

Impact of Environmental Public Policy on Youth: A Case Study of Banning Firecrackers during Diwali in Delhi

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Abstract: *The practice of burning firecrackers during Diwali has been a major concern for air quality in Delhi which already grapples with poor environmental standards. As an environmental public policy measure, the Supreme Court of India prohibited the sale of fire crackers in 2015 and subsequently several steps were taken regarding the manufacture, sell and burning time for firecrackers. Finally, the Government of Delhi banned the burning of fire crackers in 2020. The present study based on a primary survey of 741 young residents across all classes, communities, and colonies of Delhi, has examined the impact of the ban on the youth who are active in burning firecrackers as well as potential agents for promoting environmentally conscious behaviour. The possible reasons for burning firecrackers were sought in socio-economic status, social norms, faiths, etc. The second point of enquiry was the impact of policy instruments, such as, generation of awareness, command and control, vigilance, and monitoring on the sample population. The results of a binary logistic regression model have shown a significant role of environmental public policy, carried out by Municipal Corporations, Resident Welfare Associations, police, and educational institutions in effectively controlling the burning of firecrackers by the youth of Delhi.*

Keywords: Air quality, Environmental Public Policy, Firecrackers, Pro-environmental Behaviour, Youth

1. Introduction

1.1 Firecrackers as part of festivity

It is a global tradition to burn firecrackers during celebrations of major events, such as, the Olympic Games, World Cup Opening Ceremony, Las Fallas in Spain, Diwali festival in India, Guy Fawkes Night in the United Kingdom, Bastille Day in France, Australia Day in Australia, Lantern Festival in China, Independence Day in America and many more (Liu *et al.*, 2019; Singh *et al.*, 2019). Diwali, known as the 'row of lights' (Ambade, 2018) is a Hindu mythological festival in India, celebrated throughout the country by lighting lamps and burning firecrackers. Diwali was once celebrated in an environmentally responsible manner by utilising clay lamps for lighting purposes only. However, with firecrackers being added as part of the celebrations, the festivals have become damaging to the environment and human health in recent times (Tandon *et al.*, 2012). The use of fireworks during these occasions produces smoke plumes, which may temporarily elevate the level of concentration of particulate matters (PM) up to 2 to 8 times higher than ambient levels. As a result, during fireworks displays, overall visibility drops dramatically, sometimes by as much as 92 percent (Singh *et al.*, 2019).

The quantum and excitement for celebrations and the extensive use of fireworks have worsened the situation of air pollution in overcrowded metros like Delhi, where diverse

religions, cultures, languages, and social classes coexist (Kaur & Kaul, 2017). While many people perform these activities as an exercise of faith, many others frequently use them to demonstrate their wealth, prosperity, excitement, and joy (Khan & Ali, 2013; Majumdar, 2010). Marketers have successfully caught and magnified the client temperament and consumers are further motivated to spend and demonstrate their wealth by commercials and the magnificent ambience produced by marketers during festivals (Kaur & Kaul, 2017). Hence, the negative environmental effects of burning firecrackers often get overpowered by the pomp and splendour, religious practice, and social norms. As in case of most festive celebrations, youth play a major role due to their energy, excitement, and exuberance during the Diwali festival in India. On the other hand, they are also the ones who can be influenced by positive thinking and awareness, bring in change, and influence others in the society. They can be very active agents of promoting environmentally conscious behaviour in the community. Therefore, any enquiry on people's behaviour, environmental consciousness, and community participation may be understood well by studying the youth of the region.

