

Interconnected Disaster Risks
2020/2021

Beirut Explosion

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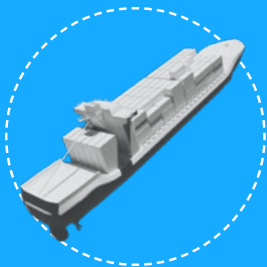


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1. Event

On August 4th, 2020, at 6:07 pm, 2,750 tonnes of ammonium nitrate detonated in Hangar 12 at the port of Beirut (El Sayed, 2020). The explosion caused seismic waves that registered as a 3.3 magnitude earthquake on the Richter scale (Balkiz and others, 2020; Al-Haji and others, 2021; El Sayed, 2020; Urbina, 2020b). According to ongoing investigations, a fire led to an initial smaller explosion of fireworks stored in the same hangar, which then triggered the detonation of ammonium nitrate. It resulted in the biggest non-nuclear blast in modern history (El Sayed, 2020). To make matters worse, this disastrous event occurred at a time when Lebanon was facing both the COVID-19 pandemic and a national financial crisis.

How did the ammonium nitrate end up in Beirut?

In 2013, a ship named MV Rhosus, flying a Moldovan flag, was transporting a cargo of 2,750 tonnes of ammonium nitrate from Batumi, Georgia, to Beira, Mozambique (Ruhayem & Adams, 2020). On the way, it stopped in Beirut to load more cargo (Ruhayem & Adams, 2020). The port authorities found the vessel as unseaworthy and forbade a continuation of the journey (Murphy, 2020). The vessel was subsequently abandoned by its owner, a Russian national who operated a shipping company from Cyprus that was registered in the Marshall Islands, leaving four crew members stuck on board for more than a year because of immigration restrictions (Ruhayem & Adams, 2020; Urbina, 2020a; Urbina, 2020b; Voytenko, 2014). Due to the deterioration of the ship after it was no longer maintained, the cargo was brought ashore in 2014 and placed in Hangar 12 at the port. Here it remained unsafely stored for the next six years despite several warnings from port authorities on the danger of ammonium nitrate (Al-Haji and others, 2021; Pasman and others, 2020). The MV Rhosus sank in the breakwaters of the port of Beirut in February 2018 (Holroyd, 2020).

Box 1: Port of Beirut

The Port of Beirut occupies an area of 1.2 square kilometres and is therefore one of the largest in the Middle East (LCA, 2021). Due to its strategic position at the intersection between the three continents of Africa, Asia and Europe, the port is of general importance for international trade. It serves as a regional hub providing imported products for the eastern Mediterranean region, including Syria, Jordan, Iraq and the Persian Gulf countries (LCA, 2021). For Lebanon, the port is of high economic importance as it channels more than two-thirds of the country's total external trade and generated an average annual revenue of US\$313 million in 2017 (Al-Haji and others, 2021). Furthermore, most goods delivered through this port are essential to meet the basic needs of the Lebanese, as 85 per cent of all food is imported (WFP, 2021). The grain silo in the port, which was destroyed by the explosion, held about 85 per cent of the national grain reserves (Port of Beirut, 2012).

The explosion destroyed most of the crucial infrastructure, and in the immediate aftermath all imports and exports had to be directed to the port of Tripoli, which is 85 km away and has only a third of the capacity of the port in Beirut (UN-OCHA, 2021a).

