

Environmental Justice And Law: Protecting Vulnerable Communities From Environmental Hazards

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Abstract

The idea of environmental justice centers on treating everyone equally and involving them meaningfully in the creation and implementation of environmental laws, rules, and policies, irrespective of their nationality, race, or income. Protecting Vulnerable Communities from Environmental Hazards: Environmental Justice and Law" is a study that attempts to investigate how well legal frameworks shield marginalized communities from environmental hazards, which frequently disproportionately impact vulnerable groups. The goals are to evaluate the effectiveness of the current environmental laws, look into the difficulties in putting them into practice, and examine how the public policy and judicial systems contribute to environmental justice for these communities. This study's methodology combines both qualitative and quantitative techniques. A thorough analysis of case studies, legal precedents, and court decisions is complemented by the gathering of primary data via surveys. 252 respondents from a range of communities at risk from environmental hazards, including air and water pollution, are included in the survey sample. In-depth interviews with legal professionals, community leaders, and environmental law specialists are also included in the study to obtain a better understanding of the difficulties in achieving environmental justice. Significant flaws in the implementation and enforcement of environmental laws are revealed by the findings. The lack of access to legal remedies, inadequate government intervention, and weak regulatory frameworks continue to disproportionately harm vulnerable communities. Legal protections are frequently present but either not enforced properly or are completely disregarded. The study comes to the conclusion that improved enforcement of current laws, stronger legal frameworks, and increased involvement of marginalized communities in decision-making processes are urgently needed. In order to achieve environmental justice, the conclusion highlights the necessity of reforms that guarantee equal access to legal protection and give marginalized populations' needs top priority.

Keywords: *Environmental justice, Legal frameworks, Vulnerable communities, Environmental hazards, Public policy, Regulatory enforcement*

1.Introduction

Environmental justice is a crucial issue that has evolved over the past few decades, addressing the disparities in environmental protection and hazards faced by marginalized communities. The concept first gained prominence in the United States in the 1980s, when activists began to highlight how minority and low-income populations were disproportionately exposed to pollution, hazardous waste, and environmental degradation. Since then, the scope of environmental justice has broadened, encompassing global concerns about how vulnerable communities worldwide bear the brunt of environmental hazards, often due to systemic inequalities.

The term "environmental justice" initially emerged from grassroots movements that sought to rectify the unequal distribution of environmental risks. Over time, it gained traction in legal frameworks and policy discussions, leading to the recognition that environmental protection must be applied equitably across all populations. The environmental justice movement advocates for fair treatment in environmental policies and practices, emphasizing that no group should disproportionately suffer the negative impacts of industrial activities, resource extraction, or pollution.

In many countries, including India, environmental justice has become a growing concern as rapid industrialization and urbanization have intensified the exposure of vulnerable communities to environmental hazards. These communities, often lacking the political power or financial means to defend their rights, are most affected by environmental degradation.

In response to growing awareness of environmental injustice, governments worldwide have introduced various initiatives. In India, the government has implemented several measures to address environmental risks, such as the National Green Tribunal (NGT) Act, 2010, which aims to provide effective and expeditious justice in cases involving environmental protection and conservation. Other key initiatives include the Air (Prevention and Control of Pollution) Act, 1981, and the Water (Prevention and Control of Pollution) Act, 1974. These laws aim to control pollution and safeguard natural resources, but their implementation often falls short in marginalized regions.

The Indian government has also launched specific programs to improve environmental protection, such as the National Clean Air Programme (NCAP), which aims to reduce air pollution levels in urban centers. However, these initiatives often face challenges related to inadequate enforcement, limited resources, and a lack of political will to prioritize the needs of vulnerable communities.

Several factors influence the ability of legal frameworks to protect vulnerable communities from environmental hazards. One key factor is the lack of legal literacy among marginalized groups, which limits their ability to assert their rights. Additionally, the inadequate enforcement of existing environmental laws means that even when protections exist on paper, they are not effectively applied in practice. Corruption, bureaucratic inefficiency, and the prioritization of economic development over environmental concerns further exacerbate the problem.

The location of marginalized communities near industrial zones, waste disposal sites, or areas prone to natural disasters also increases their vulnerability. Economic inequality, limited access to healthcare, and poor infrastructure compound the effects of environmental hazards on these populations.

Current trends in environmental justice emphasize the need for a more inclusive approach to environmental protection, one that considers the voices of vulnerable communities in decision-making processes. There is a growing recognition that climate change, pollution, and other environmental hazards disproportionately affect these groups, and addressing this requires comprehensive legal reforms and more robust enforcement mechanisms.

