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Boudra Djamel ^{*1}

University August 20, 1955- Skikda- (Algeria)

Email : d.boudra@univ-skikda.dz

Zineb Lemmouchi ²

University August 20, 1955- Skikda- (Algeria)

Email : Z.lemmouchi@univ-skikda.dz

Abstract :

This study examines the role of environmental culture in enhancing awareness of fire risks in the Collo and Beni Oulban areas of Skikda province. Findings indicate that human negligence is the main factor contributing to fire outbreaks, while the roles of natural elements and agricultural activities remain subjects of debate.

The study also reveals that environmental awareness of fire risks varies by age, gender, and education level, with older adults and those with secondary education demonstrating greater awareness. In conclusion, the study underscores the need to foster environmental culture through media and social media, along with enforcing strict regulations to help reduce fire incidents.

Keywords: *Environmental culture, environmental awareness, awareness programs, fire risk awareness.*

Résumé :

Cette étude examine le rôle de la culture environnementale dans la sensibilisation aux risques d'incendie dans les régions de Collo et Beni Oulban, dans la wilaya de Skikda. Les résultats indiquent que la négligence humaine est le principal facteur contribuant aux incendies, tandis que l'influence des éléments naturels et des activités agricoles reste sujette à débat.

L'étude révèle également que la sensibilisation aux risques d'incendie varie en fonction de l'âge, du sexe et du niveau d'éducation, les personnes plus âgées et celles ayant un niveau d'éducation secondaire montrant une conscience plus élevée. En conclusion, l'étude souligne la nécessité de promouvoir la culture environnementale par le biais des médias et des réseaux sociaux, tout en appliquant des lois strictes pour réduire les incidents d'incendie.

Mots-clés: *Culture environnementale, sensibilisation environnementale, programmes de sensibilisation, sensibilisation aux risques d'incendie.*

1. Introduction

Fires represent one of the most serious natural disasters, posing substantial risks to both the environment and human life. In recent years, many parts of the world have experienced a rise in fire incidents, driven by factors such as climate change, human negligence, and insufficient environmental awareness. In this context, the Skikda province in Algeria faces significant challenges, particularly in the Collo and Beni Oulbane areas, where fires occur frequently. These incidents cause extensive damage to forests and agricultural crops, while also endangering the lives of residents and destroying vital infrastructure.

Raising environmental consciousness is crucial for educating people about the risks associated with fires. Highlighting the significance of environmental preservation and implementing effective preventive strategies can greatly help in minimizing the occurrence of such incidents and alleviating their adverse effects. By fostering a culture of environmental awareness, the local community can engage actively in safeguarding forests and conserving natural resources through the adoption of responsible environmental practices and behaviors.

The Collo and Beni Oulbane regions face specific challenges that make them vulnerable to fires, such as the geographical characteristics of the area, the density of vegetation, and climate changes that increase the risk of fire outbreaks. However, promoting environmental consciousness can significantly enhance fire prevention efforts by educating local residents on how to avoid accidentally starting fires, the importance of reporting any suspicious activities, and adhering to the preventive guidelines issued by local authorities.

2 Problem Statement:

Skikda Province, located in northeastern Algeria, is known for its natural diversity, with mountain ranges and dense forests covering vast areas, making it both rich and environmentally sensitive. However, these valuable resources face a constant threat from recurring wildfires, especially in rural and mountainous areas like Collo and Beni Oulbane. The geographic characteristics, dense vegetation, and accelerating climate changes increase the risk of fire outbreaks. While natural fires are part of many ecosystems, the recent fires in Skikda are notable for their size and intensity, leading to significant losses in vegetation, wildlife, and local economic resources. These fires also have negative effects on residents' health and environmental sustainability, contributing to worsening pollution and biodiversity loss.

In addition to natural factors, human activities play a key role in the occurrence of fires. The lack of environmental awareness and the prevalence of harmful practices, such as random waste disposal or lighting fires in public areas for recreational or agricultural purposes, increase the risk of fire. With limited resources and capabilities allocated to firefighting, the situation worsens because citizens lack awareness and guidance on how to prevent and handle fires when they occur.

In this context, environmental awareness emerges as a crucial element in addressing and reducing fire risks. Environmental culture goes beyond theoretical knowledge to include a deep understanding and commitment to sound practices that preserve the environment and reduce potential risks. By promoting environmental culture, the local community can adopt preventive behaviors and measures that help limit the occurrence of fires and mitigate their negative impacts.

Despite the efforts made by local authorities and civil society organizations to raise awareness about the environment, there is an urgent need to intensify these efforts and make them more effective and comprehensive. Fire prevention requires close cooperation among all actors in society, starting from individuals to educational institutions and extending to security forces and government agencies.

From here arises the necessity to study the role of environmental culture in raising awareness about the dangers of fires in the areas of Collo and Beni Oulbane and to assess the impact of this culture on the awareness and behavior of the local population. Based on this, the study's central research question is centered around the following key question:

How can environmental culture contribute to raising awareness about the dangers of fires in the areas of Collo and Beni Oulbane in Skikda Province?

3. Sub-questions:

1. What are the primary causes of fires in Skikda Province's Collo and Beni Oulbane areas?
2. Is there a variation in the level of environmental awareness regarding fire hazards among the residents of Collo and Beni Oulbane, based on variables such as age, gender, and educational level?
3. What preventive measures can be enhanced through environmental culture to reduce fire incidents in these areas?

