Policy Brief

Burning your dreams! Don't let gunpowder be your nightmare

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# Problem statement

Fireworks are explosive pyrotechnic compositions designed to provide visual and sound effects (1). They are part of large events associated with culture and religion, and also smaller exhibitions that take place at family and neighborhood gatherings (2,3). In Colombia, they are mainly used in the December festivities (4).

Fireworks are made from powdered metal salts that produce intensely bright white colors and flashes that are added to explosive projectiles, making them a flammable, explosive, and toxic material (2,3). These characteristics, regardless of the size of the appliance, pose a risk of causing injury to children and adults if not used with proper precautions (1,3).

Fireworks injuries are within the group of injuries of external cause and the operational definition established by the Surveillance Protocol for Injuries by pyrotechnic gunpowder of the National Institute of Health (INS) is: *"Case in which, as a result of the production, storage, transport, handling, and/or exhibition of pyrotechnic gunpowder, injuries are caused to people, which require medical, ambulatory or hospital management, or trigger their death"* (3).

Worldwide, fireworks injuries represent a high social and economic cost that translates into medical disabilities and temporary and permanent deformations (5). Other negative effects of pyrotechnic gunpowder are the increase in air pollution by particulate matter and toxins, poisoning by ingestion, noise pollution and considerably affects domestic and wildlife (2,6).

While these injuries are considered preventable, Puri et al. (7) They identify four types of causes that lead to gunpowder injuries:

1. Improper behavior – e.g., holding fireworks in your hand while they are being lit, altering fireworks, being too close to fireworks, picking up failed or defective fireworks for reuse –
2. Disturbance of fireworks – fireworks behave unpredictably –
3. Personal failure (delayed removal of lit fireworks or inadequate lighting), recurrent in adult handlers.
4. Innocent victims and bystanders

# Quantifying the problem

Worldwide, the epidemiological behavior of those injured by pyrotechnic powder suggests a wide variation depending on the country and the time of year (8). Emergency centers in the United States refer more than 12,000 consultations for this cause per year (9), with an increasing trend between 2012 and 2022, going from an incidence rate of 2.61 to 3.05 per 100,000 inhabitants, respectively (10). The literature on the phenomenon indicates that most lesions of this type occur in men (10,11), teens and young adults (8), with mainly eye and limb injuries (11,12), with mild and temporary traumas (11), caused by the misuse of the devices, by the failure of the devices or by the illegal origin of the devices (7,10).

According to the American Pyrotechnics Association, total fireworks consumption in the United States has increased 2.66-fold between 2000 and 2020, driven by non-professional demand. While demand for professionally purchased fireworks declined from £50.6 million to £18.7 million, consumer consumption of fireworks increased by £283.8 million (1).

Between 2007 and 2022 20,649 injuries from pyrotechnic gunpowder were reported in Colombia, approximately 1,291 events per year and an average rate of 2.77 injuries per 100,000 inhabitants. The rates ranged from 0.64 cases in 2007 to 2.92 in 2022, the years 2015 and 2017 were the periods with the highest statistics, reaching 4.34 cases (n=2,012; 9.74%) and 3.75 (n=1,778; 8.61%) per 100,000 inhabitants, respectively (Graphic 1).

**Graphic 1.** Incidence rate of injuries by pyrotechnic powder, Colombia, 2007-2022

Chart, Bar Chart

Auto-generated description

Source: ONS team elaboration from Sivigila.

The average age of the injured was 21 ± 14.5 years (range, 0 to 95 years), about 60% of the events occurred in people between 10 and 29 years old, mostly children (n=3,351; 16.23%) and adolescents (n=3,323; 16.09%). The injured were predominantly men (n= 17,349; 84%), in the municipal capitals (n=13,704; 66.36%) and in the subsidized affiliation regime (n=10,663; 51.64%). In relation to the socioeconomic status and ethnicity of the injured, there is evidence of low reporting and quality of data; however, for those reported, it was found that a quarter were from low or middle strata, while less than 1% of the injured were from the upper stratum and about 10% of the total injured were identified as black, mulatto, Afro-Colombian or indigenous (Board 1).

About three-quarters (n=15,204; 73.40%) of the injured reported elementary occupations that involve the performance of simple and routine physical or manual functions (13).