Internationally, countries like the United States and the European Union have made significant strides in integrating environmental justice into policy. The U.S. Environmental Protection Agency (EPA), for example, has launched initiatives aimed at addressing the cumulative impacts of environmental hazards on disadvantaged populations. Similarly, the European Union's Green Deal highlights the need for a just transition that leaves no community behind.

When compared to other countries, India's legal framework for environmental justice lags in enforcement and community involvement. While countries like the United States have established comprehensive regulatory mechanisms to address environmental justice, including the involvement of affected communities in decision-making, India is still in the early stages of implementing such inclusive measures. For example, cities like Los Angeles and New York have strong environmental justice policies, with dedicated programs aimed at reducing pollution in vulnerable neighbourhoods. In contrast, Indian cities, including those like Delhi and Chennai, face significant challenges related to air and water pollution, particularly in marginalized communities. Although the Indian government has introduced initiatives such as the National Green Tribunal, there remains a substantial gap between policy and implementation. While environmental justice is gaining attention worldwide, there is still much work to be done to protect vulnerable communities from environmental hazards, especially in countries like India where rapid industrialization continues to place marginalized populations at risk. Legal reforms, stronger enforcement, and more inclusive governance are essential for achieving true environmental justice.

1.2 Research Problem

The research problem focuses on the persistent environmental injustices faced by vulnerable communities, particularly in developing countries like India. Despite the existence of environmental laws, these populations are disproportionately affected by environmental hazards due to weak enforcement, lack of legal access, and minimal community involvement in decision-making processes. This study aims to explore the gaps in legal frameworks and their real-world effectiveness in protecting marginalized groups from environmental risks.

1.3 Research Gap

The research gap identified in this study lies in the inadequate understanding of how existing environmental laws are enforced and their effectiveness in protecting vulnerable communities from environmental hazards. While various legal frameworks exist, limited research has been conducted on the practical challenges faced in their implementation, especially in marginalized regions. Additionally, there is a lack of comprehensive studies that analyze the role of community participation and legal access in achieving environmental justice.

1.4 Research Questions

- How effective are existing environmental laws in protecting vulnerable communities from environmental hazards, and what challenges hinder their enforcement?
- What role does community participation play in ensuring environmental justice, and how can legal frameworks be improved to enhance access to legal remedies for marginalized populations?

1.5 Objectives

- To evaluate the effectiveness of existing environmental laws in protecting vulnerable communities from environmental hazards, focusing on the enforcement mechanisms and real-world impacts.
- To analyze the role of government policies and initiatives in promoting environmental justice and addressing the needs of marginalized communities affected by environmental risks.

2. Literature Review

The concept of environmental justice has evolved significantly over the years, with scholars making key contributions to understanding how legal frameworks protect vulnerable communities from environmental hazards. **Bullard (1990) and Bryant (1995)** were among the early pioneers in environmental justice, highlighting the disproportionate exposure of minority and low-income populations to environmental risks in the United States. Their work laid the foundation for further research on how systemic inequalities affect marginalized communities globally. **Mohai, Pellow, and Roberts (2009)** expanded this analysis by examining how political and economic power dynamics influence environmental protection, concluding that marginalized communities often lack access to the resources necessary for legal redress. In India, legal frameworks such as the National Green Tribunal (NGT), established in 2010, have been designed to provide environmental justice. **Ghosh (2015)** analyzed the effectiveness of the NGT in addressing environmental disputes and found that, while it plays a critical role in enforcing environmental laws, challenges such as weak enforcement mechanisms and limited jurisdiction impede its ability to protect vulnerable populations. **Narain and Chaturvedi (2016)** further explored the implementation of environmental laws in India, identifying bureaucratic inefficiencies, corruption, and the prioritization of economic development over environmental protection as key barriers to achieving justice for marginalized groups. **Ramesh and Dey (2017)** focused on the legal challenges faced by vulnerable communities in accessing justice. Their research revealed that many affected populations are unaware of their legal rights and lack the resources to pursue legal action, resulting in continued exposure to environmental risks. In particular, they highlighted the burden of proof placed on these communities in environmental litigation, which often requires scientific evidence that they are unable to provide. Similarly, **Raghavan and Rao (2021)** critiqued recent legal reforms, such as the Compensatory Afforestation Fund Management and Planning Authority (CAMPA), arguing that these reforms do not adequately address the long-term environmental damage caused to local communities, particularly indigenous populations. Comparative studies have also contributed to understanding how different countries address environmental justice. For example, **Ramesh (2016)** compared India's environmental justice efforts with those in the United States and Europe, focusing on **the Aarhus Convention (1998)** in the European Union, which emphasizes public access to information and participation in environmental decision-making. He concluded that India could benefit from adopting similar frameworks to improve transparency and community engagement in environmental governance. The objectives of this body of research include evaluating the effectiveness of legal frameworks in protecting vulnerable communities, identifying barriers to the enforcement of environmental laws, and comparing national efforts with international standards. The research methodologies employed in these studies are diverse, ranging from qualitative analyses of legal frameworks and case studies to quantitative assessments of enforcement mechanisms and their impact on marginalized communities. The research framework in most studies involves a mixed-methods approach that combines legal analysis with field research, including interviews with affected communities and environmental law experts. Major findings from these studies indicate that, while legal frameworks for environmental protection exist, their implementation is often insufficient,