4. Hypotheses:

1. First Hypothesis: There are multiple primary causes for the occurrence of fires in the areas of Collo and Beni Oulbane in Skikda Province, related to human activities and environmental factors.
2. Second Hypothesis: The residents of Collo and Beni Oulbane have varying levels of environmental awareness regarding fire risks, which is influenced by age, gender, and educational background.
3. Third Hypothesis: Preventive measures can be strengthened by promoting environmental culture, resulting in a reduction in fire incidents in Collo and Beni Oulbane.

5. Definition of Concepts:

5.1 Role:

A role is the action or activity performed by an individual, referring to the task or function that a person carries out. It can also be understood as contributing or participating significantly in a particular activity or field (Antoine et al., 2002, p. 494).

Additionally, a role refers to a set of standards and expectations that govern an individual's behavior in relation to their social status or position within a group (Dictionnaire encyclopédique, 1995, p. 896).

5.1.1 Terminological Definitions:

Role: Scholars have differing views on how to define "role." Some view it as a set of acquired actions in social interaction, while others attribute it to the services an individual provides within a group or to motivations tied to destiny. Some have divided the concept of roles into two types:

1. The Normative Role is one that anticipates the role and defines its expectations.
2. Static Role: associated with a fixed meaning (Leksir, 2007, pp. 23-24).

5.1.2 Operational Definition of Role:

In the context of this study, the operational definition of "role" refers to the set of activities and behaviors undertaken by individuals or groups being studied within the framework of environmental culture, aimed at enhancing awareness and managing fire risks. This includes:

Awareness tasks: Individuals or entities carry out activities to spread knowledge about fire hazards and prevention.

Community Participation: How individuals engage with environmental initiatives and programs aimed at reducing risks.

Implementation of Preventive Measures: actions taken based on environmental awareness to improve responses to fire hazards.

5.2 Environmental Culture:

5.2.1 Culture:

Linguistically, in Arabic, "culture" derives from the root verb (Thaqafa), which means being skilled or proficient in something. It also connotes mastery and excellence in a task or skill practiced by a person (Ghada Taweel, 2007, p. 13).

Terminologically: The British anthropologist Edward Burnett Tylor defined culture in his book *Primitive Culture* as "that complex whole which includes knowledge, belief, art, morals, law, tradition, and other habits and capabilities acquired by humans as members of society" (Al-Shwayhat, 2004, p. 42).

5.2.2 Environment:

Linguistically, the word "environment" in Arabic is derived from the past tense verband with its present tense (yaboo'). Arabic dictionaries indicate that this verb has been used in various meanings, the most common being "to reside" or "to settle." For example, when we say, "So-and-so settled in a place," it means they moved into and resided there. Accordingly, "environment" linguistically refers to the space surrounding a person in which they live, i.e., the dwelling or habitat in which an individual resides (Rateb, 2004, p. 16).

5.2.3 Terminological Definitions:

Environment: The environment is defined as "the natural surroundings in which individuals live, encompassing all surrounding natural and environmental elements such as air, water, soil, plants, and animals, in addition to climatic and geological factors that affect their interactions and behaviors" (Matthijis, 1971, p. 519).

Operational Definition of Environment: In the context of this study, the environment includes everything surrounding the individuals under study that influences their quality of life and health, as well as contributing to environmental problems like fires.

5.3 Concept of Environmental Culture:

Environmental Culture: Roth (1992) defined environmental culture as "an individual's knowledge of the environment, their attitudes toward it, and environmental issues, as well as the skills that motivate them to act toward solving environmental problems and actively participate in efforts aimed at

maintaining the dynamic balance between the quality of life and the quality of the environment" (Roth, 1992, pp. 1-3).

5.3.1 Operational Definition of Environmental Culture:

In this study, environmental culture refers to the set of knowledge, skills, and values possessed by the sample group regarding the environment and environmental risks, which influence their behaviors and attitudes toward dealing with environmental issues such as fires. Environmental culture encompasses individuals' awareness of their surroundings, the causes of environmental problems, and their understanding of the potential impact of their actions on the environment, as well as their effectiveness in participating in preventive and precautionary measures to protect the environment and reduce environmental risks.

6. Importance of the Study:

The significance of this study stems from three aspects: theoretical, practical, and contextual.

Theoretical Aspect: The study contributes to a deeper understanding of the role of environmental culture in raising awareness about fire hazards, particularly in environmentally sensitive areas like Collo and Beni Oulbane in Skikda Province. This enriches the scientific literature in the fields of environmental culture and awareness.

Practical Aspect: The study provides data and insights that can assist decision-makers and environmental institutions in developing awareness programs and preventive measures for the residents of these areas. The goal is to reduce fire incidents and enhance community response.

Contextual Aspect: The study focuses on analyzing the main causes of fires and the level of environmental awareness among the population, taking into account variables such as age, gender, and educational level. This allows for a deeper understanding of local influencing factors and aids in designing effective and comprehensive strategies for awareness and prevention.

7. Field Study Data Presentation and Analysis :

In this study, the descriptive method was employed, which is considered the most suitable approach. It is defined as "a method that investigates the characteristics of phenomena or elements that are the subject of study in scientific research. It serves as a fundamental tool aimed at observing, recording, and analyzing important or distinctive details in the topic" (Sunaina

Singh, 2023). The descriptive-analytical method aims to describe a group, situation, or phenomenon to reach logical explanations backed by evidence (Shona McCombes, 2023)

An online questionnaire was used as the data collection tool. It is a set of questions designed specifically for the internet with high capabilities for efficiently gathering large amounts of data. One of its characteristics is that it saves effort, labor, and time compared to other data collection tools, making it easier to reach a target audience that is usually difficult to contact (Pramod R. Regmi et al., 2016). It is also defined as "a tool containing a set of questions or statements, where the respondent is asked to answer in a manner determined by the researcher according to the objectives of the research" (Atwi, 2007, p. 99).