**Board 1.** Sociodemographic characteristics of those injured by pyrotechnic powder, Colombia, 2007-2022.

|  |  |  |
| --- | --- | --- |
| Variable | n | % |
| Sex | | |
| Female | 3.300 | 15,98 |
| Male | **17.349** | **84,01** |
| Socioeconomic status | | |
| 1 | **2.848** | **13,79** |
| 2 | 1.941 | 9,39 |
| 3 | 437 | 2,11 |
| 4 | 60 | 0,29 |
| 5 | 18 | 0,09 |
| 6 | 19 | 0,09 |
| Doesn't report | **15.326** | **74,22** |
| Area of occurrence | | |
| Municipal seat | **13.704** | **66,36** |
| Populated center | 2.203 | 10,67 |
| Dispersed rural | 4.742 | 22,96 |
| Ethnicity | | |
| Indigenous | 749 | 3,63 |
| Rom, Gypsy | 36 | 0,17 |
| Raizal | 59 | 0,29 |
| Palenquero | 10 | 0,05 |
| Black, Afro-Colombian mulatto | **1.214** | **5,88** |
| Other | **18.581** | **89,98** |
| Affiliation regime | | |
| Contributory | 6.570 | 31,82 |
| Subsidized | **10.663** | **51,64** |
| Special | 468 | 2,27 |
| Exception | 730 | 3,54 |
| Uninsured | 2.080 | 10,07 |
| Indeterminate | 138 | 0,67 |
| Occupation | | |
| Elementary occupations | **15.204** | **73,40%** |
| Agricultural, forestry and fisheries farmers and skilled workers | 1.834 | 8,85% |
| Service workers and vendors in shops and markets | 1.075 | 5,19% |
| Journeymen, operators, craftsmen and related trades | 877 | 4,23% |
| Directors and managers | 398 | 1,92% |
| Plant and machine operators and assemblers | 392 | 1,89% |
| Professionals, scientists and intellectuals | 384 | 1,85% |
| Technicians and professionals of the intermediate level | 356 | 1,72% |
| Administrative Support Staff | 195 | 0,94% |

Source: ONS team elaboration from Sivigila.

The highest rates recorded during the study period were in adolescents aged 15 to 19 with 5.13 cases per 100,000 inhabitants, followed by children aged 10 to 14 years with 5.06 cases. The rate in male children aged 10 to 14 was 8.65 cases per 100,000 inhabitants (n=2,903; 16.73%), in adolescents of the same gender it was 8.80 cases (n=2,859; 16.48), in young adults aged 20 to 24 it was 8.91 cases (n=2,698; 15.55) and in adult men aged 25 to 29 it was 7.84 cases (n=2,141; 12.34). In contrast to youth, the indicators in older men gradually tend to decrease as the years progress, those between 55 and 59 years old or those over 75 years old had less than 1 case per 100,000 people.

In the case of females, it was adolescents aged 15 to 19 years who indicated the highest rate during the study period with 1.44 cases per 100,000 inhabitants (n=464; 14.06%), followed by girls aged 10 to 14 years with a rate of 1.37 cases (n=448; 13.58%), and young adults with 1.26 cases (n=389; 11.79%). From 30 years of age onwards, there were less than 1 cases in women per 100,000 inhabitants.

The adjustment of rates according to age and sex suggested a slight increase in both men and women, going from a crude rate of 4.75 cases per 100,000 inhabitants to an adjusted rate of 4.78 in the former; For women, the increase in the rate was also three tenths, going from 0.87 crude to 0.90 adjusted (Graphic 2).

**Graphic 2.** Incidence rate of pyrotechnic gunpowder injuries adjusted by age and sex, Colombia, 2007-2022

Graphic

Auto-generated description

Source: ONS team elaboration from Sivigila.

For its part, the fatality rate of firecracker injuries in the country was 0.46% for the study period. In 2015 and 2017 alone, a lethality rate of 1% was reported for this cause, with a higher risk of death in women (1.4 and 1.1% per year, respectively) than in men (0.9%, for each year). These two years, in addition to bearing the highest incidences, claimed a third of the 94 deaths caused by injuries from pyrotechnic devices, as follows: 2015 with 21.3% (n=20) of the cases and 2017 with 17% (n=16). This is consistent with what has been reported in other studies of lethality and mortality of the event (8,9); however, some authors reported an increase in lethality of up to 13% when the events occurred in gunpowder factories or when poisoning from the ingestion of these substances was referred to (14,15).