leaving vulnerable communities exposed to significant risks. Weak enforcement, lack of legal literacy, and inadequate access to justice are recurring themes across the literature. Additionally, international comparisons reveal that countries like the United States and members of the European Union have more comprehensive frameworks for addressing environmental justice, with greater emphasis on community participation and legal accountability. In conclusion, the literature on environmental justice and law highlights the need for stronger legal enforcement, better public participation, and legal reforms that prioritize the protection of vulnerable communities. Researchers such as **Bullard (1990), Ghosh (2015), and Raghavan and Rao (2021)** have contributed to a growing body of knowledge that underscores the importance of bridging the gap between policy and practice. Moving forward, future research should focus on developing more robust legal frameworks that integrate international best practices and ensure equitable environmental protection for all communities.

Shrivastava and Dhawan (2015) explored the environmental impacts on marginalized communities in urban and rural India, focusing on the socio-economic vulnerabilities these populations face. The study's objective was to analyze how environmental degradation exacerbates poverty and inequality, emphasizing the role of weak enforcement of environmental regulations. The authors used a mixed-methods approach, combining case studies and statistical data from pollution control boards. They found that environmental laws in India, while robust on paper, were ineffective in protecting vulnerable communities due to corruption, lack of resources, and inefficient governance. Shrivastava and Dhawan concluded that strengthening local governance and public participation in environmental decision-making could improve outcomes for marginalized populations.

Pathak (2018) analyzed the challenges in implementing India's environmental laws, particularly in rural areas. The study aimed to identify barriers to law enforcement and the gaps between legal provisions and their practical application. Using qualitative methods, Pathak conducted interviews with environmental officials and legal experts, finding that lack of training, limited infrastructure, and political interference significantly hindered the effectiveness of environmental protections. The research framework emphasized the need for capacity-building within regulatory agencies and recommended reforms to decentralize environmental governance. Pathak concluded that empowering local authorities and increasing transparency were essential for achieving environmental justice.

Sahu (2016) focused on the intersection of environmental law and public health, examining how pollution disproportionately affects low-income and minority communities in India. The objective was to analyze the legal mechanisms available to protect public health from environmental hazards. Sahu employed a legal research framework, reviewing case law and statutory provisions related to air and water pollution. The findings revealed that public health concerns were often overlooked in environmental litigation, with a lack of coordination between health agencies and environmental regulators. Sahu concluded that integrating public health considerations into environmental law enforcement was crucial for ensuring comprehensive protection for vulnerable communities.

Gupta and Rajan (2017) examined the role of civil society organizations in promoting environmental justice in India. Their objective was to analyze how non-governmental organizations (NGOs) have influenced environmental policy and advocacy. Using a case study methodology, they explored successful environmental litigation led by NGOs and assessed their impact on marginalized communities. The study highlighted the positive role of NGOs in raising awareness and holding the government accountable for environmental protection. However, it also noted the limitations faced by NGOs, such as funding constraints and political opposition. Gupta and Rajan concluded that civil society's continued involvement is essential for addressing gaps in government enforcement of environmental laws.

Banerjee and Sen (2019) studied the impact of industrial pollution on tribal communities in India, with a specific focus on mining regions. The objective was to investigate how legal protections for indigenous populations are applied in areas affected by resource extraction. Using both qualitative and quantitative research methods, they conducted surveys and interviews with tribal communities living near mining operations. The findings indicated that despite legal protections under the Forest Rights Act, these communities continued to suffer from environmental degradation due to weak law enforcement and the prioritization of industrial interests. Banerjee and Sen concluded that stricter enforcement of environmental laws and better recognition of tribal land rights were needed to protect these vulnerable populations.