Justification for using the online questionnaire:

The decision to use an online questionnaire for data collection in this study is based on several scientific and methodological aspects:

1. Suitability for the Descriptive-Analytical Method: The questionnaire is an appropriate tool for gathering accurate quantitative and qualitative data, contributing to the description and analysis of fire phenomena and the level of environmental awareness among the population.
2. Efficiency in Data Collection, Cost, and Time Savings: The online questionnaire provides a quick and efficient way to collect data from a large number of individuals, especially from areas that are difficult to access, such as those affected by fires.
3. Reaching the Target Audience and Obtaining Accurate, Structured Data: Designing the questionnaire in an organized manner allows the collection of precise data on the study topics, facilitating their organization and analysis to reach supported conclusions.

Data Collection and Distribution:

The questionnaire was distributed via social media platforms to a sample of 80 individuals from Collo, Beni Oulbane, and other areas affected by fires. We divided the subquestions and hypotheses into axes, each of which provided a clear picture of the following:

- **The main causes of fires**
- **The population's level of environmental awareness**
- **Suggested preventive measures to reduce incidents**

The tables relating to the results will be reviewed and analyzed, leading to accurate conclusions about the role of environmental culture in reducing forest fires in these areas.

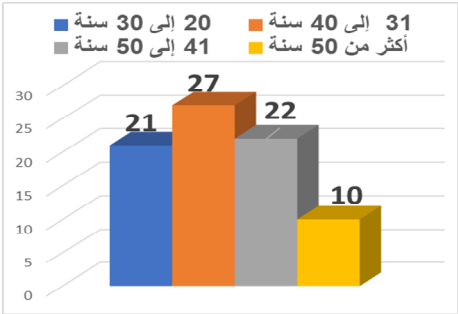
7.1. Presentation and Analysis of Personal Data of the Respondents:

Table (1) shows the distribution of the sample by age.

Age Range	Frequency	Percentage (%)
20 to 30 years	21	26.3
31 to 40 years	27	33.8
41 to 50 years	22	27.5
Over 50 years	10	12.5
Total	80	100

Source:"The table was prepared by the researchers based on the outputs of the SPSS.

Figure (1) shows the distribution of the sample by age.



Source: The figure was prepared by the researchers using Excel based on the outputs of the SPSS 27 statistical analysis program

The table shows that the age group "31 to 40 years" recorded the highest percentage (33.8%), indicating that this group is the most represented among the residents of the fire-affected areas. This is likely due to their presence in work and production phases. The "41 to 50 years" group follows with a percentage of 27.5%, reflecting a significant presence of middle-aged individuals. The "20 to 30 years" group ranks third with 26.3%, showing a good representation of youth. The "Over 50 years" group had the lowest percentage at 12.5%, indicating a lower representation of elderly individuals in the sample.

Table (2) shows the distribution of the sample by gender.

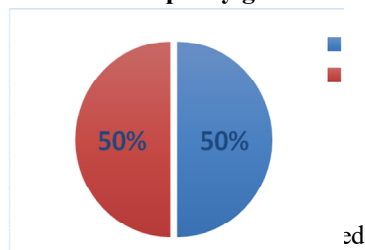
Gender	Frequency	Percentage %
Male	40	50
Female	40	50
Total	80	100

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Analysis of Gender Distribution:

The table shows that the percentage of males is **50.0%**, which is exactly the same as the percentage of females, which is also **50.0%**. This equal distribution between genders indicates that the sample studied was balanced in terms of representation between males and females. Therefore, the study achieves complete gender balance in the sample

Figure (2) shows the distribution of the sample by gender.



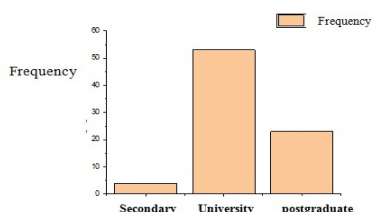
by the researchers using Excel based on the outputs of the SPSS 27 statistical analysis program

Table (3) shows the distribution of the sample by the educational level.

Educational Level	Frequency	Percentage (%)
Secondary	4	5
University	53	66.3
postgraduate	23	28.8
total	80	100

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Figure (3) : shows the distribution of the sample by the educational level



Source: The figure was prepared by the researchers using Origin based on the outputs of the SPSS 27 statistical analysis program.

The table shows that the "**university**" educational level recorded the highest percentage, at **66.3%** of the sample, indicating that most individuals in the sample have university qualifications. This is followed by the "**postgraduate**" category with a percentage of **28.8%**, reflecting a notable presence of individuals with advanced education. On the other hand, the "secondary" level

recorded the lowest percentage at 5.0%, indicating a low representation of individuals with only secondary education. We can conclude that the sample has a high educational level, predominantly composed of individuals with university degrees and higher, with limited representation of those with only secondary education.

7.2.Presentation and Analysis of Data on the Main Causes of Fires in the Areas of Collo and Beni Welaban:

Table 4: Distribution of Residents' Assessment in Collo and Beni Welaban on Whether Fires are Due to Natural Factors

Do you think that the fires in your area are caused by natural factors?	Frequen cy	Percenta ge (%)	Mean	Standar d Deviati on	T- value	Sample Directio n
No	42	52.5	1.5250	0.59481	-7.143	No
Maybe	34	42.5				
Yes	4	5.0				
Total	80	100.0				

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Analysis of Residents' Views on Whether Fires Are Due to Natural Factors:

The table shows that the largest percentage of respondents (52.5%) believe that the fires in their area are not due to natural factors, indicating that most participants think there are other causes behind the fires. The next highest percentage is for the "Maybe" option (42.5%), suggesting that a significant portion of the sample is unsure about the primary cause of the fires and that there may be a mix of natural and non-natural factors. The percentage for "yes" (5.0%) is the lowest, meaning that only a small number of participants believe the fires are solely caused by natural factors. The mean (1.5250) reflects that most opinions lean toward the belief that the fires are not due to natural factors. The standard deviation (0.59481) shows moderate variability in opinions on this issue, and the negative t-value (-7.143) indicates a significant difference in opinions, highlighting a notable disparity between "no" and "yes" regarding natural causes of the fires.

