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“As If You’re Inhaling Your Death”

The Health Risks of Burning Waste in Lebanon



“As If You’re Inhaling Your Death”
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Summary

“It’s like there’s fog across the whole town. We are coughing all the time, unable to breathe, sometimes we wake up and see ash in our spit. The intensity of the smell would cause us to become dizzy.”

— Othman, Kfar Zabad, February 16, 2017

“When they burn we can’t breathe.... We’ve had to go to the hospital because of this.”

— Mohamed, Kfar Zabad, February 16, 2017

Open burning of waste is a dangerous and avoidable practice that takes place across Lebanon. Because it risks causing a range of short and long-term health problems, it implicates the Lebanese government’s legal obligations to protect the health of its citizens. In Lebanon, open burning is a consequence of the government’s failure to manage solid waste in a way that respects environmental and health laws designed to protect people. Children and older persons are at particular risk.

Open burning of waste occurs when existing waste management plans break down, such as occurred in Beirut and surrounding Mount Lebanon during a 2015 waste management crisis that saw garbage piling up in the streets. But it is also the result of the central government’s prioritization of waste collection and disposal in Beirut and Mount Lebanon, which produce just half of Lebanon’s municipal solid waste, while leaving other municipalities to fend for themselves without adequate financial support, technical expertise, and oversight.

The open burning of waste in Lebanon may have serious consequences for the health of people living nearby. A range of scientific studies have documented the dangers that emissions from the open burning of household waste pose to human health. These include exposure to fine particles, dioxins, volatile organic compounds, polycyclic aromatic hydrocarbon, and polychlorinated biphenyls, which have been linked to heart disease, cancer, skin diseases, asthma, and respiratory illnesses. The dangers of open burning of waste are compounded by the fact that Lebanon often does not properly dispose of industrial and healthcare waste, which may be mixed into the municipal solid waste stream.



An open dump in Baalbek just meters from this family's home. © Bassam Khawaja/Human Rights Watch

Human Rights Watch found that those living near open burning reported an array of health problems consistent with the frequent and sustained inhalation of smoke from the open burning of waste. These included chronic obstructive pulmonary disease, coughing, throat irritation, skin conditions, and asthma. In many cases, interviewees described a temporal relationship between the burning of waste and their health condition; some developed a condition after the burning started or they moved to an area where burning was taking place. Others said their symptoms subsided after a municipality stopped burning or they moved away from an area where burning was taking place.

Because of its detrimental impact on health, the burning of waste triggers Lebanon's obligations under international human rights law. Lebanon is a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), which requires it to take steps



An open dump in Bar Elias, where nearby residents said burning has taken place for years. © Bassam Khawaja/Human Rights Watch

to achieve “the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.”

While other factors may play some part in these illnesses, the extent of air pollution from the open burning of waste, the correlation between these conditions and periods of open burning, and interviews with doctors and other public health experts suggest a causal relationship between air pollution from the open burning of waste and poor community health.

Ten doctors told Human Rights Watch that they believed the open burning of waste was causing respiratory illnesses. Doctors in and near Beirut often noted an increase in respiratory illness cases in areas that began burning waste after the 2015 waste management crisis.

People living near open garbage dumps in Lebanon explained how the burning of waste gravely affected other aspects of their lives: they were unable to spend time outside, had difficulty sleeping because of air pollution, or had to vacate their homes when burning was taking place. Some residents reported moving permanently to a different location to avoid the potential health effects of open burning of waste.

Leila, who lives in Sin el Fil, outside Beirut, described how burning of waste near her apartment since the summer of 2016, and ongoing at the time of the interview in November 2016, was affecting her:

It starts with the smell. And then this white smoke begins rising, and it encircles our building. The burning usually starts at night and lasts until dawn. I immediately run to the balcony, take in the laundry, and lock all the windows, all the doors. But the smell, the smoke, it stays there. We can't turn on the air conditioning. We can't sleep. We stay awake until the morning and we [feel like we are] suffocating. This happened last night, starting at midnight. It's too much. Even when I leave the area it's as if the smoke is still inside my lungs.

The vast majority of residents interviewed by Human Rights Watch reported health effects that they attributed to the burning and inhalation of smoke from the open burning of waste. Thirty-eight people said they were suffering from respiratory issues including chronic obstructive pulmonary disease, coughing, throat irritation, and asthma. According to an extensive body of scientific literature, these symptoms are consistent with exposure to open burning of waste. Thirty-two individuals had sought medical treatment for these respiratory illnesses, and two said that a doctor or hospital had prescribed oxygen masks.

Human Rights Watch also documented three cases in which open burning was taking place directly adjacent to schools. At one of the schools, near Naameh, administrators said that garbage was being dumped and burned across the street from the school for four days during October 2016, causing them to adopt emergency measures and send children home.

At three large dump sites, Human Rights Watch used an unmanned aerial vehicle, or drone, to take aerial photographs. At each site, the images showed black scars from recent burns and ash deposits that indicate large burns on an earlier date.



In addition to the immediate health concerns, some families said that uncertainty over whether

An oxygen machine that a family in Baalbek said they used because of the nearby open burning of waste. © Bassam Khawaja/Human Rights Watch

the burning would lead to more serious health effects, including cancer, was taking a heavy psychological toll. In only one case did an interviewee say that the municipality had provided their family with information about the risks of open burning and safety precautions to take. As a result, many expressed fear about the unknown risks and concern about the potential impact of the burning on their health and the health of their children. Parents expressed frustration that they were not able to protect their children from the potential health effects of the burning.

The open burning of waste in Lebanon has had a disproportionate effect on residents in lower income areas. A map of the open dumps in Lebanon provided to Human Rights Watch by the Ministry of Environment and the United Nations Development Programme (UNDP) shows that although there are more than 100 open dumps in Beirut and Mount Lebanon, some of the wealthiest areas of the country (and home to approximately 50 percent of the population), just nine of these are being burned. Meanwhile there are nearly 150 open burn dumps located across the rest of the country, home to the other 50 percent of the population. Most of the dumps at which open burning takes place regularly are located in some of the poorest areas in the country, including the Bekaa Valley, Nabatieh, and the south.

Lebanon has not implemented a national solid waste management plan that covers the entire country. According to the most recent government figures that are publicly available, Lebanon generated just over 2 million tons of solid municipal waste in 2014. According to researchers at the American University of Beirut, only 10-12 percent of Lebanon's waste cannot be composted or recycled. But 77 percent is either openly dumped or landfilled. Based on data from the Ministry of Environment and UNDP, as of 2017 there are 941 open dumps in the country, including 617 municipal solid waste dumps. More than 150 of these dumps are open burned at least once a week on average.

Open burning of garbage also increased in Beirut and Mount Lebanon after the waste management system for those areas collapsed during the 2015 waste crisis. From the beginning of that crisis until June 30, 2017, Lebanon's fire department said it responded to 3,612 reports of open burning of waste in Beirut and Mount Lebanon, and 814 in the rest of the country. According to the department, the number of open burning cases reported in Mount Lebanon rose 330 percent in 2015 and a further 250 percent in 2016.

The history of the waste management crisis in Lebanon goes back several decades, with a pattern of poor government planning and management; inadequate support to and oversight of areas outside of Beirut and Mount Lebanon; overuse of landfills, open dumping, and burning; a reliance on the private sector and international donors; and a lack of transparency. Waste management in Lebanon has historically not been based on sound environmental and public health best practices, and important decisions are often made on a last minute, emergency basis.

Since the end of the Lebanese civil war in 1990, the central government has focused its waste management efforts on Beirut and the Mount Lebanon governorate, while leaving other municipalities and governorates largely to their own devices.

Municipal officials outside of Beirut and Mount Lebanon complained that the central government was not providing adequate financial or technical support for waste management. Most officials said the central government was late in disbursing their share of the Independent Municipal Fund in recent years, making it difficult for municipalities to invest money in solid waste management. According to a report by the Lebanese Center for Policy Studies, Independent Municipal Fund disbursements have been irregular, and subject to months-long delays and changing disbursement criteria. A 2010 Ministry of

Environment report found that these delays contributed to open dumping. Although some of the municipalities have recently taken steps to curb open burning, residents expressed frustration that authorities were not taking their complaints seriously and at the delays in action despite repeated outcry and protests. Residents also expressed frustration that, despite repeated complaints to the municipalities where burning was taking place, no one was being held to account.

The Ministry of Environment is responsible for environmental monitoring, but appears to lack the necessary personnel and financial resources to do so effectively. The ministry's budget in 2010 was just LBP7.325 billion (US\$4.88 million).

During the 2015 waste management crisis, garbage piled up in the streets of Beirut and Mount Lebanon following the government's closure of the central Naameh landfill without identifying an alternate site. A March 2016 cabinet decision ended that crisis by creating two new temporary landfills and calling for the exploration of waste-to-energy solutions in the longer term. This plan has largely removed waste from the streets in Beirut and Mount Lebanon, however both new landfills are mired in lawsuits and reportedly will reach capacity in 2018—a full two years before the government's initial estimate of 2020.

Discussions for a long-term solution have centered around the use of incineration plants, however public health experts and environmental activists have raised concerns about the use of incineration plants as a long-term solution in Lebanon, citing concerns about the lack of a waste management framework, independent monitoring, emissions, and the high cost of incineration. Meanwhile, open dumping and burning continues across the country.

Human Rights Watch conducted research in 15 municipalities for this report. While a number of these municipalities have taken steps to curb open burning of waste and invest in more advanced waste processing facilities, almost all of these projects experienced lengthy delays in implementation and were dependent on funding from foreign countries and international organizations.

Cabinet approved a draft law on integrated solid waste management and sent it to parliament in 2012. The law would create a single Solid Waste Management Board, headed by the Ministry of Environment, responsible for the national-level decision making and

waste treatment, while leaving waste collection to local authorities. However, parliament has yet to pass the bill.

The open burning of waste violates Lebanon's environmental protection laws, which prohibit the emission of pollutants into the air, including harmful or disturbing smells. The government's lack of effective action to address widespread open burning of waste and a lack of adequate monitoring or information with regard to its health effects violate Lebanon's obligations under international law, including the government's duties to respect and protect the right to health.

Lebanon should enforce the ban on the open burning of waste, and the Ministry of Environment and judiciary should hold violators to account. The Ministry of Environment should monitor the environmental pollution from open dumping and burning of waste and publicize results. The Ministry of Health should monitor the health effects of open dumping and burning, publicize the results, and advise residents on how to mitigate health risks. Parliament should adopt a national law on integrated solid waste management that includes the entire country, not just Beirut and Mount Lebanon, and takes into account the associated environmental and health consequences.

Recommendations

To the Ministry of Environment

- Develop and implement a national waste management framework that complies with environmental and public health best practices, covers all municipalities in Lebanon, and meets Lebanon's obligations under international law.
 - Ensure that the national waste management framework accounts for the technical, institutional, and financial aspects of solid waste management planning and clearly allocates responsibilities and a coordination strategy between ministries, municipalities, international institutions, and the private sector.
 - Conduct independent monitoring to ensure compliance and impose penalties for violations.
- Allow affected communities the opportunity for informed input and engagement in solid waste management planning prior to the adoption of particular approaches or decisions.
- Under article 24 of Lebanon's environmental Law No. 444/2002 and Law No. 64/1988, take appropriate administrative action against individuals and municipalities found to be open burning waste in Lebanon.
- Establish a public process for residents to report open burning of waste.
- Monitor the environmental impact of open dumping and burning in Lebanon, and publicize the findings.
- In coordination with the ministries of health and education, develop public awareness programs to promote sustainable waste management practices that respect the right to health and a clean environment, while demonstrating the health risks of open dumping and burning.
 - Incorporate the environmental and health implications of waste management in public school curricula.
- Devise a comprehensive environmental clean-up strategy of open dumps in Lebanon, prioritizing those where open burning is putting the health of nearby residents at risk.
- Ensure proper disposal of hazardous waste and medical waste, and that such waste does not enter the regular solid municipal waste stream unless properly treated.

To the Ministry of Public Health

- Monitor the short and long-term health effects of open dumping and burning of waste on an ongoing basis, including on children and older people, and regularly publicize results, including at a local level.
 - In coordination with the Ministry of Environment, ensure that residents in the vicinity of dump sites with open burning are informed about the extent of environmental contamination from the sites and possible health consequences of contamination.
 - Ensure residents have adequate access to diagnostic health services and treatment.
- Devise a comprehensive public health strategy to tackle the health problems resulting from open burning of waste in Lebanon.
- Ensure adequate health services are available to address health impacts, especially for children and older people.
- Ensure the proper disposal of medical waste.

To the Ministry of Education

- In coordination with the ministries of environment and health, incorporate awareness for the environmental implications of waste management in public school curricula.
- Ensure that public schools promote and engage in sorting and recycling of waste.

To the Ministry of Interior and Municipalities

- Ensure that municipalities receive their allotment from the Independent Municipal Fund on time each year.

To the Lebanese Parliament

- Pass the draft law on integrated solid waste management approved by the Cabinet in 2012.
- In coordination with the Ministry of Environment, develop and pass a bill to encourage reduction of waste, including by regulating and taxing waste-intensive products and polluters. Introduce penalties for violators.
- Ensure that the Ministry of Environment has sufficient resources and inspectors to effectively regulate the waste management sector.

To International Donors

- Provide financial assistance to the Ministry of Environment to ensure the ministry has the required staff, capacity, and funding to monitor and supervise solid waste management in Lebanon.
- Provide capacity building, training, and technical assistance to both the central government and local municipalities in coordination with the Ministry of Environment.

Methodology

Research for this report was conducted between September 2016 and May 2017. Human Rights Watch conducted 104 interviews with public health experts, government officials, doctors, pharmacists, activists, and residents living near open dumps in Lebanon.

Human Rights Watch visited 15 locations including Bourj Hammoud, Fanar, Sin el Fil, Antelias, Dora, Jdaideh, Doha, Naameh, and Dekwaneh; in the Bekaa Valley in Zahle, Kfar Zabad, Bar Elias, and Baalbek; and in the South in Majadel, Chehabiyeh, and Sour, including three large dumps where burning was reported, and spoke with 53 residents about the burning. In all cases, the dumps were located just a few hundred meters from residential areas, and some were directly adjacent to homes. During these visits, Human Rights Watch observed burn scars at the dumps as well as the presence of animal carcasses, tires, and medical waste at some of the dumps. Human Rights Watch researchers wore protective masks when visiting sites where ongoing burning of waste was taking place.

Due to restricted physical access, Human Rights Watch operated a commercial unmanned aerial vehicle (UAV), or drone, to remotely survey two large open dumps in the Bekaa Valley, in Bar Elias and Baalbek, and one in the south, in Majadel. The UAV took hundreds of detailed aerial photographs of the dump sites and their immediate surroundings. Human Rights Watch reviewed these photos for evidence of recent burning, assessed the structure and composition of the dumps, and compared observed findings with official reports and interviews with local residents. Human Rights Watch obtained permission from Lebanese authorities to operate the UAV and Lebanese military personnel accompanied Human Rights Watch to the Baalbek site during the drone flight, as required by the Lebanese Armed Forces.

Human Rights Watch conducted all interviews in safe and private places. Interviews were conducted in English and Arabic, sometimes with the assistance of an interpreter. Five of the interviews were conducted by telephone. The names of some interviewees in this report have been replaced with pseudonyms at their request, due to fears of retaliation for criticizing local authorities. All instances where pseudonyms have been used are

referenced in the footnotes. In some cases, we have withheld additional identifying information to protect a person's privacy.

Human Rights Watch informed all interviewees of the nature and purpose of our research, and our intentions to publish a report with the information gathered. We informed each potential interviewee that they were under no obligation to speak with us, that Human Rights Watch does not provide humanitarian services, and that they could stop speaking with us or decline to answer any question with no adverse consequences. We obtained oral consent for each interview and interviewees did not receive material compensation for speaking with Human Rights Watch.

We did not undertake surveys, scientific testing, or a statistical study, but instead base our findings on extensive semi-structured qualitative interviews with residents, public health officials, doctors, pharmacists, government officials, and environmental activists. Our sample is not representative of the broader population. We also reviewed a wide range of published and unpublished materials including reports, surveys, and statistics. As part of our research, Human Rights Watch met with the Ministry of Environment and sent letters to the Ministry of Environment, Ministry of Health, Ministry of Interior, and the Civil Defense. The Ministry of Health and the Civil Defense responded to Human Rights Watch and we have included a translation of their responses in Annexes I and II of this report. An independent expert on air pollution reviewed sections of this report at the request of Human Rights Watch.

I. Background

The history of the waste management crisis in Lebanon goes back several decades, with a pattern of poor government planning; inadequate support to and monitoring of waste management in areas outside of Beirut and Mount Lebanon; overuse of open dumping and burning; and a lack of transparency. A paralyzed political system, the presence of more than a million Syrian refugees, weak infrastructure, and slow recovery following a 15-year civil war have exacerbated the crisis. Waste management in Lebanon has historically not been based on sound environmental and public health best practices, and important decisions are often made on a last minute, emergency basis. Meanwhile, political indecision, a shortage of available land, and residents' aversion to nearby waste treatment plants have frustrated long-term planning.¹

Lebanon has not implemented a national solid waste management plan covering the entire country. There is no single authority responsible for solid waste management in Lebanon: that role is divided between multiple ministries, municipalities, as well as foreign donors and international organizations who fund and implement waste management projects on an ad hoc basis.² Decree 8735 of 1974 assigned solid waste management as a local municipal responsibility.³ Meanwhile, the Ministry of Environment is responsible for regulating the waste management sector, establishing environmental standards, developing waste management strategies, and supervising waste management facilities.⁴

Since the end of the Lebanese civil war in 1990, the central government has largely focused its waste management efforts on Beirut and the Mount Lebanon governorate, the wealthiest parts of the country, home to 50 percent of the population and producing 50

¹ Ministry of Environment and United Nations Development Programme (UNDP), "State and Trends of the Lebanese Environment 2010," 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), pp. 269-270.

² SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 11.

³ Ministry of Environment and UNDP, "State and Trends of the Lebanese Environment 2010," 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 272.

⁴ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 23.

percent of the solid waste in Lebanon. Meanwhile, it has left other, poorer, municipalities and governorates largely to their own devices.⁵

SWEEP-Net, a regional network for the exchange of information on best practices for solid waste management, found in a 2014 report that the waste management sector in Lebanon is plagued by a lack of sufficient capacity, poor dissemination of information and knowledge sharing, poor coordination between stakeholders, a lack of clear responsibilities in the public sector, the absence of a clear legal and regulatory framework, and a lack of awareness of regulations amongst personnel who are supposed to enforce them.⁶ It further found that what regulations do exist lack clarity and precision; that there is only minimal coordination between responsible authorities; and that there is a lack of enforcement due to staffing constraints, a lack of adequate training, low fines, and political interference.⁷

Solid waste management in Lebanon is largely reliant on landfilling and open dumping and burning. As of 2014, Lebanon generated 2.04 million tons of solid municipal waste every year, according to SWEEP-Net. Of that, 52.5 percent is organic, while 36.5 percent consists of recyclables like glass, plastics, metal, and paper.⁸ According to researchers at the American University of Beirut, only 10-12 percent of Lebanon's waste cannot be composted or recycled.⁹ Although waste collection approaches 100 percent, only around 8 percent of waste is recycled and another 15 percent composted.¹⁰ Instead, 77 percent of the waste in Lebanon is either openly dumped or landfilled.¹¹

⁵ Ibid., p. 16; Central Administration of Statistics and World Bank, "Measuring poverty in Lebanon using 2011 HBS," December 2015, http://www.cas.gov.lb/images/Excel/Poverty/Measuring%20poverty%20in%20Lebanon%20using%202011%20HBS_technical%20report.pdf (accessed July 9, 2017), p. 22.

⁶ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), pp. 11, 13.

⁷ Ibid., p. 21.

⁸ Ibid., p. 10.

⁹ American University of Beirut, "Guide to Municipal Solid Waste Management," 2016, https://aub.edu.lb/units/natureconservation/gallery/Documents/guide_to_municipal_solid_waste_management.pdf (accessed June 6, 2017), p. 15.

¹⁰ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 8.

¹¹ Ibid., p. 10.

As of 2005, about 410,000 tons of municipal solid waste were being dumped in the environment every year including medical, industrial, and slaughterhouse waste comingled with the municipal waste stream.¹² Meanwhile, the Ministry of Environment estimated in 2010 that the cost of environmental degradation from dumping and burning was estimated to be US\$10 million per year, and rising.¹³

Even in Beirut, opportunities for recycling are scarce, and often depend on private companies or NGO initiatives.¹⁴ Meanwhile, rapid urbanization, rising consumption, and “a lack of environmental awareness” are leading to an increase in waste generation, according to the Ministry of Environment’s report.¹⁵

Open Burning

Open burning is a direct result of the Lebanese government’s mismanagement of its solid waste. In Lebanon, open burning of waste has occurred when existing waste management plans break down, such as occurred in Beirut and Mount Lebanon in 2015. But it is also the direct result of a policy in which the central government has arranged for waste collection and disposal in Beirut and Mount Lebanon, while leaving other municipalities to fend for themselves without adequate oversight, financial support, or technical expertise. In areas outside of Beirut and Mount Lebanon, residents told Human Rights Watch that open burning of waste has been taking place for decades.

According to the Ministry of Environment, more than 941 open dumps have been established across the country, including 617 municipal solid waste dumps, many of which are being burned on a regular basis.¹⁶ Some of these are located directly adjacent

¹² The latest figure publicly provided by the Ministry of Environment. Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 278.

¹³ *Ibid.*, p. 279.

¹⁴ World Bank, “Republic of Lebanon Country Environmental Analysis,” June 2011, <http://documents.worldbank.org/curated/en/360011468265768992/Lebanon-Country-environmental-analysis> (accessed June 7, 2017), p. 31. See, for example, “Your Recycling Directory in Lebanon,” Lebtivity, accessed June 6, 2017, <http://www.lebtivity.com/p/recycling-lebanon>.

¹⁵ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 269.

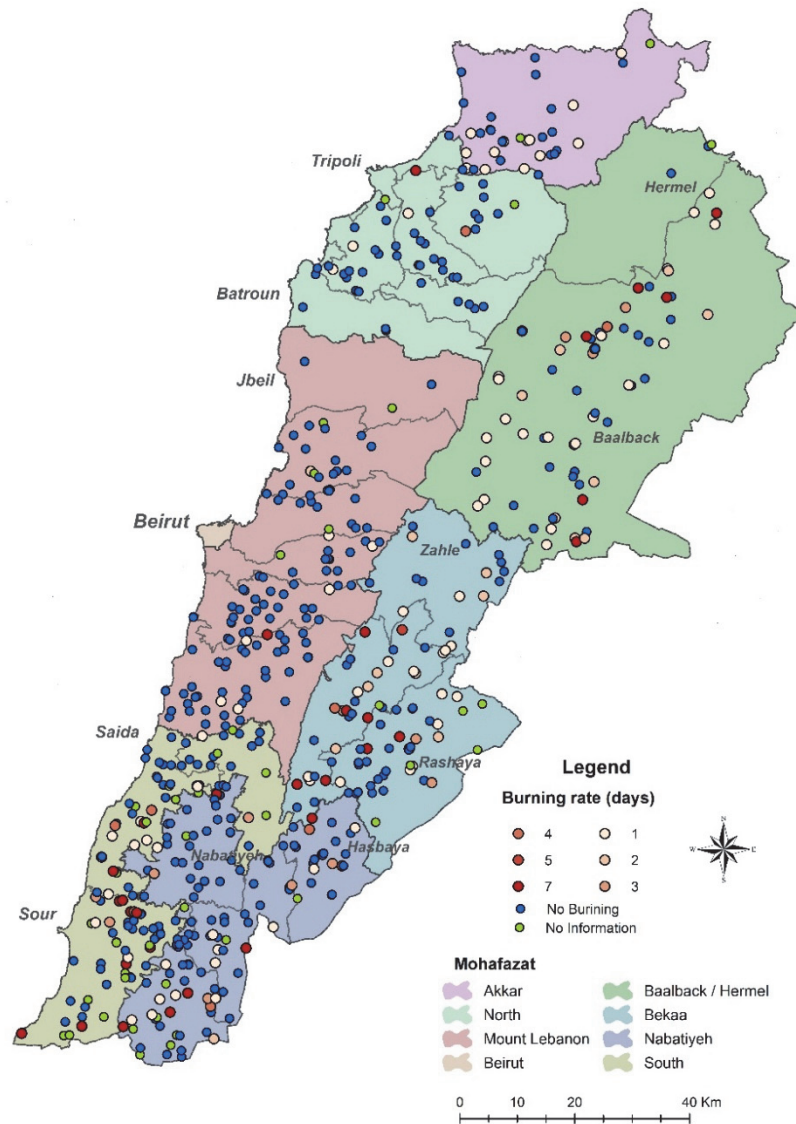
¹⁶ Ministry of Environment and UNDP, “Updated Master Plan for the Closure and Rehabilitation of Uncontrolled Dumpsites Throughout the Country of Lebanon,” June 2017, [http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-\(1\).aspx](http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-(1).aspx) (accessed October 15, 2017), p. III.

to people's homes. According to a map provided by the Ministry of Environment and the United Nations Development Programme (UNDP) to Human Rights Watch, of the 617 municipal solid waste dumps, more than 150 are burned on a weekly basis.

Human Rights Watch visited three of the dumps and observed burn scars at all three, as well as the presence of animal carcasses, tires, and medical waste at some of the dumps. Due to restricted physical access, Human Rights Watch also used an unmanned aerial

vehicle to photograph three large open dumps in Bar Elias and Baalbek in the Bekaa Valley, and in Majadel in the south. The high resolution aerial imagery from each site showed clear evidence of recent burns and ash deposits that indicate earlier burns.

Spontaneous open burning of waste has also taken place in Beirut and Mount Lebanon, and appears to have increased after the waste collection system there collapsed during



Map of municipal solid waste dump burn rates in Lebanon.¹⁷

¹⁷ Provided to Human Rights Watch by the Ministry of Environment and UNDP, based on Ibid.

the 2015 crisis that saw garbage piling up in the streets. In a letter to Human Rights Watch, the Civil Defense—equivalent to Lebanon’s fire department—wrote that they had responded to 4,426 reports of open burning of waste since the beginning of the 2015 waste management crisis. Of these, 108 were in Beirut, 3,504 were in Mount Lebanon, and the remaining cases were outside of Mount Lebanon. According to the Civil Defense, as compared to the period before the 2015 waste management crisis, the number of open burning cases reported in Mount Lebanon was 330 percent higher in 2015 and 250 percent higher in 2016. In Beirut, the number of cases was 50 percent higher in 2015 and 75 percent higher in 2016 as compared to rates of fires before the crisis. In both Beirut and Mount Lebanon the reports of burning declined in 2017.¹⁸ The Civil Defense data only represents fires that have been reported, and is not representative of all burning of waste taking place across Lebanon.

Burning is widespread in rural areas in Lebanon and open burning in the vicinity of highly populated areas has been on the rise in the wake of the country’s solid waste crisis.¹⁹ According to one Ministry of Environment official, municipalities won’t pay for appropriate waste management of their own volition. “If left to their own ways, they will openly dump,” she said.²⁰ Although residents in some areas asserted that the municipality or waste disposal workers were the ones who carried out the burning, all of the municipal officials that Human Rights Watch interviewed denied they were behind the burning.²¹

The open burning of waste violates Lebanon’s environmental protection laws. Under article 24 of Law No. 444/2002, all individuals and legal entities, whether public or private, shall commit not to undertake activities that lead to the emission of pollutants into the air, including harmful or disturbing smells. The law provides penalties for violators, and, after notification by local authorities, instructs the Ministry of Environment to take all necessary legal measures to stop the polluting activities.²² Law No. 64/1988 on toxic waste and

¹⁸ Letter from the Lebanese Civil Defense to Human Rights Watch, “Open Burning of Waste,” July 24, 2017.

¹⁹ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/getattachment/The-Ministry/Reports/State-Of-the-Environment-Report-2010/4-Air-Quality.pdf.aspx> (accessed June 6, 2017), p. 107; “Health fears as Lebanon rubbish crisis deepens,” *Guardian*, March 4, 2016, <https://www.theguardian.com/world/2016/mar/04/health-fears-lebanon-rubbish-collection-crisis-deepens> (accessed June 6, 2017).

²⁰ Human Rights Watch interview with Ministry of Environment official, Beirut, November 16, 2016 (details withheld).

²¹ Human Rights Watch interviews with the heads of Naameh, Baalbek, Bar Elias, and Majadel municipalities, October 27, 2016, March 23, April 12, and May 8, 2017.

²² Protection of the Environment, Law No. 444/2002, art. 24.

harmful pollutants prohibits the creation of toxic waste without proper disposal, and provides for penalties including fines and terms of imprisonment between three months and three years.²³

The Ministry of Environment is responsible for environmental monitoring, but appears to lack the necessary personnel and financial resources to do so effectively.²⁴ The ministry's budget in 2010 was only LBP7.325 billion (US\$4.88 million).²⁵

In November 2015, the Minister of Health sent a communication to the Ministry of Interior asking municipalities to cease burning waste, which the Ministry of Interior forwarded to municipalities.²⁶ In February 2016, the health minister accused 85 municipalities of burning waste, referred them to the judiciary, and called on the Minister of Interior and General Prosecutor to have municipalities sign a pledge not to burn waste.²⁷ The health minister later said that it was the ministry's responsibility to ensure that the burning stopped.²⁸ In a letter to Human Rights Watch, the ministry wrote: "The Ministry of Public Health has stressed since the onset of the trash crisis that the open burning of trash is strictly prohibited, and it calls on all municipalities to take the necessary and strict measures to prohibit it."²⁹

²³ Protecting the Environment Against Pollution from Harmful Waste and Hazardous Materials, Law No. 64/1988, arts. 1-3, 10.

²⁴ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), pp. 23, 28.

²⁵ Ministry of Environment and UNDP, "State and Trends of the Lebanese Environment 2010," 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed October 20, 2017), p. 21.

²⁶ "Minister Abou Faour Requested the Municipalities Not to Burn Waste Due to the High Risks to Public Health," Ministry of Public Health press release, November 26, 2015, <http://www.moph.gov.lb/ar/Pages/13/2935/minister-abou-faour-requested-the-municipalities-not-to-burn-waste-due-to-the-high-risks-on-public-h> (accessed June 6, 2017); "Lebanon Health Ministry refers garbage burning case to judiciary," *Daily Star*, January 29, 2016, <https://www.dailystar.com.lb/News/Lebanon-News/2016/Jan-29/334604-ministry-refers-garbage-burning-culprits-to-judiciary.ashx> (accessed June 6, 2017).

²⁷ "Eighty-five Lebanon municipalities accused of waste burning," *Daily Star*, February 1, 2016, <https://www.dailystar.com.lb/News/Lebanon-News/2016/Feb-01/334985-municipalities-referred-to-judiciary-over-waste-burning-abu-faour.ashx> (accessed June 6, 2017); "Minister Abou Faour Requested the Municipalities Not to Burn Waste Due to the High Risks to Public Health," Ministry of Public Health press release, November 26, 2015, <http://www.moph.gov.lb/ar/Pages/13/2935/minister-abou-faour-requested-the-municipalities-not-to-burn-waste-due-to-the-high-risks-on-public-h> (accessed June 6, 2017).

²⁸ "Press Conference by Minister of Health Wael Abu Faour," Ministry of Public Health press release, November 26, 2015, <http://www.moph.gov.lb/ar/Pages/13/3815/press-conference-for-he-minister-abou-faour> (accessed June 6, 2017).

²⁹ Letter from the Ministry of Public Health to Human Rights Watch, "Open Burning of Waste," June 29, 2017.

Beirut and Mount Lebanon

There is a stark discrepancy between how waste is managed in Beirut and Mount Lebanon, the two wealthiest areas, and in the rest of the country, which has substantially higher rates of poverty.³⁰ In greater Beirut, Lebanon initially awarded the Averda company Sukleen a one year contract for waste collection and street cleaning through a competitive bidding process in 1994, which was then renewed and expanded.³¹ In 1997, the Council for Development and Reconstruction, a government institution that monitors the execution of major projects, developed and implemented a solid waste emergency plan for Beirut and most of Mount Lebanon (excluding Jbeil). By 1998, the Averda companies Sukleen and Sukomi were collecting, treating, and disposing of a significant portion of Lebanon's waste.³² SWEEP-Net, a regional network for the exchange of information on best practices for solid waste management, found that because Averda's contract under the emergency plan is based on quantity of waste collected, and not tied to the way in which waste is treated, it has largely relied on bailing and landfilling of waste with insufficient levels of composting and recycling.³³ As of 2014, Beirut and Mount Lebanon generated 2850 tons of waste per day, about 50 percent of Lebanon's total output.³⁴

The Naameh sanitary landfill opened in 1997 and became the primary waste disposal option in Beirut and Mount Lebanon.³⁵ By 2014, the Naameh landfill received nearly 2,500 tons of

³⁰ World Bank, "Republic of Lebanon Country Environmental Analysis," June 2011, <http://documents.worldbank.org/curated/en/360011468265768992/Lebanon-Country-environmental-analysis> (accessed June 7, 2017), p. 31; Central Administration of Statistics and World Bank, "Measuring poverty in Lebanon using 2011 HBS," December 2015, http://www.cas.gov.lb/images/Excel/Poverty/Measuring%20poverty%20in%20Lebanon%20using%202011%20HBS_technical%20report.pdf (accessed July 9, 2017), p. 22.

³¹ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 32.

³² Matt Nash, "Dissecting a waste empire," *Executive Magazine*, January 15, 2016, <http://www.executive-magazine.com/economics-policy/dissecting-a-waste-empire> (accessed June 6, 2017).

³³ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), pp. 10, 26, 32; Ministry of Environment and UNDP, "State and Trends of the Lebanese Environment 2010," 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), pp. 271, 273.

³⁴ SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 16.

³⁵ Matt Nash, "Dissecting a waste empire," *Executive Magazine*, January 15, 2016, <http://www.executive-magazine.com/economics-policy/dissecting-a-waste-empire> (accessed June 6, 2017).

trash per day—more than twice as much as originally planned.³⁶ It reached its original capacity in 2001, but was expanded several times despite outcry from local residents.³⁷

On July 17, 2015, after several delays and years of protests by local residents, the Lebanese government finally closed the Naameh landfill—but without creating an alternate waste management plan.³⁸ Without a disposal site, Sukleen halted waste collection, and garbage built up on the streets in Beirut and parts of Mount Lebanon. A popular movement under the banner “You Stink” called for an end to the garbage crisis, the resignation of the minister of environment, and an accounting for political corruption in the country.³⁹ The crisis led to widespread demonstrations in July and August 2015 in which police used excessive force against protesters.⁴⁰ As an interim measure, the government responded by moving the waste out of Beirut and into its peripheries.⁴¹

The cabinet adopted a temporary waste management plan in March 2016, focusing on Beirut and the districts of Keserwan, Metn, Baabda, Aley, and Chouf—essentially the areas that Sukleen and Sukomi had serviced under the emergency plan since the 1990s. The plan calls for the use of waste-to-energy technologies starting in 2020.⁴² In the interim, Lebanon began construction of two new sanitary landfills, with an intended lifespan of four years: on the coast near Bourj Hammoud in Beirut, already home to a large civil-war era dump, and on the coast in Costa Brava, south of Beirut and near the Beirut airport.⁴³ The rest of the waste from Beirut was to go to Saida, 40 kilometers to the south, where the

³⁶ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 277; SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-0b0bc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 18.