1.2 Air quality of Delhi during Diwali

Delhi, India's national capital is home to more than 16.79 million people who live in the urban and rural districts of the mega city that cover over 75 per cent of the total area (Directorate of Economics and Statistics, Government of

National Capital Territory of Delhi, 2016). As Delhi is landlocked, huge numbers of pollutants from surrounding States engulf the air of Delhi, especially during winter. Burning of firecrackers during Diwali, followed by stubble burning in Punjab and Haryana, impacts the quantity and chemical character of pollutants that make Delhi one of the most polluted metropolitan cities of the world (Kotnala *et al.*, 2021). The impact of firecrackers may cause a 25 per cent increase in the PM_{2.5} concentration during the Diwali festival in Delhi (Mukherjee *et al.*, 2018) exceeding the 24-hour average PM_{2.5} standard (60 µg/m³) set by the National Ambient Air Quality Standard (NAAQS). Other studies have recorded concentration levels of PM_{2.5}, PM₁₀, CO, NO₂, SO₂, NH₃, and O₃ in the National Capital Territory (NCT) to be significantly high at 401.2, 395.7, 92.1, 76.2, 19.5, 12.8 and 34.2 µg/m³, respectively (Saha *et al.*, 2021). While low wind speed, temperature inversion, and low boundary layer height during the months of October and November make the meteorological conditions unfavourable, human intervention in the form of social festivity and celebration worsens the air quality of Delhi.

1.3 A public policy of ban on fire crackers during Diwali

Public policies may be effective instruments in controlling environmental quality through preventive and reductive means to counteract environmental harm caused by anthropogenic activities. The continuously deteriorating air quality in Delhi led to such an alarming condition that some environmental public policy intervention became necessary. In view of the gravity of the situation, the Supreme Court of India issued a judgement on November 25, 2016, prohibiting the sale of firecrackers within Delhi and the National Capital Region (NCR). In 2017, the use of five toxic compounds and heavy metals in firecracker manufacturing, namely, mercury, lithium, arsenic, antimony, and lead were explicitly banned. An order was also given to the national government to stop importing these firecrackers (Lokur, 2017). A ban was imposed on the sale of firecrackers in 2018 and burning was allowed for a two-hour window in the evening of Diwali (Gupta, 2018). Moreover, any explosive specified in Part I of Schedule IV, that is manufactured, transported, sold, or stored required a licence (*The Gazette of India, 2008*), although during events such as Diwali, fireworks could be sold and transported with a temporary license from the District Magistrate. In 2020, the Government of the National Capital Territory of Delhi (GNCTD) declared a ban on firecrackers during Diwali to control atmospheric pollution. Later, the National Green Tribunal (NGT) issued a comprehensive ban on the sale or use of all types of firecrackers in all cities and towns across the country where the average ambient air quality was poor or above the specified standard.

Despite these public policy interventions, burning of firecrackers have not stopped completely. The reason may lie in a gap between policy and practice, people's overwhelming faith, culture, or awe of God, lack of awareness about environmental pollution and so on (Saha *et al.*, 2021). This calls for active involvement and all-out efforts at various levels, such as, educational institutions, residential associations, police, municipal corporations etc. to create awareness as well as impose vigilance on people's behaviour

and community practices without which pollution control seems to be difficult.

1.4 The aim of the study

Most of the studies conducted on Diwali in Delhi concentrate on the emissions and resultant levels of air pollutants, spatiotemporal variation in PM_{2.5} concentrations and chemical constituents. The current study aims to investigate the causes and possible impacts of policy intervention on the firecracker burning habits of the people of Delhi, with focus on youth, who are supposed to be the main agents of festive celebrations as well as future hope for community commitments. The changing behaviour patterns, if any, and the possible driving factors ranging from socio-economic status and demographic profile to policy initiatives, such as, campaigns in educational institutions, monitoring, supervision, etc. need to be studied as a socio-economic investigation of the habit of burning firecrackers in mega cities. While these may explain the current situation, the results may help in designing policies for future.

The study, based on a primary sample survey in Delhi and econometric modelling of the collected data, aims

- To explore the impact of the ban on burning fire crackers during Diwali on the actual behaviour of the urban youth of Delhi,
- To study the possible socio-economic variables influencing the youth's decision to burn and/or not burn firecrackers,
- To examine the impacts of environmental public policy instruments that may encourage urban youth to abstain from and/or reduce burning of fire crackers, if at all, and
- To analyse the youth's perception about various instruments and strategies of banning fire crackers as inputs for future policy planning.