It can be concluded that the majority of study participants believe that the fires in Collo and Beni Welaban are not due to natural factors, and they perceive other reasons behind them. A considerable percentage is unsure of the main cause, while a few believe the causes are natural.

Table 5: Assessment of Human Negligence's Contribution to Fires in Collo and Beni Oulbane

Do you think human negligence contributes to the occurrence of fires?	Frequency	Percentage (%)	Mean	Standard Deviation	t-Value	Sample Tendency
No	0	0	2.925	0.26505	31.214	Yes
Maybe	6	7.5				
Yes	74	92.5				
Total	80	100				

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Analysis of the Contribution of Human Negligence to Fires:

The table shows that the majority of respondents (92.5%) believe that human negligence contributes to the occurrence of fires, while a very small percentage (7.5%) think that human negligence does not play a significant role in the fires. No participants expressed the opinion that human negligence has no relation to the fires (0%).

The mean (2.9250) indicates that opinions strongly lean towards the belief that human negligence is a significant factor in fire occurrence. The standard deviation (0.26505) shows low variability in opinions, indicating a high level of agreement among participants. The t-value (31.214) signifies a substantial difference between responses, confirming that most participants believe human negligence plays a major role in fires.

According to the majority of participants, human negligence is considered the primary cause of fires, with no support for the contrary view.

Table 6: Impact of Agricultural Activities on the Likelihood of Fires in Collo and Beni Oulbane

Do you think agricultural activities increase the likelihood of fires?	Frequency	Percentage (%)	Mean	Standard Deviation	t-Value	Sample Tendency
No	29	36.3	2.0000	0.26505	0	Maybe
Maybe	22	27.5				
Yes	29	36.3				
Total	80	100				

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Analysis of the Impact of Agricultural Activities on the Likelihood of Fires:

The table shows that the responses are evenly distributed among the three options. Specifically, 36.3%) believe that agricultural activities do not increase the likelihood of fires, while the same percentage (36.3%) think that agricultural activities do increase the likelihood of fires. Meanwhile, 27.5% believe that there is a possibility, but it is not certain.

The mean (2.0000) indicates a balance in opinions between believing that agricultural activities increase the likelihood of fires and not believing so. The standard deviation (0.26505) reflects low variability in opinions, suggesting a relatively high level of agreement among participants. The t-value (0.000) indicates that there is no significant difference in opinions regarding the impact of agricultural activities on the likelihood of fires.

The sample shows a tendency towards varied opinions about the impact of agricultural activities on the likelihood of fires, with a clear balance between the opposing answers (no and yes) and a moderate percentage of participants who think the impact is uncertain.

We conclude that there is variability in opinions regarding the impact of agricultural activities on the likelihood of fires. The majority of participants do not clearly lean towards a neutral opinion, indicating that opinions on this subject are either undefined or diverse.

Analysis of Environmental Awareness Levels Regarding Fire Risks Among Residents:

Table 7: Distribution of Knowledge About Fire Prevention Awareness Programs Among Males and Females in Collo and Beni Welaban, Skikda Province Based on Gender:

The table shows that the percentage of males who have heard about fire prevention awareness

Have you heard about awareness programs on fire prevention in your area?			Have you heard about awareness programs on fire prevention in your area?			Total
			Yes	Not sure	No	
Gender	male	Frequency	23	5	12	40
		Percentage	57.5%	12.5%	30.0%	100.0%
	female	Frequency	17	4	19	40
		Percentage	42.5%	10.0%	47.5%	100.0%
	total	Frequency	40	9	31	80
		Percentage	50.0%	11.3%	38.8%	100.0%
Chi-square value		Degrees of freedom		Statistical significance:		Statistical decision
2.592a		2		0.274		Not significant at 0.05

Source: The table was prepared by the researchers based on the outputs of the SPSS.

Programs was 57.5%, which is higher than the percentage of females who heard about them, at 42.5%. The percentage of males who have not heard about these awareness programs was 30.0%, compared to 47.5% for females. As for those unsure about the existence of such programs, the percentage was similar between males (12.5%) and females (10.0%).

The chi-square value (2.592) with 2 degrees of freedom and a statistical significance of 0.274 indicates that the relationship between gender and hearing about awareness programs is not statistically significant. This means there is no substantial difference between males and females in terms of their exposure to fire prevention awareness programs.

It is evident that hearing about fire prevention awareness programs is not significantly influenced by gender, as the percentages are similar between males and females, and there is no statistically significant relationship.

Table (8) illustrates the differences in environmental awareness levels among residents of the Collo and Beni Oulbaneareas in Skikda Province regarding fire prevention awareness programs, based on the age variable.