On this point, it is emphasized that as of 2015, protocol 452 considers both the surveillance of events of injuries by pyrotechnic gunpowder, as well as those injuries by antipersonnel mines and unexploded ordnance. However, the open microdata provided by Sivigila do not allow differentiating the type of device that caused the injury, as provided in the complementary information section of the notification form.

The INS reported for the season of intensified surveillance of firepowder injuries from December 1, 2023 to January 13, 2024, a variation of 18.5% (n=1,366) of total cases in relation to the previous season (n=1,153). The behavior of the event suggested some peaks on the 7th (n=105), 8th (n=100), 24th (n=76), 25th (n=137), December 31st (n=157) and January 1st (n=382), consistent with previous years. The departments with the most 10 new cases were Antioquia (n=152; 47.6% more than the 2022-2023 season), Nariño (n=149; -2.6%) and Bogotá, D.C. (n=126; 28.6%), 90% (n=1,229) of the injuries were burn-type, of which 44.5% were grade one, 47.6% grade two, and 7.9% grade three (16).

Of the total number of injuries for the last surveillance season, 69.6% (n=951) occurred due to direct handling, 22.9% (n=313) in observers, the remaining percentage due to transport, manufacturing, sale, storage or other activities. It should be noted that in 27.5% (n=376) of the cases, it was determined that the injured person was under the influence of alcohol and that a quarter of the cases were due to totes (26.8%; n=366), other devices (23.1%; n=316), flying devices (16.3%; n=233), rockets (10.2%; n=139), volcanoes (9.0%; n=123), sparklers (3.8%; n=52) and the remaining percentage without information (16).

# Review of the regulations on the sale, handling and use of gunpowder in Colombia

**Evolution**

The first regulatory efforts dating back to pyrotechnic gunpowder in Colombia obey the Sanitary Code, established by Law 9 of 1979 that established the responsibility of the Ministry of Health for the authorization for the sale to the public and use of pyrotechnic articles, in addition to the prohibition of the sale of these articles containing white phosphorus. Based on the previous legal basis, the Ministry of Health, through Resolution 19703 of 1988 and Resolution 4709 of 1995, which partially repealed the previous one, established sanitary measures, such as prevention campaigns, burn care routes and reference centers for care and sanctions, as well as prohibitions on handling, transport, storage, marketing and sale of gunpowder and pyrotechnic products (4).

As part of this regulatory effort, local initiatives can be highlighted, especially the case of the Capital District, where, based on national regulations, different administrative acts were issued for the sale and use of pyrotechnic articles, but given the increasing behavior of the cases of people injured by gunpowder, in the administration of Antanas Mockus the decision was taken to prohibit the sale of these articles through Decree 791 of 1995 "*The sale of pyrotechnic items, fireworks and balloons, as well as the use of the same products in the Capital District, is prohibited."*

By virtue of the above, and taking into account part of the local experience, the Congress of the Republic (17) it issues Law 670 of 2001, which establishes at the head of the mayor's offices the competence to allow the use and distribution of pyrotechnic articles or fireworks, establishing the necessary security conditions, the prohibition of their sale to minors and persons in a state of drunkenness, with the respective sanctions for non-compliance; the obligatory nature of care in hospitals and clinics for the victims of these devices; as well as measures against parents whose children are burned.

In addition, a complementary regulatory framework has been developed to strengthen mechanisms for the protection of minors. In particular, the Code of Childhood and Adolescence (18), which determines that the National Police is responsible for the work of surveillance, control and prevention of the carrying and use of gunpowder by children or adolescents. In turn, Law 1801 of 2016 (19), includes penalties for individuals for the unauthorized use of gunpowder, as well as powers to enter sites where there is a collective risk from these substances; likewise, with regard to the technical competence to pronounce on the safety conditions for the performance of shows that include the use of pyrotechnics, as well as the places where it is manufactured, stored and marketed, Law 1575 of 2012 (20), determined that this responsibility lies with the Colombian Fire Departments.

