

Bursting Joy, Breathing Risk: Health, Environmental and Economic Consequences of Firecrackers

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Abstract

Festive celebrations across many cultures are often marked by the bursting of firecrackers, symbolizing joy, tradition, and collective enthusiasm. However, behind this celebratory practice lies a growing concern related to its adverse impact on human health, the environment, and economic well-being. This study examines the multifaceted consequences of firecracker usage, focusing on the hidden risks associated with air and noise pollution, public health challenges, and financial implications. The emission of harmful pollutants such as particulate matter and toxic gases significantly degrades air quality, leading to respiratory disorders, cardiovascular stress, and heightened vulnerability among children, the elderly, and individuals with pre-existing health conditions. Additionally, excessive noise levels contribute to hearing impairment, sleep disturbances, and psychological stress. Beyond health and environmental degradation, the study highlights the economic burden caused by firecracker consumption, including household expenditure, healthcare costs, and environmental cleanup. Using an interdisciplinary approach, the research emphasizes the urgent need to reassess celebratory practices through the lens of sustainability and public welfare. The findings underscore the importance of awareness, policy intervention, and the promotion of eco-friendly alternatives to balance cultural traditions with responsible celebration. Ultimately, the study advocates for informed decision-making and collective responsibility to safeguard health, preserve the environment, and reduce unnecessary economic loss while retaining the essence of festive joy.

Keywords: Firecracker Pollution, Health Hazards, Environmental Damage, Festive Noise Impact, Economic Cost of Celebrations

Introduction:

Festivals are an integral part of Indian culture, symbolising joy, togetherness, gratitude, and the celebration of life itself. Over time, however, the way festivals are celebrated has undergone significant change. One of the most visible and debated practices is the bursting of firecrackers. While firecrackers are often associated with excitement and tradition, their excessive use has raised serious concerns related to health, environment, economy, and social well-being. The research paper titled “*Bursting Joy, Breathing Risk: Health, Environmental and Economic Consequences of Firecrackers*” aims to examine this contrast between momentary happiness and long-term harm.

Firecrackers release harmful gases, fine particulate matter, and loud noise, all of which directly affect air quality and human health. Respiratory problems, eye irritation, stress, sleep disturbance, and anxiety are commonly reported during festive seasons. Vulnerable groups such as children, elderly people, patients with asthma, and animals suffer the most. Environmental damage in the form of air pollution, sound pollution, and waste accumulation further adds to the concern. In addition to health and environmental costs, firecrackers also involve significant financial expenditure, often spent for a few moments of noise and light, raising questions about money value and responsible consumption.

To understand public perception and behaviour, a structured survey consisting of more than ten questions was conducted, and 107 responses were received. The survey focused on the use of firecrackers during festivals, preferred types of crackers, opinions on limiting their use, awareness of guidelines, and views on whether festivals can remain joyful without crackers. The responses provide meaningful insights into changing attitudes, growing awareness, and the willingness of people to adopt alternative ways of celebration.

This study also highlights that bursting firecrackers is not the only way to express happiness. Festivals can be celebrated through eco-friendly decorations, lighting diyas and lamps, community gatherings, cultural programs, music, dance, rangoli, charity activities, and spending quality time with family and friends which not only spreads happiness but also offers lasting mental satisfaction and social value.

Overall, this research attempts to encourage thoughtful celebration by balancing tradition with responsibility. With guidance from mentors and support from informed communities, festivals can truly become occasions of joy that protect health, preserve the environment, respect economic value, and promote inner peace.

Research Methodology :

The present research is based on a mixed-method approach using both **primary and secondary data** to ensure depth, accuracy, and reliability of findings. Primary data was collected through a structured questionnaire designed using **Google Forms**, consisting of more than ten questions. These questions focused on patterns of firecracker usage during festivals, types of crackers preferred, awareness about health and environmental impacts, opinions on limiting cracker use, existence of strict guidelines, and perceptions regarding celebrating festivals without firecrackers. The questionnaire link was shared digitally, and **107 valid responses** were received through the Google Forms application, providing a diverse and meaningful data set.

In addition to the online survey, **direct interaction with individuals** was conducted to gain qualitative insights. Informal discussions with students, faculty members, and community participants helped in understanding personal experiences, emotional viewpoints, and practical concerns related to firecracker usage. These interactions added depth to the numerical data collected through the survey.