2. Determinants and instruments of pro-environmental behaviour

2.1 Environmentally conscious behaviour

Purposeful action that can decrease the negative influence on environment is the widely accepted definition of pro-environmental behaviour (Stern, 2000; Kollmuss & Agyeman, 2002). A holistic approach classifies it as basic environmental behaviour, decision-making environmental behaviour, interpersonal environmental behaviour, and civic environmental behaviour (Li *et al.*, 2019). It may further be analysed in terms of the sphere of action, namely, public, and private. Citizenship behaviours, financial activities, persuasive behaviours, and ecological management behaviours are the major forms of pro-environmental behaviour (Sun *et al.*, 2012). Often such behaviours may be guided by altruism, value, belief, and norms (Allen and Ferrand, 1999; Stern *et al.*, 1999), while several socio-economic and demographic factors can explain these features. In case of deficiency in pro-environmental behaviour, public policy and governance can be effective instruments to steer communities towards a more environmentally sustainable future.

2.2 Factors affecting pro-environmental behaviour

Group predictors of environmental behaviours can be categorised as economic, environmentally sensitive, demographic, and attitudinal (Lopez-Mosquera et al. 2015). The deciding factors behind pro-environmental behaviours can be external, such as, cost, social norms, convenience, and policy control and/or individual, such as, demographic, psychological, and socioeconomic (Li et al., 2019).

Studies have shown that socio-demographic factors like gender, age, education, marital status, place of residence, personal economic condition, etc. have a huge role in pro-environmental behaviour (Brécard et al., 2009; Saphores et al., 2012; Botetzagias et al., 2015). According to earlier studies, women, married couples, highly educated young people with good earnings and urban inhabitants tend to have greater environmental behavioural goals (López-Mosquera et al., 2015). Because of their roles as care-givers and nurturers, women appear to be more cooperative and concerned, resulting in a greater concern for the environment (Torgler and García-Valiñas, 2007). Married people may pay more attention to environmental issues than single people because they are concerned about the future environmental conditions of the next generation (Dupont, 2004). Wealthier people may have a stronger demand for a clean environment and lower environmental pollution (Fan et al., 2013). Educated and younger people generally have greater concern about the environment, are more aware of the potential harm caused by environmental neglect and familiar with pro-environmental behavioural norms (Danielson et al., 1995; Welsch and Kühling, 2010).

Psychological factors, such as, beliefs, attitudes, subjective norms, and perceived behavioural control have been successful in predicting pro-environmental behaviour (Sidique et al., 2010; Hage et al., 2009; Botetzagias et al., 2015). According to the theory of reasoned action, self-shaped attitudes and peer-shaped subjective norms influence people's behavioural intentions (Sheppard et al., 1988). Environmental attitude, according to most research, is the most important determinant of environmental behaviour. Other variables like political interest and social capital have significant impacts on people's inclinations to avoid environmental damage (Torgler and Garca-Valias, 2007).

At the individual level, age and pro-environmental behaviour have been found to have a positive association. As people get older, they may become more interested in self-transcendence and pro-social aims, and practising environmentally friendly habits could be one way for older folks to pass on their traditional wisdom and stay active (Wang et al., 2021). On the other hand, several studies have found that younger generations to have more pro-environmental sentiments. Younger individuals may claim to care more about the environment than their elders, but convenience and expense frequently serve as a roadblock to the transfer of environmentally friendly attitudes to actual behaviour (Peattie, 2010). Therefore, the study of youth behaviour is an intriguing exercise in any analysis of social behaviour and community commitments.

2.3 Role of policy initiatives and prescriptive solutions

To attain environmental quality, governments can adopt alternative and/or a mix of policy approaches, such as, command-and-control and economic/market instruments. While the former can directly regulate technology, behaviour and/or practices through prescription, the latter works through monetary incentives and/or charges. The near-universal dependence on direct regulation appears to have originated from a desire to acquire instant control over what was at the time an unfamiliar and pressing problem (Callan & Thomas, 2007). The principle is to order people or businesses not to do something by establishing a law, making it illegal and delegating authority, such as, police to execute the law, by imposing fines or penalties on violators. Governments often use policy instruments like bans, mandates, information campaigns, incentives, and nudges to encourage behavioural change among their citizens (Tummers, 2019).