³⁷ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 277.

³⁸ “Protesters enforce Naameh dump closure,” *Daily Star*, July 17, 2015, <https://www.dailystar.com.lb/News/Lebanon-News/2015/Jul-17/307104-activists-to-act-as-human-shields-in-naameh-landfill-closure.ashx> (accessed June 6, 2017).

³⁹ “Social Movement Responding to the Lebanese Garbage Crisis,” Civil Society Knowledge Centre, accessed June 6, 2017, <http://dev.cskc.daleel-madani.org/party/social-movement-responding-lebanese-garbage-crisis>.

⁴⁰ “Lebanon: Police Violence Against Protesters,” Human Rights Watch news release, August 22, 2015, <https://www.hrw.org/news/2015/08/22/lebanon-police-violence-against-protesters>.

⁴¹ “Trash Pickup Resumes in Lebanon, Ending Eight-Month Crisis,” *Wall Street Journal*, March 19, 2016, <http://www.wsj.com/articles/trash-pickup-resumes-in-lebanon-ending-eight-month-crisis-1458412632> (accessed June 6, 2017).

⁴² Lebanese Cabinet Decision on Waste Management, March 12, 2016, <http://www.pcm.gov.lb/Arabic/subpg.aspx?pageid=8145> (accessed June 6, 2017).

⁴³ Matt Nash, “Wasting time,” *Executive Magazine*, September 14, 2016, <http://www.executive-magazine.com/economics-policy/wasting-time> (accessed June 6, 2017).

additional 250 tons a day they are receiving from Beirut have reportedly overwhelmed the only waste processing plant there.⁴⁴ According to a Ministry of Environment official, this plan was never approved by the ministry and the two new landfills never underwent an environmental impact assessment. The ministry now estimates that the new Costa Brava and Bourj Hammoud landfills will be full by the end of 2018.⁴⁵ In September 2017, local media reported that cabinet was considering reopening the Naameh landfill.⁴⁶

A group of lawyers have sued the Lebanese state, the Council for Development and Reconstruction, and the companies contracted to build both the Bourj Hammoud and Costa Brava landfills, calling for a halt to construction and closure of both sites for violations of Lebanon's environmental law.⁴⁷ Construction in Bourj Hammoud was repeatedly put on hold while protestors blocked access to the site.⁴⁸ In January 2017, following evidence that birds attracted to the Costa Brava landfill were posing a danger to planes at the Beirut airport, a judge ordered the landfill permanently closed within four months.⁴⁹ The Union of Municipalities of Beirut's Southern Suburbs has appealed the decision to close the landfill, and in September an appeals court judge reversed the ruling.⁵⁰ In 2017, Sukleen began ending waste collection in Mount Lebanon as its contracts expired and other companies prepared to take over.⁵¹

⁴⁴ Ghinwa Obeid, "Trash plan on track despite objections," *Daily Star*, March 17, 2016, <https://www.dailystar.com.lb/News/Lebanon-News/2016/Mar-17/342641-trash-plan-on-track-despite-objections.ashx> (accessed June 6, 2017); Mohammed Zaatar, "Something's rotten in the state of Sidon's trash," *Daily Star*, May 22, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/May-22/406755-somethings-rotten-in-the-state-of-sidons-trash.ashx> (accessed June 6, 2017).

⁴⁵ Human Rights Watch interview with Ministry of Environment official, Beirut, August 25, 2017 (details withheld).

⁴⁶ Federica Marsi, "New garbage plan: Reopen Naameh," *Daily Star*, September 5, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/Sep-05/418187-new-garbage-plan-reopen-naameh.ashx> (accessed September 5, 2017).

⁴⁷ Human Rights Watch interview with lawyer, Beirut, July 21, 2017 (details withheld).

⁴⁸ Matt Nash, "Wasting time," *Executive Magazine*, September 14, 2016, <http://www.executive-magazine.com/economics-policy/wasting-time> (accessed June 6, 2017); "Burj Hammoud landfill case adjourned, lawyers barred from speaking," *Daily Star*, April 20, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/Apr-20/402663-burj-hammoud-landfill-case-adjourned-lawyers-barrd-from-speaking.ashx> (accessed June 6, 2017).

⁴⁹ "Judge orders Costa Brava landfill closed within four months," *Daily Star*, February 1, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/Feb-01/391795-judge-orders-costa-brava-landfill-closed-within-four-months.ashx> (accessed June 6, 2017).

⁵⁰ Ghinwa Obeid, "Municipalities union appeals decision to close Costa Brava," *Daily Star*, February 8, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/Feb-08/392762-municipalities-union-appeals-decision-to-close-costa-brava.ashx> (accessed June 6, 2017); "Judge reverses previous ruling to close Costa Brava landfill," *Daily Star*, September 19, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/Sep-19/419809-judge-reverses-previous-ruling-to-close-costa-brava-landfill.ashx> (accessed September 28, 2017).

⁵¹ See, for example, "Sukleen suspends collection in several areas," *Daily Star*, June 5, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/Jun-05/408426-sukleen-suspends-collection-in-several-areas.ashx> (accessed June 6, 2017).

Outside Beirut and Mount Lebanon

Outside Beirut and Mount Lebanon, municipalities are responsible for collection, treatment, and disposal of their waste, and rely heavily on open dumping and burning of solid waste—with some exceptions such as an anaerobic digester in Saida and a sanitary landfill in Zahle.⁵² By 2010, outside of Mount Lebanon just 5 percent of waste was being recycled and 13 percent composted.⁵³ According to a Ministry of Environment and UNDP report, there are now more than 941 open dumps across Lebanon, including 617 municipal waste dumps, more than 150 of which are being burned on a weekly basis.⁵⁴

Municipalities are supposed to receive part of their funding from an Independent Municipal Fund, comprised of taxes collected by the central government. But according to a report by the Lebanese Center for Policy Studies, Independent Municipal Fund disbursements have been irregular, and subject to months-long delays and changing disbursement criteria.⁵⁵ A 2010 Ministry of the Environment and UNDP report notes that nationwide austerity measures have prevented many municipalities outside Beirut and Mount Lebanon from planning for and investing in proper solid waste systems. And municipalities “typically receive their budgetary allowances from the Independent Municipal Fund several years behind schedule and therefore tend to resort to quick solutions and fixes, including open dumping.”⁵⁶ A Ministry of Environment commissioned study from 2011, updated in 2017, has mapped out all open dumps in Lebanon, identified

⁵² Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 271; SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), pp. 10, 26.

⁵³ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 276.

⁵⁴ Ministry of Environment and UNDP, “Updated Master Plan for the Closure and Rehabilitation of Uncontrolled Dumpsites Throughout the Country of Lebanon,” June 2017, [http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-\(1\).aspx](http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-(1).aspx) (accessed October 15, 2017), p. III; map provided by the Ministry of Environment UNDP to Human Rights Watch.

⁵⁵ Lebanese Center for Policy Studies, “The Independent Municipal Fund: Reforming the Distributional Criteria,” November 2011, <https://www.lcps-lebanon.org/publications/1331312295-imf-policybrief-eng.pdf> (accessed October 15, 2017), p. 4.

⁵⁶ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 271.

appropriate rehabilitation options, and prioritized the urgency of rehabilitation. The total cost of the proposed rehabilitation projects amounts to approximately US\$74 million.⁵⁷

Environmental Concerns of Open Dumping and Burning

Beyond the direct health impacts of open burning, the practice of open dumping in Lebanon raises questions about the effect on the entire ecosystem, including the safety of food and water. According to the US Environmental Protection Agency, open burning of solid waste can produce harmful quantities of dioxins, “a group of highly toxic chemicals that settle on crops and in our waterways where they eventually wind up in our food and affect our health.” Meat and dairy animals that eat contaminated crops can in turn expose humans to dioxins.⁵⁸

A 2014 report by SWEEP-Net, a regional network for the exchange of information on best practices for solid waste management found that, despite some progress, inappropriate disposal of industrial and healthcare waste in Lebanon was contributing to water and soil pollution. According to their report, every year Lebanon produces 25,040 tons of medical waste, 5,040 tons of which is infectious, and 3,338 tons of hazardous industrial waste. Due to a lack of oversight and an inadequate waste management system, medical and hazardous waste is being mixed into the municipal solid waste stream, raising further concerns as to the impact of burning waste on residents’ health.⁵⁹

According to the Ministry of Environment and UNDP report, the composition of Lebanon’s industrial waste, some of which is hazardous, “is poorly documented and efforts to manage industrial waste are insignificant and sketchy.”⁶⁰

⁵⁷ Ministry of Environment and UNDP, “Updated Master Plan for the Closure and Rehabilitation of Uncontrolled Dumpsites Throughout the Country of Lebanon,” June 2017, [http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-\(1\).aspx](http://www.moe.gov.lb/getattachment/ob93e31f-c2fe-4964-a160-54be8d22eb6f/MASTER-PLAN-FOR-THE-CLOSURE-AND-REHABILITATION-(1).aspx) (accessed October 15, 2017), p. XIV.

⁵⁸ “Backyard Burning,” US Environmental Protection Agency, accessed June 6, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/index-3.html>; “Human Health,” US Environmental Protection Agency, accessed June 6, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/health.html>.

⁵⁹ SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-0b0bc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), pp. 8, 12, 44.

⁶⁰ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 281.

Under decree 13389 of 2004, all medical institutions are responsible for the management of their medical waste, which should be treated before disposal.⁶¹ In a letter to Human Rights Watch, the Ministry of Health wrote that, “All hospitals located in Lebanese territory are required to dispose safely of medical waste and convert it into non-hazardous waste.”⁶²

But according to the 2010 Ministry of Environment and UNDP report, only 2 percent of private medical laboratories, 33 percent of private hospitals, and 20 percent of public hospitals treat their own medical waste. The ministry found that the rest is most likely comingled with the municipal solid waste stream, with a “potentially significant” impact on water, soil, air, and public health.⁶³

The Refugee Crisis

Lebanon is the highest per capita host of refugees in the world, according to the UN High Commissioner for Refugees (UNHCR), with an estimated 1.5 million Syrian refugees in a country of approximately 4.5 million citizens.⁶⁴ Since 2011, the Syrian refugee presence has added strain to an already struggling waste management infrastructure. A 2014 study found that Syrian refugees were generating waste equivalent to 15 percent of the waste that Lebanon produced prior to the refugee crisis, and that while about half of the waste was managed by the existing infrastructure, the other half was being open dumped, and in some cases burned, with potentially serious health consequences for those living nearby.⁶⁵ According to the 2017 Lebanon Crisis Response Plan, prepared by the Lebanese government and UN, there has been a 40 percent increase in municipal spending on waste management since the beginning of the war in Syria in 2011.⁶⁶ According to UNHCR,

⁶¹ SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 47.

⁶² Letter from the Ministry of Public Health to Human Rights Watch, “Open Burning of Waste,” June 29, 2017.

⁶³ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), pp. 283-287.

⁶⁴ Government of Lebanon and the UN, “Lebanon Crisis Response Plan 2017-2020,” January 2017, <http://data.unhcr.org/syrianrefugees/download.php?id=12698> (accessed June 6, 2017), p. 10; “Global Trends: Forced Displacement in 2016,” UN High Commissioner for Refugees (UNHCR), accessed September 28, 2017, <http://www.unhcr.org/globaltrends2016/>.

⁶⁵ Ministry of Environment and UNDP, “Environmental Impacts of the Syrian Crisis in Lebanon Fact Sheet,” December 2015, <http://www.lb.undp.org/content/dam/lebanon/docs/Energy%20and%20Environment/Publications/FINAL-EASC-FactSheet2015-EN.pdf?download> (accessed June 6, 2017), pp. 2-3.

⁶⁶ Government of Lebanon and the UN, “Lebanon Crisis Response Plan 2017-2020,” January 2017, <http://data.unhcr.org/syrianrefugees/download.php?id=12698> (accessed June 6, 2017), p. 12.

international humanitarian organizations, donor countries, and UN bodies have invested in projects to improve waste management in Lebanon, including more than US\$2.8 million in 2016 alone.⁶⁷ According to a European Union (EU) official, the EU has allocated EUR77 million (US\$89 million) to solid waste management in Lebanon between 2004 and 2019.⁶⁸

Legislative and Policy Efforts

The cabinet approved a draft law on integrated solid waste management and sent it to parliament in 2012. The law would create a single Solid Waste Management Board, headed by the Ministry of Environment, responsible for national-level decision making and waste treatment, while leaving waste collection to local authorities.⁶⁹ The law would set up an institutional framework for waste management, seek to reduce the quantity of waste produced, and promote source separation, recycling, energy recovery, and waste treatment. It does not specify a particular waste treatment approach. However, the law was not adopted, and a 2014 study by SWEEP-Net, a regional network for the exchange of information on best practices for solid waste management, found that the law alone would not be sufficient to implement a solid waste management system in Lebanon, and that the implementation of a national system would require additional laws, implementing decrees, and consensus on the national and local levels.⁷⁰

In 2006, the Lebanese cabinet, Ministry of Environment, and Council for Development and Reconstruction (CDR) prepared a 10-year plan for the areas not covered under the 1997 emergency plan, that would have provided for collection, sorting, recycling, and composting of waste, with treatment centers for sorting and composting in each Caza and 6-7 additional sanitary landfills. However, the plan has not been implemented.⁷¹ In 2010,

⁶⁷ See, for example, UNDP, “Water conservation solutions in Jordanian host communities as part of the response to the spillover of the Syria crisis,” Newsletter Issue 2017 - Quarter 2, 2017, <http://www.rbas-rpnewsletter.org/Helper/ExportPdf.ashx?iid=7> (accessed June 6, 2017), pp. 2-3; Human Rights Watch interview with head of the Bar Elias municipality, Bar Elias, April 12, 2017; Human Rights Watch email correspondence with Lisa Abou Khaled, UNHCR, June 6, 2017.

⁶⁸ Human Rights Watch interview with European Union official, Beirut, June 9, 2017.

⁶⁹ SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-0b0bc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 11.

⁷⁰ *Ibid.*, p. 11.

⁷¹ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 273.

cabinet amended the plan to explore waste-to-energy options.⁷² In 2014, the Ministry of Environment presented a 25-year national integrated strategy for solid waste management to the cabinet, but cabinet has not approved it.⁷³

⁷² Ibid., p. 274.

⁷³ SWEEP-Net, “Country report on the solid waste management in Lebanon,” April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 25.

II. The Effects of Open Burning

This report focuses specifically on the open burning of municipal solid waste in Lebanon, the effects on nearby residents, and the potential health implications. The consequences of open burning are just one part of the waste crisis in Lebanon.⁷⁴ Human Rights Watch has focused this research on the impact of open burning because it is well established that open burning poses a wide-range of adverse health effects, many of them of a serious nature.

This report does not draw any determinations regarding the health of specific individuals in Lebanon. Residents complained to Human Rights Watch of a variety of illnesses including respiratory illnesses and skin conditions. While other factors may play some part in these illnesses, the extent of air pollution from the open burning of waste, the temporal association of these conditions with periods of open burning, and interviews with doctors and other public health experts strongly suggest a causal relationship between air pollution from the open burning of waste and poor community health.

Lebanon is a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), which requires it to take steps to achieve “the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.”⁷⁵ This includes the right to a healthy environment.⁷⁶ Under the Covenant, Lebanon also has an obligation to recognize “the right of everyone to an adequate standard of living ... and to the continuous improvement of living conditions.”⁷⁷

⁷⁴ Scientific studies have also identified health risks associated with proximity to landfills or open dumps. However, due to methodological considerations, those potential health effects fall outside the scope of this report. See, for example, Knowledge to Policy Center, “Approaching the Waste Crisis in Lebanon: Consequences and Insights into Solutions,” December 2015, https://www.aub.edu.lb/k2p/products/Documents/K2P%20Evidence%20Summary%20Waste%20Management_Final_%20Dec%202014%202015.pdf (accessed June 6, 2017); Martine Vrijheid, “Health Effects of Residence Near Hazardous Waste Landfill Sites: A Review of Epidemiologic Literature,” *Environmental Health Perspectives*, vol. 108, (2000); Francesca Mataloni et al., “Morbidity and Mortality of People who Live Close to Municipal Waste Landfills: A Multisite Cohort Study,” *International Journal of Epidemiology*, vol. 45.3 (2016); M. Angela Kim and Kimberly A. Williams, “Lead Levels in Landfill Areas and Childhood Exposure: An Integrative Review,” *Public Health Nursing*, vol. 34.1 (2017).

⁷⁵ International Covenant on Economic, Social and Cultural Rights (ICESCR), adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force January 3, 1976, ratified by Lebanon on November 3, 1972, art. 12.

⁷⁶ United Nations Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14, The Right to the Highest Attainable Standard of Health (art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 9.

⁷⁷ ICESCR, adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force January 3, 1976, ratified by Lebanon on November 3, 1972, art. 11.

Quality of Life

Families living near open dumps in Lebanon say that the open burning of waste has severely affected aspects of their quality of life. Families told Human Rights Watch that they were unable to spend time outside, had difficulty sleeping because of the smoke, or had to leave their homes when burning was taking place. Some families even reported either temporarily or permanently moving to a different location to avoid the burning and potential health effects.

