

THE BEIRUT PORT EXPLOSION: SOCIAL, URBAN AND ECONOMIC IMPACT

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Abstract

The Beirut port explosion caused substantial damages, not only for the city, but also for the country's economy. The explosion caused 207 deaths and more than 6.500 people were injured. Also, around 300,000 people lost their homes and the physical damages costs are estimated to \$4.6 billion. The economy and the architecture of the city was severely affected and not only the Lebanese people felt the negative impact of this event. It is estimated that foreigners from 22 countries were affected by the blast, especially the Bangladeshi nationals. In this respect, the present research aims to present the Beirut Port explosion and its effects on the citizens' lives and its negative impact on the city's economy and architecture. In the end, conclusions regarding the causes of this tragic event are drawn and a series of recommendations regarding the rebuilding of the city and its development, are presented.

Keywords: Beirut, economic impact, disaster preventing strategies, urban impact

1. INTRODUCTION

On August 4 2020, a large quantity of ammonium nitrate that was stored at the port of Beirut exploded. The explosive ammonium nitrate cargo weighed approximately 2,750 (equivalent to 550 – 580 tons of TNT) and had been stored in a nearby warehouse for the past six years without appropriate safety measures (Sly, Morris, & Haidamous, 2020). The ammonium nitrate was stored in the warehouse after it was confiscated from an abandoned Russian-owned ship, the MV Rhosus, which was deemed unsafe to continue its journey to Mozambique (Urbina, 2020). The explosion was preceded by a fire in the same warehouse, but the exact cause of the detonation is still unknown. Reports indicate that a judge sent three workers to fix a broken door in the warehouse, seal a gaping hole in a wall, and ensure all doors were tightly locked (Sly et al., 2020). The repair work was done at noon but it is still unclear what occurred in the afternoon prior to the fire. Securing the cargo from theft seemed to be the government's priority rather than safeguarding against explosions.



FIGURE 1: BEFORE-AND-AFTER IMAGES OF THE PORT OF BEIRUT.

Source: BBC News, 2020.

2. THE PRESENTATION OF THE BEIRUT PORT EXPLOSION

2.1. Initial Fire and First Explosion

A fire initially broke out a few minutes before 6 p.m. on August 5, 2020 in Warehouse 12 at the Beirut port, which was on the waterside and next to the grain silos and contained the confiscated ammonium nitrate (BBC News, 2020). The same warehouse also contained a stash of fireworks. A team of firefighters was dispatched to contain the fire but they reported that the fire was significant and was producing a weird sound. The firefighters went to contain the fire without full information about the presence of explosive cargo, so they did not take appropriate measures and some died and others went missing after the explosion (Azhari, 2020a). Reports indicate that the first explosion at around 6.07 p.m. was most likely triggered by the fireworks because there was a huge cloud of smoke and bright fireworks flashes, which led to significant structural damage to the warehouse, with a force that was equal to approximately 1.0-1.5 tons of TNT (BBC News, 2020).

2.2. Second Explosion

The second explosion occurred at least 35 seconds later and it was much larger than the first one, with its impact felt in Cyprus, which is more than 200 km away (BBC News, 2020). It sent a massive mushroom red-orange cloud into the air and a supersonic blast wave that encompassed the entire city (BBC News, 2020). Reports indicate that the red-orange cloud was caused by nitrogen oxide, which is usually a derivative of decomposed ammonium nitrate (Compound Interest, 2020). By the next morning, the original fire which had caused the blast had been extinguished.

2.3. Size of the Damage

The explosion occurred at the Beirut port, in the northern part of the city. It caused significant damage to nearby buildings, grain silos, and warehouses. Ceilings collapsed, windows, and walls were blown out, and debris was hurled as far as two miles away from the port (BBC News, 2020). Additionally, cars and a cruise ship were flipped, and rubble from nearby shattered buildings filled the streets. Near the explosion site, a ship was blasted out of the water and landed on a dock (BBC News, 2020). This is an indication of the power of the explosion and the damage it caused. The ability of the explosion to destroy such large infrastructures goes to demonstrate the significant pain and harm that humans were subjected to, considering that they were all caught unaware by the explosion.

The port has for a long time been a critical link in Lebanon's supply chain for goods, and it handles 60% of the country's imports (Somwanshi, 2020). The blast was significant, and it destroyed the immediate dockside area and created a crater that was approximately 140m wide (BBC News, 2020). The warehouse containing the ammonium nitrate was obliterated and the adjacent grain silo was significantly damaged. Additionally, reports indicated that a ship was blown completely out of the water and onto the dockside (BBC News, 2020). The explosion damaged the grain terminal and grain silos in the port.