Singh (2020) explored the international dimensions of environmental justice, comparing India's legal frameworks with those of Brazil and South Africa. The study's objective was to evaluate how different legal systems address environmental injustice in developing countries. Singh used a comparative legal research framework, analyzing case law, statutory provisions, and enforcement mechanisms in each country. The findings highlighted similarities in the challenges faced by marginalized communities in accessing environmental justice, such as weak enforcement, political interference, and economic

pressures. However, Singh noted that Brazil and South Africa had more advanced public participation mechanisms, which could serve as models for India. The study concluded that strengthening public participation and legal accountability was critical for advancing environmental justice in India.

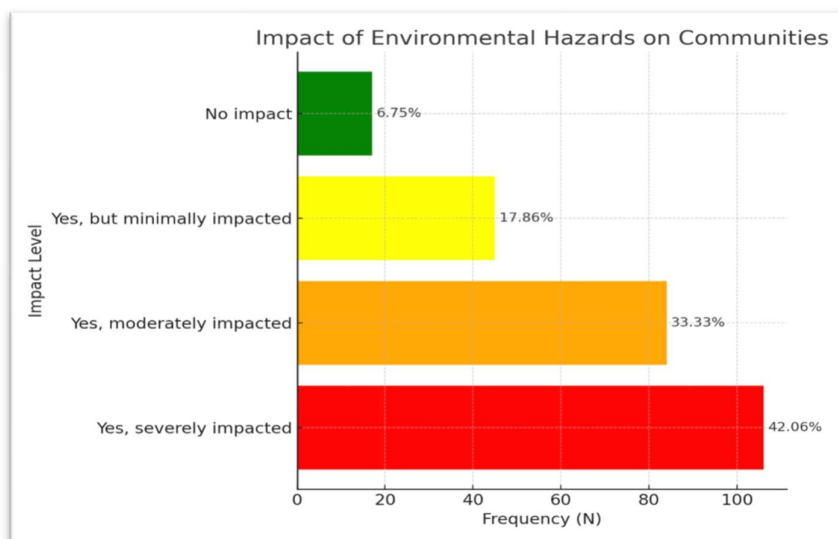
3.Methodology

This study adopts a mixed-methods research approach, combining both qualitative and quantitative data to evaluate the effectiveness of environmental laws in protecting vulnerable communities from environmental hazards. The sampling method used is stratified random sampling, ensuring representation from various marginalized communities exposed to environmental risks. The sample size consists of 252 individuals, selected from regions prone to air and water pollution. The sampling frame includes residents from industrial, rural, and urban areas in India, where environmental hazards are prominent. The study focuses on independent variables such as government policies, law enforcement, and community participation, while the dependent variables include the level of environmental degradation and the health impacts on vulnerable communities. The research tools utilized are percentage analysis to determine the extent of environmental issues, Chi-square tests to assess the relationship between variables like law enforcement and pollution levels, and ANOVA to compare environmental justice efforts across different regions.

4.Analysis & Interpretation

Figure 1: Impact of Environmental Hazards on communities

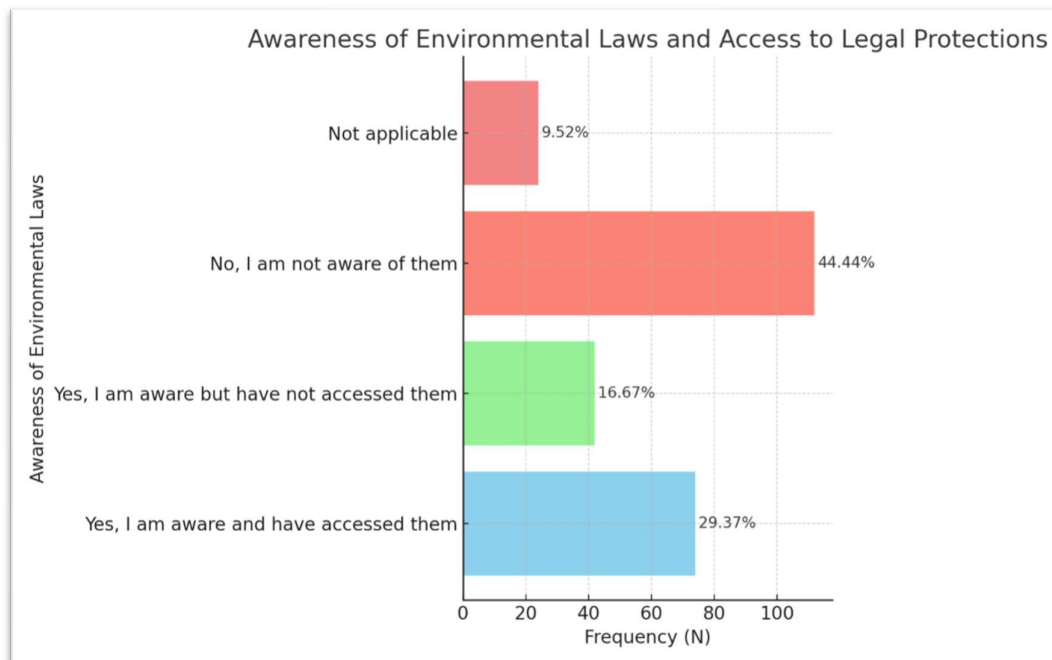
Here Figure 1 Shows that the bar chart illustrates how respondents perceive the impact of environmental hazards,