In the present context, an environmental public policy in the form of a ban is an example of command and control. As is well accepted by now, the conventional approach of command and control can act more effectively when supplemented by economic solutions. For example, failure in meeting the commands of the state must be followed by some form of penalty because that forces individuals to comply with rules. However, there are people who are guided by environmental consciousness and show eco-friendly behaviour. With the growing concern over environmental challenges and their adverse impact on human life, the number of environmentally aware people is on the rise. To bring in such behavioural change, various social initiatives may be very effective as may be other public policy instruments.

2.4 Environmental behaviour of people of Delhi

In India, a variety of policies and programmes have been implemented to combat the problem of air pollution. The effectiveness and efficacy of these programmes, like any other policy action, has been dependent on collaboration and coordination among many stakeholders. The judgement of the Supreme Court on the limits of using firecrackers during Diwali and the proper mitigation strategies to address the deteriorating ambient air quality of Delhi is a major step towards creation of clean air in Delhi. A survey of residents of Delhi has shown that more than 80 per cent of the people are aware of the adverse impacts of burning fire crackers, yet Delhi suffers from stale air every year during the festival (Yadav et al., 2022). Similar results have been found in another study on the environmental attitudes and behaviours of students at the University of Delhi using New Environmental Paradigm (NEP) and Environmentally Responsible Behaviour Index (ERBI) (Varah et al., 2020). Fortunately, the level of environmental awareness and environment-friendly activities among the High School students of Delhi has been found to be encouraging (Puri, 2020). On the whole, people of Delhi seem to be well-informed, yet not collectively responsible for pro-environmental behaviour. Occasions like Diwali offer case studies on environmental behaviour as an expression of their mindset and knowledge. The coexistence of environmental information and irresponsible environmental behaviour

indicates a possible limitation of public policy instruments, vigilance, and monitoring, as practised in the national capital.

3. Methods and Materials

3.1 The study area and sample

In the above backdrop, the current study is an attempt to analyse the pattern of burning fireworks by Delhi's youth during Diwali, identify the possible socioeconomic factors and examine the effectiveness of an environmental public policy in controlling such behaviour. Students of schools, colleges and universities in the age group 15-24 years were the major components of the sample while young professionals in the age group 25-40 years were included in view of their spending capacity and possibility of conspicuous consumption. People from all five administrative districts of the NCT of Delhi were covered in the survey.

The total sample size was 741, of which 40.8 per cent were males and 59.2 per cent were females. Around 60 per cent of the respondents were in the age group 15-18 years, followed by 25.3 per cent in the age group 19-21 years, 10.8 per cent in the age group 22-24 years and 3.9 per cent were young professionals in the age group 25-40 years. The share of school students, undergraduate students, postgraduate students and working people were 40.9, 42.9, 12.3 and 3.8 per cent respectively. The spatial distribution of the respondents was random with 42.3 per cent from East Delhi, 27.17 per cent from North Delhi, 15.6 per cent from West Delhi, 11.9 per cent from South Delhi, and 3.05 per cent from Central Delhi. A major proportion of respondents, namely, 60.9 per cent, came from nuclear families. A large proportion, namely, 60.32 per cent of the respondents lived in colonies. The survey covered people from various income classes, such as, less than ₹30,000 per month (25.91 per cent), ₹ 30,000-70,000 per month (31.44 per cent), ₹ 70,000-1.5 lakh per month (23.35 per cent) and more than 1.5 lakh per month (19.3 per cent) respectively (Table 1).

Table 1: Socio-economic Specification of the sample

Variable Category	Specification	Percentage
Age	15-18 years	59.92
	19-21 years	25.37
	22-24 years	10.80
	25-40 years	3.90
Gender	Male	40.75
	Female	59.24
Education level	School (high school)	40.90
	College (undergraduate)	42.90
	University (postgraduate)	12.30
	Working	3.80
	Other	0.13
Place of residence	North Delhi	27.17
	East Delhi	42.30
	West Delhi	15.60
	South Delhi	11.90
	Central Delhi	3.05
Family structure	Nuclear family	60.99
	Joint family	32.65
	Live alone	6.34
Type of residence	Society housing	19.97
	Colony (open locality)	60.32
	Other	19.70

Family income	Less than 30,000 per month	25.91
	₹ 30,000-70,000 per month	31.44
	₹ 70,000-1.5 lakh per month	23.35
	More than 1.5 lakh per month	19.30

Source: Primary survey.