The destroyed silos contained a significant quantity of grain which were strategic grain reserves for the country having direct negative impact on the country's economy (Somwanshi, 2020). The silos stored 85% of the country's cereal and their total capacity was 120,000 metric tons of grain, consisting of 48 big cells and 50 small cells (Somwanshi, 2020). However, it was believed that at the time of the explosion, the silos were not at full capacity because the country was at the time trying to meet a bread shortage caused by the recent financial crisis. Approximately 15,000 tons of grain was destroyed, leaving Lebanon with less than 1 month's grain reserve. The wheat that survived the explosion was however inedible, leading to further food shortages in the country.



FIGURE 2: DEVASTATION IN THE PORT AREA AFTER THE EXPLOSION.

Source: BBC News, 2020.

The blast from the explosion was so major that it was felt across Palestine, Turkey, Israel, Cyprus, Syria, and in some parts of Europe (BBC News, 2020). The United States Geological Survey (2020) also detected the blast and recorded it as a seismic event of magnitude 3.3. The blast is also termed as one of the most powerful artificial non-nuclear explosions in history and with a 10% intensity of the Hiroshima bomb (Clifton, 2020). This implies that the explosion was a major tragic event that has destroyed a large number of lives, the environment, economy, and infrastructure. Reports further indicate that a similar incident occurred at the Texas City port in 1947, where a detonation of 2,300 tons of ammonium nitrate generated a similar scale of damage to what occurred in the Beirut port explosion (Clifton, 2020).

Additionally, various studies have documented the approximate yield from the port explosion. A study by Rigby et al. (2020) based on video footage found that the most appropriate estimate and higher bound prediction of the yield of the explosion were 0.5 and 1.12 kilotons of TNT, respectively. This was perceived to be equivalent to 1 GWh of energy. Another study using different videos on the explosion estimated that it yielded 0.6 ± 0.3 kilotons of TNT (Diaz, 2021). Furthermore, an independent estimate based on infrasonic data concluded that the explosion yielded an equivalent of 0.5 – 1.1 kilotons of TNT (BGR, 2020).

3. THE IMPACT OF THE BEIRUT PORT EXPLOSION

3.1 Impact on People

Reports indicated that the most significant danger from the explosion was from flying glass, and a blast of this size was bound to cause extensive damage and related injuries over a distance of more than 1 km (Clifton, 2020). 207 people were confirmed dead from the explosion, and more than 6,500 were injured (CARE, 2021). Additionally, more than 300,000 people were displaced from their homes, and the explosion caused physical damages estimated at \$4.6 billion (CARE, 2021). There were foreigners from at least 22 countries affected by the blast, and the most affected foreigners were Bangladeshi nationals with 5 deaths and 108 casualties (New Age, 2020). Also, 34 refugees were reported dead or missing, and 124 more were injured (UNHCR, 2020).

News reports also indicate that at least 150 people were permanently disabled due to the blast, with many of them suffering blindness or loss of limbs (Ibrahim, 2020). Reports further determined that many of the disabled would require extensive reconstructive surgery due to massive scarring, and the government was now responsible for the lifelong treatment of all Lebanese victims whereas UN agencies were funding the treatment of Syrian and Palestinian refugees (Ibrahim, 2020). It is therefore evident that the explosions

caused significant physical and mental damage to victims because of lost livelihoods, loss of beloved ones, and traumatic memories that would last a lifetime.

A study on the chemical's effect in the Beirut explosion found that ammonium nitrate poses risks for the environment and creates a variety of health effects such as chemical poisoning, digestive complications, and even death (Ur Rehman et al., 2021). This means that many people in the affected areas suffered various health challenges in addition to the physical and mental injuries.

