

Nowhere to Hide

The Logic of Chemical Weapons Use in Syria

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STUDY
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For years, the international community has struggled to understand how and why the Assad regime, in defiance of norms and threats, has persisted in its use of banned chemical weapons against civilian populations. In this report, we draw on the most comprehensive dataset of chemical weapons attacks in Syria compiled to date to illustrate the sheer scale of the problem – at least 336 confirmed attacks – and offer evidence-based analysis of the tactical and operational logic underpinning the use of chemical weapons as part of the Syrian regime’s wider strategy of punitive counterinsurgency. Once we appreciate the full strategic rationale and impact of chemical weapons in the Syrian civil war, we are able to assess their true impact on humanitarian or strategic interests, and to develop more effective policy responses.



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We gratefully acknowledge financial support from the German Federal Foreign Office, the Robert Bosch Foundation and the Jeiroudi Foundation, without which the research for and work on this study would not have been possible. Finally, we are indebted to our friends and partners at Syrian Archive, the Syrian American Medical Society, Mayday Rescue and the White Helmets, the Syrian Network for Human Rights, the Violations Documentation Center, Human Rights Watch, Hala Systems, and many others for their support of this study and any forthcoming efforts.

Executive Summary

Our research found that there have been at least 336 chemical weapons attacks over the course of the Syrian civil war – significantly more than has commonly been known. Around 98 percent of these attacks can be attributed to the Assad regime, with the Islamic State group responsible for the rest. Approximately 90 percent of all confirmed attacks occurred after the infamous “red line” incident of August 2013.

The Syrian military’s chemical warfare campaign is closely intertwined – logistically, operationally and strategically – with its campaign of conventional warfare. The designs of the Assad regime’s improvised chlorine munitions, which have accounted for at least 89 percent of all chemical attacks throughout the war, are clearly derived from conventional “barrel” or “lob” bombs. Both are employed by the same Syrian military formations via the same delivery systems.

It is clear that the Syrian military has consistently prioritized striking population centers over rebel positions on the frontlines, even in the face of defeat on the ground. Indeed, the Syrian regime’s persistent and widespread use of chemical weapons is best understood as part of its overall war strategy of collective punishment of populations in opposition-held areas. Chemical weapons are an integral component of its arsenal of indiscriminate violence, alongside sieges and high-explosive weapons such as “barrel bombs.”

We show that the Assad regime did not merely “get away” with its use of these banned weapons, but succeeded in using them for strategic ends. More than two-thirds of Syria’s population are internally or externally displaced, and opposition-held communities have been buckling and surrendering under the cumulative weight – and eventually the mere threat – of violence, including the use of chemical weapons.

Putting a stop to the Syrian regime’s strategy of chemical weapons use will require halting its overall machinery of indiscriminate violence. In order to effectively disrupt the Syrian chemical weapons complex and deter their future use in Syria and other conflicts, the United States and the wider international community should directly target the military formations that would be responsible for any future attacks. The Syrian helicopter fleet, which has played a critical role in the delivery of conventional and chemical barrel bombs, should be a primary target.

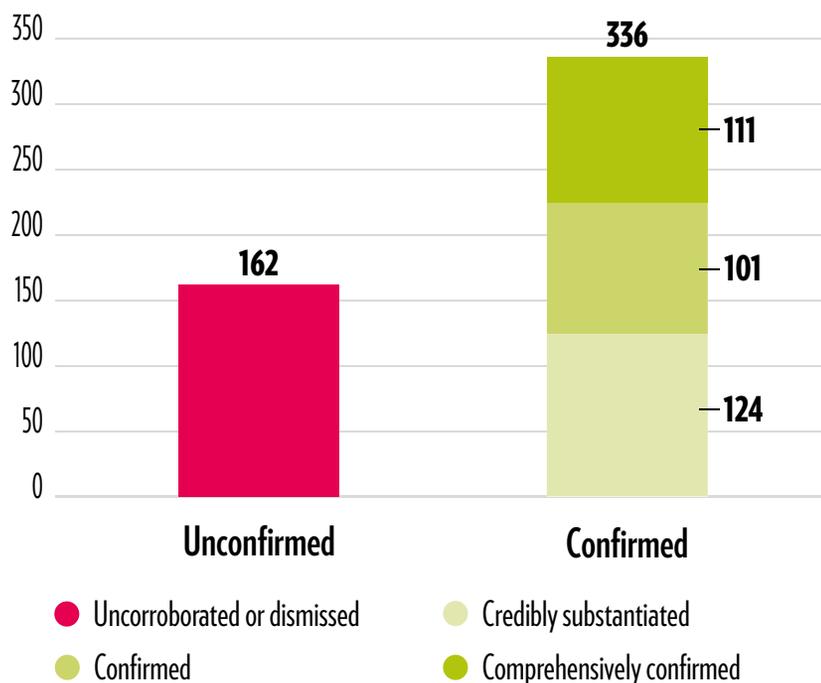
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Methodology

The analysis conducted in this study is based on the most comprehensive dataset of chemical weapons incidents that have occurred over the course of the Syrian civil war compiled to date. In building this dataset, we collected and reviewed 498 discrete reports of chemical weapons use in Syria from a wide range of closed and open sources. The first credible reported incident occurred on 23 December 2012, and the most recent one on 7 April 2018. As of 18 January 2019, we were able to assess 336 incidents as either “credibly substantiated,” “confirmed,” or “comprehensively confirmed.” We dismissed 162 reports.

Figure 1: Reported Incidents of Chemical Weapons Use (2012-2018) by Confidence



Source: Data collected by GPPi

To judge the veracity of each report, we collected and reviewed thousands of pieces of primary and secondary evidence from a wide range of sources: Syrian and international non-governmental organizations, monitoring groups, private firms, local administrative bodies, relevant international bodies, local and international media, and the open source.

We evaluated available sources according to reporting reliability and classified each reported incident according to a four-step scale on the basis of preponderance of the available evidence:

- **Uncorroborated or dismissed:** Reported incidents that either failed to meet the basic threshold of plausibility, were investigated by competent international bodies and subsequently dismissed, or for which no supporting evidence could be collected.
- **Credibly substantiated:** Reported incidents that were backed up by at least one highly reliable source of evidence or two or more independent secondary sources.
- **Confirmed:** Reported incidents that were backed up by at least two highly reliable sources of evidence or three or more independent secondary sources.
- **Comprehensively confirmed:** Reported incidents that were investigated and confirmed by competent international bodies or backed up by at least three highly reliable independent sources of evidence.

For each incident in our dataset, we collected and cross-referenced as much of the following information as possible: time and date; precise location; number and demographic characteristics of the dead and injured; chemical agent; munition type; impact site; delivery method and vehicle; point of origin and flight path; perpetrator; and important supplemental information, such as specific military context and witness statements.

We are grateful to our friends and partners at Syrian Archive, the Syrian American Medical Society, Mayday Rescue and the White Helmets, the Syrian Network for Human Rights, the Violations Documentation Center, Human Rights Watch, Hala Systems, and many others who have supported this study and forthcoming efforts. We hope that by making our data and analysis available to our partners and the wider public, we can support accountability initiatives and enable better research into the role that indiscriminate mass violence has played in the Syrian civil war. For a full list of the reported incidents that formed the basis of this analysis, please refer to the annex.

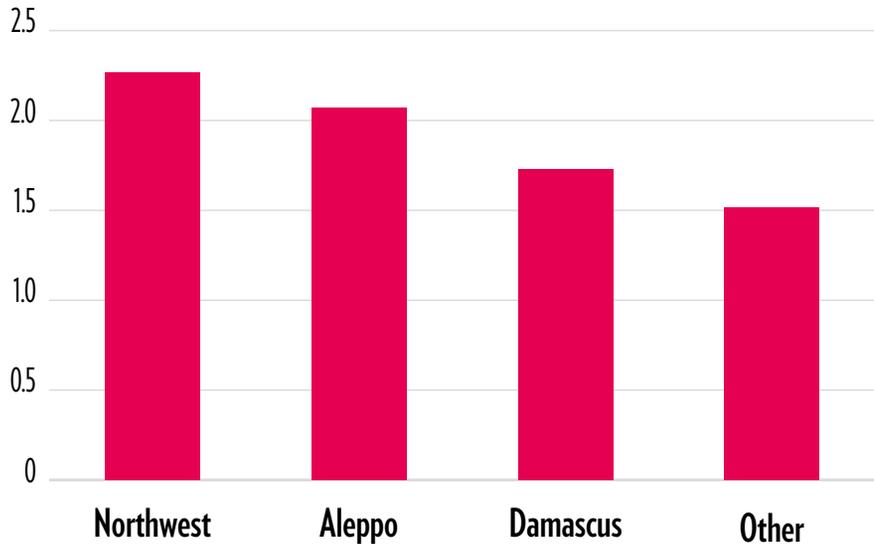
Limitations on Data Collection

Although our dataset presents an unprecedented count of incidents, we suspect that the real number may still be significantly higher.

Reporting was especially haphazard and inconsistent in the first years of the war, prior to the devastating chemical attacks of August 2013. Medical staff in Syria's opposition-held areas lacked experience and specialized training in identifying and responding to chemical attacks. The situation slowly and steadily improved over time and through international assistance. Between 2012 and 2017, the average "confidence score" in our database steadily climbed from 1.7 to 2.1. Meanwhile, the intervention of

competent international bodies and the rise of open source investigations provided an international standard for verification and spurred local and international groups to professionalize their evidence collection and preservation efforts.

Figure 2: Average of Confidence for Incidents by Region



Source: Data collected by GPPi

Nonetheless, accurate collection of evidence in an active war zone, particularly with local partners operating in the most difficult situations, remains extremely challenging. Accordingly, average confidence scores differ significantly from region to region, with the highest scores for reported attacks across the Northwest and Aleppo, where local civil society and aid organizations operate comparatively freely and evidence can easily be transported across the border to Turkey.