Leila, who lives in Sin el Fil near Beirut, described how burning of waste near her apartment since the summer of 2016, and ongoing at the time of the interview in November 2016, was affecting her:

It starts with the smell. And then this white smoke begins rising, and it encircles our building. The burning usually starts at night and lasts until dawn. I immediately run to the balcony, take in the laundry, and lock all the windows, all the doors. But the smell, the smoke, it stays there. We can't turn on the air conditioning. We can't sleep. We stay awake until the morning and we [feel like we are] suffocating. This happened last night, starting at midnight. It's too much. Even when I leave the area it's as if the smoke is still inside my lungs.⁷⁸

"You can't sit outside, can't open the windows," said Mohamed, who lives close to an open dump in Bar Elias. "In the summer, we couldn't sleep because of all the smoke, we kept waking up trying to breathe, and we would have to cover our faces in sheets."⁷⁹ Othman, who lives near the same dump, told Human Rights Watch that when the dump was burning:

We couldn't hang laundry outside. We couldn't open the windows.... They threw everything: plastic, cow [carcasses], sometimes there would be sounds of explosions [from the dump]. We couldn't open the door. It's like there's fog across the whole town. We are coughing all the time, unable to

⁷⁸ Human Rights Watch telephone interview with Leila (pseudonym), November 17, 2016.

⁷⁹ Human Rights Watch interview with Mohamed, Kfar Zabad, February 16, 2017.

breathe, sometimes we wake up and see ash in our spit. The intensity of the smell would cause us to become dizzy.⁸⁰

Samar, who lives in Baalbek, said that the nearby open dump there also had a real effect on her day-to-day life:

When there is a smell in the summer, we run away to my cousin's house to get away from the smell. We keep coughing. When they burn it, the smell doesn't leave the walls. The smell comes into the house. We have to put the laundry inside. In the summer, they are always burning it. And when they aren't burning it, they are turning it which makes it smell.... When I was pregnant I would have to cover my mouth with a cloth to avoid breathing in. After they burn, the children have difficulty breathing. When they are burning, we escape. You can't sleep. You need to leave to be able to breathe.... We want them to remove [the dump] so we can sit in our homes. We even think of leaving our homes because of it.⁸¹

In south Lebanon, Mariam complained that the constant burning forced her to clean her house every day. "The smoke covers the whole balcony," she said. "Every single day I wash the balcony.... I don't have time to keep cleaning the soot out of the house. We can't open the windows. When I smell the smoke, I can't breathe. I got asthma when we moved here."⁸²

In Fanar, in Mount Lebanon, where residents said that there has been regular burning since the beginning of the garbage crisis in Beirut in 2015, Maya said that the burning was affecting her ability to care for her children and forcing the family to rent a second home to escape to when burning was taking place.

I have two children. One is 11 and the other is 9. I can't let them breathe in all this pollution. I don't even open the windows anymore. I get purifiers. I give them vitamins and supplements. I periodically put them on a detox diet of ginger and broccoli to purify their system. I also special order

⁸⁰ Human Rights Watch interview with Othman, Kfar Zabad, February 16, 2017.

⁸¹ Human Rights Watch interview with Samar (pseudonym), Baalbek, February 17, 2017.

⁸² Human Rights Watch interview with Mariam, Chehabiyeh, February 21, 2017.

purifying oils from London. I've become obsessed. But what can I do? I can't just let them be as if nothing is happening.... I don't let my children play outdoors anymore. I can't predict beforehand when someone would decide to burn and have them inhale all these toxins. It's like we live in a refugee camp now. It's a constant state of emergency.... For three years we've lived here part time. Whenever they're burning excessively I get in the car and take my children away. Last summer, we lived like displaced people. We'd go up to the mountains. I rented a chalet as a safe house. You have to factor all these expenses.⁸³

Some families who could afford to even moved homes because of the open burning taking place near them. One man who was living in Metn with his wife and newborn child told Human Rights Watch that they relocated because of fears about the nearby burning of waste and its impact on their health:

We took the decision, my wife and I, that this is a dangerous situation for a two-months-old baby to be in. We moved to our distant village in Akkar and we stayed there for a year until we were able to change houses and we are now living in Batroun. The garbage crisis was the main reason for our displacement.⁸⁴

Many families said that uncertainty over whether the burning would lead to more serious health effects, including cancer, was also taking a psychological toll. Thirteen families told Human Right Watch that they were fearful of what future health effects the burning would have on them and their children. "People are scared, scared for their children," said Alfred Dib, a pulmonologist at Sacre Coeur Hospital in a southern suburb of Beirut.⁸⁵

Samar, who lives near a dump in Bar Elias that she says burned continuously for more than 20 years, told Human Rights Watch, "They were still burning in the summer. That's the worst. The window of my bedroom faces the dump, the smoke comes in. We're very scared

⁸³ Human Rights Watch telephone interview with Maya (pseudonym), February 13, 2017.

⁸⁴ Human Rights Watch email correspondence with Rami (pseudonym), November 17, 2016.

⁸⁵ Human Rights Watch interview with Alfred Dib, Beirut, October 19, 2017.

about cancer, many people are getting it. I'm scared for my children more than myself. I just want a good future for my children.”⁸⁶

Mariam, who lives in the south near a different dump, said that she has difficulty breathing and all of her children have allergies. “My brothers went and tried to complain but there was no result.... I'm worried that in the future we'll get more diseases or cancer.”⁸⁷ Mousa who lives in Chehabiyeh near a dump that is still being burned, said, “It's logical. Time after time you're breathing this stuff in. It's just common sense to be concerned about cancer.”⁸⁸

The Health Risks of Open Burning

The open burning of waste can cause serious impacts on human health. A range of scientific studies have documented the danger emissions from the open burning of household waste pose to human health.⁸⁹ These include exposure to fine particles, dioxins, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbon (PAHs), and polychlorinated biphenyls (PCBs), which have been linked to heart disease, cancer, skin diseases, asthma, and respiratory illnesses.⁹⁰

⁸⁶ Human Rights Watch interview with Samar (pseudonym), Baalbek, February 17, 2017.

⁸⁷ Human Rights Watch interview with Mariam, Chehabiyeh, February 21, 2017.

⁸⁸ Human Rights Watch interview with Mousa, Chehabiyeh, February 21, 2017.

⁸⁹ See, for example, Yan Wang et al., “Atmospheric Emissions of Typical Toxic Heavy Metals from Open Burning of Municipal Solid Waste in China,” *Atmospheric Environment*, vol. 152 (2017); Lawin Bastian et al., “Behavior of PCDD/Fs During Open Burning of Municipal Solid Waste in Open Dumping Sites,” *Journal of Material Cycles and Waste Management*, vol. 15 (2013); Paul M. Lemieux et al., “Emissions of Organic Air Toxics from Open Burning: A Comprehensive Review,” *Progress in Energy and Combustion Science*, vol. 30 (2004); Paul M. Lemieux et al., “Emissions of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from the Open Burning of Household Waste in Barrels,” *Environmental Science and Technology*, vol. 34 (2000); Christine Wiedinmyer, Robert J. Yokelson, and Brian K. Gullett, “Global Emissions of Trace Gases, Particulate Matter, and Hazardous Air Pollutants from Open Burning of Domestic Waste,” *Environmental Science and Technology*, vol. 48 (2014); A. Hodzic et al., “Impact of Trash Burning on Air Quality in Mexico City,” *Environmental Science and Technology*, vol. 46 (2012); Gustavo Solorzano-Ochoa et al., “Open Burning of Household Waste: Effect of Experimental Condition on Combustion Quality and Emission of PCDD, PCDF and PCB,” *Chemosphere*, vol. 87 (2012); A.O. Barakat, “Persistent Organic Pollutants in Smoke Particles Emitted During Open Burning of Municipal Solid Wastes,” *Bulletin of Environmental Contamination and Toxicology*, vol. 70 (2003); Young Koo Park, Wooram Kim, and Young Min Jo, “Release of Harmful Air Pollutants from Open Burning of Domestic Municipal Solid Wastes in a Metropolitan Area of Korea,” *Aerosol and Air Quality Research*, vol. 13 (2013); Carl Renan Estrellan and Fukuya Lino, “Toxic Emissions from Open Burning,” *Chemosphere*, vol. 80 (2010).

⁹⁰ International Solid Waste Association, “Wasted Health: The Tragic Case of Dumpsites,” June 2015, <http://www.iswa.org/nc/home/news/news-detail/article/wasted-health-the-tragic-case-of-dumpsites/109/> (accessed August 28, 2017), pp. 17-19, 30.

Open burning in Lebanon is particularly troubling given the mixing of hazardous and medical waste into the solid municipal waste stream.⁹¹

According to the US Environmental Protection Agency (EPA), open burning of solid waste can increase the risk of heart disease, aggravate respiratory ailments such as asthma and emphysema, and cause rashes, nausea, or headaches among exposed people.⁹² It notes that the burning of waste “is particularly dangerous because it releases pollutants at the ground level where they are more readily inhaled or incorporated into the food chain.”⁹³

A 2012 World Bank report found that open dumping and burning of solid waste can have a significant health impact on local residents and workers, and that “open-burning of waste is particularly discouraged due to severe air pollution associated with low temperature combustion.”⁹⁴

Around the world, several governments, provinces, and states have banned or heavily restricted open burning of municipal waste, citing adverse health effects.⁹⁵ In its Guide to Municipal Solid Waste Management, the American University of Beirut found that “open dumping and burning carry extremely high risks for contaminating natural resources with

⁹¹ Ministry of Environment and United Nations Development Programme, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), pp. 281-284.

⁹² “Backyard Burning,” US Environmental Protection Agency, accessed July 21, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/index-3.html>.

⁹³ “Dioxins Produced by Backyard Burning,” US Environmental Protection Agency, accessed June 6, 2017, <https://www.epa.gov/dioxin/dioxins-produced-backyard-burning>.

⁹⁴ World Bank, “What a Waste: A Global Review of Solid Waste Management,” March 2012, <http://documents.worldbank.org/curated/en/302341468126264791/pdf/68135-REVISED-What-a-Waste-2012-Final-updated.pdf> (accessed June 6, 2017), pp. 29, 50.

⁹⁵ See, for example, “Burning of Trash,” Michigan Department of Environmental Quality, accessed June 6, 2017, http://www.michigan.gov/deq/0,4561,7-135-3310_4106_70665_70668-234558--,00.html; “Don’t Trash Our Air,” New York Department of Environmental Conservation, accessed June 6, 2017, <http://www.dec.ny.gov/chemical/32060.html>; “Open Burning,” Indiana Department of Environmental Management, accessed June 6, 2017, <http://www.in.gov/idem/airquality/2411.htm>; “Citizens’ Guide to Open Burning,” Delaware Division of Waste and Hazardous Substances, accessed June 6, 2017, <http://www.dnrec.delaware.gov/dwhs/info/pages/opcitizensguide.aspx>; “Open Burning,” Iowa Department of Natural Resources, accessed June 6, 2017, <http://www.iowadnr.gov/Environmental-Protection/Air-Quality/Open-Burning>; Saskatchewan Ministry of Environment, “Health and Environmental Effects of Burning Municipal Solid Waste,” January 2010, <http://www.environment.gov.sk.ca/adx/asp/adxGetMedia.aspx?DocID=2571,114,104,81,1,Documents&MediaID=416d2c4e-ce8b-4bba-ada8-f84d2865779e&Filename=Health+and+Environmental+Effects+of+Burning+Municipal+Solid+Waste.pdf> (accessed June 6, 2017).

harmful and potentially toxic pollutants that increase the likelihood of nearby inhabitants contracting chronic, and potentially lethal, diseases and infections.”⁹⁶

Open burning solid waste can release a range of pollutants into the air. PM₁₀ particles, which are particles of 10 micrometers or less, can penetrate the lungs or enter the bloodstream, and can lead to heart disease, lung cancer, asthma, and acute lower respiratory infections.⁹⁷ PM_{2.5} are smaller fine inhalable particles, with diameters that are 2.5 micrometers and smaller.⁹⁸ The health effects of inhalable PM include respiratory and cardiovascular morbidity, such as “aggravation of asthma, respiratory symptoms and an increase in hospital admissions” and mortality from cardiovascular and respiratory diseases and lung cancer.⁹⁹ Although the harmful effect of these pollutants has been well documented, the particular health impact on individuals in Lebanon will vary depending on variables including the total dose and time of exposure. Children, people with chronic heart and lung diseases, and older persons may be at particular risk.

Burning also produces harmful dioxins, such as Polychlorinated dibenzodioxins and dibenzofurans (PCDD/Fs), a group of highly toxic chemicals classified as persistent, bioaccumulative, and toxic pollutants.¹⁰⁰ According to the US Environmental Protection Agency, dioxins can cause “cancer, reproductive and developmental problems, damage to the immune system, and can interfere with hormones.”¹⁰¹ Dioxins are persistent organic pollutants, which persist for long periods of time in the environment and can accumulate and pass from one species to the next through the food chain.¹⁰² Dioxin-like

⁹⁶ American University of Beirut, “Guide to Municipal Solid Waste Management,” 2016, https://aub.edu.lb/units/natureconservation/gallery/Documents/guide_to_municipal_solid_waste_management.pdf (accessed June 6, 2017), p. 8.

⁹⁷ “Tackling the global clean air challenge,” World Health Organization press release, accessed July 21, 2017, http://www.who.int/mediacentre/news/releases/2011/air_pollution_20110926/en/.

⁹⁸ “Particulate Matter (PM_{2.5}) Trends,” Environmental Protection Agency, accessed July 21, 2017, <https://www.epa.gov/air-trends/particulate-matter-pm25-trends>.

⁹⁹ World Health Organization, “Health Effects of Particulate Matter,” 2013, http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf (accessed July 21, 2017), p. 6.

¹⁰⁰ “Backyard Burning,” US Environmental Protection Agency, accessed June 6, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/index-3.html>; “Human Health,” US Environmental Protection Agency, accessed June 6, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/health.html>.

¹⁰¹ “Learn about Dioxin,” US Environmental Protection Agency, accessed June 6, 2017, <https://www.epa.gov/dioxin/learn-about-dioxin#tab-3>.

¹⁰² “Persistent Organic Pollutants: A Global Issue, A Global Response,” Environmental Protection Agency, accessed July 21, 2017, <https://www.epa.gov/international-cooperation/persistent-organic-pollutants-global-issue-global-response>.

polychlorinated biphenyls (PCBs) are synthetic organic chemicals that can cause skin conditions and are “probably carcinogenic to humans.”¹⁰³

Open burning of waste can also expose nearby residents to high levels of volatile organic compounds (VOCs) which can worsen respiratory, heart, and other existing health problems and lead to “eye, nose, and throat irritation; headache; loss of coordination; nausea; and damage to liver, kidney, and central nervous system.”¹⁰⁴ Polycyclic aromatic hydrocarbons (PAHs) have been classified as carcinogenic in humans, and studies have linked breathing or skin contact for long periods to lung or skin cancer.¹⁰⁵

There is a troubling lack of scientific testing, monitoring and surveillance, or public information regarding the health consequences of open burning of waste in Lebanon. According to a Ministry of Environment official, the ministry doesn’t monitor or test the impact of open burning due to a lack of resources and expertise.¹⁰⁶ However, two local studies have also indicated the health risks of open burning of waste.

In October and December 2015, researchers from the American University of Beirut conducted scientific tests of air quality taken near the top of a four-story residency building east of Beirut, over a series of days when waste burning and no burning occurred in a nearby waste site. The results were released to the public in January 2016.

The researchers found an alarming increase of air pollution on days during which waste was being burned at the site.¹⁰⁷ The air was found to contain significantly higher concentrations of pollutants, including particulate matter, PAHs, and PCDD/Fs, compared to measurements taken prior to the period of burning (in 2014) or to measurements taken

¹⁰³ “Polychlorinated Biphenyls (PCBs),” Agency for Toxic Substances and Disease Registry, accessed July 22, 2017, <https://www.atsdr.cdc.gov/phs/phs.asp?id=139&tid=26>.

¹⁰⁴ “Wastes - Non-Hazardous Waste - Municipal Solid Waste,” US Environmental Protection Agency, accessed June 6, 2017, <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/health.html>.

¹⁰⁵ Public Health England, “Polycyclic aromatic hydrocarbons (Benzo[a]pyrene),” 2008, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316535/benzoapyrene_BaP_polycyclic_aromatic_hydrocarbons_PAH_guidance.pdf (accessed July 21, 2017), p. 3.

¹⁰⁶ Human Rights Watch interview with Ministry of Environment official, Beirut, August 25, 2017 (details withheld).

¹⁰⁷ “AUB releases its latest findings on toxic emissions of waste burning and launches a solution manual,” American University of Beirut, accessed June 6, 2017, <http://www.aub.edu.lb/news/2016/Pages/toxic-waste-manual.aspx>; Rima Baalbaki et al., “Exposure to Atmospheric PMs, PAHs, PCDD/Fs and Metals Near an Open Air Waste Burning Site in Beirut,” *Lebanese Science Journal*, vol. 17.2 (2016).

away from a burning incident or after it had rained. The researchers noted that exposure to these pollutants would result in a considerable increase in cancer risk to local residents.

Another study conducted by a different group of researchers at the American University of Beirut measured self-reported acute health conditions among men working in a variety of industries in Beirut, comparing the results between those working in the vicinity of a dump site with open burning, and those working without a dump site nearby. The study found significantly higher reports of fatigue, headaches, sneezing, insomnia, and breathing difficulties among the exposed individuals.¹⁰⁸ The researchers note that their study may underestimate the potential health effects, in part because this study excluded children or those above the age of 60, who may be more susceptible to effects of open burning.¹⁰⁹ The researchers concluded that exposure to waste, being near it or breathing air polluted by waste burning, led to serious acute health impacts, especially in the respiratory and digestive systems.¹¹⁰

In the course of researching this report, Human Rights Watch spoke with ten doctors regarding the impact of open burning of waste on the health of nearby residents. Ten doctors told Human Rights Watch that they believed the open burning of waste was causing respiratory illnesses. Doctors in and near Beirut often noted an increase in respiratory illness cases in areas that began burning waste after the 2015 crisis. Seven of them mentioned patients whose illnesses they were confident were caused or exacerbated by open burning, noting patterns of symptoms consistent with exposure to open burning of waste, patients' complaints of burning nearby, and the temporal link between the burning and their symptoms. Doctors reported cases of patients who had not previously had symptoms developing respiratory illnesses, as well as patients with preexisting respiratory conditions that deteriorated when burning started or was taking place.¹¹¹ However the doctors could not definitively confirm that open burning was the sole cause of the respiratory illnesses in their patients.