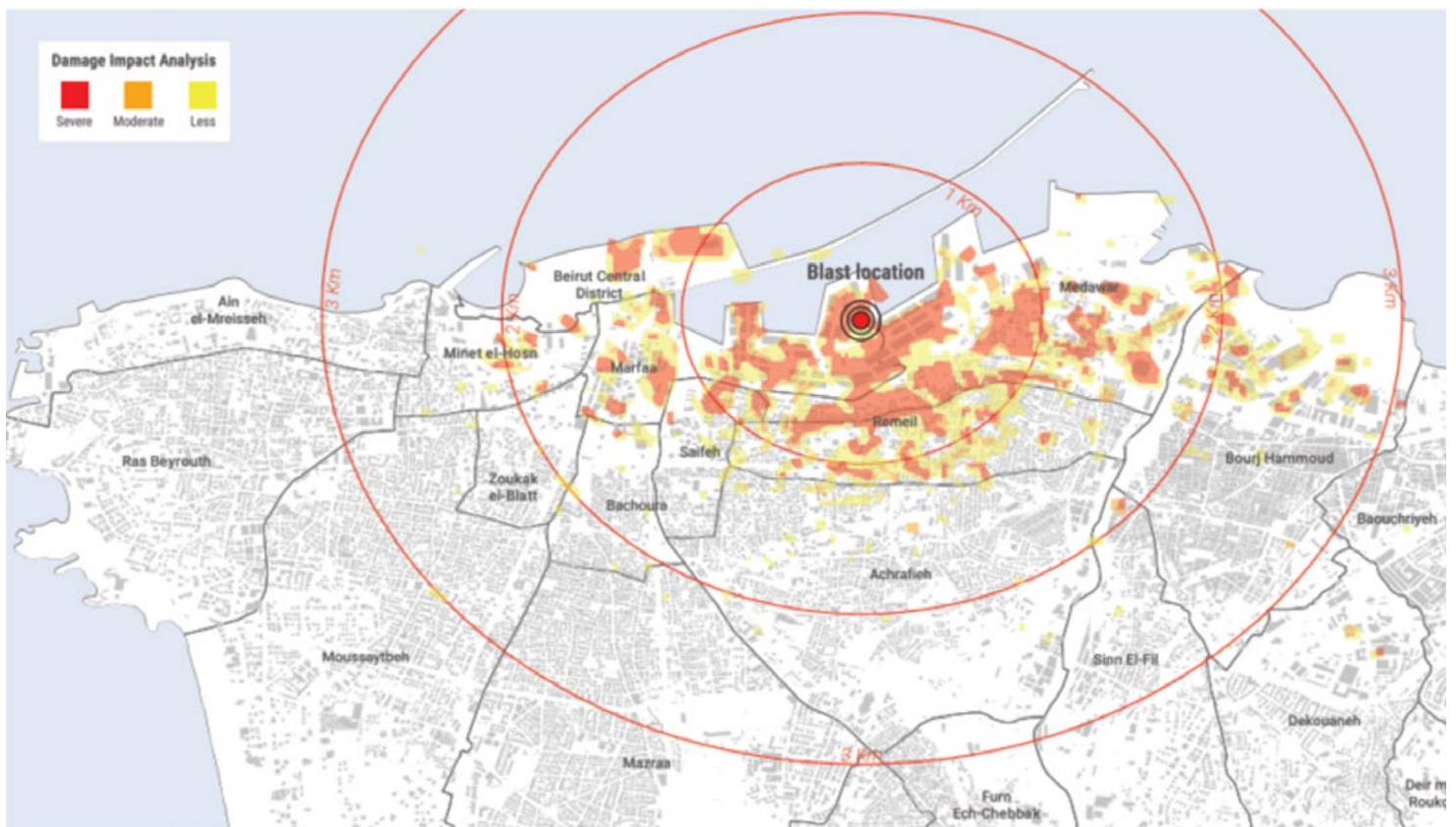


Figure 1: Satellite pictures of the port of Beirut before and after the explosion (Al-Haji and others, 2021).

2. Impacts

Direct impacts

The blast caused the death of more than 200 people and left more than 6,000 injured (El Sayed, 2020; Cheaito & Al-Haji, 2020). At the same time, the health infrastructure in Beirut was severely affected by the blast, increasing the challenge of responding to the disaster. Three hospitals and a storage building for needed medication were completely destroyed, leaving Beirut with less than 50 per cent of its usual hospital capacity during an ongoing pandemic (Dyer, 2020; Landry and others, 2020). As a consequence the health system was immediately overwhelmed when the explosion occurred, forcing the local doctors to triage injured people (El Sayed, 2020). In the days after the disaster, the combination of toxic gases (e.g. nitric oxides) resulting from the chemical reaction of ammonium nitrate mixed with humidity and dust posed a threat to roughly 2.4 million citizens of Beirut, and the first responders assisting with relief efforts (Al-Haji and others, 2021). Inhalation was lethal



Map 1: Damage impact analysis by ARIA team scientists at NASA JPL, Caltech, and Earth Observatory of Singapore (UN-OCHA, 2021a).

within a 200-metre radius around the blast site, but smaller concentrations – still capable of causing symptoms like abdominal pain, nausea, headache, fatigue, coughing, and difficulty breathing – were detected up to 3 km away (Al-Haji and others, 2021; UN-OCHA & UNEP, 2020).