Have you heard about awareness programs on fire prevention in your area?			Have you heard about awareness programs on fire prevention in your area?			Total
			Yes	Not sure	No	
Age	20 to 30 years old	Frequency	5	3	13	21
		Percentage	23.8%	14.3%	61.9%	100.0%
	31 to 40 years old	Frequency	21	2	4	27
		Percentage	77.8%	7.4%	14.8%	100.0%
	41 to 50 years old	Frequency	7	4	11	22
		Percentage	31.8%	18.2%	50.0%	100.0%
	over 50 years	Frequency	7	0	3	10
		Percentage	70.0%	0.0%	30.0%	100.0%
total	Frequency	40	9	31	80	
	Percentage	50.0%	11.3%	38.8%	100.0%	
Chi-square value		Degrees of freedom	Statistical significance		Statistical decision	
19.707a		6	0.003		Not significant at 0.05	

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that the age group of 31 to 40 years has the highest percentage of individuals who have heard about fire prevention awareness programs, at 77.8%. This is followed by individuals over 50 years old, with 70.0%, indicating a notable interest in awareness programs among these age groups. Conversely, the age group of 41 to 50 years has a lower percentage of individuals who have heard about these programs, at 31.8%, and the group aged 20 to 30 years has the lowest percentage, at 23.8%.

Additionally, the highest number of individuals who have not heard about these programs is from the 20 to 30-year age group, at 61.9%, followed by the 41 to 50-year age group, at 50.0%. This suggests that awareness of these programs is lower among these younger age groups compared to the older ones. The overall percentage of individuals who have not heard about the awareness programs is 38.8% of the total sample, while 11.3% were unsure.

The chi-square value (19.707) with 6 degrees of freedom and a statistical significance of 0.003 indicates that the relationship between age and knowledge of fire prevention awareness programs is statistically significant. This means age plays an important role in the level of awareness about these programs. Therefore, there is a clear relationship between age group and the level of awareness of fire prevention programs, with older age groups being more informed about these programs compared to younger ones. This highlights the need to focus awareness campaigns more on younger age groups.

Table (9) illustrates the differences in the participation of residents from the Collo and Beni Oulbane areas in Skikda Province in fire risk awareness activities or workshops based on age.

Have you heard about awareness programs on fire prevention in your area?			Have you heard about awareness programs on fire prevention in your area?			Total
			Yes	Not sure	No	
Age	20 to 30 years	Frequency	0	4	17	21
		Percentage	0.0%	19.0%	81.0%	100.0%
	31 to 40 years	Frequency	11	0	16	27
		Percentage	40.7%	0.0%	59.3%	100.0%
	41 to 50 years	Frequency	4	2	16	22
		Percentage	18.2%	9.1%	72.7%	100.0%
	over 50 years	Frequency	2	0	8	10
		Percentage	20.0%	0.0%	80.0%	100.0%
	total	Frequency	17	6	57	80
		Percentage	21.3%	7.5%	71.3%	100.0%
Chi-square value		Degrees of freedom		Statistical significance		Statistical decision
16.914a		6		0.010		Not significant at 0.05

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that the age group of 20 to 30 years has the highest percentage of individuals who did not participate in any fire risk awareness activities or workshops, at 81.0%, followed by those over 50 years old, at 80.0%. This

indicates low participation in these activities among these age groups. For the 31 to 40-year age group, the percentage of non-participants is 59.3%, while the 41 to 50-year age group has a non-participation rate of 72.7%.

On the other hand, those who participated in awareness activities or workshops were predominantly from the 31 to 40-year age group, with 40.7% participation, followed by those over 50 years old at 20.0%. The 20 to 30-year age group showed no participation, with a percentage of 0.0%.

The chi-square value (16.914) with 6 degrees of freedom and a statistical significance of 0.010 indicates a statistically significant relationship between age and participation in awareness activities.

It can be concluded that participation in fire risk awareness activities varies significantly among age groups, with older age groups being more likely to participate compared to younger ones. However, there is a clear need to increase awareness and participation among younger age groups, especially those who have not registered any participation.

Table (10) shows the distribution of sample participation in fire risk awareness activities and workshops in the Collo and Beni Oulbaneareas of Skikda Province based on gender.

Have you heard about awareness programs on fire prevention in your area?			Have you heard about awareness programs on fire prevention in your area?			Total
			Yes	Not sure	No	
Gender	male	Frequency	12	2	26	40
		Percentage	30.0%	5.0%	65.0%	100.0%
	female	Frequency	5	4	31	40
		Percentage	12.5%	10.0%	77.5%	100.0%
	total	Frequency	17	6	57	80
		Percentage	21.3%	7.5%	71.3%	100.0%
Chi-square value		Degrees of freedom	Statistical significance:		Statistical decision	
3.988a		2	0.136		Not significant at 0.05	

Source: The table was prepared by the researchers based on the outputs of the SPSS. The table shows that the percentage of males who did not participate in any fire risk awareness activities or workshops was 65.0%, while the percentage of

females was 77.5%. Among those who did participate in awareness activities, the percentage for males was 30.0%, which is higher than the 12.5% for females. For those who do not remember their participation, the percentage was 5.0% for males and 10.0% for females.

The chi-square value of (3.988) with 2 degrees of freedom and a statistical significance of (0.136) indicates that the relationship between gender and participation in awareness activities is not statistically significant, meaning there is no substantial difference between males and females in participating in fire risk awareness activities.

We conclude that there is no clear effect of gender on participation in fire risk awareness activities, as the percentages are relatively similar between males and females, and there was no statistically significant relationship.