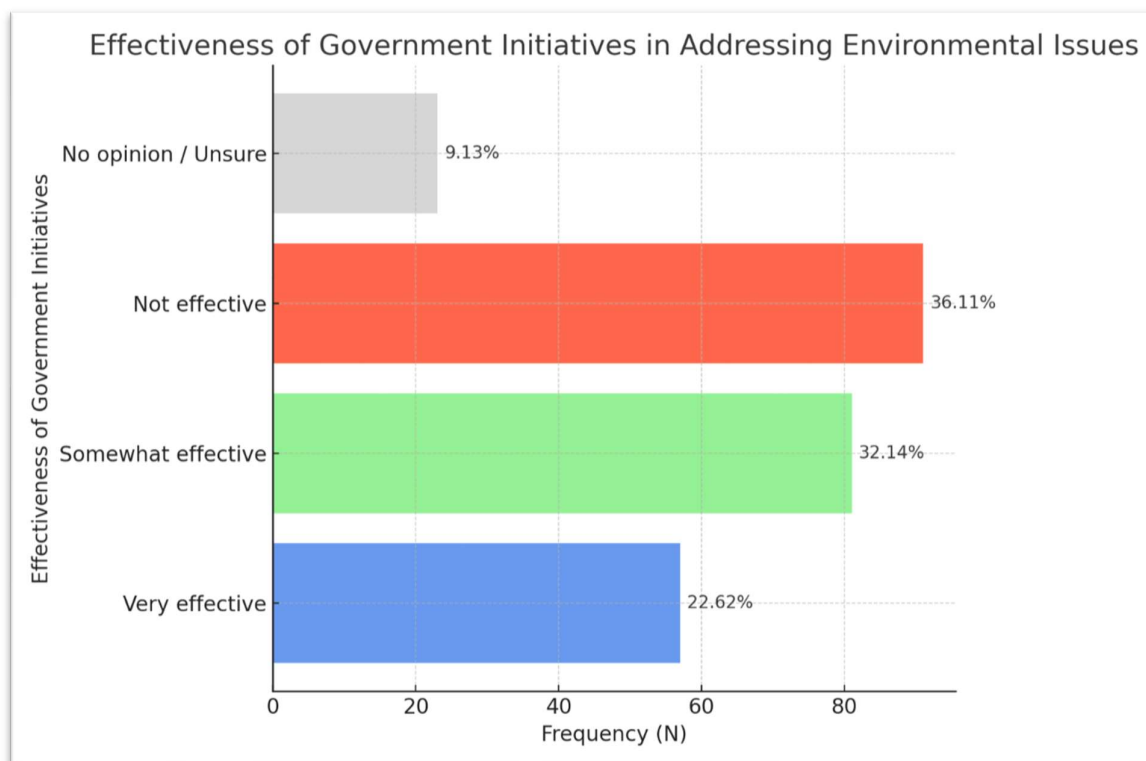
such as air or water pollution, on their daily lives. The largest group (42.06%, in red) reports that they are **severely impacted** by environmental hazards. This suggests that a significant portion of the population experiences major disruptions due to pollution, potentially affecting their health and quality of life. About one-third of respondents (33.33%, in orange) feel **moderately impacted** by environmental issues. This indicates that while the impact may not be as severe as the first group, many people still face considerable challenges related to pollution. A smaller portion (17.86%, in yellow) reported being **minimally impacted** by environmental hazards. While these respondents experience some effects, the impact is relatively minor compared to other groups. Only a small fraction (6.75%, in green) of respondents reported **no impact** from environmental hazards. This suggests that very few individuals or communities remain unaffected by pollution or environmental risks.