In addition to the health impacts, the cost of damage to infrastructure was estimated at \$3.8–\$4.6 billion (Kent, 2021; World Bank, 2021). At least 73,000 apartments, along with public infrastructure including schools and roads, were severely damaged and roughly 300,000 people have been displaced (Al-Haji and others, 2021; UN-OCHA, 2021a). The destruction of roads hampered the first response further, as both hospitals and victims were hard to access (El Sayed, 2020). Also, cultural heritage sites, including eight historical areas and 480 heritage buildings, were damaged (Strategy&, 2020). The most affected residential areas were close to the port (Map 1), but some windows shattered as far as 10 km away from the port (UN Women, 2020; UN-OCHA, 2021a; Al-Haji and others, 2021).

Indirect impacts

In the weeks after the explosion, the long-lasting financial crisis of Lebanon worsened as inflation increased in the aftermath of the disaster. The necessity of essential goods and services sharply increased at a time where the supply decreased, pushing more people into poverty or hunger (Haghdoost, 2020; Noack & Mellen, 2020). The financial crisis was also exacerbated by the fact that many people lost their livelihoods as a result of the explosion across all sectors (UN Women, 2020). This included many of the small businesses selling essential goods to citizens in the affected neighbourhoods, which have been heavily impacted – threatening both the food security of the people in these areas and the jobs of many people working in these small businesses (Mercy Corps, 2020). Food security was further impacted due to the disruption to the supply of imported food and the destruction of food stores in the port, as described in Box 1.

After the blast there were a series of protests and riots related to the political handling of the disaster, eventually leading to the resignation of Prime Minister Hassan Diab on 10 August 2020 (Nakhoul & Bassam, 2020), further adding to the existing trend of political instability in Lebanon in recent years (Haghdoost, 2020). In October 2019, the former

Prime Minister Saad Hariri was forced to resign after a major national financial crisis triggered widespread protests (World Bank, Middle East and African Region, 2019), and at the time writing (summer 2021) there is yet to be a new government formed (World Bank, Middle East and African Region, 2021). This lack of executive power in times of multiple crises – Beirut explosion, COVID-19 and the financial crisis – has led to increased risk as there is little chance to develop adequate and coherent policy responses. The financial crisis in Lebanon, for example, developed into possibly one of the top three most severe the world has seen since the mid-nineteenth century (World Bank, Middle East and African Region, 2021). Meanwhile, fear of widespread corruption hampered the coordination of relief efforts in the wake of the explosion, as there was little trust between the private sector, state officials and NGOs (El Sayed, 2020) (see section 4, Insufficient disaster risk management in Lebanon). For example, international donors, who raised \$200 million in support, requested that these funds were to be paid out directly to the population, circumventing state actors, until reform measures were in place (El Sayed, 2020). In summary, the explosion further destabilized the institutional capacity of Lebanon, hindering both an effective response to the blast and a policy response to the ongoing pandemic and financial crisis.

Beirut explosion and COVID-19

Lebanon had 4,022 COVID-19 cases before the blast (El Sayed, 2020) and managed the pandemic comparatively well until the disaster, with massive testing for suspected infections and a national curfew initiated (Hashim and others, 2021). However, in the aftermath of the explosion the number of cases increased sharply to 10,347 by 19 August 2020 (an increase of 157 per cent), due to three key reasons: a) lowered precautionary standards in hospitals and disaster response activities due to excessive demands, b) mass gatherings for protest, and support in urban search and rescue, and c) natural progression of the pandemic since the weekly COVID-19 reproduction rate average exceeded 1.5 in the pre-explosion phase (El Sayed, 2020). The lowered precautionary standards in hospitals saw the number of COVID-19 cases among health workers and supporting volunteers increase abruptly in the aftermath of the event (International Medical Corps, 2020). On top of the causes for the immediate increase in cases, further containment measures like lockdowns proved to be difficult, as hundreds of thousands of citizens lost their homes during the explosion (Dyer, 2020; El Hajj, 2021; International Medical Corps, 2020).