Secondary data was collected from reliable sources such as research articles, environmental reports, government notifications, health studies, and published literature related to pollution, public health, and sustainable celebrations. This secondary information supported and validated the findings obtained from primary data.

The collected data was systematically analysed using percentage analysis and descriptive interpretation. The combined use of digital tools, personal interaction, and literature review ensured a comprehensive understanding of the health, environmental, and economic consequences of firecrackers, making the methodology suitable for academic research under mentor guidance.

Implications of Firecracker Bursting During Festivities :

1. **Environmental Degradation:** Firecrackers emit toxic substances that contaminate air, soil, and water, damaging natural ecosystems and weakening efforts to protect and preserve the environment.
2. **Air Pollution Impact:** Dense smoke and fine particles from crackers reduce air quality, making breathing difficult and increasing pollution levels during festive seasons.
3. **Health Hazards:** Exposure to firecracker fumes leads to respiratory discomfort, eye irritation, headaches, and aggravation of chronic illnesses, especially among vulnerable groups.
4. **Mental Stress and Anxiety:** Sudden loud explosions cause fear, nervousness, and emotional discomfort, disturbing mental peace and increasing stress levels in daily life.
5. **Noise Pollution:** Excessive sound from firecrackers crosses safe limits, disturbing sleep, concentration, and overall comfort of people living nearby.
6. **Destruction of Peace:** Festive celebrations turn chaotic due to constant noise, disturbing infants, elderly individuals, patients, and pets, and reducing community harmony.
7. **Unnecessary Financial Spending:** Money spent on firecrackers provides short-lived excitement and no lasting benefit, leading to wasteful expenditure with little social or personal value.
8. **Risk of Fire and Accidents:** Improper handling of crackers increases chances of burns, injuries, and accidental fires, creating fear and safety concerns during festivals.
9. **Damage to Plants and Animals:** Chemical residue harms plant life and soil fertility, while loud noises disturb animals, birds, and pets, affecting their health and behaviour.
10. **Against Sustainable Celebrations:** Firecracker usage contradicts eco-friendly practices, encouraging pollution instead of responsible and environmentally conscious celebrations.
11. **Waste Generation:** Discarded cracker remains litter streets and open spaces, increasing non-biodegradable waste and creating cleanliness and sanitation problems.
12. **Water Contamination:** Pollutants from burnt crackers settle into water bodies, affecting aquatic life and reducing the quality of water used for daily purposes.
13. **Reduced Quality of Life:** Persistent pollution and noise lower overall living standards, making festive periods uncomfortable rather than enjoyable for many individuals.
14. **Negative Influence on Children:** Children may associate celebration with noise and waste, reducing awareness of responsible behaviour and sustainable values.
15. **Strain on Public Services:** Medical emergencies, fire incidents, and pollution control measures during festivals put additional pressure on healthcare and emergency services.

Challenges Associated with Firecracker Bursting During Festivities (With Citations) :

1. **Reconciling Cultural Practices with Environmental Responsibility** (*Li, 2022*) Balancing traditional festive practices with environmental sustainability remains challenging, as cultural attachment often delays the acceptance of eco-friendly alternatives.
2. **Escalation of Pollution Levels** (*Subramaniam et al., 2023*) Firecracker use during festivals causes sharp increases in air and noise pollution, making short-term environmental control and monitoring difficult.
3. **Safeguarding Vulnerable Populations** Children, elderly individuals, and patients face higher health risks due to increased exposure to smoke, toxic particles, and excessive noise.
4. **Limited Public Awareness** (*Chhatwal, 2024*) Insufficient awareness about long-term health and environmental consequences limits behavioural change and responsible festive practices.