Qualitative Dimension

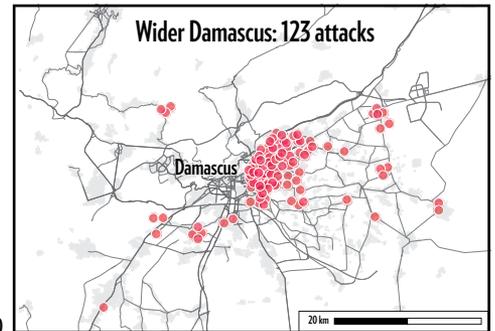
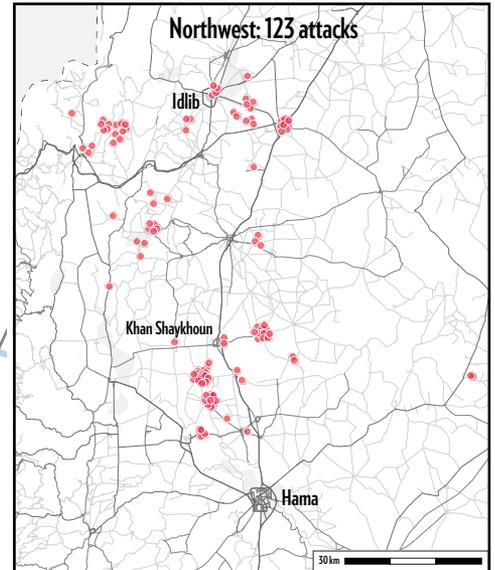
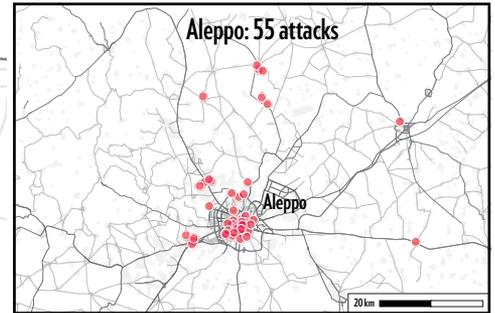
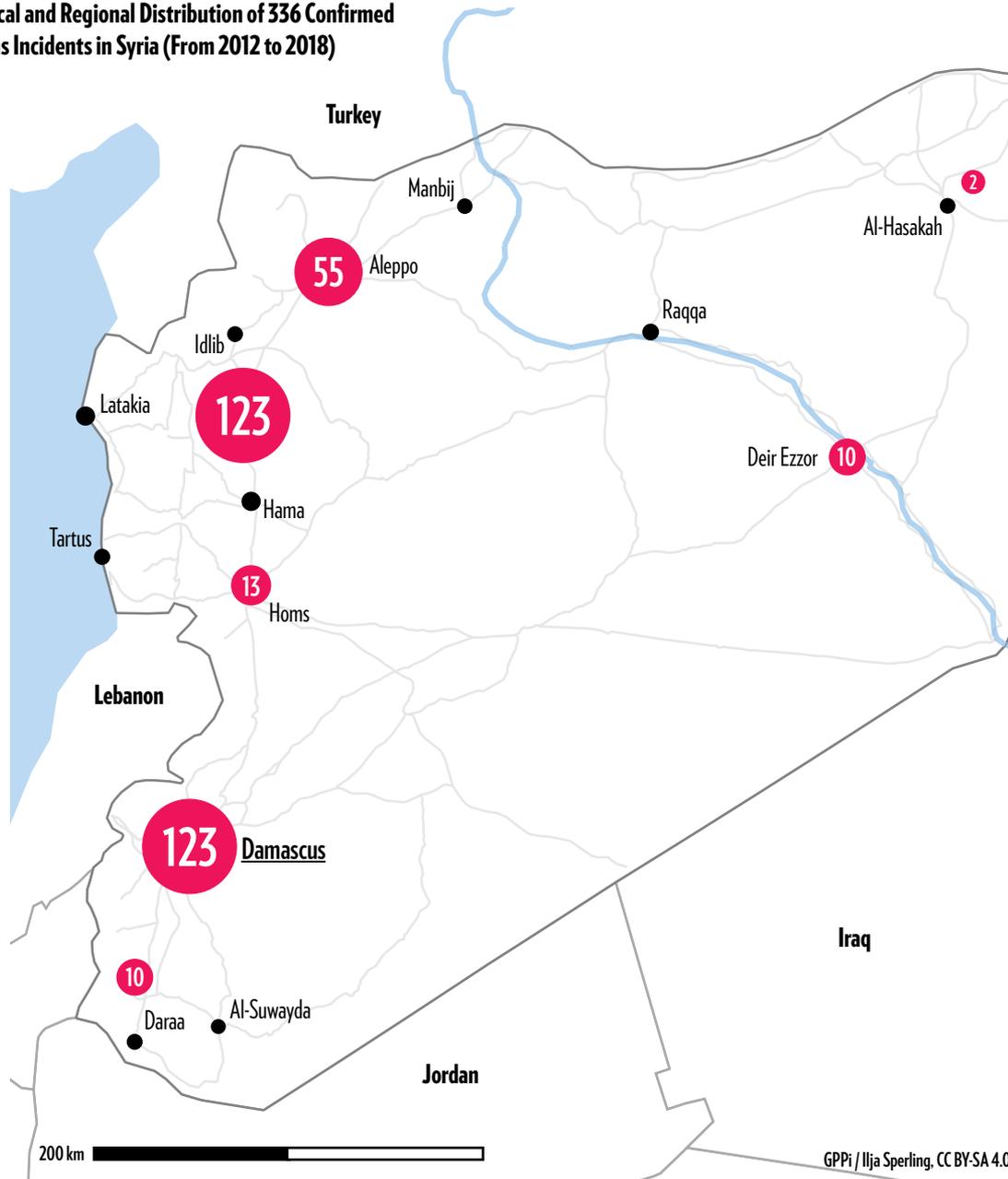
Finally, we colored in our dataset with the help of extensive qualitative research. In addition to extensive witness testimony provided through partner organizations, we conducted dozens of original interviews with affected civilians, reporters, civil society members, medical workers, political representatives and members of rebel groups. In doing so, we sought to better understand the specific effects of chemical weapons use on a wide variety of actors in opposition-held areas.

Timeline of Syria Chemical Weapons Diplomacy

-
- 15 Mar 2011** ● The Syrian Revolution breaks out.
 - 20 Aug 2012** ● US President Barack Obama declares a “red line” regarding the use of chemical weapons in Syria.
 - 23 Dec 2012** ● The first use of chemical weapons is recorded in Khalidiya, Homs.
 - 21 Aug 2013** ● Eastern Ghouta and Moadamiya outside of Damascus are attacked with Sarin.
 - 9 Sep 2013** ● Obama announces the postponement of air strikes and renews focus on diplomatic solutions. Five days later, US Secretary of State John Kerry and Russian Foreign Minister Sergei Lavrov agree on the removal and destruction of Syria’s chemical weapons arsenal. The deal averts the US air strikes.
 - 27 Sep 2013** ● UN Security Council (UNSC) Resolution 2118 passes unanimously, calling for the disarmament of Syria by mid-2014.
 - 14 Oct 2013** ● Syria officially accedes to the Chemical Weapons Convention (CWC).
 - 29 Apr 2014** ● Following allegations of a series of chlorine attacks in Hama, the director general of the Organisation for the Prohibition of Chemical Weapons (OPCW) announces the creation of a fact-finding mission to investigate the use of chlorine in Syria.

- 
- 18 Aug 2014** ● All declared stockpiles of Syrian chemical weapons materials are destroyed offshore.
 - 7 Aug 2015** ● UN Security Council Resolution 2235 passes unanimously, calling for the establishment of a Joint Investigative Mechanism (JIM).
 - 6 Jan 2016** ● The OPCW officially confirms the disarmament of Syria.
 - 4 Apr 2017** ● *Khan Shaykhoun, Idlib is attacked with Sarin.*
 - 7 Apr 2017** ● In reaction to the attack in Khan Shaykhoun, the US launches a missile strike against a government-held airbase.
 - 17 Nov 2017** ● Due to a veto by Russia, the UNSC does not renew the mandate of the JIM. It expires by midnight.
 - 7 Apr 2018** ● *Douma outside of Damascus is attacked with chlorine.*
 - 14 Apr 2018** ● In reaction to the attack on Douma, the US, the UK, and France launch missile strikes against government sites.

Map 1: Geographical and Regional Distribution of 336 Confirmed Chemical Weapons Incidents in Syria (From 2012 to 2018)



Source: Data collected by GPPi

Map vector data derived from: © OpenStreetMap contributors and Natural Earth (Public Domain)

The Full Picture: The Assad Regime's Reliance on Chlorine as a Weapon

In an attempt to develop the most comprehensive understanding of how the Syrian government has employed chemical weapons, this study will put special emphasis on its most widespread manifestation: improvised chlorine bombs, delivered from helicopters or rocket launchers. Over the course of the war, chlorine attacks accounted for 91.5 percent of all confirmed chemical weapons attacks attributable to the Assad regime (which is responsible for 98 percent of all recorded attacks over the course of the war), including the fateful 7 April 2018 attack on Douma.

Figure 4: Share of Confirmed Incidents by Perpetrator

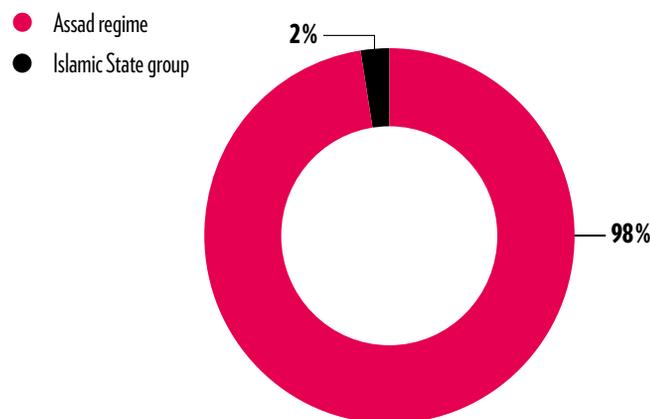
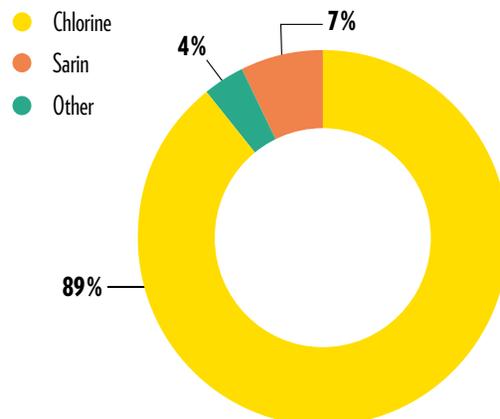


Figure 5: Shares of Identified Chemical Agents



Source: Data collected by GPPi

From the perspective of the Syrian regime, chlorine as an agent has a number of advantages: As a non-controlled substance with legitimate and important civilian applications (e.g., in water purification), chlorine is easy and cheap to procure in significant quantities. Syria's industrialized infrastructure makes it easy for chlorine to be stored, handled and eventually weaponized without specialized knowledge or equipment.³ Chlorine weaponization could therefore easily continue (and expand) even as the Assad regime surrendered most of its formal chemical weapons to the international community in the aftermath of the 21 August 2013 Sarin attacks on

Ghouta. As a so-called choking agent, chlorine gas is far less lethal than other chemical weapons employed by the Syrian government over the course of the war, such as the nerve agent Sarin, reducing the risk that attacks involving chlorine could make international headlines.

Still, chlorine gas turns into hydrochloric acid if inhaled, damaging the victim's respiratory system.⁴ In extreme cases, victims drown from fluid build-up in their lungs. Medical workers and first responders in opposition-held areas may have counted only 188 direct fatalities as a consequence of chlorine exposure, but have treated over 5,000 who have been injured by the gas, putting a heavy strain on already overworked local health services. Further, many of the symptoms of chlorine intoxication are non-specific to chemical weapons, leading to instances of panic where the misdiagnosis of "conventional" victims with breathing difficulties trigger cascading emergency protocols that can disrupt emergency responses and frighten the wider community.