Additionally, the field hospitals set up by international support to assist with the disaster response after the explosion were not equipped to handle patients infected with COVID-19, meaning many of the victims were diverted back to the remaining Lebanese health infrastructure that was still functioning (El Sayed, 2020). In the weeks to come the stress on the remaining health capacity increased further as the priorities of the response shifted back from explosion injuries to COVID-19 cases (El Sayed, 2020). Lastly, COVID-19 slowed down international support efforts as relief workers entering the country had to wait at least two days in quarantine before they could join the relief effort (UN-OCHA, 2021b) (see main report, Chapter 3.1 – Section 1 – How disastrous events in 2020/2021 are interconnected).



3. Drivers

In view of these impacts, this chapter explores some of the main drivers which contributed to causing the blast in Beirut.

Lack of accountability and regulation in international shipping

The practice of abandoning ships which become unprofitable, like the one bringing ammonium nitrate to Lebanon, is far from seldom, with drastic consequences for the affected crew members in most cases (Urbina, 2020b). At the time of writing (summer, 2021) there are more than 250 active cases of abandonment with crew members on board (Adams, 2021; ILO, 2021). These statistics do not include the deliberate dumping of roughly 700 end-of-life ships, mainly on the beaches of the Indian sub-continent, each year to avoid disposal costs (Galley, 2014). Taken together, this indicates a systemic issue regarding the accountability of ship operators, which was one of the drivers of the Beirut explosion. The possibility to declare bankruptcy and walk away as soon as a ship becomes unprofitable not only leaves crew members unpaid and stranded in unfavourable conditions but also creates significant risk when the freight is dangerous.

The possibility to abandon a ship is rooted in the way ships and their respective owners are registered. Ships must be registered in a nationally operated registry, of which there are two kinds: 'open registries' and 'closed registries' (Galley, 2014). Unlike closed registries, which require both incorporation and principal place of business of ships and their owners to be in the country of registration, open registries have fewer restrictions, allowing anyone to register a ship without a connection to the country operating the registry (Watterson and others, 2020). Currently, around 30 countries offer open registries as a way to generate income by asking ship owners for a registration fee while competing with one another in offering either the lowest fees, fewest regulations, greatest anonymity, or a combination of these to ship owners (Urbina, 2020b; Watterson and others, 2020).

Anonymity is provided in open registries by allowing ships to be registered by companies rather than by private citizens, meaning ship owners who wish to hide their identity can use a web of shell companies to do so (Galley, 2014). Also, this regulation allows ship owners to register each of their ships with a different company so that, in case it is needed, one

shell company can declare bankruptcy while all other ships and assets are protected (Galley, 2014). As mentioned above, the Moldovan-flagged MV Rhosus, belonging to a Russian national living in Cyprus and registered via a company from the Marshall Islands, is a prime example of a ship owner making use of the weak accountabilities in a global value chain enabled via open registries (Urbina, 2020b). Unfortunately, this is not an isolated case. In 2017 more than 70 per cent of the global deadweight tonnage – the sum of all weights of cargo, fuel, fresh water, ballast water, provisions, passengers and crew a ship can carry – is sailing under open registries, despite the fact that less than 12 per cent is operated from the countries that host these registries (Watterson and others, 2020).

The explosion in Beirut has shown how ship abandonment can turn into risk for more people than the directly affected crew often left stranded on board.