Figure 2: Awareness of Environmental law and access to legal protection

Here Figure 3 Shows that the bar chart illustrates respondents' awareness of existing environmental laws and their access to legal protections. The largest group of respondents (44.44%) indicated that they are **not aware** of environmental laws or legal remedies available to them. This suggests a significant gap in legal literacy and awareness among vulnerable communities, highlighting the need for increased education and outreach regarding environmental protections. About 29.37% of respondents are both **aware** of environmental laws and have



accessed them. While this is a positive sign, it also shows that fewer than one-third of respondents are actively engaging with legal remedies available to protect their community from environmental risks. A smaller proportion (16.67%) of respondents are **aware** of the laws but have **not accessed** them. This could indicate barriers to accessing legal protections, such as cost, complexity, or fear of consequences, despite knowing about their existence. Only 9.52% of respondents indicated that this question was **not applicable** to them, which could include those who do not feel affected by environmental hazards or those outside the jurisdiction of the laws in question.

Figure 3: Effectiveness of government initiative in addressing environmental issues

Inference

Here Figure 3 Shows that the bar chart illustrates respondents' opinions on the effectiveness of government initiatives and local authorities in addressing environmental issues in their communities. The largest group of respondents (36.11%) believes that government initiatives and local authorities are **not effective** in addressing environmental issues. This suggests a high level of dissatisfaction with the current measures in place, highlighting a significant gap between community expectations and government action. A substantial proportion of respondents (32.14%) finds government initiatives **somewhat effective**. While these respondents see some value in the efforts made, they may feel that more needs to be done to fully address environmental challenges. About 22.62% of respondents believe that government initiatives and local authorities are **very effective** in dealing with environmental issues. This indicates that a minority of the community is satisfied with the government's efforts, but it also shows that less than a quarter of the population holds this view. A small portion of respondents (9.13%) has **no opinion or is unsure** about the effectiveness of government actions. This could indicate a lack of awareness or engagement with the topic among a small group.

1. 4.1 Chi Square Test

Chi square test is performed to examine the association between the level of environmental impact experienced by the community and their awareness of existing environmental laws or legal remedies.

4.1.1 Have you or your community faced any significant environmental hazards (such as air or water pollution)?

Hypothesis:

H₀: There is no association between the level of environmental impact experienced by the community and their awareness of existing environmental laws or legal remedies.

H₁: There is an association between the level of environmental impact experienced by the community and their awareness of existing environmental laws or legal remedies.

Table1: Have you or your community faced any significant environmental hazards (such as air or water

pollution)?

Have you or your community faced any significant environmental hazards (such as air or water pollution)?			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi Square	1.054	4	0.000

Source: Primary Data

The purpose of this study was to examine the association between the level of environmental impact experienced by a community and their awareness of existing environmental laws or legal remedies. A Chi-square test of independence was performed to assess the relationship between these two categorical variables.

The results of the Chi-square test were significant, $\chi^2(4, N = 252) = 1.054, p < .001$, indicating a statistically significant association between the level of environmental impact and the community's awareness of legal remedies. Specifically, the **p-value of 0.000** suggests that we reject the null hypothesis, which stated that there is no association between the two variables.

These findings indicate that communities experiencing different levels of environmental hazards (e.g., severe or moderate impact) are likely to differ in their awareness of legal protections. The significant association implies that the level of environmental impact influences the extent of awareness of environmental laws. This result underscores the need for targeted legal awareness campaigns, particularly in communities that may be less affected by environmental hazards but could still benefit from knowing their legal rights.

4.1.2 Are you aware of the existing environmental laws or legal remedies available to protect your community? Vs How effective are government initiatives and local authorities in addressing environmental issues in your area?

Hypothesis:

H₀: There is **no association** between respondents' awareness of environmental laws or legal remedies and their perception of the effectiveness of government initiatives.

H₁: There is an **association** between respondents' awareness of environmental laws or legal remedies and their perception of the effectiveness of government initiatives.

Table 2: Awareness of environmental laws or legal remedies Vs Effectiveness of government initiatives

Awareness of environmental laws or legal remediesVs Effectiveness of government initiatives			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi Square	12.371	3	0.06

The purpose of this analysis was to assess whether there is a significant association between respondents' **awareness of environmental laws or legal remedies** and their perception of the **effectiveness of government initiatives** in addressing environmental issues. A Pearson Chi-square test was conducted to evaluate the relationship between these two categorical variables.