Indeed, not all effects of chlorine and other chemical weapons are physical in nature: Heavier than air, chlorine sinks into trenches, bunkers and basements where residents are sheltering from the conventional fighting. Silent and invisible, chemical attacks spread terror among defenseless civilians. Research among survivors of the Iran-Iraq War shows that victims of chemical weapons attacks and their families are significantly more likely to suffer from lifetime post-traumatic stress disorder (PTSD).⁵

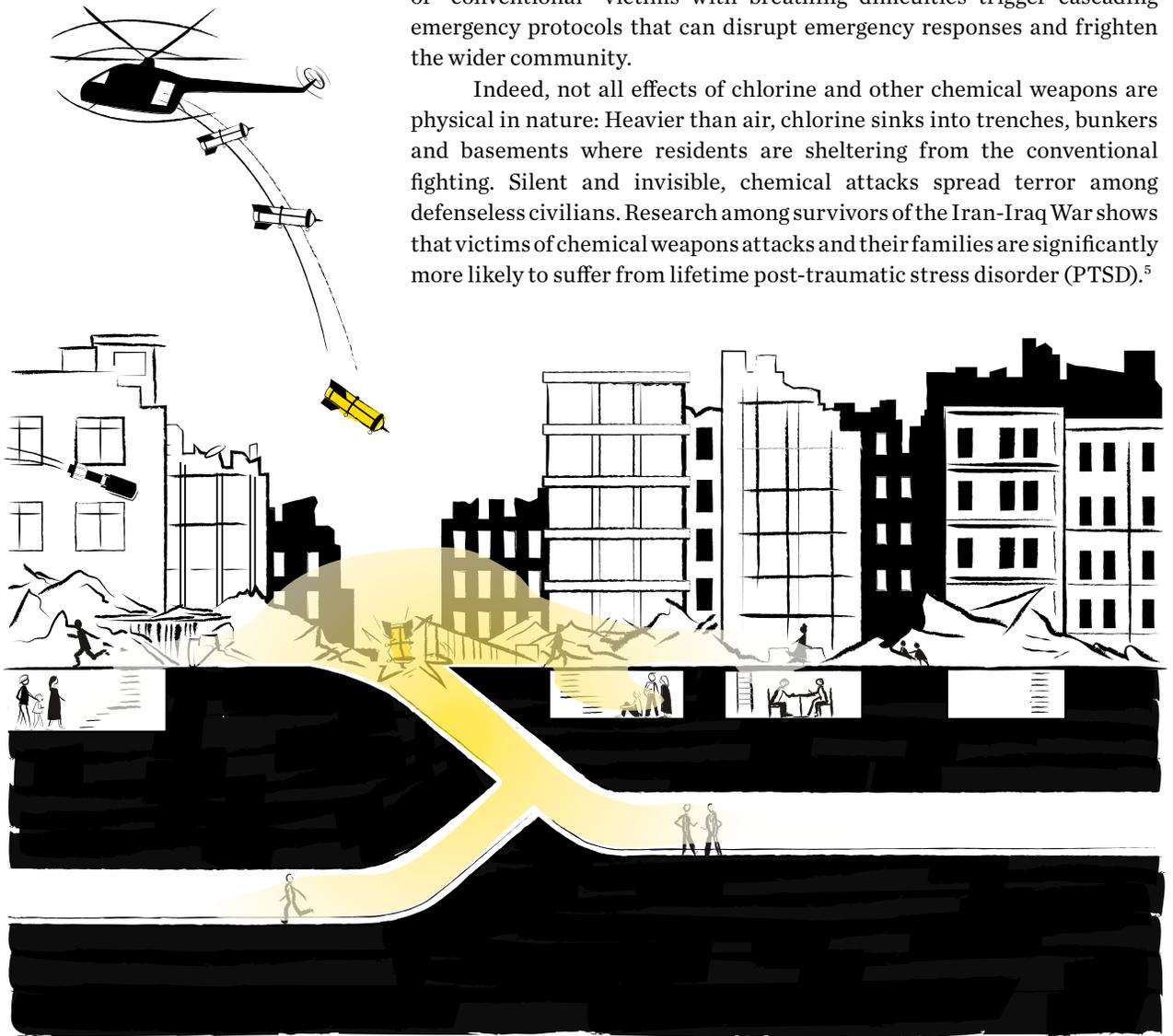
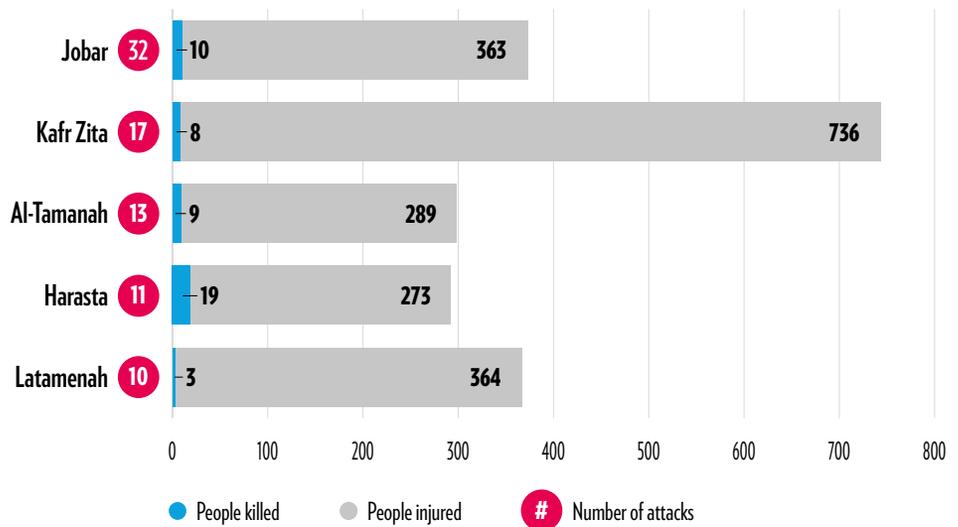


Illustration 1: Heavier than air, chlorine sinks into trenches, basements and shelters.

Despite its low lethality, chlorine can still have a significant direct and psychological impact, especially if used intensely among smaller populations in strategic areas. And indeed, as our data shows, the five towns most heavily hit with chemical weapons over the course of the war together account for 25 percent of all attacks. All are known as opposition strongholds.

Figure 6: Five Most Heavily Hit Towns by Number of Confirmed Incidents



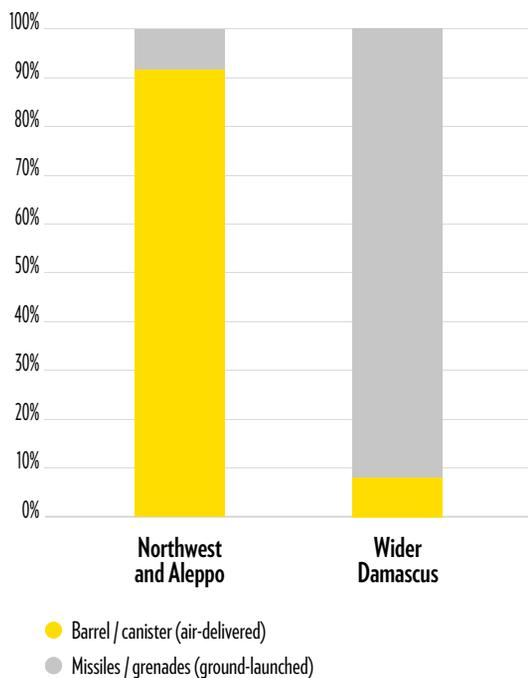
Source: Data collected by GPPi

In the following sections, we will describe in greater detail some of the patterns and characteristics associated with the Syrian regime’s chemical weapons use. Our research makes it especially clear how the regime’s chemical weapons complex – from munitions design to operations to targeting patterns – is thoroughly intertwined with its conventional campaign of indiscriminate violence against populations in opposition-held areas. We will offer our explanation for the strategic rationale underpinning these campaigns as well as their real political effects on the ground in a final chapter.

Improvised and Imprecise: Chlorine Munition Designs

The first material pieces of evidence recovered from most attack sites are remnants of chemical munitions. Whether spent or intact, they tell us a lot about the Syrian regime’s chemical weapons program. In addition to the forensic information gleaned from chemical analysis, we can match specific munition builds to delivery methods

Figure 7: Share of Munition Types Employed Across Regions



Source: Data collected by GPPi

and locales over time and thus deduce information about which military units were likely responsible for a particular chemical attack. On a more analytical level, the development and slow standardization of design choices help us understand the origins, evolution and some structural characteristics of the Syrian chemical weapons program. For example, a simple geographic breakdown of munitions types employed in different theaters of war suggests a clear divide between Syrian forces leading the chemical campaigns in the Northwest and Aleppo region, where air-delivered “barrel-bomb” type designs account for 92 percent of all attacks, and the Damascus theater, where ground-launched missiles and mortar grenades account for almost precisely the same overwhelming share.

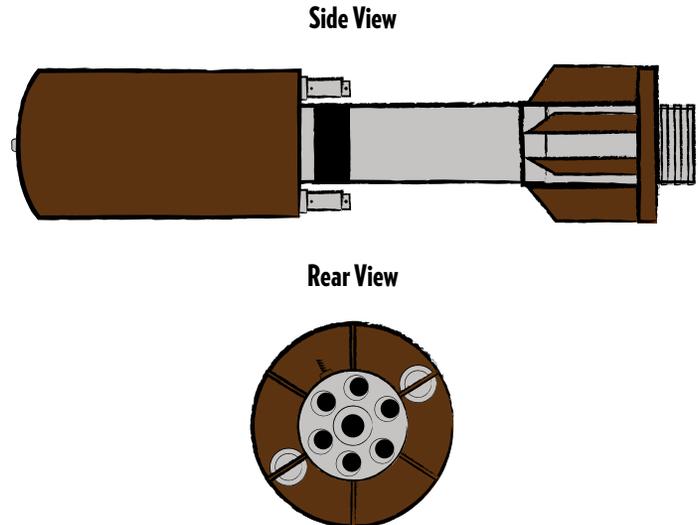
This type of analysis is especially fruitful in Syria, where almost all chemical weapons attacks were executed using domestically produced improvised munitions designs. Out of 336 recorded incidents, only three are known to have involved Soviet-era munitions specifically designed for chemical warfare.⁶ In fact, government forces even relied on “home-made” munitions for the delivery of notoriously dangerous nerve agents. For example, in the 21 August 2013 Sarin attacks outside Damascus, they fired salvos of so-called Elephant Rockets. We know these improvised rocket-assisted munitions (IRAMs) are part of the government arsenal because we have seen the same design, both in its conventional and chemical configurations, employed by regime forces multiple times before and after the

attacks. In 2017, foreign reporters even visited a refitted steel factory outside Latakia where these munitions were being manufactured.⁷

Similarly, according to weapons experts at Armament Research Services (ARES)⁸, the origins of the most common build of chlorine IRAMs – which were in regular use around Damascus since at least January 2017 and up until the final Eastern Ghouta offensive a year later – can be traced back to conventional IRAMs used by Hezbollah and Iranian-linked groups in Iraq in the mid-2000s. In producing these munitions, loyalists were clearly able to draw on their own extensive design and

production experience as well as that of their Iranian-backed allies. The model's high-explosive version, used extensively by Hezbollah in Syria, and its chemical variety share both minor and major design features, including "twin well" fuses at the bottom of the specifically fabricated payload container.