3.2 Methodology

A questionnaire-based sample survey was conducted for collection of primary data. Since the study aims at determining some of the key factors which determine the youth's attitude towards burning firecrackers around Diwali and tries to identify the effectiveness of socioeconomic and policy variables on the respondents' decisions, the first exercise was to identify possible correlations between different variables using crosstabulation. Pearson's chi-square test was used to check the association among these categorical variables. Subsequently, a binary logit regression model was used to identify the impact of socioeconomic and policy variables on the respondents' decisions. The dependent variable in the model is categorised into two, namely, burning and not burning fire crackers, while all the predictor variables are categorised into two or more. Additionally, some questions were asked to explore the youth's perceptions about effective policy instruments as solutions for a better future.

4. Results and discussion

4.1 Cross-tabulation results on correlation among variables

Most of the respondents in the survey said that they did not burn crackers. Therefore, the attempt was to find out possible explanations in terms of all the socio-economic indicators listed in Table 1. The variables showing significant correlation were income, type of residence and actions of the residential welfare associations (RWA).

The first investigation was into the possible correlation between family incomes and burning behaviour. Pearson's chi-square coefficient shows a significant relationship between the two variables, implying that family income significantly affects people's choice for burning firecrackers (Table 2). Religious sentiments were a common reason for burning crackers accounting for nearly 30 per cent of the respondents in both the lowest and the highest income brackets. While 16 per cent of the respondents in the lowest income bracket felt that they burnt crackers as a source of social prestige, none of the respondents in the highest income bracket felt that burning crackers was a status symbol. Burning crackers was perceived as a source of fun and enjoyment for 71 per cent of the respondents in the highest income category as compared to 54 per cent in the lowest income category. This result shows that richer people need not necessarily be more concerned about environmental quality as their idea of fun and enjoyment may go against it. This is in contrast with the results of some previous studies that have shown wealthier people may have a stronger demand for a clean environment and less environmental pollution (Fan *et al.*, 2013).

Table 2: Burning firecrackers and family income (per cent)

	Monthly Family Income (in ₹)			
	Less than 30000	30000-70000	70000-1.5 lakhs	More than 1.5 lakhs
Religious sentiment	30	34.4	27.3	29.4
Fun and enjoyment	54	53.3	68.2	70.6
Social prestige	16	12.2	4.5	0.0
Total	100	100	100	100

Source: Primary Survey; $\chi^2=10.843$, Significant, ($p=0.093$), $p<0.10$.

The results related to the association between the reasons for not burning crackers and the type of residence have been significant too (Table 3). It is often the RWAs in housing societies that discourage the use of crackers during Diwali. This was evident in the data as well, with 65 per cent of the respondents living in society housing not burning crackers due to the concern for environmental pollution compared to 57 per cent of the respondents living in open housing behaving likewise. Environmental concern has been a dominant factor on the whole. Other considerations, such as, personal health reasons, expense etc. had lower impacts on the decision of not burning firecrackers.

Table 3: Not burning firecrackers and type of housing (%)

	Society housing	Open housing	Others
Personal health reasons	15.4	24.4	18.3
Environmental pollution	64.6	57	58
Too expensive	13.8	10.2	9.2
Do not celebrate Diwali	13.6	8.4	14.5
Total	100	100	100

Source: Primary Survey; $\chi^2=12.534$, Significant, ($p=0.051$), $p<0.10$.

Many housing societies also impose restrictions on burning crackers inside their premises for safety concerns. However, people living in open housing do not face any such restriction. In such a scenario, a significant relation was found between

RWA initiatives and the type of residence that people occupied (Table 4). Although there are RWAs in colonies, often they do not create too many rules. The figures in the table show how people in society housings were more aware of the initiatives undertaken by their RWAs, as compared to those in open housing colonies.