Table (11) shows the distribution of individuals' responses regarding their knowledge of fire prevention awareness programs based on the variable of educational level:

Have you heard about awareness programs on fire prevention in your area?			Have you heard about awareness programs on fire prevention in your area?			Total
			Yes	Not sure	No	
Educationa l Level	Secondary	Frequency	4	0	0	4
		Percentage	100.0%	0.0%	0.0%	100.0%
	University	Frequency	31	5	17	53
		Percentage	58.5%	9.4%	32.1%	100.0%
	Post graduate	Frequency	5	4	14	23
		Percentage	21.7%	17.4%	60.9%	100.0%
	Total	Frequency	40	9	31	80
		Percentage	50.0%	11.3%	38.8%	100.0%
Chi-square value		Degrees of freedom	Statistical significance		Statistical decision	
12.878a		4	0.012		Not significant at 0.05	

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that individuals with a secondary education level exhibited full awareness of fire prevention awareness programs with a percentage of 100.0%. In contrast, among those with a university education, 58.5% had heard about

these programs, while 32.1% had not. In postgraduate education, 60.9% had never heard of these programs, compared to 21.7%.

The chi-square value (12.878) with 4 degrees of freedom and a statistical significance of 0.012 indicates a statistically significant relationship between educational level and knowledge of fire prevention awareness programs. This means that educational level plays a role in determining awareness of these programs.

Thus, we conclude that the relationship between educational level and awareness of awareness programs is statistically significant. Individuals with secondary education seem to have more knowledge about these programs compared to those with higher educational levels, reflecting a variance in access to this information based on educational background.

Table (12) shows the distribution of individuals' responses regarding their participation in fire risk awareness activities and workshops based on educational level.

Have you ever participated in any awareness activity or workshop about fire risks?			Have you ever participated in any awareness activity or workshop about fire risks?			Total
			Yes	Not sure	No	
Educationa l Level	Secondar y	Frequency	2	0	2	4
		Percentage	50.0%	0.0%	50.0%	100.0%
	Universit y	Frequency	12	4	37	53
		Percentage	22.6%	7.5%	69.8%	100.0%
	Post graduate	Frequency	3	2	18	23
		Percentage	13.0%	8.7%	78.3%	100.0%
	Total	Frequency	17	6	57	80
		Percentage	21.3%	7.5%	71.3%	100.0%
Chi-square value		Degrees of freedom	Statistical significance:		Statistical decision	
3.105a		4	0.540		Not significant at 0.05	

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that participants with a secondary education level were evenly distributed between those who participated in fire risk awareness activities or workshops and those who did not, with a participation rate of 50.0%. For those

with a university education, the percentage of nonparticipants was 69.8%, while the participation rate was 22.6%. The non-participation rate was the highest among those with postgraduate education, at 78.3%, followed by a participation rate of 13.0%.

The chi-square value (3.105), with 4 degrees of freedom and a statistical significance of 0.540, indicates that the relationship between educational level and participation in fire risk awareness activities is not statistically significant. This means that educational level does not significantly influence participation in these activities.

We conclude that although participation in fire risk awareness activities varies by educational level, the statistical analysis shows that these differences are not statistically significant, indicating that educational level does not have a clear impact on participation in these activities.

7.3. Presentation and Analysis of Data Related to Preventive Measures and Procedures to Enhance Environmental Awareness to Reduce Fire Incidents:

Table (13) shows the impact of educating children and youth about environmental culture on reducing fire risks.

Do you think that the fires in your area are caused by natural factors?	Frequenc y	Percentag e (%)	Mean	Standard Deviatio n	T- value	Sample Directio n
No	2	2.5	2.9125	0.36261	22.508	Yes
Maybe	3	3.8				
Yes	75	93.8				
Total	80	100.0				

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The data analysis related to the question, "Do you believe that educating children and youth about environmental culture can reduce fire risks?" The data analysis reveals that a significant majority of the sample (93.8%) holds the belief that environmental education can reduce fire risks, indicating a high awareness of the importance of environmental education. In contrast, a small percentage of the sample (3.8%) may see some potential for impact, while only 2.5% view it the opposite way.

The mean value is (2.9125) and the standard deviation is (0.36261), indicating a convergence of opinions and low dispersion among respondents. Meanwhile, the

T-value (22.508) is statistically significant, confirming the strong correlation between participants' awareness and the importance of environmental education. This reflects a positive trend in the sample towards promoting environmental education as an effective means of reducing fire risks, and indicates the need to intensify educational and awareness programs to achieve better results in this area.

Table (14) illustrates the evaluation of the role of media in raising awareness about fire risks.

What do you think is the role of the media in raising awareness about fire risks?	Frequency	Percentage (%)	Mean	Standard Deviation	T-value	Sample Direction
No	8	10.0	3.9000	1.37427	12.366	Large
Weak	5	6.3				
Moderate	16	20.0				
Large	9	11.3				
Very Large	42	52.5				
Total	80	100.0				

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The analysis of the data reveals that the majority of the sample considers the role of media in raising awareness about fire risks to be very significant. Specifically, 52.5% of respondents indicated that the role is "very significant," while 11.3% saw it as "significant." The remaining percentage is divided between those who view the role as "moderate" (20%) and "weak" (6.3%), with 10% indicating that the media has no role in this regard.

The mean value is (3.9000), which is high, reflecting participants' recognition of the importance of media in spreading awareness. The standard deviation is (1.37427), indicating some variation in opinions among participants. The T-value (12.366) is statistically significant, confirming that the media's role is perceived as substantial by the sample. This suggests the importance of continuing and intensifying media efforts in raising awareness about fire risks through educational programs, prevention campaigns, and training.

Table (15) illustrates the most effective methods for raising awareness about fire risks.