Illustration 2: Standard Ground-Launched Chlorine Muniton Design (2017-2018)



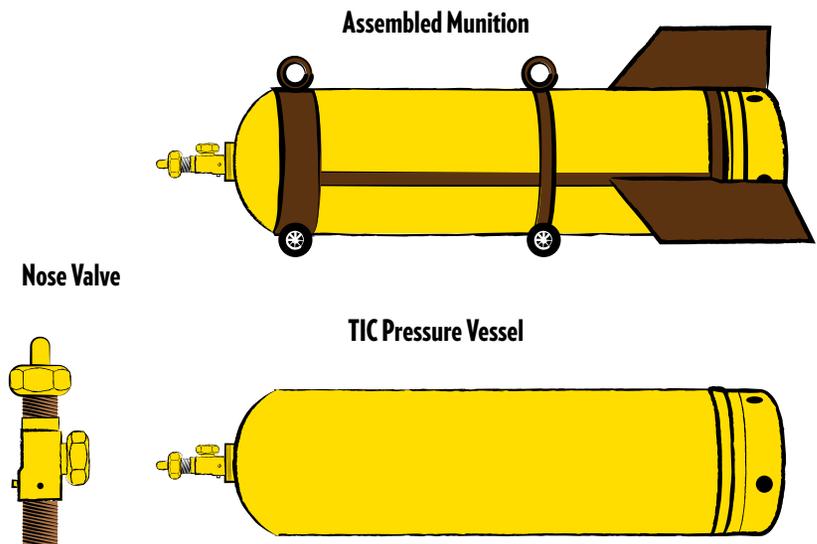
Adapted from: Armament Research Services (ARES), 2018

Fired in salvos of three to 10 rockets from dedicated launchers, ARES experts judge these designs as "particularly inaccurate and imprecise," given their poor aerodynamic profile and crude assembly. They estimate a maximum range of no more than two kilometers for the conventional variety and likely less for chlorine payloads. Because these munitions are imprecise and short-ranged, regime fighters were careful and prioritized their use against hardened rebel trenches and tunnels that insurgents had dug along frontlines in and around Damascus. A commander from Faylaq Al-Rahman, one of the major rebel groups in the region, described how regime forces avoided firing at open positions "where [government] forces were close to [rebels]" for fear that the wind would carry the gas back into loyalist trenches.⁹ Such precautions, however, would not save regime troops from regularly encountering chlorine "in the tunnels" of Jobar and Ein Tarma.

In the case of improvised air-delivered chlorine munitions, Syrian regime forces went through multiple phases of development. The available evidence suggests that chlorine barrel bombs are delivered almost exclusively via the Syrian Arab Air Force (SyAAF) fleet of Mi-8/17 transport helicopters. Again, we can see the influence of designs for conventional improvised munitions used by the same units from the same platforms. The initial attempts at developing air-delivered chlorine munitions in the spring of 2014 very clearly drew upon conventional "barrel bomb" designs used by government forces since August 2012¹⁰: instead of high explosives and shrapnel, industrial gas vessels were lodged inside metal drums, occasionally wrapped with detonation charges to ensure rupture and the dispersion of the gas. Eventually, regime

engineers developed a simpler, more functional munition design by using a welded steel “cradle” to convert a single, usually yellow, standard industrial chlorine canister into a crude but functional munition. The complete contraption features stabilizing tail fins, two “eyes” for easier loading and transportation, and two small sets of wheels that make it easier for the munition to roll off – two at a time – a ramp installed in the back of Mi-8/17 “Hip” helicopters. No explosives are needed, as the high-pressure canister – or its valve – are expected to rupture on impact. This design appears to have superseded all previous chlorine barrel bomb variants and has been in exclusive use since late 2016. Remnants of this type have since been recovered from dozens of sites across Aleppo, Idlib, Hama, and rural Damascus, including the site of the 7 April 2018 Douma attack.

Illustration 3: Standard Air-Delivered Chlorine “Barrel Bomb” Design (2016-2018)

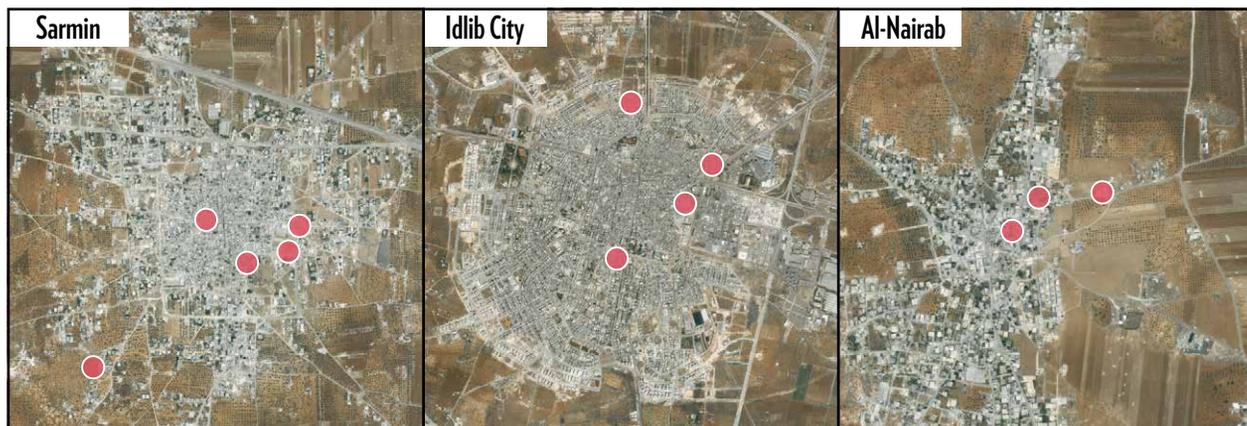


Adapted from: Armament Research Services (ARES), 2018

Despite the inclusion of tail fins, it would prove nearly impossible to accurately aim such munitions. Even if it were possible to consistently hit the intended targets with accuracy, the chemical payload would nonetheless disperse in indiscriminate fashion. According to expert assessment from ARES, each air-delivered chlorine munition has a usable volume of 50-60 liters, enough for around 71 kilograms of liquefied chlorine – roughly 22 cubic meters of pure chlorine gas or up to 27,500 cubic meters dispersed in air at lethal concentration of 800 parts per million. Theoretically, this is enough to douse an area of 120 by 120 meters at ground level – an entire housing block.

Moreover, the introduction of man-portable air-defense systems (MANPADS) into rebel arsenals after 2013¹¹ induced regime pilots to overfly rebel airspace at increasingly higher altitudes. Regime pilots usually flew at least 3,000 meters overhead, further complicating the task of purely visual targeting (from such heights, munitions drop for 30 seconds). A brief OPCW review of munition impact sites in various heavily targeted towns in Northwest Syria revealed no discernable patterns in targeting and suggests they were the result of city-level targeting.¹²

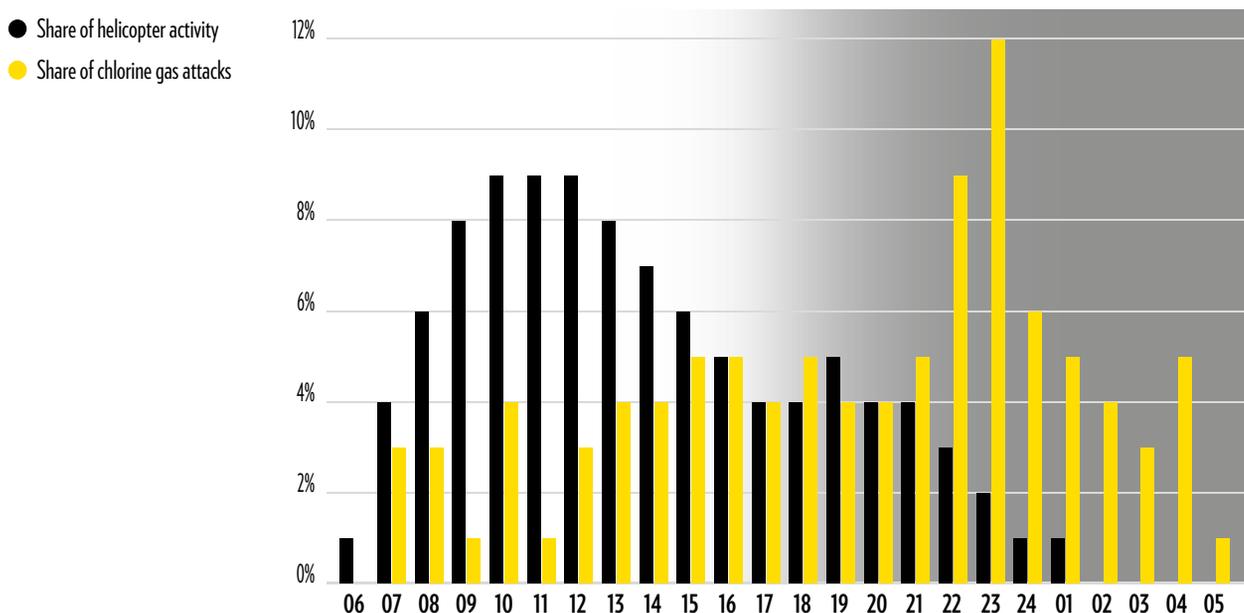
Image 1: Apparently Random Distribution of Chlorine Impact Sites in Select Locations



Sources: Satellite imagery derived from Esri ArcGIS Online, World Imagery; © DigitalGlobe, Esri, HERE, Garmin

In the rare instances where SyAAF crews successfully hit “high-value targets” (such as the 25 March 2017 attack against an underground hospital in Latamenah¹³), the attack usually took place during daylight hours. However, our data shows that two-thirds of time-recorded incidents occurred in the dark, i.e., after nightfall and before daybreak, on the tail end of daily helicopter operational patterns across Syria, which mostly adhere to daylight hours (only 24 percent of flight activity takes places after dark)¹⁴. Indeed, while they impede targeting, late nights and early mornings are generally considered ideal for the deployment of chemical weapons because accompanying inverted atmospheric conditions favor the dispersion of gas.¹⁵

Figure 8: Registered Helicopter Activity and Chemical Weapons Incidents by Time of Day



The Operational Backbone

Overlaying flight data for helicopters, loyalist military operations and our aforementioned munitions typology, we can make sophisticated deductions about the operational workings of the chlorine barrel bombing campaign and identify operational nexuses.¹⁶ This task is greatly aided by material attrition of the Syrian Arab Air Force. Based on open source information and analysis of satellite imagery, experts from IHS Janes suggest that, as of July 2018, only 10-15 of the 51 Mi-8/17 helicopters on the SyAAF books remain operational.¹⁷ Excluding those aircraft dedicated to supplying encircled loyalist communities in far-flung corners of the country, we can easily track the small number of Mi-8/17 apparently detailed to barrel bombing campaigns. Matching their

deployment history to ground operations, we come across Syrian military formations most closely associated with conventional and chemical barrel bombings – most notably the so-called Tiger Forces.