Law 2224 of 2022 was recently enacted (21), which does not repeal Law 670 of 2001, but covers aspects not included in the latter, such as formalization and professionalization of powder makers, redefinition of the categories of gunpowder, creation of an account fund for the prevention of injuries, institutional coordination, citizen culture and use of gunpowder, among others; the regulation of the aforementioned law was carried out through Decree 2174 of 2023 (22).

**Graphic 3.** Evolution of national regulations on pyrotechnic powder

Source: own elaboration

**Policy approaches**

The regulations and in general the public policy against the handling and use of gunpowder have focused on the prohibition and restriction of sale, but with the production authorized under the compliance with the technical requirements established in the regulations.

Regarding the use and handling, there are rules, controls and procedures for the use of gunpowder in public shows, under the responsibility of an organization that must comply with safety standards, contingency plans and verification by municipal authorities and fire departments. The sale of gunpowder for these purposes is not prohibited and, on the contrary, the local authorities promote and carry out public fireworks demonstrations during holiday seasons.

On the other hand, with regard to the private or private use of gunpowder, the regulatory effort has focused on prohibition, for which local authorities have the power to allow or not its use (especially at the end of the year season) and on scattered campaigns on the consequences of the use of gunpowder. but contrary to what is evident in other countries, little or nothing is addressed about risk management, including the responsible handling of gunpowder by non-professionals.

**Challenges**

The heterogeneity in local regulations on gunpowder makes it difficult for the authorities to strictly control them, since gunpowder producers seek to establish themselves in those municipalities with less capacity and resources to control this activity, including fire departments that are poorly trained to issue safety concepts. Around the large urban centers of the country, it can be observed that the main cities such as Bogotá, Cali, Medellín, Barranquilla, among others, issue regulations to prohibit the sale and use of gunpowder, but not necessarily the mayors of the neighboring municipalities act in a coordinated manner, which allows sellers to locate themselves in these places and from there the gunpowder is distributed in these metropolises.

One of the main difficulties of the administrative function of the police in Colombia is the inability to enforce the prohibitions of what is prohibited; Although numerous regulations are issued that restrict behaviors and activities, in practice it is still "symbolic", since the reality is that people continue to carry out these activities, despite what is established in the regulations: "it is complied with, but it is not complied with".

Likewise, when issuing the rules on the prohibition and control of gunpowder or any other activity, the "cost of prohibition" is not clear, it is clear that in Colombia the priority of the National Police is the issue of crime, and the issues of coexistence and citizen security in a broad sense, are relegated. Therefore, the measures of inspection and seizure of gunpowder are only applied at certain times of the year, since with the resources and current personnel of the police it is almost impossible to sustain this activity permanently throughout the year.

In addition to the above, the recently issued Decree 2174 of 2023 establishes technical, sanitary and security conditions and requirements for storage, which will make it difficult for territorial entities to comply with the obligation to have warehouses for the seized material, as provided for in article 2.2.4.2.13 of the aforementioned decree, which may discourage the seizure of this material due to the impossibility of the municipalities themselves to comply with said regulations, given the budgetary restrictions of most territorial entities, since about 93% of Colombia's municipalities are classified in fourth, fifth and sixth categories (23), which implies a significant dependence on the transfers of resources from the general budget of the nation, and the impossibility of assuming new commitments with own resources.

This makes it difficult to implement strong measures in the control of gunpowder, despite the fact that since Law 670 of 2001, mayors were empowered to create the *municipal fund for the prevention of accidents generated by the improper handling and use of gunpowder, pyrotechnic articles and fireworks;* a fund that was to be financed with a percentage of the Industry and Commerce Tax, caused by companies linked to the gunpowder business. However, given the high informality in this sector, temporality and prohibitions of the activity, the resources to finance the activities determined in the aforementioned law are scarce or absent.

Law 2224 of 2022 contains measures aimed at pedagogy and risk management in the use of gunpowder, which may represent an opportunity to advance in strategies for the responsible use of gunpowder, for that classified as used by non-professional personnel. The prohibitionist approach, at least with the current regulatory framework, must be complemented with education for the safe and responsible use of gunpowder, indicating to adults what are the best practices for the storage and handling of gunpowder, recommended sites for its use, safety measures, types of devices and their consequences.

* **Powder sector**

It is a sector that still maintains artisanal manufacturing practices, with an association called the National Federation of Pyrotechnicians – Fenalpi, where there is no information on the characterization of the companies.

