Narrative-based educational information is a more effective way to tell people about a variety of pregnancy-related concerns.

Recommendations

- Making educational interventions that lessen the negative effects of climate changes on the maternal and fetal health should employ narrative messages.

- For pregnant women, policymakers could create an effective communication method that will safeguard their health from the harmful effects of climate changes.
- Every effort should be made to establish and maintain effective antenatal care in the face of harsh life circumstances through new educational interventions to lessen the detrimental effects on health which brought on by the climate changes conditions.

Further research

- Further research is needed to increase expectant mothers' understanding of how climate change and its environmental consequences affect the health of pregnancy and fetus.

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