Often described as an “elite” formation of the Syrian military, the Tiger Forces and their commander Brigadier General Suheil Al-Hassan (of the notorious Air Force Intelligence Directorate, AID) are commonly “credited” with pioneering the systematic use of barrel bombs in the campaigns in Aleppo and Hama (2013–2014)¹⁸. Following a conclusive OPCW investigation into chlorine incidents in Sarmin, Qamenas and Talmenes in 2014 and 2015, more than 40 UN member states have pointed the finger at Hassan and his AID associates for coordinating the first chlorine barrel bombing campaigns.¹⁹ Since then, mass-produced explosive and chemical barrels have followed wherever the Tiger and his men have gone.

For example, following their successful campaign against the Islamic State in central Syria in the summer of 2017, the Tiger Forces redeployed in September to northern Hama in anticipation of a Russian-led offensive against the rebel-held Northwest pocket. Flight tracking data collected via a sophisticated civilian early warning system shows

associated Mi-8/17 activity shift from Tiyas airbase (used as a hub against IS) toward Hama airbase as well as eventually to the so-called Vehicle School, a small forward operating base established the same year 20 kilometers northeast of Hama city, which during December 2017 – following the entry of the Tigers into the offensive²⁰ – accounted for 61 percent of all Mi-8/17 departures in Syria. It is from here that, on 4 February 2018 at 9:02 PM, a regime helicopter with the call sign “Alpha 253” departed to drop two yellow canister chlorine bombs on the eastern outskirts of the rebel-held town of Saraqeb.²¹

Image 2: SAA Fighter About to Roll a Barrel Bomb Out of a Helicopter



Source: Image via Bellingcat

Syrian Helicopter Deployments and Select Chlorine Attacks (2017-2018)

Image 3: Remnant of a Yellow Chlorine Canister From the 4 February 2018 Saraqeb Attack

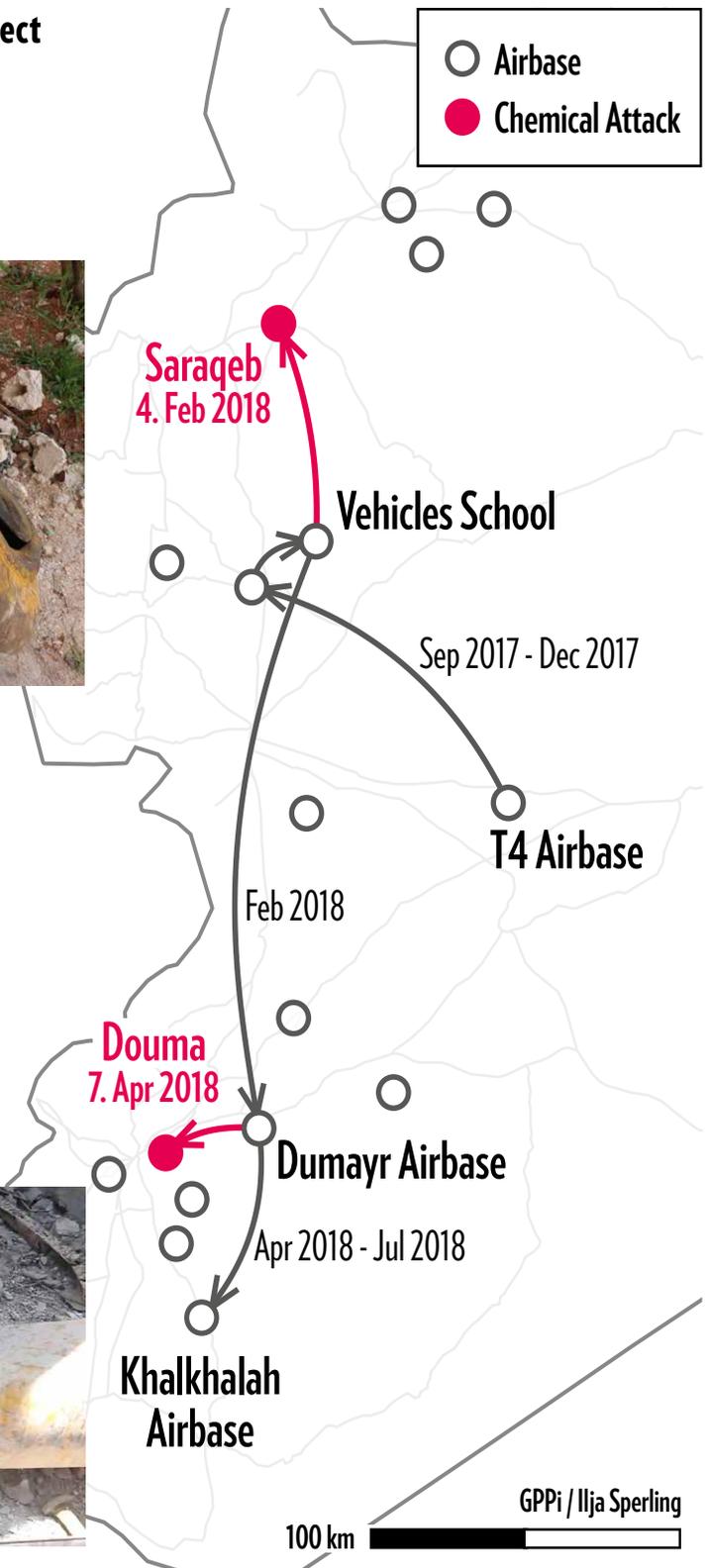


Source: Image via SNHR

Image 4: Remnant of a Yellow Chlorine Canister From the 7 April 2018 Douma Attack

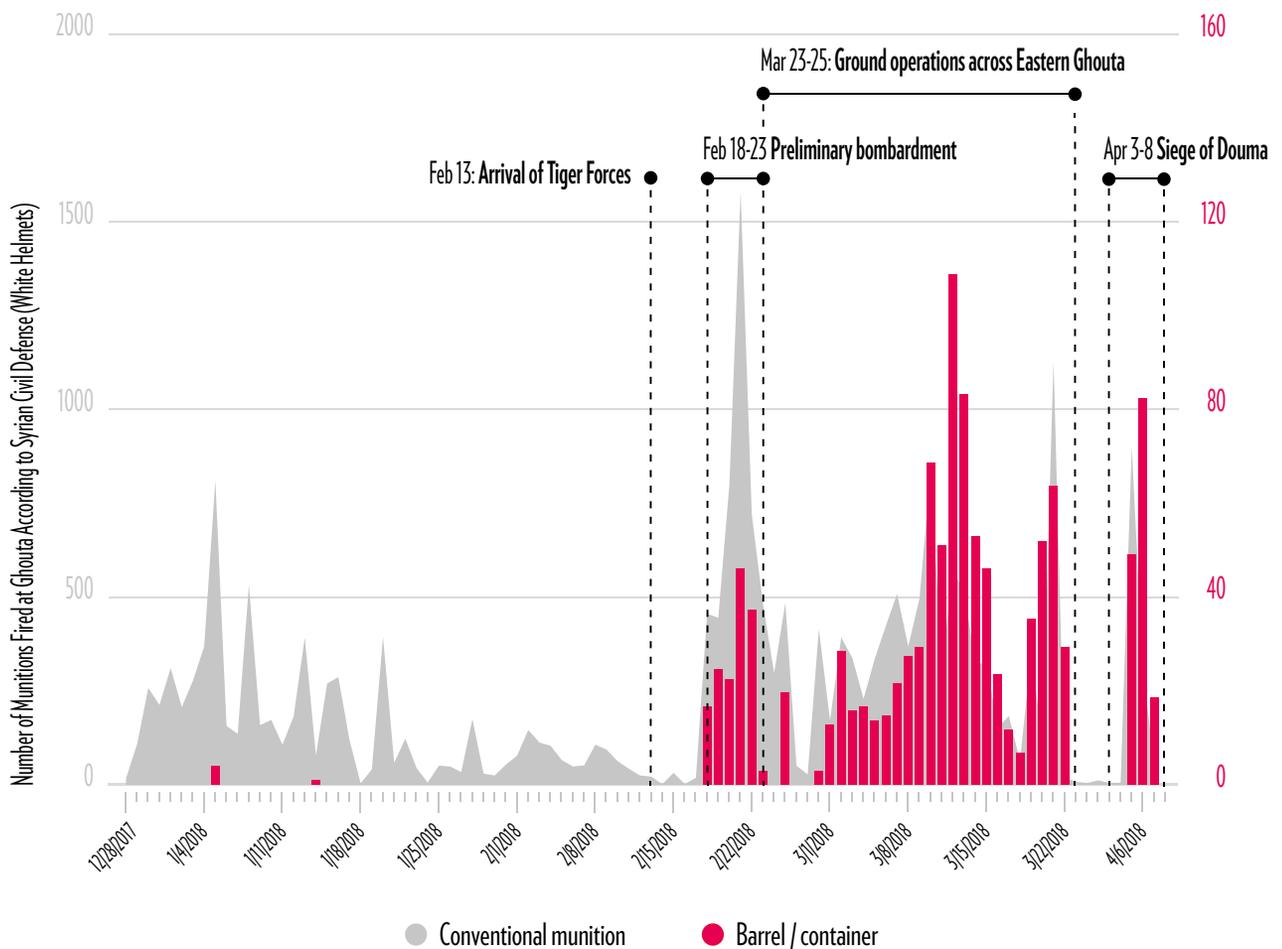


Source: Snapshot of a video by the White Helmets



Just about a week later, on 13 February, the Syrian military announced the redeployment of the Tigers to the Damascus countryside in support of a final campaign to crush the rebel-held pocket in Eastern Ghouta.²² Again, we can observe the corresponding shift in activity in the air and on the ground. Beginning on 18 February, Mi-8/17s flying out of the Dumayr airbase delivered waves of explosive and sometimes chemical barrel bombs throughout the rebel pocket. Local survivors reported that they were stunned and unable to cope with the unprecedented²³ number of indiscriminate munitions²⁴ (the Tigers had not previously operated in the area). Sector-specific data collected by first responders even allow us to trace the campaign's incremental advance through the pocket, day after day, town to town, until the final push against Douma, where the indiscriminate bombardment culminated in the two notorious chlorine attacks of 7 April, launched from Dumayr and involving two yellow canister chlorine bombs of the same configuration that was recovered from Saraqeb.²⁵

Figure 9: Tiger Forces Come to Damascus: Barrel Bombs in the Ghouta Campaign (2017-2018)