¹⁰⁸ Rami Z. Morsi et al., "The Protracted Waste Crisis and Physical Health of Workers in Beirut: A Comparative Cross-sectional Study," *Environmental Health*, vol. 16 (2017), p. 5.

¹⁰⁹ Ibid.; Human Rights Watch interview with Dr. Monique Chaaya, Beirut, December 1, 2016.

¹¹⁰ "AUB: First Scientific Study Demonstrates Enormity of Waste Crisis Effect on Public Health in Lebanon," American University of Beirut news release, November 17, 2016, <https://www.aub.edu.lb/communications/media/Documents/nov-16/waste-crisis-effect-public-health-EN.pdf> (accessed June 6, 2017).

¹¹¹ See, for example, Human Rights Watch interview with pulmonologist, Zahle, April 12, 2017 (details withheld).

Human Rights Watch also spoke with eight pharmacists in areas where open burning was taking place, who said that residents were seeking treatment for respiratory illnesses and complaining of smoke inhalation.

Seven doctors also told Human Rights Watch that they were concerned that the most serious, longer term effects of open burning of waste, including cancer, would take years to manifest.

A pulmonologist at the al-Mashreq hospital near Beirut said after the 2015 waste crisis in Beirut and Mount Lebanon, “Ten percent of patients I’m seeing explicitly say they were bothered by the smell of garbage in the air.... The biggest issue is the burning of garbage. Patients ask, ‘Should we stop breathing?’” She said most of these patients presented with pulmonary infections, bronchitis, and asthma attacks, and that symptoms were worse in patients that already had asthma or Chronic Obstructive Pulmonary Disease (COPD). She worried that respiratory dysfunction, respiratory failure, and pulmonary fibrosis would increase among the population.¹¹² Dr. Abda Alam, in Jdeideh, east of Beirut, said that she was witnessing worsening in the condition of patients who already had asthma and COPD living near open burning of waste. “Asthma that was under control is now out of control, and people who previously had [COPD] are getting worse, an out of control cough. People say, ‘They were burning right by my house, and then the [health] situation deteriorated.’”¹¹³

A pulmonologist at the Hotel Dieu hospital in Beirut noted that those who already had respiratory illnesses were at the highest risk. “After the burning increased, symptoms in people that had COPD or asthma got worse,” she said. “They became unstable and some needed hospitalization. If COPD is not controlled, it will lead to respiratory failure, and will require home respiratory assistance. We are seeing this more and more from the burning.”¹¹⁴

Some doctors also noted a temporal link between open burning and their patients’ respiratory symptoms. A doctor at the Saint Joseph hospital in Beirut told Human Rights Watch, “We’ve seen cases directly relating to burning garbage. For example, in 2015 an old lady kept her window open [during burning] and caught a respiratory illness directly after

¹¹² Human Rights Watch interview with pulmonologist, Beirut, October 19, 2016 (details withheld).

¹¹³ Human Rights Watch interview with Dr. Abda Alam, Jdeideh, October 19, 2016.

¹¹⁴ Human Rights Watch interview with pulmonologist, Beirut, October 13, 2016 (details withheld).

exposure.... In some cases, it's very obvious. One day they are burning, and the next day the symptoms manifest."¹¹⁵

A doctor at a hospital in Hermel located near an open dump told Human Rights Watch that burning of waste is taking place in close proximity, and affecting the hospital itself. "Smoke and dust fills the place, especially if the wind is blowing toward us," he said. "The dust, the flies, what can I say? Sometimes my patients complain. It's only natural that the smell and the pollution will bother them. But what can I do? What more can I do than closing all the windows?"¹¹⁶ A government official who oversees the hospital said that although the construction of the hospital began in 1998, the nearby dump was never moved.

Whenever there's a dump, burning will take place. And it lasts for hours.... There's a constant smell. If wind is blowing south, the smoke and smell will reach the hospital. Patients who have allergies, asthma, chest problems, heart problems, will get affected. We obviously can't check who was and who wasn't. But the effect on patients is indisputable.¹¹⁷

The Impact of Open Burning on Nearby Residents

The vast majority of the residents interviewed by Human Rights Watch reported health effects that they attributed to the inhalation of smoke from the open burning of the waste. Thirty-eight individuals said that they were suffering from respiratory issues including COPD, coughing, throat irritation, and asthma. According to an extensive body of scientific literature, these symptoms are consistent with exposure to the open burning of waste.¹¹⁸ Thirty-two individuals had sought medical treatment for these respiratory illnesses, and two said that a doctor or hospital had prescribed oxygen masks.

Residents in Beirut and Mount Lebanon said that after the 2015 waste management crisis, garbage piling up in the streets was routinely burned. Most of the residents Human Rights Watch spoke with in these areas reported an increase in respiratory symptoms after the burning began.

¹¹⁵ Human Rights Watch interview with doctor, Beirut, October 18, 2016 (details withheld).

¹¹⁶ Human Rights Watch telephone interview with doctor, May 9, 2017 (details withheld).

¹¹⁷ Human Rights Watch telephone interview with Hermel government official, May 9, 2017 (details withheld).

¹¹⁸ See above, The Effects of Open Burning.

Amal, an immunologist and university professor, told Human Rights Watch that when she was living in the Furn el Chebbak neighborhood near Beirut, burning had commenced in the summer of 2016. “I woke up suffocating,” she said. “We had to close the windows. I could sleep in the living room because there are less windows there.... At first you feel like you can’t breathe normally.... I wasn’t breathing normally.”¹¹⁹ Haitham, a resident of Dekwaneh, a suburb east of Beirut, said that he began needing to use an inhaler after the 2015 crisis. “When you smell the burning, of course you get bothered,” he said. “The area filled with smoke, we’d go inside.” Haitham said that a doctor conducted a chest scan, and found an infection that the doctor attributed to the open burning.¹²⁰

In areas outside of Beirut and Mount Lebanon, open burning of waste has been taking place for decades. Almost all residents living near open dumps that have been burned reported living with health issues. Mohamed, who lives near a dump in Bar Elias, in the Bekaa Valley, that he says was burned regularly for more than 20 years, told us that he suffers from coughing, pulmonary infections, an inability to breathe, and more recently, coughing blood.¹²¹ He said:

The smell had a license to go anywhere, it affected our ability to breathe. We had no health issues before it began burning.... My children all have difficulty breathing because of the smoke. My wife was the most affected, but everyone has symptoms. When they burn we can’t breathe.... We’ve had to go to the hospital because of this. My wife has gone four or five times [since burning began], my son and I went two times. All because of breathing [problems]. We usually stay two days to a week. The hospital said it was an infection in the lungs because of the smoke. They would give us pills, they were very expensive. They also gave us oxygen masks.... We’re not even able to fix our house because of how much we spend on medical care.... In the summer we can’t sleep because of all the smoke, we kept waking up trying to breathe.

¹¹⁹ Human Rights Watch interview with Amal, Fanar, February 15, 2017.

¹²⁰ Human Rights Watch interview with Haitham, Dekwaneh, October 19, 2016.

¹²¹ Human Rights Watch interview with Mohamed, Kfar Zabad, February 16, 2017.

Hassan lives near an open dump in Baalbek, in the Bekaa Valley, that residents say was burned regularly for more than 10 years. He said he has had asthma since he was 10 years old, and that his condition is exacerbated by the burning. He told Human Rights Watch:

We have to put masks on our children and go inside to hide from the smell whenever they are burning. Imagine sitting next to a dump and living on a dump. Every 4-5 months we need to take our children to the hospital.... It's like a dust storm, whenever the smoke gets here we have to leave. We have to rent a bigger oxygen machine sometimes. It costs more than \$100 per month. The dump used to be burning continuously.¹²²

Haitham, another resident near the Baalbek dump said, "When they are burning, we'd be inside and we'd suffocate. You choke. We go to the pharmacy when we get sick. Every summer we have to go get medicine. In the summer, the smell is terrible, even if you're drinking coffee or tea you want to throw up."¹²³ The head of the Baalbek municipality told Human Rights Watch that "residents used to leave with their kids when [the dump] was on fire," but that the municipality has since put an end to burning at the dump.¹²⁴

In many cases, interviewees told Human Rights Watch that there was a temporal relationship between the burning of waste and their health condition(s); that they developed a condition after the burning started or moving to an area where burning was taking place. Others reported that their symptoms subsided after they moved away from an area, or their municipality stopped burning.

Sami lives near the dump in Bar Elias that he says was burned frequently for more than 20 years, but that the municipality recently put an end to the regular burning. He said his symptoms have subsided since the burning largely stopped.

Sometimes it was more intense burning. Children in this area are always in the hospital, children are the most affected. We took them to hospitals and pharmacies for respiratory symptoms, flu, cold. Ever since they stopped

¹²² Human Rights Watch interview with Hassan, Baalbek, February 17, 2017.

¹²³ Human Rights Watch interview with Haitham, Baalbek, February 17, 2017.

¹²⁴ Human Rights Watch interview with head of Baalbek municipality, Beirut, February 17, 2017.

burning these symptoms have become rare.... Ever since they stopped burning, they haven't needed oxygen.¹²⁵

Human Rights Watch also spoke with Syrian refugees living near open burn sites, who said that they had never had respiratory problems in the past, but developed symptoms after moving near the dumps. Ahmed who lives with his family near an open burn site in south Lebanon, said that he, his wife, and daughters had all developed problems breathing. "Sometimes my throat gets blocked. It gets worse when there is burning," he said. "Sitting outside here is a pleasure, but the smell is slaughtering us. Before we came here we never had these symptoms, now all my kids do."¹²⁶ "We never had these symptoms in Syria," said Adnan, another refugee who experienced similar symptoms in the Bekaa Valley.¹²⁷

Vulnerable Populations

Children

Children are physically, developmentally, and socially different from adults, and these differences leave them uniquely vulnerable to the harmful effects of pollutants. Children also have faster metabolic rates than adults, and proportionally consume more water and food, and breathe more air than adults.¹²⁸ As a result, when toxins are present in the environment, children may suffer greater exposure to these toxins than an adult would in the same environment. Children also have more years of life remaining than adults, meaning more time to suffer long-term health effects that develop over time.¹²⁹ Children under 18 still remain in a critical stage of development as their nervous systems and reproductive systems are maturing. Exposure to toxins during these critical years can have lasting impacts on children's growth and development.¹³⁰

¹²⁵ Human Rights Watch interview with Sami, Kfar Zabad, February 16, 2017.

¹²⁶ Human Rights Watch interview with Ahmed, Chehabiyeh, February 21, 2017.

¹²⁷ Human Rights Watch interview with Adnan, Kfar Zabad, February 16, 2017.

¹²⁸ Catherine Karr, "Children's Environmental Health in Agricultural Settings," *Journal of Agromedicine*, vol. 17.2, (2012), p. 128.

¹²⁹ Human Rights Watch, *Teens of the Tobacco Fields: Child Labor in United States Tobacco Farming*, December 2015, <https://www.hrw.org/report/2015/12/09/teens-tobacco-fields/child-labor-united-states-tobacco-farming#ced79a>, p. 43.

¹³⁰ Elaine M. Faustman et al., "Mechanisms Underlying Children's Susceptibility to Environmental Toxicants," *Environmental Health Perspectives*, vol. 108, no. Supp 1 (2000), pp. 13-21.

Human Rights Watch documented many cases in which families said they believed open burning was affecting the health of their children.

Human Rights Watch spoke with Khalil, who lives with his four children in Chehabiyeh near a dump in neighboring Majadel. Khalil told Human Rights Watch that the site is burning on an almost daily basis; the dump was burning on two of the three occasions that Human Rights Watch visited it in February and March 2017. Human Rights Watch met Khalil's three-year-old daughter, who was coughing continuously during the 20-minute interview. Khalil told Human Rights Watch:

It's always on fire unless it's raining. It's a very serious smell in the summer, the smoke fills everything. They throw everything in the dump. I have three children with health issues, aged 15, 13, and 11. All are affected. They have allergies because of this. When we smell the smoke, we can't breathe. It's from the dump, we start coughing. My wife also has shortness of breath.... We're very concerned that the health issues will get worse. In the summer, we have to close all the windows when they are burning it at night. My three-year-old daughter is starting to show symptoms. When they smell the smoke, they are irritated.¹³¹

Parents expressed frustration that they were not able to protect their children from the potential health effects of the burning. Samar, who lives in Baalbek, next to a dump that she says was burning almost every week until fall 2016, told Human Rights Watch that she and her children developed respiratory conditions after moving there. "There is a connection, when there is smoke our symptoms become worse," she said. "My children are coughing, I have to take them to the doctor and the pharmacy. Everything the doctor recommends is not possible. I don't have clean air. It's not available here. What can I do?"¹³²

Human Rights Watch also documented three cases in which open burning was taking place directly adjacent to schools. At one of the schools, near Naameh, administrators said that garbage was being dumped and burned across the street from the school for four days

¹³¹ Human Rights Watch interview with Khalil, Chehabiyeh, February 21, 2017.

¹³² Human Rights Watch interview with Samar (pseudonym), Baalbek, February 17, 2017.

during October 2016, causing them to adopt emergency measures and send children home. Administrators told Human Rights Watch:

It was unclear if the school would stay open, we had to adopt procedures for dealing with the garbage.... They were burning it every day. We called the municipality and had to buy water to put out the fire outside the school several times. We had to provide medical masks to all of our students, kept them inside, and then sent them home early when the garbage was burning. We reported to the municipality and kept reporting it each time the garbage was burned. The nurse got in touch with parents of kids with respiratory illnesses, allergies, and asthma first, and parents pulled their kids out of school. One girl was waiting for her parents and coughing, coughing, coughing. People who had asthma were affected.... Eventually the municipality put up a fence and signs, and stopped people from dumping garbage there.¹³³

The school nurse told Human Rights Watch that when the burning was taking place, children at the school suffered from difficulty breathing, headaches, and nausea after the burning, and that children who were asthmatic and those with pre-existing respiratory conditions suffered most. She said,

There were literally yellow and grey clouds of smoke around the school. Even the teachers were affected by headaches.... I saw around 20 kids that were really affected. Others had general issues.... We are trying to take precautions, but we need to end the problem itself. It's the whole community being affected, not just the school.... You can't imagine the smell when they were burning, you can't imagine.¹³⁴

A pediatrician working in the Bekaa Valley told Human Rights Watch:

Everybody is affected but children are even more vulnerable. The burning of waste can cause allergies and irritations. What I prescribe depends on the

¹³³ Human Rights Watch interview with school administrators, Doha, October 27, 2016 (details withheld).

¹³⁴ Human Rights Watch interview with school nurse, Doha, October 27, 2016 (details withheld).

symptoms.... If they are small children, months old, and not able to breathe or eat, I'm sending them to the hospital to get oxygen, an IV, and medication. It's obviously expensive for the family. I'm still seeing cases from burning garbage. This is now, but we need to look to the future consequences, increases in cancer among the population. The burning of plastic of course causes cancer. You need to look at the future.¹³⁵

Older People

Open burning of solid waste can also especially affect older persons.¹³⁶ Doctors consistently told Human Rights Watch that children and older people were among the most vulnerable to respiratory illnesses as a result of nearby open burning of waste.¹³⁷

Hamze, who lives near a dump in Bar Elias, where he said waste was burned on a regular basis, told Human Rights Watch, "My mother has asthma, and it got worse anytime there was burning. They would transport her to the hospital to give her oxygen. One or two times per year we would take my mother to the hospital." Hamze's mother confirmed his account, saying "I had symptoms in my lungs, I would stay a week [in the hospital], it happened several times. When the smoke starts we'd start coughing."¹³⁸

Khabsa, 79, who lives in the same area, told Human Rights Watch:

I developed an allergy after the smoke started and now I have shortness of breath. This was after the dump started burning. Before, I had nothing. They had to take me to the hospital many times, whenever I would get respiratory irritations. I would get tired from breathing, it would be difficult to breath and I cough. When they are burning, it gets worse. After they stopped burning I haven't needed to go to the hospital. The doctor told me that it was from the smoke, they gave me oxygen at the hospital.... The

¹³⁵ Human rights Watch interview with pediatrician, Zahle, April 12, 2017.

¹³⁶ See, for example, "Open Burning of Garbage," Environment and Climate Change Canada, accessed July 23, 2017, <http://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=684b44dd-1>.

¹³⁷ See, for example, Human Rights Watch interview with American University of Beirut Faculty of Health Sciences, Beirut, October 6, 2016; International Solid Waste Association, "Wasted Health: The Tragic Case of Dumpsite," June 2015, <http://www.iswa.org/nc/home/news/news-detail/article/wasted-health-the-tragic-case-of-dumpsites/109/> (accessed August 28, 2017), p. 31.