Table 4: RWA Initiatives and the Type of Residence (%)

		Type of Residence		
		Society Housing	Colony (Open Housing)	Others
RWA initiative	Yes	24.3	15.9	14.4
	No	38.5	49	31.5
	Not Aware	32.4	29.5	30.1
	Not applicable	4.7	5.6	24
	Total	100	100	100

Source: Primary Survey; $\chi^2=59.48$, Significant, ($p=0.000$), $p<0.01$.

4.2 Regression results

Based on the survey of 741 individuals in the age group 16-40 years, an attempt was made to determine their probability of burning crackers on Diwali. A binomial logistic regression model was used to analyse why people burn crackers. In the model (Table 5), the dependent variable was whether people burnt crackers or not. Those who did burn crackers were represented as 1, and those who burn crackers as 0.

There are 10 independent variables in the model. The independent variables comprise of socioeconomic variables, such as the age, gender and educational levels of the respondents, the type of residence, family structures, and the place of residence. The policy variables considered in the model are RWA initiatives, awareness campaigns, initiatives by the police and Municipal Corporation of Delhi (MCD) (Table 5). The model predicts the probability of people not burning crackers, for a change in a predictor variable, keeping all other predictor variables constant.

Table 5: Description of Variables used in the Binary Logistic Model

Variable	Code Description
Dependent Variable (Y)	
Burn firecrackers	If the respondent burns firecrackers = 0
	If the respondent does not burn firecrackers= 1
Independent Variables (X_i)	
Age of the respondent (X ₁) (in years)	15-18 years =1, 19-21years =2, 22-24 years = 3, 25-40 years= 0
Gender of the respondent (X ₂)	Male = 1, Female = 0
Education level (X ₃)	School = 1, Undergraduate = 2, Postgraduate = 3, Working = 4, Other = 0
Type of residence (X ₄)	Society housing = 1, Colony/Open housing = 2, Other = 0
Family structure (X ₅)	Nuclear family = 1, Joint family = 2, Live alone = 0
RWA initiatives (X ₆)	Yes = 1, No =2, Not aware = 3, Not applicable = 0
Awareness campaigns (X ₇)	Yes = 1, No =2, Not aware = 0
Initiatives by police (X ₈)	Yes = 1, No =2, Not aware = 0
Initiatives by MCD (X ₉)	Yes = 1, No =2, Not aware = 0
Place of residence (X ₁₀)	North Delhi = 1, East Delhi =2, West Delhi = 3, South Delhi = 4, Central Delhi = 0

Two models have been considered to analyse the impact of various factors on the burning behaviour of individuals (Table 6). The first model includes all socioeconomic and policy variables as the independent variables; while the second model only considers the policy variables.

The Chi-square values in both the models are significant, showing that the independent variables taken together have a significant effect on the dependent variables. The results show that the variables that determine the probability of individual's burning crackers are awareness campaigns,

RWA initiatives, Police and MCD initiatives. While the socio-economic variables do not show any significant influence on people’s burning behaviour, the policy variables like awareness campaigns and RWAs in making people aware of the detrimental effects of burning crackers on the environment have been found to be significantly explanatory.

People who had a knowledge of ‘awareness campaigns’ were 1.7 times more likely to not burn crackers than those who were ‘not aware of any such campaign’. Variables depicting vigilance and monitoring have been found to be significant too.