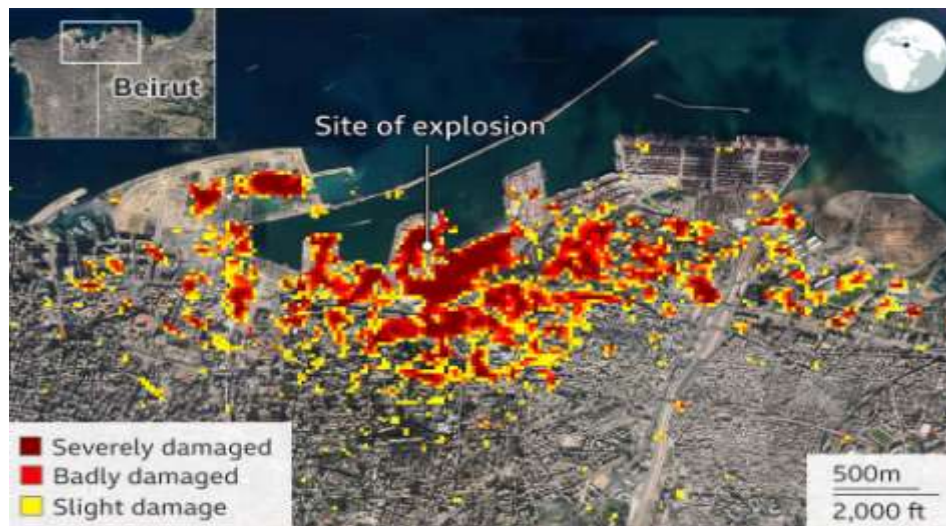


FIGURE 3: DAMAGE ASSESSMENT ON THE EXPLOSION.

Source: BBC News, 2020.

3.2. Impact on Society

Beyond the port, the explosion destroyed schools, streets, hospitals, and homes, and many businesses were forced to close. This in turn led to economic losses estimated at between \$2.9 billion and \$3.5 billion (CARE, 2021). The explosions also destroyed popular nightlife and shopping districts as well as densely populated neighborhoods. Several hospitals were so severely damaged that they could not be able to admit patients. It also became apparent that the damage to transport and building infrastructure meant that the government became incapacitated in the supplies requires to rescue and treat victims, leading to a major humanitarian catastrophe that was bound to have significant long-term effects.

Furthermore, the explosion damaged religious and cultural artifacts. For instance, the Sursock Museum was severely damaged, including numerous ceramics and artworks in the building (Bishara, 2020). Other art galleries and institutions affected in the city included Galeri Tanit, Marfa' Gallery, Sfeir Semler Gallery, the Arab Image Foundation, and Ashkal Alwan. Additionally, the Armenian Catholicosate, National Evangelical Church, FIBA Asia headquarters, and various embassies in and around Beirut sustained

heavy damage from the blast (Bishara, 2020). The Beirut-Rafic Hariri International Airport also suffered some structural damage but flights continued in spite of the damage.

According to reports, ammonium nitrate is usually comparatively safe if it is stored properly. However, if there are enormous amounts of the substance lying around over a long period of time, it begins to decay (Da Silva, 2020). The ammonium nitrate lay in the port warehouse for six years, and what this means is that with time, it absorbed moisture and hardened, thus making it more dangerous because of an increased chemical reaction during the fire.

3.3. Government's Reaction Before and After the Explosion

The ship's crew repeatedly warned the Lebanese authorities about the potential safety risks posed by the cargo but the authorities did not respond. On their part, the customs authorities repeatedly tried to get permission from local judges to allow them seize the cargo so that they could export the ammonium nitrate or hand it over to the Lebanese army (Urbina, 2020). However, their urgent requests went unanswered. This lack of an appropriate reaction can be termed as one of the reasons of the explosion. This is because the Lebanese customs, government, judiciary, public works ministers, port authorities, and army were all aware of the presence of the ammonium nitrate and yet none of them took measures to ensure public safety (Azhari, 2020a).

After the explosion, President Aoun stated that the explosion was unacceptable, but he refused to take the blame for the event (BBC News, 2020). Rather, he blamed it on the country's entrenched political elite. This appears to be a poor excuse, considering that he was the leader of the country at the time and should have taken appropriate steps before and after the explosion. This is because customs officials sent letters more than six times between 2014 and 2017 seeking guidance on the confiscated cargo, but they received no response (Azhari, 2020b). This indicates that government officials knew about the cargo but did not consider its safety implications. Therefore, President Aoun cannot lay all the blame on the entrenched political elite because it was his duty to change the system and ensure effective communications between all government departments.

In spite of calls for accountability on the issue, the government only performed token measures and remained silent about the possibility of compensating cases of negligence or wrongful death related to the blast (Mekay, 2020). The day after the explosion, the government initiated an administrative rather than criminal inquiry into the explosion and later referred the case to the Judicial Council, and yet the council has been criticized over the years for failing to use due process or guarantee fair trials. Reports indicated that ministers were refusing to show up before the Judicial Investigator, and it is only Prime

Minister Diab who requested the Investigator to offer insights of his role (Mekay, 2020). In general, those detained in the case were general directors and low-ranking employees.