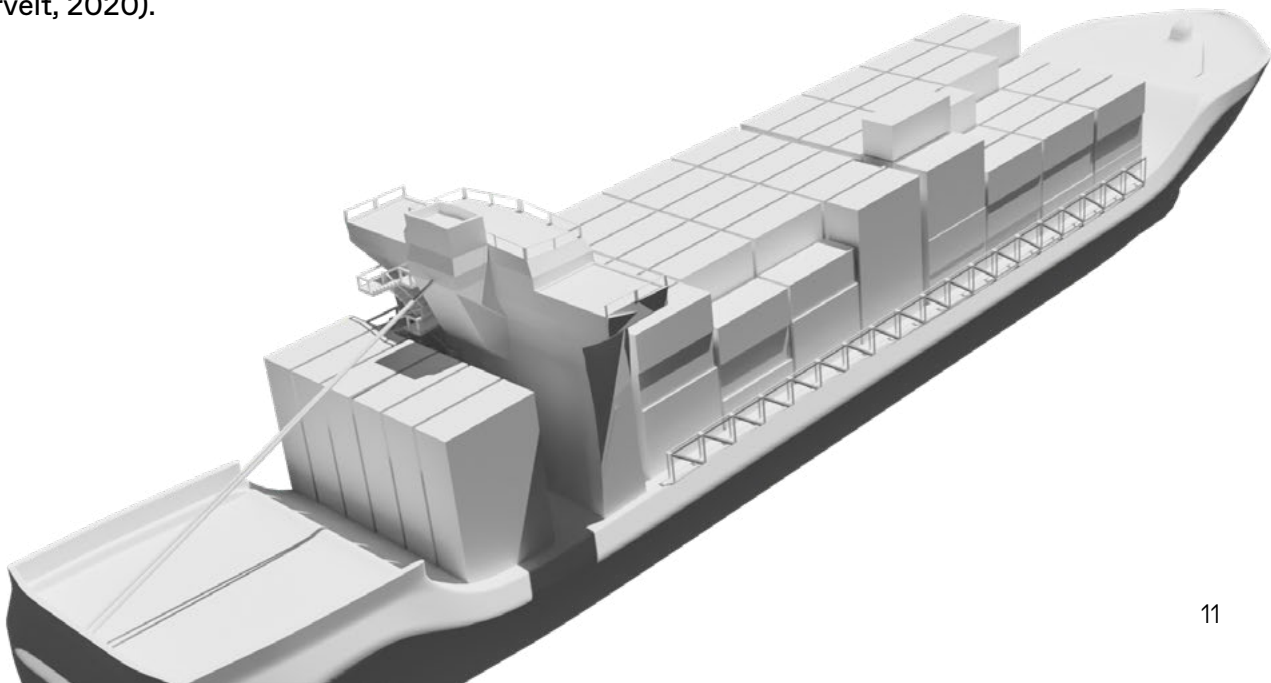
Box 2: Impacts of ship abandonment

Explosive freight transported by ships which end up abandoned around the world is not the only risk resulting from this lack of accountability created by open registries. The anonymity granted by these registries may be chosen for valid commercial reasons, but also institutionalizes an option for ship owners to sidestep laws and regulations (Galley, 2014). For example, owners of end-of-life ships often make use of this anonymity to dump their ships once they become unprofitable, without paying for the cost-intensive disposal, despite potentially devastating impacts on the environment (Galley, 2014; Wan and others, 2021). Also, ship operators trying to evade maritime sanctions frequently use open registries (Watterson and others, 2020). The list of possible misuse of anonymously operated ships is long and all cases have in common that they eventually threaten the security of crew members, the general population and the environment. As shipping is responsible for roughly 80 per cent of global trade in volume (UNCTAD, 2018), there is risk of further disasters facilitated by the anonymity of the actual beneficiaries of the involved ships as long as actions are not taken to effectively address it.

Lack of security measures concerning ammonium nitrate

Ammonium nitrate is widely used in fertilizers and blasting in quarrying, mining and civil construction (Shakoor and others, 2020). Generally, it is cheap to produce and safe to handle, but storing it safely is a challenge as exposure to moisture – for example, moist air close to the sea – over a long period of time increases the risk of explosions (Guglielmi, 2020). Globally, explosions involving the chemical ammonium nitrate have led to 2,215 fatalities since 1916 (Prugh, 2020). Since 2000 alone, four significant explosions occurred in France (2001), the United States (2013), China (2015) and this most recent explosion in Lebanon (2020) (Berger & Karklis, 2020; Prugh, 2020).

As the need for this chemical is unlikely to decline in the near future, regulatory measures should be taken by all nations worldwide to prevent disasters like the explosion in Beirut (Shakoor and others, 2020). In fact, in Lebanon an institution implementing and controlling security measures for the handling of explosives was missing (Al-Haji and others, 2021). Currently, there is ample knowledge on the dangers of ammonium nitrate, as well as plenty of recommendations for its safe storage (Pasman and others, 2020). However, it remains challenging to implement strict regulations around ammonium nitrate without creating unfavourable conditions for the industries that use it, meaning that changing regulations will always face opposition. This can be exemplified in the case of the United States, where the Obama administration faced stiff opposition from industry when trying to implement stricter rules in handling ammonium nitrate after a blast in Texas in 2013 involving the chemical (Westervelt, 2020).