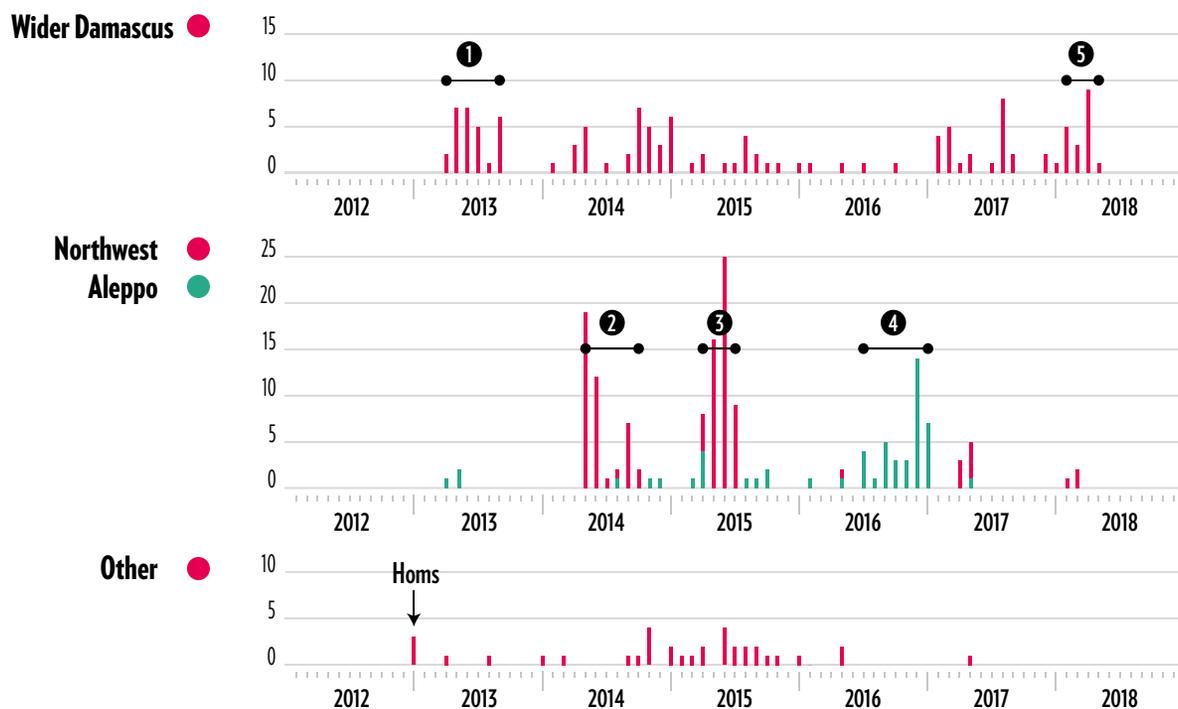


Source: Mayday Rescue and media reporting

Chlorine Use in Military Campaigns: Idlib 2015

As the example of the Tiger Forces suggests, we are clearly able to associate significant waves of chemical weapons use with major Syrian government military operations throughout the war. Reviewing our data, spikes in chemical weapons incidents clearly correspond to some of the pivotal battles of the past six years: from their first use in the Siege of Homs in late 2012 to the surrender of Douma in 2018. We can observe the first major spike of chlorine use as government forces were struggling to repulse a rebel offensive in Hama in the spring of 2014. Subsequently, we are able to distinguish significant peaks for the rebel Idlib Offensive of 2015, the Battle of Aleppo in 2016, and the Eastern Ghouta campaign of 2018. Not visible in the charts but noticeable in the data are individual attacks in support of minor regime operations, such as the regime's defense of Deir Ezzor in 2015 and its capture of Beit Jinn in 2016.

Figure 10: Confirmed Incidents of Chemical Weapons Use Over Time (by Region)



Source: Data collected by GPPi

- ① Damascus Offensive
- ③ Idlib Offensive
- ⑤ Eastern Ghouta Campaign
- ② Hama Offensive
- ④ Battle of Aleppo

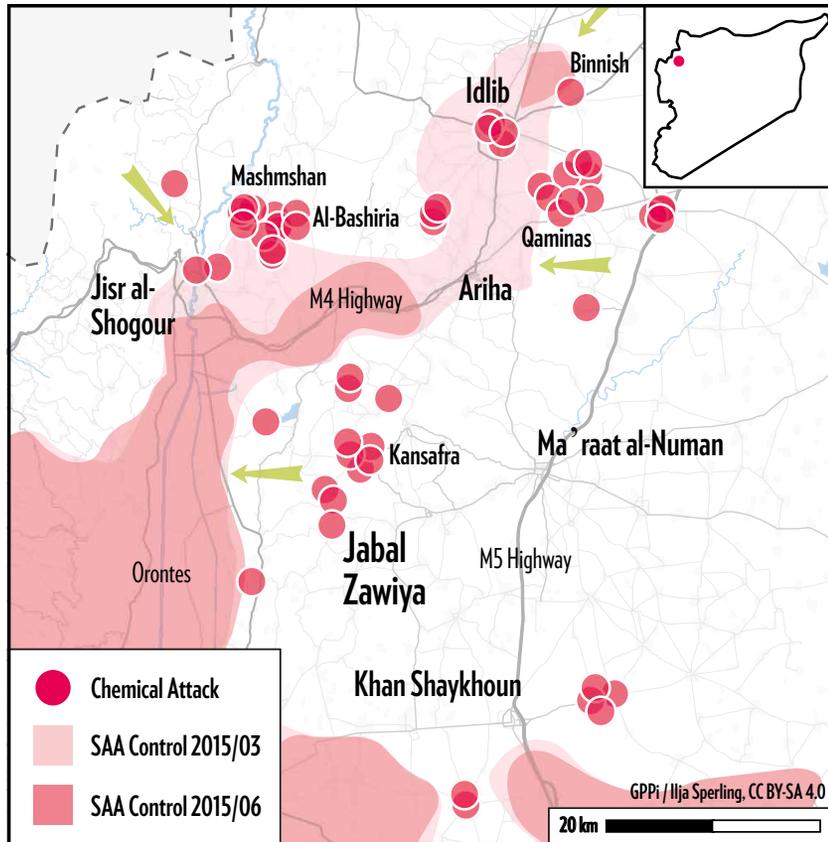
Apparently, Syrian government forces find chemical weapons, and in particular improvised munitions carrying chlorine gas, a useful complement to their conventional arsenal during ground operations. Even though their lack of precision made them all but useless for the purpose of close air support to loyalist ground forces, throughout the war the regime dedicated valuable helicopter capacities to chlorine bombings of

opposition settlements, regardless of the circumstances.

Nowhere was that dedication to chlorine bombing and the willingness to bear opportunity costs more visible than in the regime's fighting retreat during the 2015 rebel offensive in Idlib governorate.

In late March 2015, the "Army of Conquest" – a newly formed rebel coalition bringing together hard-line Islamists and moderate Free Syrian Army (FSA) factions²⁶ – had been riding from victory to victory. It had captured the provincial capital of Idlib after only four days of fighting before launching a three-pronged attack against the extended salient of loyalist positions along the strategic M4 highways connecting Aleppo and Latakia via Jisr Al-Shoghour. The battle turned into a rout, as loyalist lines repeatedly collapsed, eventually forcing Syrian regime forces to all but abandon the province. In response, these same units – many affiliated

Map 3: Use of Chemical Weapons Against 2015 Rebel Offensive in Idlib (March-June)¹



Source: Data collected by GPPi

with the "Tiger Forces"²⁷ – embarked on a major campaign of chlorine attacks against perceived rebel strongholds throughout Idlib province.

The incident data reveals a startling disconnect between immediate military need and the actual allocation of air strikes. Finding itself on the defensive all throughout the province and facing a major defeat, the regime chose to dedicate its Mi-8/17 fleet not to the defense of its collapsing frontlines but to a campaign of collective punishment against civilian populations in the surrounding opposition-held areas. Of the 58 chlorine attacks attributable to Syrian government forces in the context of the Idlib offensive

1 Map vector data for all case study maps was derived from © OpenStreetMap contributors and Natural Earth (Public Domain). Frontline vector data (territorial control lines) derived from Wikipedia Commons contributions by users Alhanuty, MrPenguin20 and Rr016 under the CC BY-SA 4.0 license.

between March and June of 2015, only three targeted areas that were in dispute, while the majority fell on rebel-held towns sometimes far behind the frontlines. The remote mountain settlements of the Jabal Zawiya region suffered at least 11 chlorine attacks. At no point during the offensive were villages such as Kansafra (struck four times in six weeks) under threat of falling to the regime. On average, Assad’s helicopters struck population centers two to three settlements removed from the actual fighting lines – towns with no immediate military value, unlikely to be captured by loyalist forces, and too far removed to participate in any direct fire on retreating regime militias.

Figure 11: Number of Chlorine Attacks on Settlements by Distance to Frontline

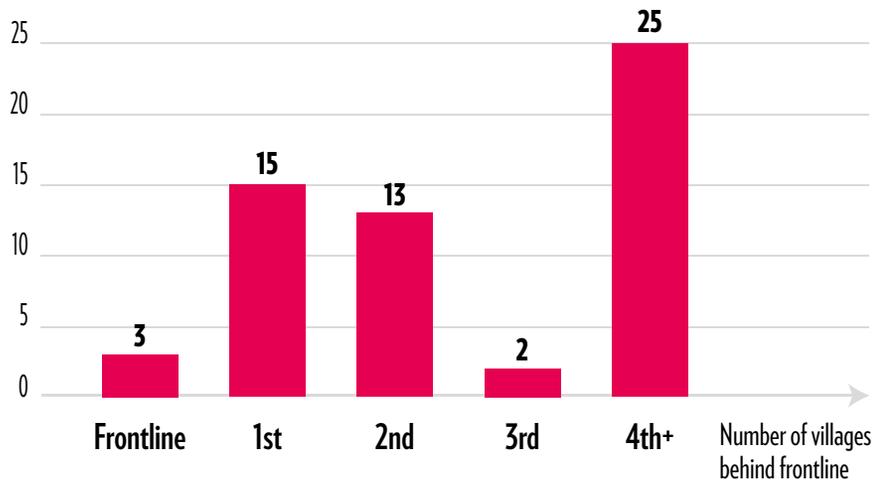
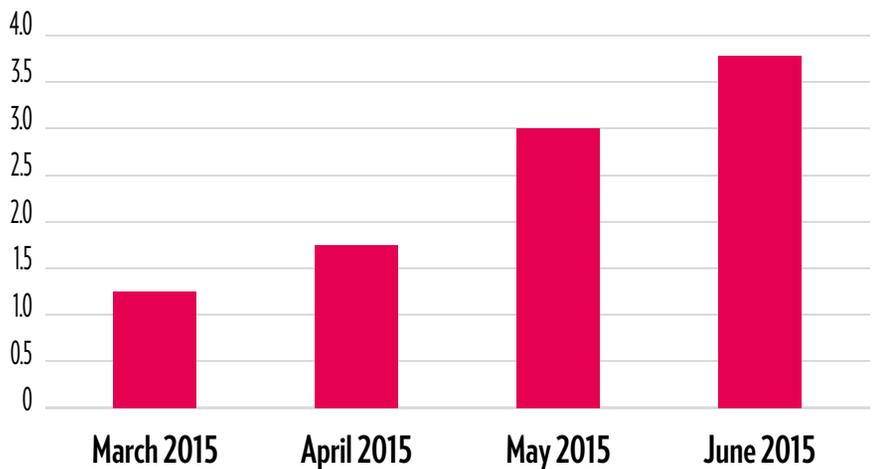


Figure 12: Average Distance of Attacked Settlements to Frontline During 2015 Idlib Offensive



Source: Data collected by GPPi

Such was the case during the Siege of Jisr Al-Shoghour: the strategic industrial and trading city fell to rebel forces in late April 2015, making it the second major urban area after Idlib city to be captured during the offensive. While regime forces had been pushed south into the Ghab plain, up to 150 loyalist fighters remained trapped in the National Hospital complex outside the city for another month.²⁸ At this point of desperation, instead of concentrating its fire on the besieging rebels, regime helicopters once again struck far behind the frontline: the villages of Mashmshan and Al-Bashiria to the northeast of Jisr Al-Shoghour – that is, five and six settlements removed from the front lines – were struck with chlorine three and four times, respectively.