The president further rejected the need of any international investigation in spite of demand from global leaders, suggesting that it was possible that a rocket, bomb, or other act caused by external forces could have led to the blast (BBC News, 2020). This implies that although the government promised accountability and transparency on the matter, it was willing to do nothing to actually investigate the matter and apprehend those responsible. The only reaction evident was the arrest of security, port, customs, and political officials who were aware of the cargo (Azhari, 2020c). The Lebanese government and its cabinet also resigned as a result of protests over the incident. However, this is a delayed reaction that could have been prevented if the officials had acted as expected from the beginning. Also, considering that there is rampant and entrenched corruption in Lebanon, many people were skeptical that any high-profile individuals linked to the events leading to the explosion would face consequences.

4. RECOMMENDATIONS

Had the *MV Rhosus* not been abandoned at the warehouse, perhaps the explosion would not have been so severe. The captain and three crew members of the ship repeatedly warned Lebanese authorities that the ship's cargo posed a serious safety risk to the public, but the authorities took no steps to find a solution to the problem (Urbina, 2020). Corruption and ineptitude within the Lebanese government thus played a major role in the explosion, and this is an issue that needs to be rectified. Port management should be streamlined to ensure that goods in the warehouses are tracked, safely stored, transported to safer locations, or allowed to continue on their journeys, especially if they are deemed dangerous to public health and safety.

The explosion highlighted the systemic health system issues that persist in the country because it clearly demonstrated the weaknesses prevalent in planning and implementation (Landry et al., 2020). However, it provides an opportunity for the country to improve its health care systems. This means that the new government should prioritize allocation of finances to health care provision in order to avoid catastrophic consequences should such an event reoccur. However, to achieve this requires that the government totally eliminate corruption so that financial allocations are used appropriately as expected.

Similar catastrophes are likely to occur in the country or other nations across the globe. It is therefore important for the Lebanese government to be prepared for such an eventuality by investing in disaster prevention strategies. This means ensuring effective oversight, communication, and preventive maintenance in critical facilities (Turlica, 2020). Better communication and the availability of detailed

information should help all employees in facilities to be aware of what they are moving or storing so that they can take swift and appropriate action in case of a disaster. This should involve keeping better records, ensuring they are easily accessible to everyone, and using digital technologies to empower individuals in the workplace (Turlica, 2020). In general, a top-to-bottom approach to safety will create a link between equipment, processes, and human resources so that problems are quickly spotted and dealt with.

Significant efforts will also be required to restore the environment; therefore air, water, soil, and biological impact monitoring will continue to be critical in the site (Ur Rehman et al., 2021). This implies that the government should monitor the area over the long term and also ensure that such events do not occur in future. It will also be critical to select a new government that is accountable and transparent, adhering to the rules and regulations of governance so that communications are streamlined and everyone becomes accountable for their actions.

5. CONCLUSIONS

In conclusion, it is evident that government corruption and negligence are mainly to blame for the tragedy. Had government officials heeded the warnings concerning the cargo from the beginning, the devastation would have been minimal. Many people lost their lives, thousands were wounded, and hundreds of thousands became homeless as a result of the blast. Also, the fact that the government stored the cargo near a residential area and constantly ignored port officials' warnings attests to the degree of negligence that Lebanese government has towards its people.

REFERENCES

- Azhari, T. (2020a). *How Beirut firefighters were sent into disaster*. Aljazeera, 8 August.
<https://www.aljazeera.com/news/2020/08/08/how-beirut-firefighters-were-sent-into-disaster/>
- Azhari, T. (2020b). *Beirut blast: Tracing the explosives that tore the capital apart*. Aljazeera, 5 August.
<https://www.aljazeera.com/news/2020/08/05/beirut-blast-tracing-the-explosives-that-tore-the-capital-apart/>
- Azhari, T. (2020c). *Fadi Sawan: The man leading the Beirut explosion investigation*. Aljazeera, 21 August.
<https://www.aljazeera.com/news/2020/8/21/fadi-sawan-the-man-leading-the-beirut-explosion-investigation>