The results of the Chi-square test were not statistically significant, $\chi^2(3, N = 252) = 12.371, p = 0.06$, indicating that we fail to reject the null hypothesis. The **p-value of 0.06** is greater than the commonly used significance threshold of 0.05, suggesting that there is **no significant association** between respondents' awareness of environmental laws and their perception of the effectiveness of government initiatives.

The findings suggest that respondents' awareness of existing environmental laws or legal remedies does not significantly influence their views on the effectiveness of government initiatives in addressing environmental issues. This result implies that factors other than legal awareness may shape perceptions of government effectiveness in managing environmental challenges.

2. 4.2 ANOVA

3. 3.2.1 ANOVA test Perception of Government Effectiveness VS Different Educational Levels:

4. An ANOVA test was conducted to examine whether there is a significant difference in the mean perception of government effectiveness based on different educational levels, including No formal education, High school (SSLC), and Graduate degree. The following hypotheses were tested:

H0: There is **no significant difference** in the mean perception of government effectiveness across different educational levels (No formal education, High school, Graduate degree).

H1: There is a **significant difference** in the mean perception of government effectiveness between at least two educational levels.

5. Table :3 Perception of Government Effectiveness VS Different Educational Levels

S. No	6. Perception of Government Effectiveness VS Different Educational Levels	F	Sig
1	No formal education	0.226	0.878
2	SSLC & High school	1.228	0.299
3	Graduate degree	2.163	0.092

Source: Primary Data

The results of the ANOVA for each educational level are as follows: **No formal education:** The F-value is **0.226** with a significance value of **p = 0.878**. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that there is no significant difference in the mean perception of government effectiveness for individuals with no formal educations **& High School:** The F-value is **1.228** with a significance value of **p = 0.299**. Again, since the p-value is greater than 0.05, we fail to reject the null hypothesis. This suggests that there is no significant difference in perception among those with SSLC and high school education. **Graduate degree:** The F-value is **2.163** with a significance value of **p = 0.092**. Although the p-value approaches significance, it is still greater than 0.05, meaning we fail to reject the null hypothesis. Thus, there is no statistically significant difference in the mean perception of government effectiveness among individuals with a graduate degree.

The ANOVA results indicate that there are **no statistically significant differences** in the mean perception of government effectiveness across the three educational levels (No formal education, SSLC & High School, and Graduate degree) as all p-values are greater than 0.05. Therefore, educational level does not significantly influence the perception of government effectiveness in this study.

4.2.2 Hypotheses for Legal Remedies Access Score Across Vs Different Age Groups:

An ANOVA test was conducted to examine whether there is a significant difference in the mean legal remedies access score across different age groups, specifically Under 25, 25-45, 46-65, and Over 65. The following hypotheses were tested:

- Null Hypothesis (H₀): There is no significant difference in the mean legal remedies access score across different age groups.
- Alternative Hypothesis (H₁): There is a significant difference in the mean legal remedies access score between at least two age groups.

Table :4 Legal Remedies Access Score VS Across Different Age Groups:

S. No	Legal Remedies Access Score VS Across Different Age Groups:	F	Sig
1	Below 25	1.411	0.239

2	25-45,	2.491	0.04
3	46-65	1.724	0.620
4	Over 65	1.641	0.056

Source: Primary Data

The F-value is **1.411** with a significance value of **p = 0.239**. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that there is no significant difference in the mean legal remedies access score for individuals under 25. The F-value is **2.491** with a significance value of **p = 0.04**. Since the p-value is less than 0.05, we reject the null hypothesis for this group, indicating that there is a significant difference in the mean legal remedies access score for individuals aged 25-45 compared to other age groups. The F-value is **1.724** with a significance value of **p = 0.620**. The p-value is greater than 0.05, so we fail to reject the null hypothesis, meaning there is no significant difference in the legal remedies access score for individuals in this age group. The F-value is **1.641** with a significance value of **p = 0.056**. Although the p-value approaches significance, it is still greater than 0.05, meaning we fail to reject the null hypothesis. Thus, there is no statistically significant difference in the mean legal remedies access score for individuals over 65. The ANOVA results suggest that there is a **statistically significant difference** in the mean legal remedies access score for individuals in the **25-45 age group (p = 0.04)**. However, for the other age groups (Below 25, 46-65, Above 65), there is **no significant difference** in their legal remedies access scores, as the p-values are greater than 0.05. Therefore, age seems to influence access to legal remedies only for the 25-45 group.