5. **Ineffective Implementation of Regulations** (*Government of India, CPCB Reports*) Despite existing guidelines, inconsistent enforcement and public non-compliance reduce their practical effectiveness during festivals.
6. **Public Safety Management** Managing fire hazards, accidental burns, and emergency situations requires extensive coordination, especially in densely populated residential areas.
7. **Economic Inefficiency** (*Chhatwal, 2024*) Expenditure on firecrackers provides momentary enjoyment but lacks long-term economic or social value.
8. **Psychological Impact on Communities** Persistent loud noise contributes to stress, anxiety, sleep disturbance, and reduced mental well-being among community members.
9. **Disturbance to Ecosystems and Animals** Firecracker noise and chemical residue disrupt animal behaviour and negatively affect ecological stability.
10. **Post-Festival Waste Management** (*Subramaniam et al., 2023*) Firecracker debris increases solid waste load, creating sanitation and environmental contamination challenges.
11. **Resistance to Behavioural Change** Deep-rooted beliefs linking celebration with firecrackers slow the adoption of sustainable alternatives.
12. **Restoration of Environmental Quality** Reversing the effects of festive pollution requires extended time and coordinated environmental interventions.
13. **Social Conflict and Community Disagreement** (*Chhatwal, 2024*) Differences in celebration preferences often lead to social tension within residential communities.
14. **Acceptance of Alternative Celebratory Practices** Promoting creative, non-polluting celebrations faces resistance due to strong social norms and habits.
15. **Sustaining Long-Term Environmental Commitment** (*Subramaniam et al., 2023*) Maintaining environmentally responsible festive behaviour requires continuous awareness, policy support, and collective effort.

Crux of Public Awareness and Attitude Towards Eco-Friendly Celebrations During Diwali – Google Form Questions and Responses Received :

1. Why are firecrackers traditionally used during Diwali?

- a) To increase air pollution
- b) To celebrate the victory of light over darkness
- c) To start the harvest season

2. Which of the following is a major environmental concern related to firecrackers?

- a) Water contamination
- b) Soil erosion
- c) Air and noise pollution
- d) Deforestation

3. Which type of firecracker is considered more eco-friendly?

- a) Bombs
- b) Green crackers
- c) Rockets
- d) Chakris

4. What harmful gas is commonly released by firecrackers?

- a) Oxygen

- b) Nitrogen
- c) Sulphur dioxide
- d) Helium

5. What is the purpose of "green crackers"?

- a) They are cheaper than traditional crackers
- b) They make louder sounds
- c) They reduce emissions and noise pollution
- d) They are used in religious rituals.

6. Which of these is a safety tip while bursting crackers?

- a) Light crackers indoors
- b) Use candles to light crackers
- c) Maintain a safe distance
- d) Store crackers near fire sources

7. What is one alternative to bursting crackers during Diwali?

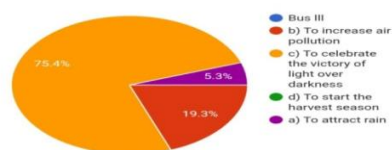
- a) Playing loud music
- b) Lighting diyas and lamps
- c) Burning plastic
- d) Using electric heaters

Google Form Link :

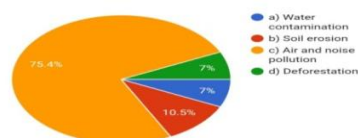
https://docs.google.com/forms/d/e/1FAIpQLSfRJRgvVvCuLot-eEB0b2YawToUJ5_Zlg5alDfxe3VwSq2mzQ/viewform?usp=header

Representation of Responses Received in Pie Diagram :

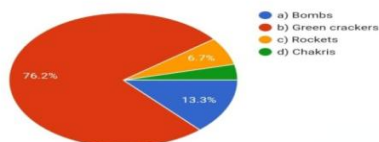
1. Why are firecrackers traditionally used during Diwali?
105 responses



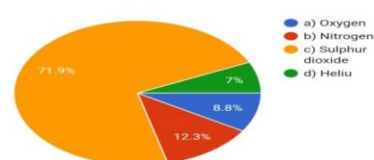
2. Which of the following is a major environmental concern related to firecrackers?
105 responses



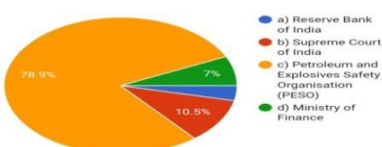
3. Which type of firecracker is considered more eco-friendly?
105 responses



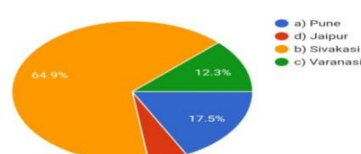
4. What harmful gas is commonly released by firecrackers?
105 responses



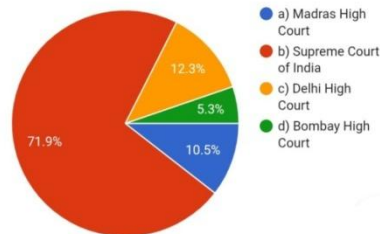
5. Who regulates the manufacturing and sale of firecrackers in India?
105 responses