- BBC News. (2020). *Beirut Explosion: What we know so far*. <https://www.bbc.com/news/world-middle-east-53668493>
- BGR. (2020). *Beirut explosion causes strong shock waves – Infrasonic, hydroacoustic and seismic signals registered and investigated by BGR*. https://www.seismologie.bgr.de/sdac/erdbeben/big_quakes/beirut_200804_eng.html
- Bishara, H. (2020). *Deadly explosion in Beirut decimates thousands of buildings, including galleries and museums*. <https://hyperallergic.com/580732/deadly-beirut-explosion/>
- CARE. (2021). *6 months later, Beirut blast still sends shock waves through Lebanese communities*. <https://www.care.org/news-and-stories/press-releases/6-months-later-beirut-blast-still-sends-shock-waves-through-lebanese-communities/>
- Clifton, K. (2020). *Beirut explosion 'one of the largest non-nuclear blasts in history*. Evening Standard, 5 August. <https://www.standard.co.uk/news/world/beirut-explosion-one-of-largest-blasts-history-a4517646.html>
- Compound Interest. (2020). *What is ammonium nitrate and what happens when it explodes?* <https://www.compoundchem.com/2020/08/05/ammonium-nitrate/>
- Da Silva, G. (2020). *What is ammonium nitrate, the chemical that exploded in Beirut?* Scientific American, 5 August. <https://www.scientificamerican.com/article/what-is-ammonium-nitrate-the-chemical-that-exploded-in-beirut/>
- Díaz, J. S. (2021). *Explosion analysis from images: Trinity and Beirut*. *European Journal of Physics*, 42(3), 035803.
- Ibrahim, A. (2020). *Scarred for life: Beirut blast victims and life-altering wounds*. Aljazeera, 25 August. <https://www.aljazeera.com/news/2020/08/25/scarred-for-life-beirut-blast-victims-and-life-altering-wounds/>
- Landry, M. D., Alameddine, M., Jesus, T. S., Sassine, S., Koueik, E., & Raman, S. R. (2020). *The 2020 blast in the Port of Beirut: can the Lebanese health system "build back better"?*, *BMC Health Services Research*, 20(1), 1040.

- Mekay, E. (2020). *Explosive evidence of Lebanon's governance deficit*. International Bar Association, 6 October. <https://www.ibanet.org/article/9FCFA44A-B295-413A-A421-BDDA9C7000DA>
- New Age. (2020). *Missing Bangladeshi found dead in Beirut hospital*. <https://www.newagebd.net/article/113055/missing-bangladeshi-worker-found-dead-in-beirut-hospital>
- Rigby, S. E., Lodge, T. J., Alotaibi, S., Barr, A. D., Clarke, S. D., Langdon, G. S., & Tyas, A. (2020). Preliminary yield estimation of the 2020 Beirut explosion using video footage from social media. *Shock Waves*, 30(6), 671-675.
- Sly, L., Morris, L., & Haidamous, S. (2020). *Fears Beirut port chemicals would be stolen may have contributed to blast*. The Washington Post, 31 August. https://www.washingtonpost.com/world/middle_east/beirut-blasts-probe-ammonium-nitrate/2020/08/30/d3c20ad0-e3cd-11ea-82d8-5e55d47e90ca_story.html
- Somwanshi, R. (2020). *Explosion at Port of Beirut damages grain silos, terminal: Reports*. S&P Global, 4 August. <https://www.spglobal.com/platts/en/market-insights/latest-news/agriculture/080420-explosion-at-port-of-beirut-damages-grain-silos-terminal-reports>
- Turlica, C. (2020). *Safety lessons from the Beirut blast*. EHS Today, 29 September. <https://www.ehstoday.com/safety-technology/article/21143254/safety-lessons-from-the-beirut-blast>
- Urbina, I. (2020). *'Ticking time bomb': Abandoned seafarers stranded without water, food, or money*. CTV News, 26 October. <https://www.ctvnews.ca/world/ticking-time-bomb-abandoned-seafarers-stranded-without-water-food-or-money-1.5156352>
- UNHCR. (2020). *Beirut blast death toll includes dozens of refugees, emergency response ramps up*. <https://www.unhcr.org/news/briefing/2020/8/5f32469f4/beirut-blast-death-toll-includes-dozens-refugees-emergency-response-ramps.html>
- United States Geological Survey. (2020). *M 3.3 explosion – 1 km ENE of Beirut*. <https://earthquake.usgs.gov/earthquakes/eventpage/us6000b9bx/executive>

Ur Rehman, S., Ahmed, R., Ma, K., Xu, S., Aslam, M. A., Bi, H. & Wang, J. (2021). Ammonium nitrate is a risk for environment: a case study of Beirut (Lebanon) chemical explosion and the effects on environment. *Ecotoxicology and Environmental Safety*, 210, 111834.