¹³⁸ Human Rights Watch interview with Hamze, Kfar Zabad, February 16, 2017.

smoke used to come all the way up here, black smoke. It would blind us. You couldn't stay outside. You couldn't even see your neighborhood.¹³⁹

Disproportionate Impact on Poor Communities

The open burning of waste in Lebanon has had a disproportionate effect on residents in lower income areas, where people may be least able to afford healthcare costs or avoid exposure by moving to another location. A map of the open dumps in Lebanon provided to Human Rights Watch by the Ministry of Environment and the United Nations Development Programme (UNDP) show that although there are open dumps in Beirut and Mount Lebanon, some of the wealthiest parts of the country, burning is not taking place at most of these dumps. Meanwhile, the map shows that the majority of dumps where burning takes place frequently are located in some of the poorest areas in the country including the Bekaa Valley and the south.¹⁴⁰

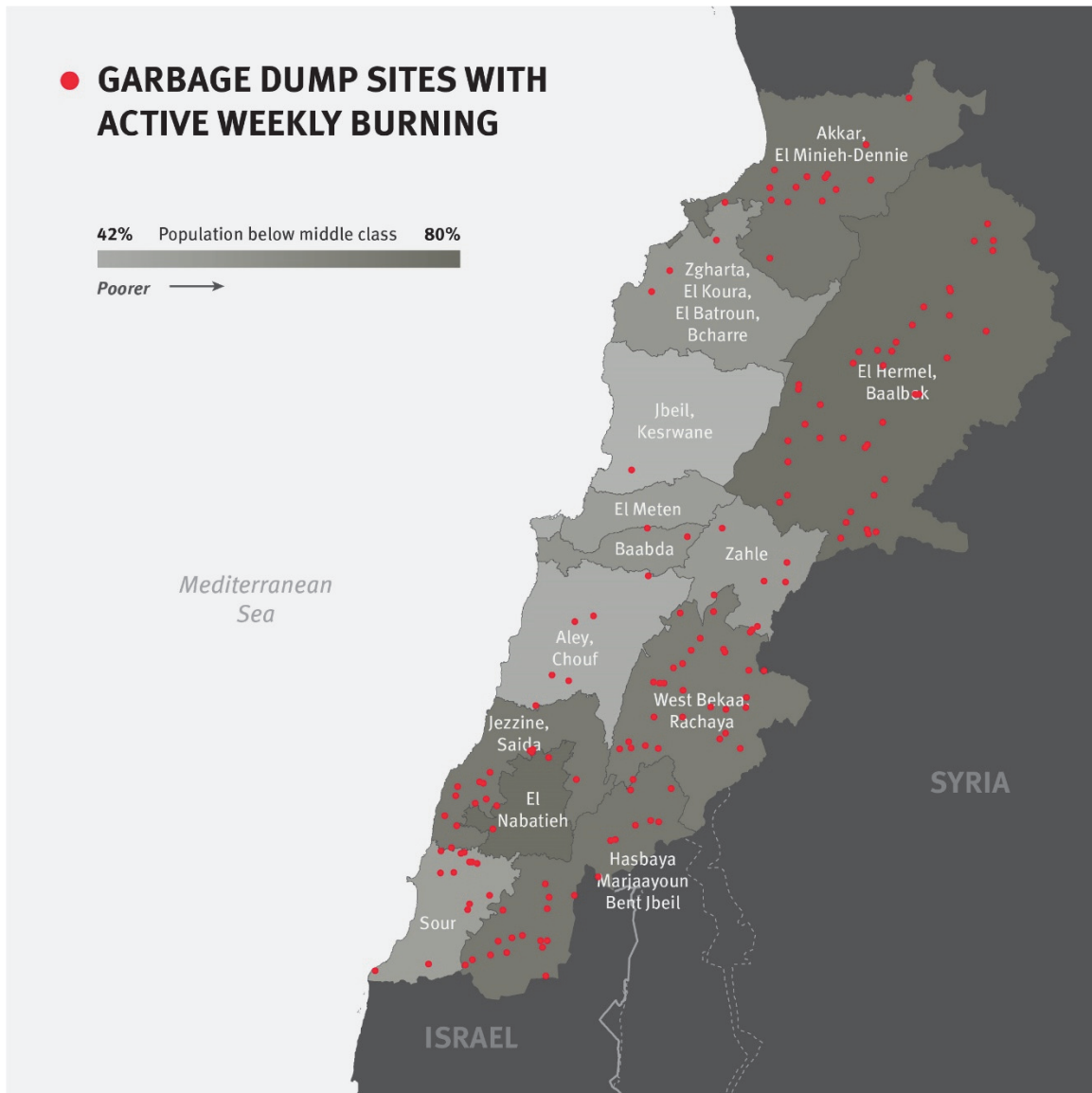
An analysis of the most recent disaggregated socioeconomic data available for Lebanon indicates that open burning of waste is taking place in some of the poorest areas of the country. A 2004 national survey of household living conditions asked participants to self-identify their socioeconomic class as either “rich,” “upper middle class,” “middle class,” “lower middle class,” or “poor.” The responses are disaggregated by 13 geographic strata, the smallest geographic area for which data is available in Lebanon.¹⁴¹

There appears to be a moderate correlation between the burning of waste taking place and the stratum where a higher percentage of respondents classified themselves as either “lower middle class” or “poor.” With some exceptions, strata where higher percentages of the population identified as lower middle class or poor were associated with higher levels of open burning.

¹³⁹ Human Rights Watch interview with Khabsa, Kfar Zabad, February 16, 2017.

¹⁴⁰ Central Administration of Statistics and World Bank, “Measuring poverty in Lebanon using 2011 HBS,” December 2015, http://www.cas.gov.lb/images/Excel/Poverty/Measuring%20poverty%20in%20Lebanon%20using%202011%20HBS_technical%20report.pdf (accessed June 7, 2017), p. 22.

¹⁴¹ United Nations Development Programme (UNDP), Household Living Conditions 2004: A National Survey, special tabulations by the United Nations Economic and Social Commission for Western Asia (UN-ESCWA).



For example, in West Bekaa and Rachaya, where 73 percent of the population are below middle class, there was an average of 89 burns taking place per week. In Hermel and Baalbek, with 80 percent of the population below middle class, there was an average of 93 burns per week. Meanwhile, in Jbeil and Kesrwane, with 42 percent of the population living below middle class, there was an average of just two burns per week, and in Aley and the Chouf, with 46 percent of the population below middle class, there were 12 burns per week. There are some outliers, such as Saida and Jezzine, where 75 percent of the population are below middle class but there was an average of only 4 burns per week.

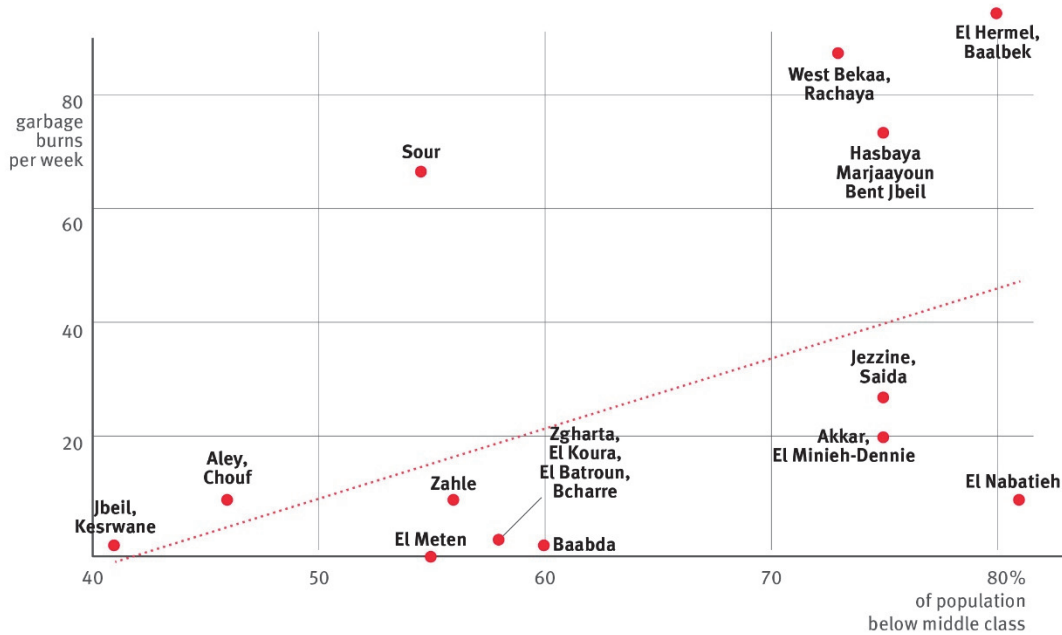
Overall there also appears to be a clear discrepancy between the burning taking place in Beirut and Mount Lebanon, where the central government has taken over waste management, and the rest of the country. Roughly 50 percent of Lebanon's population is concentrated in Beirut and Mount Lebanon, where the proportion of the population living below middle class is among the lowest in the country, between 42 and 60 percent, but there was an average of only 14 burns per week in those areas. Meanwhile, in the Bekaa Valley, where the population below middle class is between 56 and 80 percent, there was an average of 192 burns per week. The outlier is Zahle, the stratum with the lowest percentage of its population below middle class in the Bekaa, 56 percent, where there was an average of just 10 burns per week. Similarly, in the south, where the proportion of the population below middle class ranges between 54 and 81 percent, there was an average of 159 burns per week.¹⁴²

Based on available data on poverty and the location and burn rate of each dump, provided by the Ministry of Environment, the Central Administration of Statistics, and UNDP, there is a moderate correlation between the proportion of each area's population living below middle class and the amount of burning that takes place nearby.

The graph below plots the percentage of population who identify as living below middle class in each stratum against the average number of burns in that stratum every week. Although self-reported poverty rates do not correspond to the amount of burning taking place nearby in every case, in general it appears that higher levels of poverty in an area do correspond with higher numbers of burn days per week.

¹⁴² Lebanon has not conducted a census since 1932. Population estimates are based on the Central Administration of Statistics 2009 population survey, available here: <http://cas.gov.lb/index.php/demographic-and-social-en/population-en> (accessed July 19, 2017). Central Administration of Statistics and World Bank, "Measuring poverty in Lebanon using 2011 HBS," December 2015, http://www.cas.gov.lb/images/Excel/Poverty/Measuring%20poverty%20in%20Lebanon%20using%202011%20HBS_technical%20report.pdf (accessed June 7, 2017), p. 22.

Garbage burning in Lebanon moderately correlates with income levels.



Some residents living near open burning of waste said that they didn't have the money to seek medical treatment, and that they often resorted to pharmacies when they became sick. "I don't have insurance and can't afford to go to the hospital. The pharmacy diagnoses me approximately," one resident near the Bar Elias dump told Human Rights Watch.¹⁴³

Residents at dumps Human Rights Watch visited said they could not afford to move and that no one was willing to buy their homes because of the proximity to the dump. Parents also expressed anger and frustration that they were unable to follow doctors' orders to reduce their children's exposure to the smoke, and fear over the potential health consequences. Adnan, a Syrian refugee living in a tent near Bar Elias, told Human Rights Watch, "The children were the most affected, their body can't take it.... The doctor told us to get the children out of the area. I told him where should I take them to?"¹⁴⁴

¹⁴³ Human Rights Watch interview with Yousef, Kfar Zabad, February 16, 2017.

¹⁴⁴ Human Rights Watch interview with Adnan, Kfar Zabad, February 16, 2017.

III. Authorities' Response

Human Rights Watch spoke with municipality officials in areas where open burning of solid waste has taken place. In most cases, officials in the municipalities complained of a lack of support or adequate funding from the central government to manage their waste. However, residents also consistently expressed frustration that municipalities had not engaged with them or addressed complaints regarding the open burning of waste and associated health risks. Some residents said they feared local authorities and felt intimidated when they tried to complain.

Some of the municipalities have taken steps to curb the open burning of solid waste in their jurisdictions, but the initiatives documented by Human Rights Watch were almost all projects funded by foreign governments or international organizations and not the Lebanese government. In some cases, local authorities said projects faced lengthy delays and uncertain funding.

As a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), Lebanon has an obligation to prevent and reduce the population's exposure to harmful substances such as "detrimental environmental conditions that directly or indirectly impact upon human health" and to adopt appropriate "legislative, administrative, budgetary, judicial, promotional and other measures towards the full realization of the right to health."¹⁴⁵ According to The UN Committee on Economic, Social and Cultural rights, the international expert body that monitors implementation of the Covenant, any State "which is unwilling to use the maximum of its available resources for the realization of the right to health is in violation of its obligations" under article 12 of the Covenant.¹⁴⁶

Inadequate Support to Municipalities

Municipality officials who spoke to Human Rights Watch consistently complained that the central government was not providing adequate financial or technical support, and most officials said that the central government was late in disbursing municipal funds in recent

¹⁴⁵ United Nations Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14, The Right to the Highest Attainable Standard of Health (art. 12), U.N. Doc. E/C.12/2000/4 (2000), paras. 15, 33.

¹⁴⁶ *Ibid.*, para. 47.

years, making it difficult for them to invest in solid waste management. Government officials said municipalities resorted to open dumping or burning of waste because it is the cheapest option, and that the municipalities did not have the resources or technical expertise to pursue other solutions.¹⁴⁷ A 2010 Ministry of Environment report found that municipalities typically receive their budgetary allowances from the Independent Municipal Fund several years behind schedule and that they therefore “tend to resort to quick solutions and fixes, including open dumping.”¹⁴⁸

In Naameh, where Human Rights Watch documented open dumping and burning after the 2015 crisis, the head of the municipality said that Sukleen had stopped collecting the municipality’s waste in September 2016, leading to garbage piling up and being burned in the streets. The head of the municipality said the municipality started collecting the garbage but didn’t have any place to put it. “The only place we had that’s a little far from the people was on the street by the sea,” where residents said it had been burned.¹⁴⁹ A member of the municipal police told Human Rights Watch, “Do you want us to eat the trash? We have no place to put it.... It’s piling up by people’s homes, we’re under siege.”¹⁵⁰ According to the head of the municipality, Naameh municipality hadn’t received its share of the Independent Municipal Fund since 2014, increasing the difficulties of managing the waste. “If we had that, we could solve the crisis,” he said.¹⁵¹ In its 2010 report on the state of the environment, the Ministry of Environment found that delays in disbursement of the Fund were leading municipalities to resort to open dumping.¹⁵²

The head of the southern municipality of Majadel, where residents told Human Rights Watch that waste was being burned at the dump on a regular basis, complained about the lack of resources or support for waste management. “The government should develop a central plan,” he said. “They should treat us properly ... not have us run our own dumps

¹⁴⁷ Human Rights Watch interview with Ministry of Environment official, Beirut, November 16, 2016 and Sour Union of Municipalities official, Sour, May 8, 2017 (details withheld).

¹⁴⁸ Ministry of Environment and UN Development Programme (UNDP), “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 271.

¹⁴⁹ Human Rights Watch interviews with head of the Naameh and Doha municipalities, Naameh, October 27, 2016.

¹⁵⁰ Human Rights Watch interview with municipal police officer, Doha, October 27, 2016 (details withheld).

¹⁵¹ Human Rights Watch interview with head of the Naameh and Doha municipalities, Naameh, October 27, 2016.

¹⁵² Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 271.

without any support. They don't give you any money, how are you supposed to do this?"¹⁵³ A representative of the Sour union of municipalities, which includes 63 municipalities in south Lebanon, told Human Rights Watch that most municipalities were burning because it was the cheapest option for managing their solid waste.

I told the ministries that municipalities are finding the prettiest places and turning them into dumps because they are further away from people.... It's true that they shouldn't be burning, but you've pushed them into a corner because this should be the role of the central government, not the municipalities. We don't have support.... They don't want to help us and they don't want to give us our money. The government needs to give municipalities more support.¹⁵⁴

Protests and Complaints

Twenty-nine families told Human Rights Watch that they had complained to municipal authorities about the burning of their garbage near their homes. In several cases, residents said that they had held protests, spoken to journalists, and submitted petitions to municipal authorities. Although some of the municipalities Human Rights Watch visited had since taken steps to curb burning, residents nevertheless expressed frustration that authorities were not taking their complaints seriously and at the delays in action. In a letter to Human Rights Watch, the Ministry of Health wrote that it had set up a telephone hotline (the number is 1214) for citizens to file complaints of threats to their health.¹⁵⁵

In Kfar Zabad and Chehabiyeh, affected residents said that the dumps being burned were located in the neighboring municipality, making it difficult for them to hold the responsible authorities accountable. "If we voted there we wouldn't let them do what they did," said Mohamed, who lives near a dump in neighboring Bar Elias.¹⁵⁶

Near the Bar Elias dump, Othman told Human Rights Watch, "We spoke with the municipality, we held more than 20 demonstrations, we tried to stop the garbage truck but

¹⁵³ Human Rights Watch interview with head of the Majadel municipality, May 8, 2017.

¹⁵⁴ Human Rights Watch interview with Sour union of municipalities official, Sour, May 8, 2017 (details withheld).

¹⁵⁵ Letter from the Ministry of Public Health to Human Rights Watch, "Open Burning of Waste," June 29, 2017.

¹⁵⁶ Human Rights Watch interview with Mohamed, Kfar Zabad, February 16, 2017.

the police wouldn't let us. We filed an official complaint, there were no results."¹⁵⁷ According to residents, only after a new head of municipality was elected in 2016 did the municipality take steps to stop burning at the dump. The head of the municipality told Human Rights Watch, "The area suffered for years because of the dump. My first week as the head of the municipality we had a meeting with residents, it was sad, people were telling me they couldn't open windows or sit outside and we made a decision to end the burning at the dump."¹⁵⁸

In Baalbek, residents said that they had held multiple protests about the presence of an open dump, which was often burned, close to their homes. Ghazwa, who said both she and her husband have asthma and that her young daughter has developed a cough, told Human Rights Watch, "We held a protest, I told them let a tank drive over me I just want them to remove that dump. Members of the municipality came. They told us 'You can either handle it or you can leave'.... The municipality threatened to bring in the police and I told them that we are already dead, bring whomever you want."¹⁵⁹ Her neighbor, Salwa, said, "They never give us any information. They threatened to remove us after we complained."¹⁶⁰

Residents in Beirut faced similar issues. In one area that started burning waste after the 2015 crisis, one resident told us that despite holding protests, "There was no engagement from the municipality after the protests."¹⁶¹

Municipalities' Failure to Act

Residents expressed frustration with municipalities' failure to take action to end open burning, address health concerns, or even engage with their constituents.

Cynthia, who lives in Fanar, said that open burning of waste started at the beginning of the 2015 crisis. She said residents tried to meet with the municipality to put an end to the burning, which was still taking place when Human Rights Watch visited the site in February 2017.