The focus on rebel strongholds over fighting positions became clear as frontlines shifted while chlorine targeting continued. Early on, chlorine attacks appeared to still be hitting towns close to the frontlines. In late March, helicopters had targeted the towns of Qaminas and Binnish, rebel strongholds and immediate staging grounds²⁹ for the assault on neighboring Idlib city. But as the frontlines shifted westward, chlorine attacks lingered on. From March to June, by which time government forces had been almost evicted from the province, the average distance of attacked settlement to frontline had grown from 1.25 to 3.8.

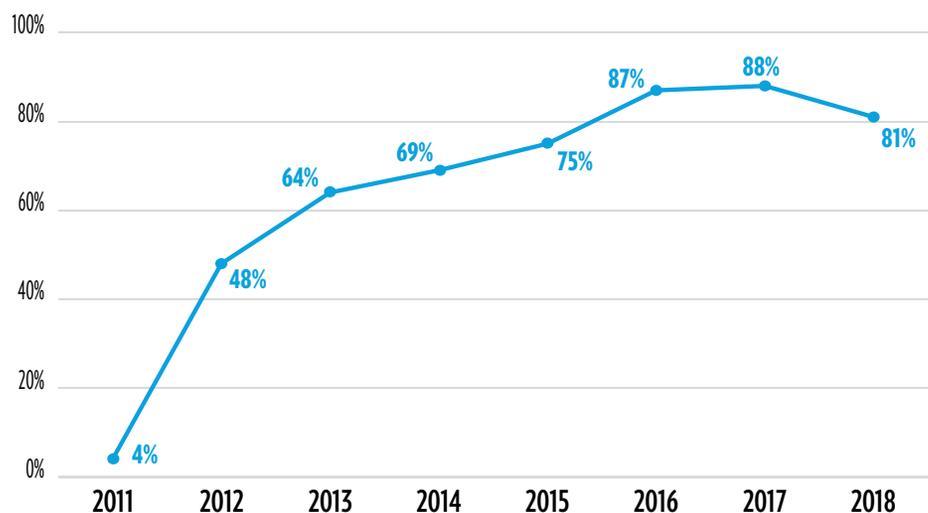
The Damascus School of Counterinsurgency

While the Assad regime’s approach of indiscriminate targeting of opposition strongholds with chlorine had little immediate effect on the day-to-day movements of frontlines, it made perfect sense in the context of the regime’s overall military strategy.

Short on manpower and resources, and resting on a precarious foundation of sectarianism and rentierism, the regime and its backers pursued a military strategy of collective punishment against populations supporting or hosting insurgents. Unlike “hearts and minds” doctrines favored by contemporary western democracies, this approach to counterinsurgency – sometimes referred to as “draining the sea”³⁰ – does not seek to win over oppositionist populations through compromise or provision of services, but instead aims to inflict such unbearable pain that locals are forced to either withdraw their support from insurgent groups or flee areas outside regime control, thereby undermining rebel governance and facilitating government population control through aid provision.³¹

In 2012, the Assad regime began escalating its military strategy of indiscriminate violence against those parts of the country that had over the previous year shaken off regime authority.³² Beginning in March, the Syrian Arab Air Force began flying first sporadic, then regular bombing missions against densely populated cities, such as Homs³³. In August, barrel bombs made their first appearance in Aleppo province³⁴. The first recorded chemical weapons attack attributable to the Syrian government happened later that year, again in Homs.

Figure 13: Share of Civilian Casualties due to Indiscriminate Violence Over Time

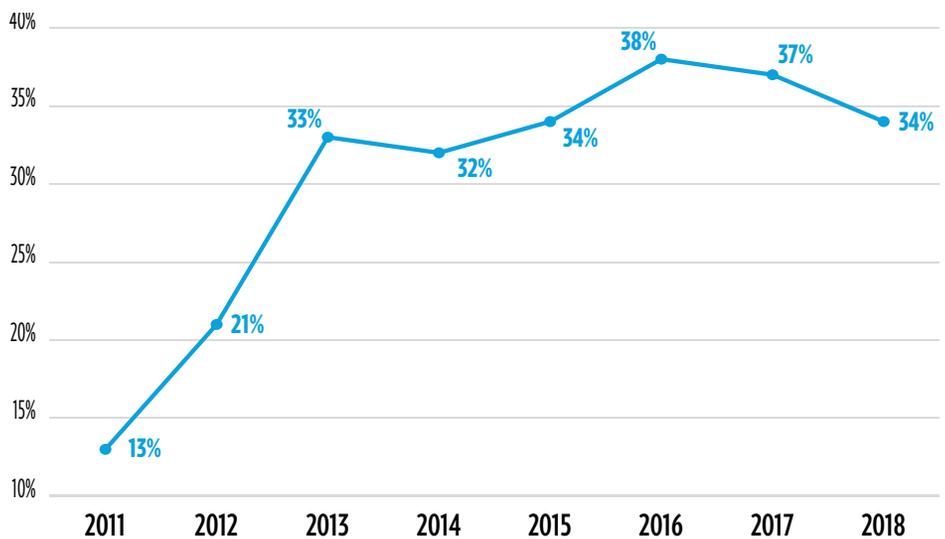


Source: Violations Documentation Center

According to data collected and verified by the Violations Documentation Center in Syria (VDC), 92 percent of victims of indiscriminate modes of violence – bombing, gassing, sieges – were civilians. In line with the operational patterns described earlier, conventional and chemical attacks went hand in hand. For example, one Syrian refugee who made it to Jordan recounted to Handicap International how, during a major chemical attack on the neighboring village, residents who “saw rockets” hid in their basements “in fear of the walls collapsing on them” – only to suffocate from the heavy gas.³⁵ In multiple instances, such as Khan Shaykhoun in 2017, Syrian government and Russian jets bombed hospitals just after they had received victims of chemical attacks.

Thus, despite the frontlines hardening over time, the civilian death toll continued to climb: the share of civilian casualties due to indiscriminate violence jumped from 4 percent in 2011 to 48 percent in 2012, peaking eventually at a stunning 88 percent in 2017. Women and children were especially vulnerable to bombing of residential areas. Their share among civilian deaths almost tripled from 13 percent in 2011 to a peak 38 percent in 2016.³⁶

Figure 14: Share of Women and Children Among Civilian Victims Over Time

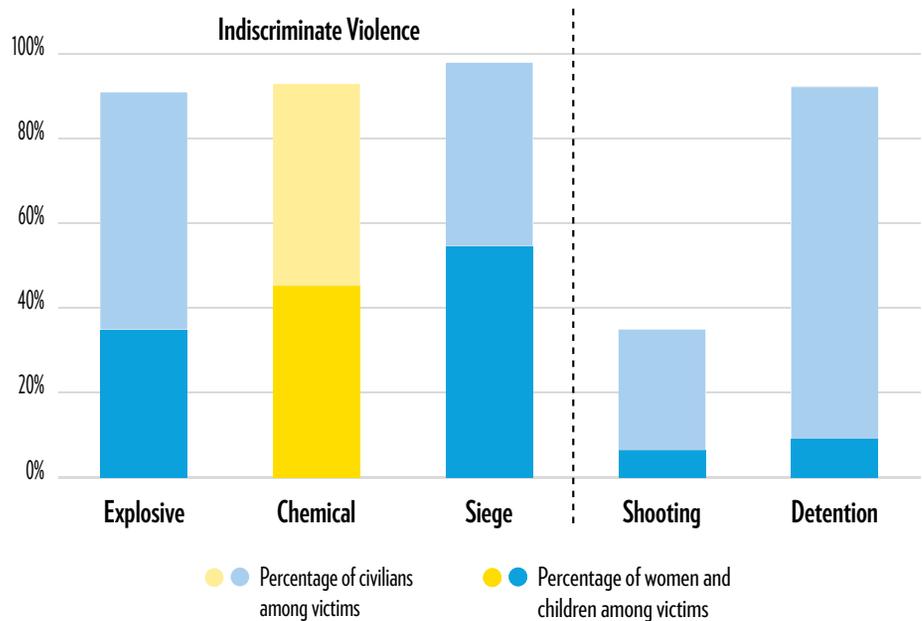


Source: Violations Documentation Center

Under such violent conditions, peaceful civilian life in areas outside the control of Syrian regime forces became all but impossible. In April 2012, a year after the outbreak of the uprising but prior to the escalation in indiscriminate shelling, the United Nations High Commissioner for Refugees (UNHCR) estimated that 65,000 Syrians had fled to neighboring countries.³⁷ Eight months later, that number would grow almost ten-fold to more than 500,000.³⁸

Displacement patterns trace not only the movement of front lines, but also the intensity of violence.³⁹ Overwhelmingly, people fled from areas that were outside government control but within reach of its air force or long-range artillery. According

Figure 15: Percentage of Women and Children Among Victims by Type of Violence



Source: Violations Documentation Center

to the UN Office for the Coordination of Humanitarian Affairs (OCHA), indiscriminate violence against populated areas was the primary driver for Syrian flight⁴⁰. At the time of writing, an estimated half to two-thirds of Syria’s pre-war population have been internally or externally displaced.