Table 6: Results of the Binary Logit model

	Model 1			Model 2		
	Coefficient	Wald	p	Coefficient	Wald	p
Age		0.152	0.985			
Age (1)	0.407 (1.502)	0.113	0.736			
Age (2)	0.400 (1.492)	0.111	0.739			
Age (3)	0.195 (1.215)	0.032	0.858			
Gender (1)	-.232 (0.793)	1.214	0.271			
Education level		21.472	0.0			
Education level (1)	-20.613 (0.00)	0.0	1.00			
Education level (2)	-19.092 (0.00)	0.0	1.00			
Education level (3)	-19.145 (0.00)	0.0	1.00			
Education level (4)	-19.695 (0.00)	0.0	1.00			
Type of residence		0.458	0.795			
Type of residence (1)	-0.132 (0.876)	0.137	0.711			
Type of residence (2)	-0.196 (0.822)	0.448	0.503			
Family structure		4.566	0.102			
Family structure (1)	-0.382 (0.683)	0.430	0.512			
Family structure (2)	-0.792 (0.453)	1.776	0.183			
Family income		7.867	0.049			
Family income (1)	0.480 (1.616)	2.068	0.150			
Family income (2)	-0.181 (0.834)	0.351	0.553			
Family income (3)	0.384 (1.468)	1.270	0.260			
Residence place		3.114	0.539			
Residence place (1)	-0.281 (0.755)	0.345	0.557			
Residence place (2)	0.038 (1.039)	0.006	0.936			
Residence place (3)	-0.516 (0.597)	1.019	0.313			
Residence place (4)	-0.077 (0.926)	0.022	0.881			
RWA Initiative		2.537	0.469		4.953	0.175
RWA Initiative (1)	-0.146 (0.864)	0.084	0.771	-0.637 (0.529)	1.872	0.171
RWA Initiative (2)	-0.196 (0.822)	0.179	0.672	-0.610 (0.543)	1.978	0.160
RWA Initiative (3)	-0.513 (0.599)	1.172	0.279	-0.920 (0.398) **	4.341	0.037
Awareness Campaign		3.267	0.195		8.493	0.014
Awareness Campaign (1)	0.367 (1.444)	1.643	0.200	0.528 (1.696) **	3.989	0.046
Awareness Campaign (2)	-0.022 (0.978)	0.005	0.944	-0.056 (0.946)	0.035	0.851
Initiative Police		2.787	0.248		6.013	0.049
Initiative Police (1)	-0.479 (0.619)	2.133	0.144	-0.594 (0.552)***	3.728	0.054
Initiative Police (2)	-0.152 (0.859)	0.162	0.687	-0.087 (0.916)	0.061	0.805
Initiative MCD		6.843	0.033		8.255	0.016
Initiative MCD (1)	-0.728 (0.483) **	6.416	0.011	-0.740 (0.477) *	7.652	0.006
Initiative MCD (2)	-0.266 (0.767)	0.671	0.413	-0.253 (0.777)	0.721	0.396
Omnibus Tests (Chi-square)	100.184***		0.000	37.071***		0.000
Observations	741			741		

Source: Results of the study

Note: Values in the parenthesis are odd ratio coefficients;

*1%, **5% and ***10% level of significance

The important insight from the results is that public policy variables can play a significant role in motivating people towards pro-environmental behaviour. The conventional approach of command and control, monitoring and vigilance has been found to be effective in Delhi in 2022, which is a major improvement over the trends in the past. These findings are in sharp contrast with the earlier ones of 2017 and 2018 where people revealed less conscious attitudes towards environmental quality in Delhi. The results may act as positive indicators for future policy designs where the government acts as the principal regulator. The current study on Delhi presents a success story of the efforts of the

government, public policy formulation and implementing authorities on environmental control.

4.3 Perception about effective measures

The respondents were further asked about their ideas of effective measures to ban burning of firecrackers. While 39.30 per cent of the youth felt that awareness campaigns were the best measures, 30.43 per cent supported the conventional command and control approach. Vigilance and fines were the best instruments according to 30.28 per cent of the respondents. When asked about the most effective tools

for awareness generation, the young respondents revealed preference for newspapers and magazines (31.31 per cent), television and electronic media (27.80 per cent), educational

institutions (20.92 per cent), and social media platforms (19.97 per cent) respectively (Figure 1).