On the other hand, according to the International Standard Industrial Classification of all economic activities (24), the production of pyrotechnic gunpowder is located in the code "2029 Manufacture of other chemical products n.e.c.*": The manufacture of fireworks, signal flares, signalling devices and other similar articles such as rockets, matches and matches".* In this order of ideas, when consulting the directory of companies available in the geoviewer of the National Administrative Department of Statistics (DANE), it is found that the aforementioned code includes companies that manufacture pyrotechnic articles, but also agrochemicals, industrial products, adhesives, rubbers, agricultural inputs and others, therefore among the 551 companies that appear on the list (25), it cannot be discriminated which one is dedicated to the subject of gunpowder.

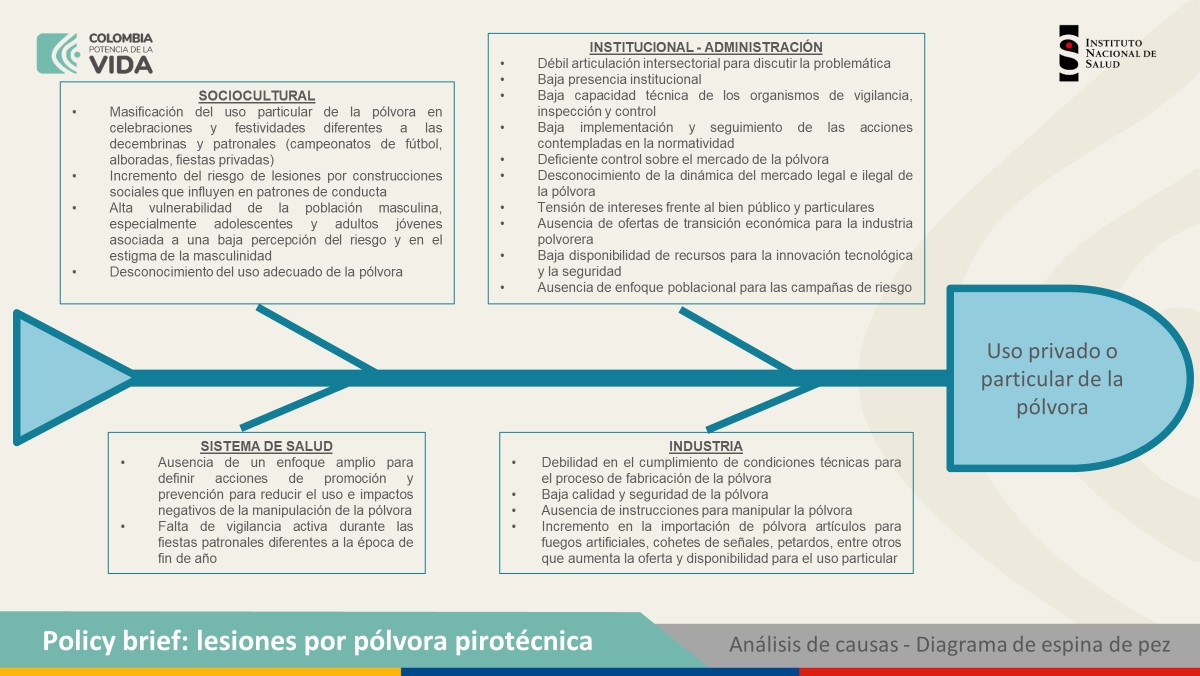
On the other hand, with regard to production, information was found on exports and imports of gunpowder in the country. According to the International Trade Centre (26), the country has imported an average of 1,470 tons of pyrotechnic articles in the period 2019-2023, with an upward trend since 2021; With respect to exports, 13 tons were registered in 2019 and one in 2023.

**Board 2.** Gunpowder imports from Colombia period 2019-2023

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product Description** | **Colombia imports from the world** | | | | | | | | | |
| **Amount in 2019** | **Unit** | **Amount in 2020** | **Unit** | **Amount in 2021** | **Unit** | **Amount in 2022** | **Unit** | **Amount in 2023** | **Unit** |
| Articles for fireworks, signal rockets or granifugues and the like, firecrackers and other ... | 1.161 | Tons | 1.104 | Tons | 1131 | Tons | 1.844 | Tons | 2.112 | Tons |

Fountain: (26)

# Fishbone diagram



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