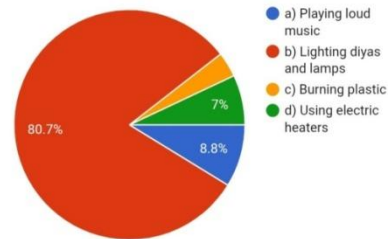
6. Which city is famous for manufacturing firecrackers in India?
105 responses



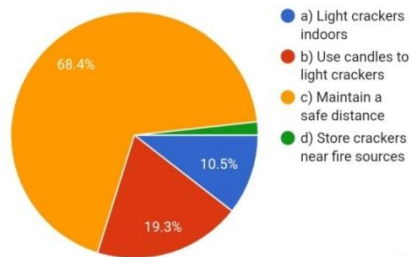
10. Which Indian court passed strict guidelines on the use of firecrackers to control pollution?
105 responses



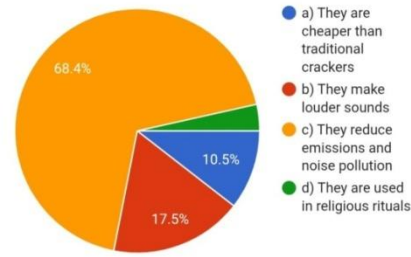
9. What is one alternative to bursting crackers during Diwali?
105 responses



8. Which of these is a safety tip while bursting crackers?
105 responses



7. What is the purpose of "green crackers"?
105 responses



Way Forward for Responsible and Sustainable Celebrations

- Promotion of Green Crackers** Green crackers should be encouraged as they produce less smoke and lower noise levels compared to conventional firecrackers. Government certification, proper labelling, and public awareness can help citizens shift towards safer options while maintaining the joy of celebrations.
- Adoption of Alternative Joyful Celebrations** Instead of firecrackers, people can celebrate festivals through cultural programmes, music, decorative lighting, eco-friendly lanterns, and community gatherings. These alternatives create happiness, strengthen social bonding, and reduce air and noise pollution during festive seasons.
- Using Festive Spending for Social Causes** Money traditionally spent on firecrackers can be diverted towards social welfare activities such as donations to hospitals, orphanages, old-age homes, or environmental initiatives. Such actions generate long-term happiness and promote values of empathy and social responsibility.
- Strict Government Rules and Regulations** Existing laws related to noise limits, air pollution, and time restrictions on firecracker use must be strictly enforced. Effective monitoring, penalties for violations, and coordinated action by authorities are essential to ensure public compliance and environmental safety.
- Restricted Licensing of Firecracker Manufacturing Units** Firecracker production should be allowed only through limited licences granted to environmentally compliant units. Regular inspections, pollution-control norms, and worker safety standards can reduce harmful emissions and prevent illegal or unsafe manufacturing practices.

6. **Environmental Pollution Awareness Programmes** Continuous awareness campaigns should educate citizens about environmental protection and responsible celebration practices. Schools, colleges, local bodies, and media platforms can play a vital role in spreading knowledge about sustainable alternatives and pollution reduction.
7. **Education on Causes and Effects of Pollution** People must be informed about how firecrackers contribute to air, noise, and soil pollution. Understanding their impact on human health, animals, and ecosystems can encourage individuals to voluntarily adopt cleaner and safer celebration methods.
8. **Community Participation in Eco-friendly Celebrations** Local communities can collectively decide to limit or avoid firecracker use by creating green celebration zones. Collective action builds social responsibility, peer influence, and shared commitment towards protecting public health and the environment.
9. **Encouragement of Research and Innovation** Investment in research for eco-friendly celebration technologies should be encouraged. Innovation can provide safer alternatives that reduce pollution while preserving cultural traditions, ensuring that sustainability and festivity coexist harmoniously.
10. **Youth Engagement and Digital Awareness** Youth-led initiatives, social media campaigns, and digital pledges can effectively promote environmentally responsible celebrations. Young citizens act as change agents by influencing families and communities to adopt sustainable and pollution-free festive practices.

Why Choose Green Crackers ?

Green crackers are environmentally responsible firecrackers developed to reduce the harmful impact of traditional fireworks on air quality, noise levels, and human health. They are manufactured using innovative chemical formulations and alternative materials that limit the release of toxic gases, particulate matter, and heavy metals during combustion. Unlike conventional crackers, green crackers are designed to produce lower smoke, controlled sound intensity, and reduced residue, while retaining the visual and cultural appeal associated with festive celebrations. They represent a sustainable approach to festivities by integrating scientific innovation with environmental ethics and public well-being.