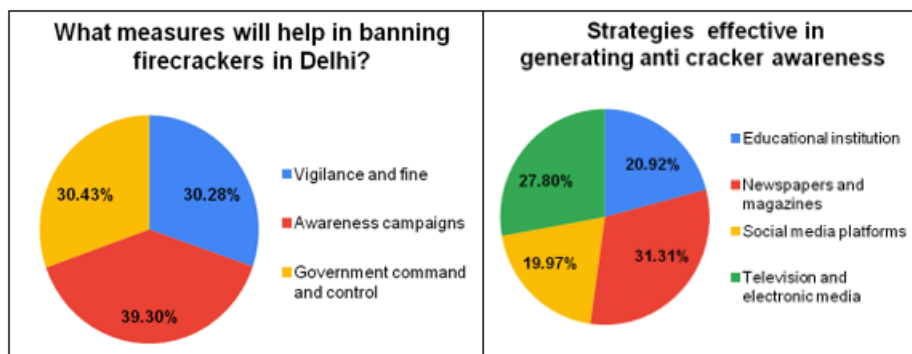


Figure 1: Youth perception about effective measures to ban burning of firecrackers

The results of the study have clearly revealed the significant role of public policy, awareness campaigns and educational institutions in maintaining environmental quality. The above responses further reiterate the enduring role of media, both print as well as social. With active intervention through these instruments, youth in mega cities may be guided towards more environmentally conscious behaviour.

4.4 Discussion

As stated earlier, there are very few studies that have analysed the issue of burning firecrackers during Diwali from an approach other than atmospheric and chemical perspectives. A study conducted to understand the awareness of the people regarding the Supreme Court order on the regulations on firecracker usage during Diwali in 2018 revealed very little compliance (Yadav *et al.*, 2022). Only 12.9 per cent of respondents thought the court order was applied in their area according to the 2-hour window, 42.8 per cent thought it was enforced somewhat strictly, and 44.3 per cent said the ruling was mismanaged and poorly enforced. Only 10.6 per cent of respondents believed that strong police surveillance was carried out for the Supreme Court order, 33.2 per cent said moderate surveillance, and 56.3 per cent said low or no surveillance. This result indicated a critical need for the police department to improve surveillance. The enforcement of the cracker regulation was delegated to Delhi Police, by a Supreme Court order in 2018. For a city with a population of 190 million people, Delhi Police has roughly 100,000 policemen, which equates to one officer for every 1900 persons. This inadequacy in number could have complicated the implementation of the previously mentioned legislation. However, 550 cases of violation were reported by the Delhi Police during Diwali, according to reports (*The Times of India*, 2018).

In contrast, the present study has revealed a positive role of surveillance, motivation, and awareness campaigns in 2022. This improvement points at the enduring role of governance, command, and control for an environmental public policy intervention into a socially bad phenomenon and negative externality associated with burning firecrackers as part of Diwali festivity. The results have further shown how significant roles may be played by other agencies, such as, educational institutions, residential associations, etc. in generation of awareness.

5. Concluding Remarks

The study contributes to the existing literature by providing a social perspective of analysing the effects of burning firecrackers during Diwali in a mega city like Delhi. The role of environmental public policy and social initiatives have come out to be the most influential factors behind the decision of the youth of Delhi to not burn firecrackers in large numbers. The initiatives taken by the police, Municipal Corporation of Delhi, and awareness campaigns at various levels, such as, schools and colleges, residential associations, etc. have played a crucial role in changing youths' behaviour. This implies that implementation of environmental public policy, such as, banning firecrackers, can be done through tightened police surveillance, intensified awareness campaigns, and the initiatives of the municipal corporations. These have come out to be effective and complementary measures along with legislative bans.

In order to implement policies successfully, the central, state, and local governments must organise regular public awareness drives and campaigns to educate the people about the multiple and serious risks involved with the use of any type of firecracker. It must be ensured that this message does not come across as a challenge to their cultural and religious ethos, but rather as a means of alleviating the current health concerns that most of Delhi's population face. Although firecrackers burned during Diwali have a short-term impact on air quality, they have a substantial impact on health and environment. Policy implementation to minimise air pollution induced by firecrackers should be taken seriously in Delhi. Attempts should be made to break the conditioned consumer behaviour when it comes to purchasing and using fireworks. They should be encouraged to enjoy festivals through environmentally friendly activities so that people's attitudes regarding festivals and the way they are observed may alter for the improvement of overall environmental quality and human well-being.

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