What do you think is the most effective way to raise awareness about fire risks?	Frequency	Percentage (%)
TV and radio programs	8	10.0
Social media	33	41.3
Lectures and workshops	6	7.5
Posters and advertisements in public places	24	30.0
Other	9	11.3
Total	80	100.0

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that social media is the most effective means of raising awareness about fire risks, with 41.3% of respondents identifying it as such. This reflects its broad impact and rapid reach to various audiences. Following this, public notices and advertisements come in at 30.0%, indicating their importance for local and direct awareness. Television and radio programs are in third place with 10.0%, highlighting the role of traditional media, though it is less impactful compared to digital means. Lectures and workshops received 7.5%, representing an effective educational method but with a more limited reach. Finally, 11.3% of participants chose other methods, suggesting the potential for new and innovative approaches to enhance awareness.

We conclude that digital strategies, particularly social media, are currently the most effective.

Table (16) outlines the proposed measures to enhance the prevention of forest fires.

What are the proposed measures to enhance the prevention of forest fires?	Frequency	Percentage (%)
Increasing awareness campaigns	8	10
Enforcing deterrent laws against starting fires	52	65
Providing firefighting equipment in public places	4	5
Training citizens on how to handle fires	8	10
All of the above	8	10
Total	80	100

Source: The table was prepared by the researchers based on the outputs of the SPSS.

The table shows that the majority of the sample (65.0%) prefers implementing deterrent laws against fire ignitions as the most important measure to be reinforced to reduce forest fires. In contrast, 10.0% of participants view

increasing awareness campaigns and training citizens on how to handle fires as important measures as well. Meanwhile, 5.0% of the sample considers providing firefighting equipment in public places as a necessary measure. Finally, 10.0% of the sample believes that all these measures combined are essential for reducing forest fires.

Based on this, it is clear that enforcing deterrent laws is the most preferred measure among the sample, indicating their recognition of the importance of legal aspects in combating forest fires, along with the need for awareness and training for a comprehensive approach.

8.Findings in Relation to the Hypotheses:

Hypothesis 1: There are multiple primary causes of fires in the regions of Qal, Beni, and Lebane in Skikda Province, related to human activities and environmental factors.

The validation of the first hypothesis, which posits that "there are multiple primary causes of fires in the regions of Qal, Beni, and Lebane in Skikda Province, related to human activities and environmental factors," was supported partially based on statistical findings. The data indicate that human negligence is predominantly viewed as the leading cause of fires, with a considerable portion of participants attributing fire incidents to human-related actions rather than natural occurrences.

Analyzing the data from **Table 5**, it becomes clear that 52.5% of participants do not believe that natural factors are the main cause of fires. In fact, only a small fraction, 5.0%, attribute fire outbreaks primarily to natural causes. This suggests a prevailing view among respondents that natural elements, such as extreme weather conditions or lightning, play a minimal role in igniting fires in these regions, pointing instead to other, more impactful causes.

Furthermore, **Table 6** reinforces the idea that human negligence is a significant factor, as 92.5% of participants believe human actions substantially contribute to fire incidents. This finding aligns with numerous studies on the relationship between human activities—such as improper disposal of waste, unattended fires, and lack of fire-prevention measures—and increased fire risks. Thus, human activity emerges as a central, highly influential cause of fires.

Turning to the role of agricultural activities, **Table 7** reveals divided perspectives. Participants' responses are evenly split regarding whether agricultural activities contribute to fire risks. This split reflects a level of

uncertainty, as half of the respondents acknowledge the possibility of an impact from agricultural practices, like slash-and-burn or uncontrolled clearing, while the other half do not. This ambiguity highlights a gap in local awareness or mixed evidence regarding agricultural influence on fire risks.

In conclusion, the findings provide substantial insight into the primary causes of fires in the regions studied, confirming that while human negligence is recognized as the most influential factor, the roles of natural and agricultural factors remain complex and open to further examination. This analysis effectively addresses the first research question on identifying the main causes of fires, underscoring the importance of addressing human behaviors in fire prevention efforts.

Hypothesis 2: There is a varied level of environmental awareness among the residents of Qal, Beni, and Lebane in Skikda Province regarding fire risks, and this level is influenced by age, gender, and educational level.

The results from the statistical analysis partially validate the second hypothesis, which states that there is a diverse level of environmental awareness regarding fire risks among the residents of Qal, Beni, and Lebane in Skikda Province. This awareness is indeed influenced by demographic factors such as age, gender, and educational level.

According to **Table 8**, a higher percentage of males (57.5%) reported hearing about fire awareness programs compared to females (42.5%). However, the difference between genders is not statistically significant, as indicated by the chi-square value of 2.592 and a p-value of 0.274, which is greater than the conventional significance threshold of 0.05. This suggests that gender does not have a meaningful effect on the awareness of fire safety programs in these regions.

When considering **age**, the data from **Tables 9 and 10** demonstrate that awareness and participation in fire awareness programs increase with age. Older age groups exhibit significantly higher levels of knowledge and involvement in these programs compared to younger individuals. The statistical analysis confirms this trend with a significant relationship between age and awareness, with a chi-square value of 19.707 and a p-value of 0.003 for knowledge, and a chi-square value of 16.914 and a p-value of 0.010 for participation. These findings suggest that older individuals are more likely to be informed about fire risks and actively engage in awareness activities.

In terms of **educational level**, the data from **Tables 11 and 12** reveal that individuals with secondary education demonstrated the highest level of knowledge about awareness programs, with those holding higher education degrees showing lower levels of knowledge. This could indicate a disconnect between formal education and the practical knowledge needed to engage with environmental awareness programs. Despite this, the analysis of **Table 13**, which examines participation in awareness activities, shows no statistically significant difference based on educational level, as the chi-square value of 3.105 and the p-value of 0.540 suggest that education does not substantially affect participation in such programs.