4. Root causes

Though there are various root causes for the systemic and structural issues which culminated in the explosion in Beirut, the key root causes focused on here interconnect the Beirut explosion with other disastrous events in 2020/2021 (see main report, Chapter 3.1), and influenced the drivers described above. The aforementioned drivers – a lack of security measures in handling ammonium nitrate and a lack of accountability in shipping – have root causes like prioritization of individual profit (see section 4, Prioritization of [individual] profits) or a general lack of governance capacity, which leads to insufficient disaster risk management beyond the impacts of this explosion (see section 4, Insufficient disaster risk management in Lebanon).

Prioritization of (individual) profits

Both described drivers – a lack of security measures in handling ammonium nitrate and a lack of accountability in shipping – can be attributed in part to the prioritization of economic profits over the security of humans and the environment. Implementing high security standards or increasing accountability creates a potential reason for investors and industry to move to a more ‘investment- and industry-friendly’ environment to gain a competitive advantage (Woods, 2006). In return, policymakers may attempt to keep industry or investments in their region, or even to attract more of them into the region by reducing security standards and accountability (Woods, 2006). This downward spiral in policymaking created by competition is sometimes referred to as the ‘race to the bottom’ theory and is not only observed in the field of security standards and accountability issues, but also triggers an ongoing debate on environmental policy in general (Woods, 2006).

In the case of ship abandonment, the situation is even more complicated. The current system of open registries with lax regulations creates profit at two ends: ship operators can make use of lower minimum standards and greater anonymity and at the same time countries can generate an income from registration fees (Galley, 2014). Since both parties benefit from this system, change is hard to implement. In this case a ‘race to the bottom’ among countries offering open registries can be observed, because most of the registration fees go to the countries with the lowest standards, greatest anonymity for ship operators or lowest registration costs (Galley, 2014). Additionally, another pattern can be observed – described by the ‘tragedy of the commons’ theory, which states that as long as the negative consequences of a decision of an individual has to be borne by all actors, but the gain remains for the one making the decision, actors will continue to make the decision despite



the negative consequence for everybody else (Hardin, 1968). In the case of MV Rhosus, which brought the ammonium nitrate to Beirut, the registration fees were paid to Moldova but the risk of allowing a vessel in poor condition to carry explosive freight manifested eventually in Lebanon. Considering that Moldova has no direct access to the sea, it was never likely that it would carry any risk of lax ship regulations in the first place, and therefore had little incentive to implement stricter regulations.

Insufficient disaster risk management in Lebanon

One of the main drivers of the Beirut explosion was a lack of security measures concerning ammonium nitrate in Lebanon. This is emblematic for structural governance issues in Lebanon leading to challenges for risk management. This subchapter gives a short overview of why people in Lebanon have been and still are particularly vulnerable, how this was intertwined with government capacity for disaster preparedness in the lead up to the explosion and how gaps in disaster risk management eventually manifested.

In the case of Lebanon multiple factors contributed to increased vulnerability, one of the primary ones being the political instability Lebanon has been dealing

with since the end of the civil war (Salloukh, 2015). Political tensions have been on the rise, especially after the assassination of the former Prime Minister Rafik Hariri, in 2005, allowing widespread clientelism and corruption – Lebanon ranked 149th of 180 in the Corruption Perceptions Index in 2020 (Barroso Cortés & Kéchichian, 2020; Salloukh, 2015; Transparency International, 2021). On top of that, a financial crisis caused and is still causing further civil unrest, as mentioned above (Abouzeid and others, 2020). In addition to civil unrest, the national financial crisis led directly to hyperinflation, which brought Lebanon to the brink of a food supply crisis in June 2020 (Abouzeid and others, 2020; El Hajj, 2021). Beyond the food supply issues, supplies of medical equipment suffered great shortages amidst the ongoing COVID-19 pandemic (El Sayed, 2020). Moreover, the high influx of Syrian refugees, which has increased the population of Lebanon by nearly 30 per cent since the outbreak of the conflicts in Syria, is further stressing limited public resources (Cheaito & Al-Haji, 2020; Abouzeid and others, 2020).