Building upon this understanding, the benefits of green crackers extend far beyond their technical composition and move into the broader domains of environmental sustainability, public health, and cultural harmony. One of the most important benefits of green crackers is their role in reducing the ecological footprint of celebrations. Festive activities often lead to sudden spikes in air pollution, placing stress on urban ecosystems and natural resources. Green crackers help moderate these impacts by significantly lowering the emission of harmful pollutants, thereby supporting cleaner air, healthier surroundings, and improved environmental resilience during peak celebration periods.

In terms of environmental sustainability, green crackers promote a shift towards responsible consumption. Their development and use encourage industries and consumers alike to adopt eco-conscious practices. By emphasizing reduced emissions and safer materials, green crackers align festive traditions with global sustainability goals. This approach supports long-term environmental protection by discouraging excessive pollution and promoting awareness about the need to balance enjoyment with ecological responsibility.

Public health benefits form another crucial dimension of green crackers. Traditional fireworks are closely associated with respiratory discomfort, eye irritation, and increased hospital visits during festive seasons. Green crackers, with their reduced emission intensity, lower the exposure of individuals to

harmful pollutants. This is especially beneficial for vulnerable groups such as children, senior citizens, pregnant women, and individuals with respiratory or cardiac conditions. Improved air quality and controlled noise levels also contribute to reduced stress, better sleep patterns, and enhanced overall well-being.

Culturally, green crackers offer a thoughtful way to preserve traditional celebrations while adapting them to modern environmental realities. Festivals hold deep emotional and social value, and green crackers allow communities to celebrate with a sense of responsibility rather than restriction. Their acceptance reflects a positive cultural transition where enjoyment is combined with care for nature and society. This balance strengthens social harmony and encourages collective participation in sustainable practices.

Overall, green crackers symbolize a progressive model of celebration. They integrate innovation, environmental consciousness, health protection, and cultural continuity, demonstrating that traditions can evolve without losing their essence. By promoting safer and more sustainable festivities, green crackers contribute meaningfully to a healthier environment and a more responsible society.

Conclusion:

The growing concerns related to air pollution, noise pollution, and public health hazards clearly indicate that the traditional practice of excessive firecracker use requires thoughtful reconsideration. Celebrations are meant to spread happiness, unity, and positive energy; however, when they result in environmental degradation and health risks, their purpose becomes contradictory. Therefore, adopting sustainable and responsible celebration practices has become an urgent social necessity rather than a mere option.

The promotion and acceptance of **green crackers and noise-free crackers** represent a practical and balanced solution. These alternatives significantly reduce the emission of harmful pollutants and control excessive sound levels, making celebrations safer for children, elderly citizens, patients, and animals. By choosing such environmentally conscious options, society can preserve cultural traditions while minimising their negative impact on health and the ecosystem. Wider availability, proper certification, and awareness regarding these crackers are essential to ensure their effective adoption.

Equally important is the role of **strict government regulations and effective enforcement**. Clearly defined policies regarding permissible noise limits, controlled timings, and regulated sales can bring discipline and accountability to celebratory practices. Restricted licensing of firecracker manufacturing units ensures that only authorised and environmentally compliant producers operate in the market. This not only limits pollution at the consumption level but also addresses environmental and safety concerns at the production stage.

Public awareness and education remain the strongest tools for long-term change. When citizens understand the causes of pollution and its long-term effects on climate, biodiversity, and human health, responsible behaviour naturally follows. Educational institutions, community groups, and media platforms must continuously reinforce the message that celebrating responsibly is an act of social maturity and environmental care.

Furthermore, shifting focus from materialistic celebrations to **meaningful alternatives** such as cultural programmes, community gatherings, and social welfare activities can redefine joy in a more inclusive manner. Using festive budgets for tree plantation, healthcare support, or education initiatives creates lasting social value and strengthens collective well-being.

In conclusion, the future of celebrations lies in striking a harmonious balance between tradition and sustainability. Green crackers, noise-free celebrations, regulatory discipline, and social awareness together provide a comprehensive pathway forward. By embracing environmentally responsible choices today, society ensures cleaner air, healthier communities, and a safer environment for future generations. True celebration is not measured by sound or smoke, but by the shared happiness created without harming nature or human life.

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