In summary, the hypothesis is partially confirmed: while factors like age significantly influence environmental awareness, gender and educational level have a more limited impact on awareness and participation in fire risk education in Skikda Province.

Thus, we have answered the second question, with environmental awareness regarding fire risks being more significantly affected by age, while the effects of gender and educational level are less pronounced.

Hypothesis 3: Preventive measures and procedures can be enhanced by promoting environmental culture, contributing to the reduction of fire incidents in the regions of Qal, Beni, and Lebane.

The statistical analysis supports the third hypothesis, which posits that promoting environmental culture can strengthen preventive measures and contribute to reducing fire incidents in the regions of Qal, Beni, and Lebane. The results from the tables provide strong evidence for this.

As shown in **Table 14**, a significant 93.8% of the sample believes that educating children and youth about environmental culture plays a crucial role in reducing fire risks. This high percentage highlights the general consensus on the importance of early environmental education as a preventive measure against fire outbreaks.

In **Table 15**, the role of media in raising awareness about fire risks and environmental culture is deemed "very significant" by 52.5% of participants, emphasizing the pivotal role media plays in disseminating critical information. The media's ability to reach a wide audience and influence public opinion is regarded as an effective tool in promoting preventive actions.

Further, **Table 16** demonstrates that social media is considered the most effective medium for spreading awareness, with 41.3% of respondents identifying it as the most influential platform. This underscores the rapid communication and extensive reach of social media, making it an essential tool for educating the public and promoting fire prevention measures.

Lastly, **Table 17** reveals that 65.0% of the sample views the enforcement of strict deterrent laws as the most critical measure for reducing fire incidents. This indicates that alongside raising environmental awareness, the imposition of legal regulations and penalties is seen as a vital strategy in reducing the occurrence of fires.

In conclusion, the hypothesis is validated: promoting environmental culture, particularly through education, media, social media, and the enforcement of legal measures, can significantly enhance preventive strategies and contribute to a reduction in fire incidents in the regions of Qal, Beni, and Lebane.

Thus, we have answered the third question about the preventive measures and procedures that can be enhanced through environmental culture to reduce fire incidents in these regions.

9. Conclusion:

In conclusion, this study underscores the significance of environmental culture in enhancing awareness of fire risks, particularly in the regions of Qal, Beni, and Lebane in Skikda Province. Addressing the issue of fires requires a deep understanding of the primary causes and influencing factors, as well as the strengthening of preventive measures through the promotion of environmental culture.

Our efforts to address the study's problem have revealed that environmental culture plays a crucial role in raising awareness and educating people about fire risks, thereby contributing to reducing their occurrence and protecting the environment and local communities. The study's key findings pertain to the sub-questions.

1. **Primary Causes of Fires:** The results indicate that human negligence is considered the main cause of fires, with 92.5% of participants identifying it as a significant factor. Conversely, natural factors are not seen as the primary cause, as 52.5% of participants believe that fires are not caused by natural factors. This highlights the importance of focusing on awareness about avoiding human negligence.

2. **Variation in Environmental Awareness:** A data analysis revealed a variation in environmental awareness regarding fire risks based on age, gender, and educational level. Awareness of and participation in educational programs increased with age, with individuals aged 31 to 40 being the most informed and involved. Males were more familiar with awareness programs compared to females, but the differences between genders were not statistically significant. Regarding educational level, individuals with secondary education showed higher awareness of educational programs, whereas those with higher education had lower awareness. However, the differences in participation were not statistically significant.

3. **Preventive Measures and Procedures:** The study found that promoting environmental culture can significantly impact reducing fire incidents. According to 93.8% of participants, teaching environmental culture can reduce fire risks. Additionally, the results showed that media, especially social media, plays a vital role in raising awareness about fire risks, and enforcing deterrent laws is considered a fundamental measure for reducing fires.

Overall, the study concludes that enhancing environmental culture is crucial for effective fire prevention and underscores the importance of integrating environmental education with legal measures to mitigate fire risks.

10. Recommendations:

Based on this study's findings, we recommend the following measures to improve environmental culture and fire risk awareness in the regions of Qal, Beni, and Lebane in Skikda Province:

1. Improve environmental awareness programs:

Expand environmental awareness programs to cover all age groups, with a particular focus on youth and individuals with higher educational levels. This can be achieved through intensive awareness campaigns using traditional and social media, as well as workshops and lectures in schools and community centers.

2. Target less aware groups:

Allocate more effort to increasing environmental awareness among younger age groups, such as those aged 20 to 30, who were found to be less engaged in awareness activities. Tailored educational programs, including the use of social media to capture their attention, should be developed for this demographic.

3. Educate and train teachers and families.

Integrate environmental culture into educational curricula, and train teachers on how to incorporate these concepts into their classrooms. Additionally, raise awareness among families about the importance of environmental culture through targeted educational programs that promote awareness among all family members.

4. Enhance the Role of Media:

Strengthen the role of media in raising awareness about fire risks by effectively utilizing social media to disseminate educational messages and educate the public. Media agencies should collaborate with environmental organizations to provide engaging and informative content.

5. Enforce environmental laws:

Support and strictly enforce deterrent laws against fire ignitions. Rigorous implementation of these laws can play a significant role in reducing fire incidents and enhancing awareness about the importance of adhering to environmental regulations.

6. Encourage ongoing research and studies.

Support future research and studies focused on evaluating the effectiveness of environmental awareness programs and strategies to promote environmental culture. Continuous monitoring and analysis of the actual impacts of implemented measures should be conducted, and recommendations for improvement should be provided.

Implementing these recommendations will contribute to a more effective approach to environmental education and fire risk management, ultimately leading to a safer and more informed community.

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