In the case of this particular explosion, the Lebanese state has also contributed directly to the hazard: Lebanese officials were reportedly warned about the dangerous potential of ammonium nitrate stored in the port at least eight times since 2014. State security officials requested an investigation only in December 2019, and as little as three weeks before the blast state officials at the highest level were handed a report saying the materials had been there for seven years (Trew and others, 2020; Nakhoul & Bassam, 2020). Also, port authorities did not handle the ammonium nitrate adequately, as they allowed fireworks to be stored right next to it (Sly and others, 2020).

Once the explosion occurred, existing gaps and challenges in the Lebanese disaster risk management capacity manifested: it became evident that strategies for adequate preparedness and proper emergency response for chemical spills or chemical-related fires were lacking (Al-Haji and others, 2021). Also, an efficient crowd control in the direct response, and proper coordination in triaging minor injuries away from hospitals, was missing (Al-Haji and others, 2021).

5. Solutions

This chapter addresses potential solutions to the above-described drivers and root causes. More in-depth discussions on solutions at the level of root causes can be found in Chapter 4 of the main report.

Handling ammonium nitrate

The devastating Beirut explosion should serve as a wake-up call to increase the security standards concerning ammonium nitrate (Pasma and others, 2020). The explosion highlights the need for a national agency to oversee and implement chemical safety measures and adopt preventive strategies for the entire country (Al-Haji and others, 2021).

The explosion also provides lessons for first responders. This holds especially true for preventing responding personnel from being affected by the toxic gases and dust after an explosion of this kind (Al-Haji and others, 2021). The experience from this disaster should be taken up in training to reduce the impact of the next disaster involving chemical spills.

Improving ship registration and accountability

The Beirut explosion draws attention to the lack of accountability in shipping. All attempts so far to ban or regulate open registries have failed. A bold attempt to end the anonymity of ship operators was the United Nations Convention for Registration of Ships, adopted in 1986. However, only 24 of the necessary 40 States controlling 25 per cent of the world's shipping have ratified or acceded to it (Galley, 2014). More general public attention to what happens on the sea would be needed to push political leaders for the needed international cooperation to implement stricter rules and higher accountability in the ship registration system. One attempt to advocate for such change is 'The Outlaw Ocean Project', a non-profit journalism organization. It tries to trigger public debates about lawlessness at sea, and the diversity of environmental, human rights, and labour abuses occurring off-shore around the world, by reporting about this using different narrative forms (The Outlaw Ocean Project, 2021).

Enhancing disaster risk management capacities

Responding to the explosion in the port of Beirut was particularly challenging: first, the explosion was compounded by other disasters like the financial crisis, mass migration and the COVID-19 pandemic; second, as explained in chapter 4.2 of this technical report, weakened trust in the governance and administrative systems has complicated disaster risk management even further (Salloukh, 2015).

The latter poses the question of who is in charge of disaster risk reduction action if it cannot be fully delivered by the Government and the institutions officially responsible for it. Siddiqi (2018) recognizes, rightly, that this is a field of research which needs further investigation. At the same time, there is hope that disasters of this extent at least create windows of opportunity for learning and building the institutions back better, even under fragile conditions like in Lebanon (El Hajj, 2021; Geha and others, 2020). A crucial step to increase the capacity for disaster risk management would be a thorough investigation, creating some form of accountability for this disaster. Ten months after the explosion, investigations are still ongoing and accompanied by strong and violent protest (The Guardian, 2021).

In the process of recovering and strengthening disaster risk management capacities, special focus should be placed on the health sector. The compounding effects of the explosion and the COVID-19 pandemic has revealed the importance and the fragility of the Lebanese health system (Landry and others, 2020). Learning from the shortages experienced on the ground in the aftermath of the explosion offers an entry point for building a stronger health system in order to be better prepared for future catastrophic events.

For direct response to disasters in such challenging surroundings, it is important that international support is granted to speed-up the recovery process and protect the most vulnerable from the impacts of these multiple disasters. According to UNDRR (2019) special consideration should be given to vulnerable persons and groups, engaging long term across sectors and at multiple scales, and adapting to a rapidly changing and dynamic context. Considering the multiple shocks and the desperately needed reforms in the country, the European Union, the United Nations and the World Bank launched the so-called 3RF, a people-centred initiative aimed to achieve recovery, reconstruction and reform (Atrache, 2021).



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