¹⁵⁷ Human Rights Watch interview with Othman, Kfar Zabad, February 16, 2017.

¹⁵⁸ Human Rights Watch interview with head of the Bar Elias municipality, Bar Elias, April 12, 2017.

¹⁵⁹ Human Rights Watch interview with Ghazwa, Baalbek, February 17, 2017.

¹⁶⁰ Human Rights Watch interview with Salwa, Baalbek, February 17, 2017.

¹⁶¹ Human Rights Watch interview with Nadine, Beirut, February 24, 2017.

The burning is facing my house. I'm sure that I'm being affected. We never open the windows. I don't know how long the toxins will be there.... I'm sick of it. I just want to leave. We had official meetings with the municipality, initially they were very responsive. We thought that something would change, but nothing changed. They stopped being responsive. No one answers the phone ever now.¹⁶²

Another resident of Fanar, Maya, told Human Rights Watch that the head of the municipality told residents “this isn't our responsibility,” after they complained about the open burning taking place there. She said, “We did all we could. We held so many meetings with the municipality. We begged them. They're not interested. They sell us words. No actions. All promises.”¹⁶³

Khalil, lives near a dump that is being burned in a neighboring municipality in the south. He said, “The dump is for Majadel municipality, here in Chehabiyeh we don't let them burn, we complained. We spoke with them [Majadel] but they didn't do anything. Our municipality tried to speak with their municipality about the burning.”¹⁶⁴ Mousa, who also lives in Chehabiyeh, said, “Their municipality is saying that it's other people that are burning it, but at the end of the day they are responsible. We delivered a petition to the municipality there, they didn't do anything. We tried to speak to them, they won't do anything.”¹⁶⁵

One doctor in Hermel told Human Rights Watch that the hospital he works at is located near an open dump that is burned periodically. He said the hospital wrote to the ministries of interior and health on numerous occasions but that no action has been taken to move the dump or stop the burning despite engagement from the central government.

[The previous health minister] personally talked with the minister of interior and the minister of interior, in turn, sent an order to clear and close the dump. I still have a copy of the order. But it was not enforced. The governor met with the municipality and the head of the municipality threatened: “Do you want me to leave the trash in the Hermel market?” How am I supposed

¹⁶² Human Rights Watch telephone interview with Cynthia, December 6, 2016.

¹⁶³ Human Rights Watch telephone interview with Maya (pseudonym), February 13, 2017.

¹⁶⁴ Human Rights Watch interview with Khalil, Chehabiyeh, February 21, 2017.

¹⁶⁵ Human Rights Watch interview with Mousa, Chehabiyeh, February 21, 2017.

to enforce the decision when the minister and the governor themselves could not do it? The municipality is the one who controls the dump. But they have neither the capacity nor the will to find a solution. We've met with the municipality so many times. There was a plan to create a treatment plant. They keep telling us about the plan, the plan, it's been 11 years and we never saw that plan.¹⁶⁶

Some of the residents told Human Rights Watch that they did not feel that they were able to speak out about the burning. Seven families said that they feared or mistrusted their municipality.

In Dekweneh, Wassim, whose father suffered when garbage was being burned near his home, told Human Rights Watch, "I don't trust the municipality... Honestly, I'm fed up. Who should I go to, the same people who are causing this? People are indifferent. You can't go to the person who is causing the problem. Who are you going to complain to?"¹⁶⁷ In Baalbek, one resident near the open dump said, "No one dares to speak out. People are scared."¹⁶⁸

Leila who lives in Sin el Fil said that burning of waste was taking place near her house almost every night since summer 2016. But when she tried to complain to the municipality responsible, she felt intimidated.

I tried to complain to the municipality a while ago. I first called the Sin el Fil municipality. They said it's not them, it's Mansouriyeh municipality. I called them. What can I say? Absolute disrespect. They were so rude. They said it's not them. And at one point they were disrespectful. They asked me about my name, where I live, they terrorize people. Imagine, a public institution acting that way. They're supposed to serve us, but they don't care. Maximum carelessness. It's like talking to a wall. And there's no way to stop them. There's no way to stop the burning.¹⁶⁹

¹⁶⁶ Human Rights Watch telephone interview with doctor, May 9, 2017 (details withheld).

¹⁶⁷ Human Rights Watch interview with Wassim, Beirut, October 19, 2016.

¹⁶⁸ Human Rights Watch interview with Lamice, Baalbek, February 17, 2017.

¹⁶⁹ Human Rights Watch telephone interview with Leila (pseudonym), November 17, 2016.

Syrian refugees living in areas where burning was taking place expressed fear of complaining to authorities due to their precarious status in Lebanon. We can't even complain," said Adnan, who lives near Bar Elias. "How can we complain if we can't even freely move around the area? We have to take a long detour to avoid the army."¹⁷⁰

Accountability

Many of the residents that Human Rights Watch spoke with said they were frustrated that, despite repeated complaints to the municipalities where burning was taking place, no one was being held to account. Residents also said they felt angry because the municipalities were not taking the issue of burning seriously. Although the Ministry of Environment is responsible for environmental monitoring and overseeing the disposal of waste by municipalities, it lacks the necessary personnel and financial resources to do so effectively.¹⁷¹ Under international law, victims of violations of the right to health should be entitled to adequate reparations, which could take the form of "restitution, compensation, satisfaction or guarantees of non-repetition."¹⁷² Lebanon should ensure that these rights are implemented in domestic laws.

An environmental journalist whose child attends a school near to where burning was taking place in October 2016, called on authorities to take the issue of open burning more seriously. "It's as if you're inhaling your death," he said. "It's as if someone is shooting at the school. This is not a joke.... Police don't take waste burning seriously."¹⁷³ Nadine, who said members of her family started experiencing respiratory illnesses after burning of waste started taking place near their home in 2015, called for accountability. "I learned that burning creates dioxins that stay in your body, they can't just be treated like a virus. It has a long-term effect," she said. "A crime has already been committed by releasing

¹⁷⁰ Human Rights Watch interview with Adnan, Kfar Zabad, February 16, 2017.

¹⁷¹ Human Rights Watch interview with Ministry of Environment official, Beirut, August 25, 2017 (details withheld); SWEEP-Net, "Country report on the solid waste management in Lebanon," April 2014, <http://www.moe.gov.lb/getattachment/bcb5021c-adaa-4ef9-9649-obobc410d4cb/Country-Report-on-Solid-Waste-Management-in-Lebano.aspx> (accessed June 6, 2017), p. 28.

¹⁷² CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health (art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 59.

http://tbinternet.ohchr.org/_layouts/treatybodyexternal/Download.aspx?symbolno=E%2fC.12%2f2000%2f4&Lang=en

¹⁷³ Human Rights Watch interview with environmental journalist, Doha, October 27, 2016.

dioxins into the atmosphere, someone should be held accountable, but no one is going to be held accountable.”¹⁷⁴

One lawyer, who tried to bring a court case about burning, said that the municipality in question stopped burning for one week, but that “burning has resumed because they know that there will be impunity. No one will be punished.”¹⁷⁵

In some cases, municipalities have taken positive steps to curb open burning of waste. But even in these cases residents said the municipal authorities had not provided them with information about the potential health effects or any support to treat the health conditions that they may have already developed.

Right to Information

Almost all of those interviewed told Human Rights Watch that their municipality had not provided them with any information about the risks of open burning or safety precautions to take. As a result, many expressed fear about the unknown risks, and concern about the potential impact of the burning on their health and the health of their children. Under international law, Lebanon is required to provide “education and access to information concerning the main health problems in the community, including methods of preventing and controlling them.”¹⁷⁶ The Lebanese government should provide adequate information about the dangers of waste burning and steps people should be taking to protect themselves from smoke.

A Ministry of Environment official told Human Rights Watch that although the ministry responds to complaints of open burning, the responsibility for alerting residents to the potential health risks falls under the purview of the Ministry of Health. However, the official said that the Ministry of Environment does not coordinate with the Ministry of Health in these cases.¹⁷⁷ For its part, the Ministry of Health wrote in response to a letter from Human Rights Watch that it is “raising public awareness about the dangerous health effects of burning [garbage], and discouraging citizens from burning garbage, in

¹⁷⁴ Human Rights Watch interview with Nadine, Beirut, February 24, 2017.

¹⁷⁵ Human Rights Watch interview with lawyer, Beirut, October 28, 2016 (details withheld).

¹⁷⁶ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health (art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 44.

¹⁷⁷ Human Rights Watch interview with Ministry of Environment official, Beirut, August 25, 2017 (details withheld).

cooperation with local authorities and civil society to spread awareness about this subject.” However, the Ministry did not outline any specific steps it took to warn local residents of the dangers or advise them on how to mitigate risks.¹⁷⁸

Some residents complained about the lack of information from the government and expressed fear about the possible health effects. “The municipality didn’t give us any information,” said Kheiri. “In the future if we keep smelling this, it will negatively affect us and our health.”¹⁷⁹ Doctors said that many residents often did not know to mention a nearby dump or open burning when seeking treatment for respiratory symptoms, and may not know about the associated health risks.

According to the World Health Organization, as of 2014 air pollution in Beirut is already 3.2 times the safe level, and that 1,434 people died each year from an air pollution-related disease in Lebanon.¹⁸⁰ According to the Ministry of Environment, Lebanon now has five air quality monitoring stations.¹⁸¹ Lebanese media reported in October 2017 that Lebanon had opened 10 additional air quality monitoring stations, funded by the European Union.¹⁸² But Lebanon has not adequately monitored how burning of waste is contributing to this air pollution or threatening the health of nearby residents. Human Rights Watch is not aware of any air quality monitoring stations deployed by the government to monitor for open burning. A public health professor at the American University of Beirut lamented that it fell to universities to fill this gap. “The issue is that there are no baselines,” he said. “This should not be the role of a university. The Ministry of Environment should be doing this.”¹⁸³

In response to questions from Human Rights Watch, the Ministry of Health wrote that it had formed a national committee consisting of environmental experts from the most important universities in Lebanon, but did not detail any action the ministry itself had undertaken to monitor the health effects.

¹⁷⁸ Letter from the Ministry of Public Health to Human Rights Watch, “Open Burning of Waste,” June 29, 2017.

¹⁷⁹ Human Rights Watch interview with Kheiri, Beirut, February 21, 2017.

¹⁸⁰ “WHO Global Urban Ambient Air Pollution Database (update 2016),” World Health Organization, accessed June 6, 2017, http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/; “The Air Pollution in Beirut, Lebanon,” BREATHELIFE, accessed June 6, 2017, <http://breathelife2030.org/city-data-page/?city=1714>.

¹⁸¹ Human Rights Watch interview with Ministry of Environment official, Beirut, November 16, 2016 (details withheld).

¹⁸² Timour Azhari, “New stations boost Lebanon’s air pollution monitoring capacity,” *Daily Star*, October 25, 2017, <https://www.dailystar.com.lb/News/Lebanon-News/2017/Oct-25/423854-new-stations-boost-lebanons-air-pollution-monitoring-capacity.ashx> (accessed October 26, 2017).

¹⁸³ Human Rights Watch interview with public health professor, Beirut, October 6, 2016 (details withheld).

The committee released more than one report describing the health effects of open burning. It took air samples in several locations where there was burning, and the results proved very dangerous, leading the committee to announce the danger of this situation.¹⁸⁴

¹⁸⁴ Letter from the Ministry of Public Health to Human Rights Watch, “Open Burning of Waste,” June 29, 2017.

IV. Steps Forward

Residents consistently expressed frustration that the central government was not prioritizing solid waste management solutions. Although a March 2016 cabinet decision largely removed waste from the streets of Beirut and Mount Lebanon by creating two new temporary landfills, waste management has faltered on occasion and both new landfills are mired in lawsuits.¹⁸⁵ Meanwhile open burning continues across Lebanon, and activists and public health experts have raised concerns about proposals for incineration plants as a long-term solution for Lebanon.

Some of the municipalities that Human Rights Watch visited have taken steps to curb open burning of waste in their area and invest in more advanced waste processing facilities, however these were largely funded through international aid and were not yet operational at the time research was conducted.

Residents expressed frustration that the government had not yet found a long-term solution to waste management and that open burning of waste continued. “They should be sorting the garbage, not lighting it on fire,” said Raymonda.¹⁸⁶

Positive Examples

Some of the municipalities that Human Rights Watch visited have taken steps to curb open burning of waste in their area and develop more sound waste management plans. In those cases, residents have consistently reported an improvement in their quality of life and health conditions. However, almost all of these projects experienced lengthy delays in implementation and were dependent on funding from foreign countries and international organizations.¹⁸⁷

¹⁸⁵ “Fire doused in Jadra waste collection center,” *Daily Star*, May 31, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/May-31/407887-fire-breaks-out-in-jadra-waste-collection-center.ashx> (accessed June 6, 2017); Trash returns to Beirut streets as collectors strike,” *Daily Star*, October 21, 2016, <http://www.dailystar.com.lb/News/Lebanon-News/2016/Oct-21/377543-trash-returns-to-beirut-streets-as-collectors-strike.ashx> (accessed June 6, 2017).

¹⁸⁶ Human Rights Watch interview with Raymonda, Chehabiyeh, February 21, 2017.

¹⁸⁷ Ministry of Environment and United Nations Development Programme (UNDP), “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 276.

Residents living near the Bar Elias dump told Human Rights Watch that they suffered for more than 20 years from the burning of waste, but that a new head of municipality had largely put a stop to the burning in the fall of 2016. “Since they closed the dump, it’s like another life,” said Sami.¹⁸⁸ The head of the municipality told Human Rights Watch that he had ordered an end to the burning after residents complained, and that the municipality was covering the waste with dirt now instead. He said that the municipality was building new recycling and composting centers, as well as two sanitary landfills, backed by international funding. The project would have a capacity of 125 tons per day, and would also take waste from Qab Elias and Al Marj. “This was a dream for us,” he said.

But although the international agencies have funded establishment of the facilities, he said that they would not fund their operation, and that the municipality would need support from the central government. “We don’t have the experience to operate it, and we are asking for support from the central government,” he said. “They haven’t offered us the money yet. The central government will need to fund the continued operating costs. If the government doesn’t operate it, it won’t run.... Operating requires technical experience and financial support.”¹⁸⁹

In Baalbek, the head of the municipality told Human Rights Watch that he has also recently taken measures to curb burning at the open dump, though residents said that waste there is still burned occasionally. According to the head of the municipality, a recently opened sorting plant burned down, and the municipality is working with the World Bank and European Union to rehabilitate it and include composting facilities and two sanitary landfills that will receive waste from Baalbek and ten nearby municipalities. But according to the head of the municipality, the central government will be responsible for the day-to-day costs of operating the facility, and will need to provide the funding for its operation.¹⁹⁰

A representative of the Sour union of municipalities, which includes 63 municipalities in south Lebanon, told Human Rights Watch that many of its municipalities operate open dumps, most of which are being burned. He said the US Agency for International Development (USAID) funded a waste sorting factory in 2008, but that it only had the

¹⁸⁸ Human Rights Watch interview with Sami, Kfar Zabad, February 17, 2017.

¹⁸⁹ Human Rights Watch interview with head of Bar Elias municipality, Bar Elias, April 12, 2017.

¹⁹⁰ Human Rights Watch interview with head of Baalbek municipality, Beirut, February 17, 2017.

capacity to take 60 tons per day, of the 300 tons per day produced by the municipalities in the union. A World Bank project is underway to increase capacity to 150 tons per day, and he said the union is considering additional projects to manage the remaining 150 tons of solid waste produced in its municipalities every day.¹⁹¹

The Future of Waste Management in Lebanon

Long-Term Planning

Any long-term plan for waste management in Lebanon should include the entire country, not just Beirut and Mount Lebanon, and take into account the associated environmental and health consequences. There is also a real need for an incentive structure within Lebanon's waste management contracts to encourage proper waste disposal, recycling, and composting. The current quantity-based system used in Beirut and most of Mount Lebanon encourages the comingling of special waste that should be treated separately, such as hazardous or medical waste, and provides no incentives for proper sorting and composting.¹⁹²

Adopting sustainable waste management practices is essential to reducing the amount of waste being open dumped and burned, and realizing residents' rights to health and a healthy and safe environment.

Researchers at the American University of Beirut have developed a Guide to Municipal Solid Waste Management, which recommends that open burning be completely banned and that open dumps "be closed and rehabilitated as soon as possible and monitored in order to avoid catastrophic health repercussions."¹⁹³ In the meantime, it recommends that residents in areas near burning use face masks, "specifically particulate filtering face-piece respirators such as N95 respirators, which filter out at least 95% of airborne particles."¹⁹⁴

¹⁹¹ Human Rights Watch interview with Sour union of municipalities official, Sour, May 8, 2017 (details withheld).

¹⁹² Ministry of Environment and UNDP, "State and Trends of the Lebanese Environment 2010," 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 276.

¹⁹³ American University of Beirut, "Guide to Municipal Solid Waste Management," 2016, https://aub.edu.lb/units/natureconservation/gallery/Documents/guide_to_municipal_solid_waste_management.pdf (accessed June 6, 2017), p. 8.

¹⁹⁴ Ibid.