5. Result & Discussion

Figure 1 shows that the largest portion of respondents (42.06%) reported being severely impacted by environmental hazards such as air or water pollution. This highlights the significant negative effects of environmental hazards on many communities, with major disruptions to health and quality of life. About one-third (33.33%) felt moderately impacted, suggesting that these individuals face notable challenges related to pollution, though less severe. A smaller proportion (17.86%) indicated minimal impact, while only 6.75% reported no impact. These findings indicate that the majority of respondents experience some level of impact from environmental hazards, emphasizing the need for stronger environmental policies. Figure 2 illustrates respondents' awareness of environmental laws and legal protections. A large group (44.44%) reported being unaware of these protections, underscoring a significant gap in legal literacy. Only 29.37% of respondents were aware and had accessed legal remedies, suggesting that fewer than one-third are actively engaging with legal protections. Barriers such as cost or complexity may explain why 16.67% are aware but have not accessed them. These findings highlight the importance of increasing awareness and making legal remedies more accessible, especially for those facing environmental risks. Figure 3 shows that 36.11% of respondents believe government initiatives and local authorities are ineffective in addressing environmental issues, revealing a high level of dissatisfaction. A substantial proportion (32.14%) find these initiatives somewhat effective, while only 22.62% view them as very effective. The findings suggest that while some respondents recognize the value of government efforts, a significant gap remains between community expectations and actions taken by authorities. A small percentage (9.13%) are unsure, indicating a lack of awareness or engagement with the issue. A Chi-square test was conducted to examine the relationship between the level of environmental impact and respondents' awareness of legal remedies. The test was statistically significant, $\chi^2(4, N = 252) = 1.054$, $p < .001$, suggesting a strong association between environmental impact and legal awareness. This result indicates that those more severely impacted by environmental hazards are likely to have higher awareness of legal protections. These findings highlight the need for targeted awareness campaigns to reach communities less affected by environmental hazards but still in need of legal education.

Another Chi-square test assessed whether awareness of environmental laws influences respondents' perceptions of government effectiveness. The result was not statistically significant, $\chi^2(3, N = 252) = 12.371$, $p = 0.06$, meaning there is no significant relationship between these variables. This suggests that factors other than legal awareness may shape perceptions of government effectiveness.

An ANOVA test was conducted to examine the differences in perceptions of government effectiveness based on educational levels. The results for No formal education ($p = 0.878$) and High school education ($p = 0.299$) were not significant, indicating no differences in perception across these groups. The result for Graduate degrees ($p =$

0.092) approached significance but did not reach the threshold. This suggests that educational level does not significantly influence perceptions of government effectiveness. A final ANOVA test assessed differences in access to legal remedies across age groups. The result was significant for the 25-45 age group ($p = 0.04$), indicating that this group has better access to legal remedies compared to others. However, for those Under 25 ($p = 0.239$), 46-65 ($p = 0.620$), and Over 65 ($p = 0.056$), there were no significant differences in legal remedies access. This suggests that age plays a role in access to legal remedies, particularly for the 25-45 age group. These findings underscore the importance of age-specific strategies to improve access to legal protections and highlight areas where legal awareness and government effectiveness can be improved.

6. Conclusion:

Given that most participants in this study reported severe or moderate effects on their daily lives, it is clear how much environmental hazards affect communities. To address the pervasive problems caused by pollution, the results show a clear need for improved environmental laws and safeguards. The study also found a significant lack of knowledge about environmental regulations and legal recourse. The fact that many respondents were either ignorant of their legal protections or encountered obstacles in obtaining them highlights the necessity of focused education and outreach programs to guarantee that all communities, particularly the most vulnerable, can take advantage of legal protections. Even though the study found no meaningful correlation between legal knowledge and opinions about how effective the government is, this implies that other elements—like how well government programs actually work or how fairly they are perceived to be implemented—may have a greater influence on public opinion than knowledge of legal remedies. Although age seems to have an impact on access to legal protections, especially for those between the ages of 25 and 45, the results of the ANOVA tests also show that opinions of the efficacy of the government do not differ significantly by educational level. These findings highlight the significance of enhancing vulnerable communities' access to protections as well as their legal literacy. More community involvement, more robust government action, and more equitable access to legal remedies are all necessary components of efforts to address environmental hazards. Protecting the most vulnerable from environmental harms and promoting environmental justice require this all-encompassing strategy.

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