Human Rights Watch does not take a position on the technical waste management approach that Lebanon should pursue. However, any integrated solid waste management framework in Lebanon will need to detail a plan for reduction, sorting, collection, transfer, storage, processing, and disposal of solid waste in a manner that takes into account the perspectives of the public health and environmental experts and local communities.¹⁹⁵

Incineration Plants

In 2010, the cabinet adopted a decree to explore waste-to-energy options, and according to politicians and the Ministry of Environment, current discussions around a long-term plan for waste management in Lebanon focus on the use of incineration plants.¹⁹⁶ In October 2016, the Beirut municipality reportedly proposed an incinerator plant for the city in response to the 2015 waste management crisis.¹⁹⁷ Some public health experts and activists in Lebanon have opposed the use of incineration plants, citing concerns about the lack of a waste management framework, independent monitoring, potential emissions, and the high cost of the plants.¹⁹⁸

In its Guide to Municipal Solid Waste Management, researchers at the American University of Beirut found that although toxic byproducts of incineration plants can be filtered, treated, and neutralized, this requires expensive equipment and complex processes, “particularly when considering the emission control measures, which require highly skilled personnel and careful maintenance.”¹⁹⁹ Dr. May Massoud, a professor of environmental management at the American University of Beirut, expressed concern about the implementation of waste to energy in Lebanon, and that a lack of appropriate oversight

¹⁹⁵ *Ibid.*, p. 5.

¹⁹⁶ Ministry of Environment and UNDP, “State and Trends of the Lebanese Environment 2010,” 2011, <http://www.moe.gov.lb/The-Ministry/Reports/State-Of-the-Environment-Report-2010.aspx?lang=en-us> (accessed June 6, 2017), p. 274; “CDR to follow up with ministries on incinerators,” *Daily Star*, April 25, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/Apr-25/403336-cds-to-follow-up-with-ministries-on-incinerators.ashx> (accessed June 6, 2017); “Waste Incineration ‘Serious Choice’ as Ministerial Panel Holds 1st Meeting,” *Naharnet*, February 8, 2017, <http://www.naharnet.com/stories/en/225182-waste-incineration-serious-choice-as-ministerial-panel-holds-1st-meeting> (accessed June 6, 2017).

¹⁹⁷ “CDR to follow up with ministries on incinerators,” *Daily Star*, April 25, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/Apr-25/403336-cds-to-follow-up-with-ministries-on-incinerators.ashx> (accessed June 6, 2017).

¹⁹⁸ *Ibid.*

¹⁹⁹ American University of Beirut, “Guide to Municipal Solid Waste Management,” 2016, https://aub.edu.lb/units/natureconservation/gallery/Documents/guide_to_municipal_solid_waste_management.pdf (accessed June 6, 2017), p. 12.

and expertise, as well as corruption, could lead to improper operation and inadequate safety precautions with serious health effects.²⁰⁰

Some studies have raised health concerns about the use of incinerators. Studies in Britain, France, and Italy have found an increase in cancer, non-Hodgkin's Lymphoma, and soft tissue sarcomas among residents living in close proximity to incinerators.²⁰¹

According to Ministry of Environment officials, one municipality, Dhour el Shweir, imported a small incinerator that has been met with opposition from local residents concerned about potential health effects.²⁰² According to the Ministry, the incinerator did not come equipped with a filter and has not passed an environmental impact assessment.²⁰³ Local media reported that in January 2016, the former minister of environment Mohammad Machnouk ordered the closure of the incinerator, which he said was operating without an environmental impact assessment.²⁰⁴ According to a Ministry of Environment official, as of August 2017, the incinerator still had not passed an environmental impact assessment.²⁰⁵

²⁰⁰ Human Rights Watch interview with Dr. May Massoud, October 31, 2016.

²⁰¹ A comprehensive study of 72 municipal solid waste incinerators in Britain from the 1970s to the 1980s found a statistically significant decline in risk with distance from incinerators for stomach, colorectal, liver, and lung cancer. P. Elliott et al., "Cancer Incidence Near Municipal Solid Waste Incinerators in Great Britain," *British Journal of Cancer*, vol. 73.5 (1996). In France, which has the largest number of municipal solid waste incinerators in the European Union, one study found that the risk for non-Hodgkin's Lymphoma for persons living closer to incineration sites was 2.3 times higher than the risk for persons living farther from the sites. Nathalie Floret et al., "Dioxin Emissions from a Solid Waste Incinerator and Risk of NonHodgkin Lymphoma," *Epidemiology*, vol. 14.4 (2003), pp. 392-398. According to a study conducted in Italy, there is a significant increase in risk of soft tissue sarcomas associated with residence within two kilometers of an incinerator. Paola Zambon et al., "Sarcoma Risk and Dioxin Emissions from Incinerators and Industrial Plants: A Population-based Case-control Study (Italy)," *Environmental Health*, vol. 6.19 (2007), pp. 1-10.

²⁰² "Dhour Shweir Incinerator, Lebanon," Environmental Justice Atlas, accessed June 6, 2017, <https://ejatlas.org/conflict/dhour-shweir-incinerator>.

²⁰³ Human Rights Watch interview with Ministry of Environment official, Beirut, November 16, 2016 (details withheld).

²⁰⁴ "CDR to follow up with ministries on incinerators," *Daily Star*, April 25, 2017, <http://www.dailystar.com.lb/News/Lebanon-News/2017/Apr-25/403336-cds-to-follow-up-with-ministries-on-incinerators.ashx> (accessed June 6, 2017).

²⁰⁵ Human Rights Watch interview with Ministry of Environment official, Beirut, August 25, 2017 (details withheld).

V. Legal Standards

Lebanon is a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), which requires it to take steps to achieve “the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.”²⁰⁶ This includes the right to a healthy environment.²⁰⁷ Under the Covenant, Lebanon also has an obligation to recognize “the right of everyone to an adequate standard of living ... and to the continuous improvement of living conditions.”²⁰⁸

Although the Covenant recognizes constraints due to the availability of resources and the right to health is subject to progressive realization, the United Nations Committee on Economic, Social and Cultural Rights, the international expert body that monitors implementation of the ICESCR, has held that it also imposes on states various obligations which are of immediate effect, including an obligation to take steps towards the full realization of the rights to health. Such steps must be deliberate, concrete, and targeted towards the full realization of the right. It further found that “the progressive realization of the right to health over a period of time should not be interpreted as depriving States parties’ obligations of all meaningful content. Rather, progressive realization means that States parties have a specific and continuing obligation to move as expeditiously and effectively as possible towards the full realization of article 12.”²⁰⁹

Under the Covenant, the right to health includes an obligation on the state to prevent and reduce the population’s exposure to harmful substances such as “detrimental environmental conditions that directly or indirectly impact upon human health.”²¹⁰ It also requires states to adopt measures against “environmental and occupational health hazards and against any other threat as demonstrated by epidemiological data” and to

²⁰⁶ International Covenant on Economic, Social and Cultural Rights (ICESCR), adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force January 3, 1976, ratified by Lebanon on November 3, 1972, art. 12.

²⁰⁷ United Nations Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 14, The Right to the Highest Attainable Standard of Health (art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 9.

²⁰⁸ ICESCR, adopted December 16, 1966, G.A. Res. 2200A (XXI), 21 U.N. GAOR Supp. (No. 16) at 49, U.N. Doc. A/6316 (1966), 993 U.N.T.S. 3, entered into force January 3, 1976, ratified by Lebanon on November 3, 1972, art. 11.

²⁰⁹ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health (Art. 12), U.N. Doc. E/C.12/2000/4 (2000), paras. 30-31.

²¹⁰ *Ibid.*, para. 15.

formulate and implement “national policies aimed at reducing and eliminating pollution of air, water and soil.”²¹¹ States are further required to adopt appropriate “legislative, administrative, budgetary, judicial, promotional and other measures towards the full realization of the right to health.”²¹² According to the committee, any state “which is unwilling to use the maximum of its available resources for the realization of the right to health is in violation of its obligations” under article 12 of the Covenant.²¹³

According to the committee, “the failure to take appropriate steps towards the full realization of everyone’s right to the enjoyment of the highest attainable standard of physical and mental health” as well as the failure to enforce relevant laws would constitute violations of the Covenant.²¹⁴ Under the Covenant, not only are states to refrain from unlawfully polluting air, water, and soil, but they must also take measures to prevent pollution by third parties.²¹⁵ A state’s failure to take all necessary measure to safeguard persons within their jurisdiction from infringements of the right to health by third parties, the failure to regulate the activities of individuals, groups, or corporations so as to prevent them from violating the right to health of others also constitutes a violation, including “the failure to enact or enforce laws to prevent the pollution of water, air and soil by extractive and manufacturing industries.”²¹⁶

Furthermore, the committee has held that all victims of violations of the right to health should be entitled to “adequate reparation, which may take the form of restitution, compensation, satisfaction or guarantees of non-repetition. National ombudsmen, human rights commissions, consumer forums, patients’ rights associations or similar institutions should address violations of the right to health.”²¹⁷

The right to health also includes the right to “seek, receive and impart information and ideas concerning health issues.”²¹⁸ Specifically, state parties have an obligation to provide

²¹¹ *Ibid.*, para. 36.

²¹² *Ibid.*, para. 33.

²¹³ *Ibid.*, para. 47.

²¹⁴ *Ibid.*, para. 49.

²¹⁵ *Ibid.*, paras. 34, 51.

²¹⁶ *Ibid.*, para. 51.

²¹⁷ *Ibid.*, para. 59.

²¹⁸ CESCR, General Comment No. 14, The Right to the Highest Attainable Standard of Health (Art. 12), U.N. Doc. E/C.12/2000/4 (2000), para. 12.

education and access to information “concerning the main health problems in the community, including methods of preventing and controlling them.”²¹⁹

The Convention on the Rights of the Child ties children’s right to the highest attainable standard of health, including the right to nutritious food and safe drinking water, to issues of environmental pollution, and defines the child’s right to information on environmental health issues and defines environmental education as one of the goals of education.²²⁰ In its concluding observations on country reports, the Committee on the Rights of the Child regularly addresses environmental hazards as barriers to the realization of the right to health and other rights.²²¹ The Committee has held that “States should take measures to address the dangers and risks that local environmental pollution poses to children’s health.”²²²

Lebanon is a party to the Stockholm Convention on Persistent Organic Pollutants, which requires its parties to take measures to eliminate or reduce the release of these pollutants into the environment and ensure that stockpiles and waste containing or contaminated with persistent organic pollutants are managed in a manner protective of human health and the environment.²²³ Lebanon is also a party to the Basel Convention, which requires state parties to ensure the availability of adequate disposal facilities for the environmentally sound management of hazardous wastes, including toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious wastes.²²⁴

²¹⁹ *Ibid.*, para. 44.

²²⁰ Convention on the Rights of the Child (CRC), adopted November 20, 1989, G.A. Res. 44/25, annex, 44 U.N. GAOR Supp. (No. 49) at 167, U.N. Doc. A/44/49 (1989), entered into force September 2, 1990, ratified by Lebanon on May 14, 1991.

²²¹ Human Rights Council, Report of the Independent Expert on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, John H. Knox, A/HRC/25/53, December 30, 2013, http://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session25/Documents/A-HRC-25-53_en.doc.

²²² UN Committee on the Rights of the Child, General Comment 15, The Right to the Highest Attainable Standard of Health, CRC/C/GC/15 (2013), para. 49.

²²³ The Stockholm Convention on Persistent Organic Pollutants, adopted May 22, 2001, entered into force May 17, 2004, ratified by Lebanon January 3, 2003.

²²⁴ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted March 22, 1989, entered into force May 5, 1992, ratified by Lebanon December 21, 1994.

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Annex I: Response from Ministry of Public Health

Open Burning of Trash

- Does the ministry have a position on the open burning of waste in Lebanon? If so, what is the position, and how was it arrived at?

The Ministry of Public Health has stressed since the onset of the trash crisis that the open burning of trash is strictly prohibited, and it calls on all municipalities to take the necessary and strict measures to prohibit it.

- Is the ministry monitoring or investigating the health impacts of open burning of waste in Lebanon? If so, please provide details of the monitoring and findings.

The dangerous negative health effects of the open burning of trash are scientifically well established. At the beginning of the trash crisis the Ministry created a national committee consisting of environmental experts from the most important universities in Lebanon. The committee released more than one report describing the health effects of open burning. It took air samples in several locations where there was burning, and the results proved very dangerous, leading the committee to announce the danger of this situation, particularly at press conferences held by the Minister of Public Health, with members of the committee in attendance. As for monitoring the most dangerous health effects of burning trash, such as cancer, they do not appear in a short time but take years.

- In 2016, the Ministry of Health reported 85 municipalities to the judiciary for open burning of waste. What is the current status of these cases?

These cases are under the custody of the judiciary. The issue of trash in general is a national responsibility, and the law has made the Ministry of Environment and the Ministry of the Interior and Municipalities directly responsible. What the Ministry of Health is doing is related to raising public awareness, monitoring, and referring cases to the judiciary.

- Has the ministry taken any other action against individuals or municipalities found to be open burning waste? If so, in how many cases? What is the current status of these cases?

As was mentioned previously, the Ministry has brought a number of cases against municipalities that have openly burned trash, with the understanding that the Ministry of Public Health has no direct authority over the municipalities, which fall under the Ministry of the Interior.

- Has the ministry taken other steps to reduce or end the open burning of solid waste in Lebanon?

The Ministry has tackled this thorny issue, launching awareness campaigns and holding numerous press conferences on this subject, and has filed complaints with the judiciary, as per its limited authorities in this matter.

- Since 2000, what steps has the ministry taken to warn local residents of the health risks of open burning of solid waste and how to effectively reduce exposure?

Raising public awareness about the dangerous health effects of burning [trash], and discouraging citizens from burning trash, in cooperation with local authorities and civil society to spread awareness about this subject.

- What procedures, if any, are in place for citizens or municipalities to report the open burning of waste to the ministry?

The Ministry has set up a hotline 1214 (24/24) at the disposal of citizens for them to file complaints in this matter or other matters affecting their health.

- What steps has the ministry taken to regulate the disposal of hazardous medical waste in Lebanon?

The Ministry of Health, in cooperation with the Ministry of Environment and the Arcenciel organization, works to convert medical waste into domestic waste, and it is also working to draft an agreement with the Pharmaceutical Imports Union and a foreign company specialized in the export of expired and poisonous drugs for treatment abroad, paid for by manufacturers and importers, and this project will be announced with and implemented soon.

- What percentage of hazardous medical waste in Lebanon is being treated before disposal?

All hospitals located in Lebanese territory are required to dispose safely of medical waste and convert it into non-hazardous waste, and the Ministry of Health monitors this closely. The Ministry also monitors the storage of expired and poisonous “cytotoxic” drugs, to be stored in secure spaces until it can be exported as outlined above, due to the incapacity for treatment in Lebanon.

Annex II: Response from Civil Defense

General Directorate of Civil Defense' answers to Human Rights Watch's questions:

- **How many reports of burning garbage has the Civil Defense received since July 17, 2015? How many in Beirut and Mount Lebanon? How many outside of Beirut and Mount Lebanon?**

- The Operations Room of the General Directorate of Civil Defense has received 4,426 reports of garbage burning from 7/17/2015 to 6/30/2017 in various regions of Lebanon. Those reports were categorized as follows:

- 108 reports in Beirut
- 3504 reports in Mount Lebanon
- 156 reports in the South
- 118 reports in Nabatieh
- 182 reports in Baalbek Al Hermel
- 150 reports in the North
- 18 reports in Akkar

- **In how many of these cases did Civil Defense respond in Beirut and Mount Lebanon? Outside Beirut and Mount Lebanon?**

- The General Directorate of Civil Defense responded to all reports received. Its affiliated centers deployed throughout Lebanon were ordered to extinguish the fires related to burning garbage, just like any other daily tasks [it performs] in response to the call of duty.

- **In how many of these cases did Civil Defense administer first aid or refer individuals to medical care?**

- We have not recorded any injuries due to burning garbage.

- **Did the Civil Defense document an increase in burning in Beirut and Mount Lebanon following the beginning of the garbage crisis on July 17, 2015? If so, how large of an increase?**

- The statistics show that the total number of tasks carried out in garbage-burning operations increased after the crisis of 17 July 2015 and has reached almost 600 tasks per month.

Compared to the pre-crisis period, we have noticed an increase of about 330% in the governorate of Mount Lebanon in 2015, and 250% in 2016. But we have noticed a significant decrease [since then] and until this month.

In the governorate of Beirut, although the number of tasks is not high, we have noticed an increase of 50% in 2015 and 75% in 2016. And then we have noticed a significant decrease since the beginning of the year and until the end of June.

The following table summarizes the total number of missions carried out in relation to garbage-burning fires in Beirut and Mount Lebanon. It shows a clear decrease in percentages.

| District | From 7/17/2015 to 12/31/2015 | From 1/1/2016 to 12/31/2016 | From 1/1/2017 to 6/30/2017 |
|---------------|------------------------------|-----------------------------|----------------------------|
| Beirut | 39 missions | 62 missions | 7 missions |
| Mount Lebanon | 1839 missions | 1411 missions | 254 missions |



“As If You’re Inhaling Your Death”

The Health Risks of Burning Waste in Lebanon

In Lebanon, open burning of waste at more than 150 open dumps across the country poses serious health risks to nearby residents. Open burning of waste is a dangerous and avoidable practice, a consequence of the government’s failure over decades to manage solid waste in a way that respects environmental and health laws designed to protect people. A range of scientific studies have documented the dangers that emissions from the open burning of household waste pose to human health. Children and older persons are at particular risk.

Through extensive interviews with affected residents, health experts, and government officials Human Rights Watch found that those living near open burning reported an array of health problems consistent with the frequent and sustained inhalation of smoke from the open burning of waste. People living near open garbage dumps said that the burning of waste also gravely affected their day to day lives and that a lack of information about the dangers of inhaling smoke from open burning was taking a heavy psychological toll. The open burning of waste in Lebanon disproportionately takes place in lower income areas.

Lebanon’s lack of effective action to address widespread open burning of waste and a lack of adequate monitoring or information with regard to its health effects violate Lebanon’s obligations under international law.

Human Rights Watch calls on Lebanon to end the open burning of waste and implement a sustainable national waste management strategy that complies with environmental and public health best practices and international law.

(above) A resident says her daughter’s health has been affected by burning of waste at a nearby dump in Baalbek, Lebanon.

(front cover) Open burning of waste in Majadel, south Lebanon.

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