Thus, even as the Syrian government continued to lose ground to rebel forces on the frontlines, it was succeeding at the political goal of separating insurgents and civilian populations. This is why, even at its lowest point during the Idlib Offensive of 2015, it continued to prioritize the collective punishment of civilian populations over close air support to its own troops. It pursued not primarily the control of territory but the creation of a comparative stability or safety advantage for areas loyal to the government. Compared to the violence, destruction and governance vacuum of rebel-held Syria, the government of Bashar Al-Assad appeared stable and dependable. Importantly, the Assad regime also succeeded in linking the indiscriminate violence suffered by civilians in opposition-held areas with the presence of armed rebels: a representative survey of attitudes among refugees in Turkey showed that Syrians who had directly lost their homes due barrel bomb strikes were significantly less likely to support opposition forces. Instead, they disproportionately chose to renounce all armed actors altogether. These effects were especially pronounced among women – anchors of civilian life whose withdrawal of support can have outsized effects on insurgent resolve.⁴¹

In our interviews, rebel commanders agreed that it was not their inability to hold off regime ground offensives, but their failure to protect civilians from violence that broke their backs. Damascus was further able to translate the cumulative attritional

effects of the strategy into political currency. A second survey showed that Syrian refugees who came from neighborhoods that had experienced violence and loss were, depending on how the question was framed, up to twice as willing (71 percent) to accept a compromise settlement with the Syrian regime than those from areas left untouched (35 percent). The closer the violence, the more likely an individual was to support reconciliation.⁴²

Image 5: Syrian Arab Air Force (SyAAF) Mi-8/17 Helicopter Dropping a Barrel Bomb



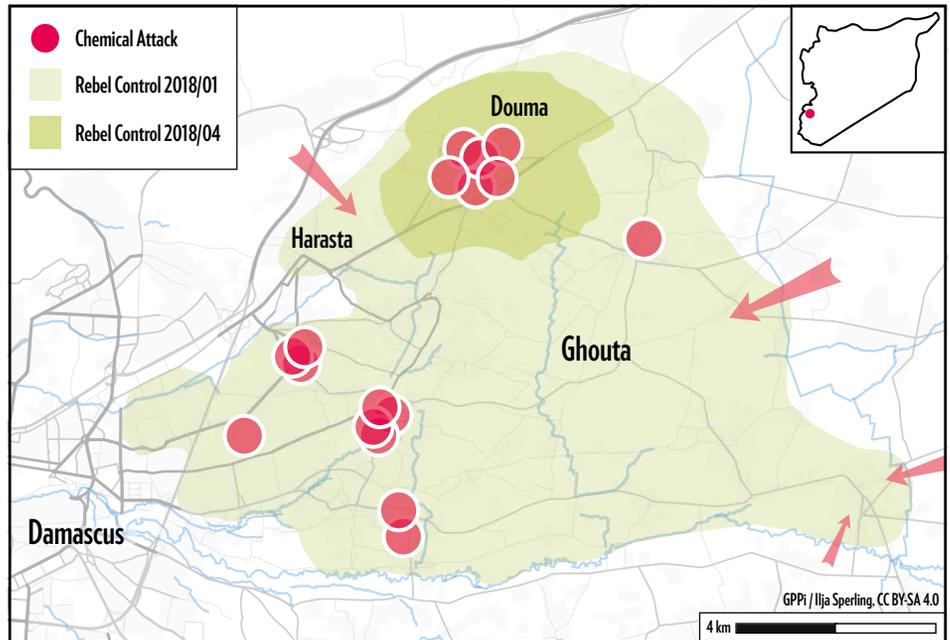
Source: Screenshots of video by Qasioun News Agency (via Syria Notes)

Breaking the Will to Resist: Douma 2018

As the war progressed and the Syrian government went on the offensive in Aleppo, Damascus, Homs, and Daraa, residents of opposition-held areas – left all but emaciated by years of violence and siege⁴³ – prioritized immediate relief from suffering over political demands. In January 2018, after the failure of Russian-sponsored political negotiations, Assad and his allies prepared to bring down rebel-held Eastern Ghouta, just outside Damascus. Home to hundreds of thousands of residents and internally displaced civilians, the pocket had remained a symbol of unbending resistance to the Assad regime within hearing distance to its seat of power.⁴⁴ Over the following three months, the regime and its Russian allies pursued a devastating three-track strategy

of intense indiscriminate violence, ground offensives, and parallel negotiations for so-called “reconciliation agreements” – surrender deals in all but name. In rapid succession, settlement after settlement across Eastern Ghouta surrendered under the cumulative weight of years of siege and the overwhelming disproportionate and indiscriminate violence of the offensive.⁴⁵

Map 4: Use of Chemical Weapons During the 2018 Campaign Against Rebel-Held Eastern Ghouta



Source: Data collected by GPPi

In the city of Douma, an early opposition stronghold, local rebel groups were preparing a last stand, hoping to hold out as long as possible to force a favorable deal with their Russian interlocutors through military prowess on the frontlines. But it was the fate of civilians that in the end would force their hands. As towns along the periphery of Eastern Ghouta fell to government forces, growing numbers of civilians moved deeper into Douma, putting additional strain on limited resources. Food and water were scarce. Medical centers were overworked.⁴⁶ For shelter, most residents crowded into basements, which were not designed for hosting people for prolonged periods of times, thus leading to the spread of disease.⁴⁷

Again, the psychological factor played a key role in pushing civilians to exert pressure on armed groups to surrender. While chemical weapons accounted for an extremely small share of all munitions launched at Eastern Ghouta (local first responders counted more than 23,000 projectiles compared to 19 chlorine attacks), survivors of the siege reported almost unanimously that fear and rumors of imminent gas attacks were prevalent among civilians, many of whom retained the trauma of the devastating Sarin attacks on the area in August 2013. One activist from Douma recounted how residents would talk morbidly about the prospect of dying from shelling

or gas: “[Civilians] used to say that death by chemical weapons [was] a merciful death” because it would at least leave the body whole. Another activist called it “death without blood” – depicting entire families suffocating silently in their sleep.

Image 6: Children Being Treated in a Hospital Following a Chemical Weapons Attack



Source: Image via Damascus Media Center

The government’s strategy, according to a civil society member and another activist from Douma, was “to target civilians to put pressure on military groups” to leave the area. The approach worked: civilians directed their frustration at the rebel groups. Residents risked their lives, staging demonstrations in the city during the brief interludes between shelling, demanding a negotiated settlement. With every attack, these calls grew louder.

On 7 April 2018, a final devastating chemical attack struck the city of Douma, killing at least 43 and injuring hundreds. One Douma resident and member of the negotiation committee that worked via foreign governments in Istanbul described how in the immediate aftermath of the attack, he and other opposition representatives had felt renewed pressure to surrender “due to the fear of another attack and the absence of any international deterrent.” A member of Faylaq Al-Rahman concluded in a resigned voice how, after years of fighting on the frontlines, “the use of chemical weapons has settled the equation in favor of the regime.” Another activist observed that the Assad regime’s apparent freedom to use chemical weapons had led locals to the collective realization that “nothing and no one will protect civilians from the violence and brutality of the regime,” leaving surrender or death as the only realistic outcomes.

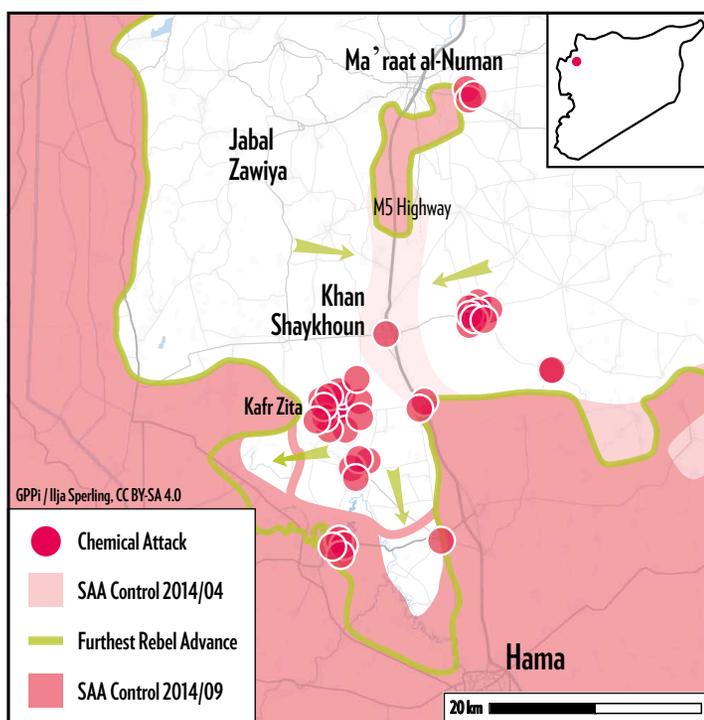
The following day, the city surrendered under a Russian-mediated “reconciliation” agreement that, according to the Russian military, led to the departure of 21,145 militants and civilians from Eastern Ghouta’s largest city for rebel-held northern Syria. The civilians were forced to “choose between bad and worse,” as a local activist described it. Overall, 67,680 individuals across the pocket chose to depart rather than reconcile with the government. Twice that number were sent to IDP camps operated by the regime.

Conclusion

The Inflection Point: Kafr Zita 2014

In April 2014, rebel forces in northern Hama, an early hotspot of armed anti-regime mobilization, launched an offensive attempting to cut and capture positions along the strategic M5 highway, a key transportation artery connecting Damascus and Aleppo, threatening to all but cut the country in half. In its response to the rebel offensive a mere

Map 5: Use of Chemical Weapons During 2014 Hama Offensive



Source: Data collected by GPPi

eight months after the fateful “red line” incident of August 2013, the Assad regime established a model that would define the regime approach to chemical weapons for the next four years: the systematic, widespread, indiscriminate use of chlorine against opposition-held towns.

Over the course of three months, Syrian government helicopters launched at least 43 chlorine attacks against a string of villages along the highway. As previously, they targeted opposition strongholds such as the small town Kafr Zita in northern Hama instead of military positions. Despite not having encountered chemical weapons in the past, civilians quickly grasped the punitive nature of the attacks: “Every time the FSA progresses on the outskirts of Hama city, the regime retaliates by bombing our city with poison gases,” reported one local resident.⁴⁸

The Joint Investigative Mechanism’s final report paints a devastating picture of what unfolded in the following months: locals told investigators that, “because of the frequency of attacks,” they “had lost their sense of the dates and times of the various incidents.” With the help of medical records, the mission concluded that this small rural town and its immediate environs had been struck at least 17 times, usually at night.⁴⁹

The Joint Investigative Mechanism’s final report paints a devastating picture of what unfolded in the following months: locals told investigators that, “because of

Alternative Pathways

Meanwhile, the international community avoided action. Local and foreign reporters had filed unequivocal dispatches, including dozens of photos that showed the remnants of improvised chlorine munitions. Within three weeks of the first attack, *The Telegraph*

had gone so far as to take soil samples from the area, submit them for professional testing, and publish its findings about the presence of chlorine as well as ammonia.⁵⁰

The lackluster response from the international community, which referred the attacks to international investigative bodies rather than taking decisive action⁵¹, not only further undermined the supposed prohibition against the use of chemical weapons, but confirmed to the Assad regime that the “red line” articulated by US President Obama

Image 7: Remnants of Chlorine Barrel Bombs Used in 2014 Kafr Zita Attacks



Source: Photo by Daniele Raineri, 2014

had been an exit rather than an entry ramp for the United States in the Syrian conflict. In singling out “chemical weapons,” the American president had tried to limit US exposure to another Middle Eastern war, but had failed to appreciate that for the regime in Damascus, this was a distinction without a difference. Chemical weapons represented just another addition to its arsenal of indiscriminate violence, like shelling or sieges, which would eventually assure the regime’s survival in power in an existential war. A red line it was thus bound to challenge.

Indeed, as our analysis shows, the Assad regime’s use of chemical weapons and its wider war effort are inextricably – tactically, operationally and strategically – linked. In order to effectively deter and prevent future use of unconventional weapons, the international

community would have to pursue policies that disrupt the regime’s conventional machinery of population warfare as well.

In the Hama offensive of 2014, the international community had the opportunity to do just that and shape the war at its most decisive stage. A single salvo against the regime’s helicopter fleet or improvised munitions factories would have delivered a meaningful blow against the Assad regime’s chemical weapons complex as well as its entire machinery of indiscriminate violence. This point should be taken especially seriously by European governments concerned about refugee flows and ungoverned spaces. Early disruption of the regime’s war effort could have limited one of the principal drivers of civilian flight and governance failure.

Chemical weapons were not the only, nor even the principal, vector of mass violence in this campaign; however, it represented a legitimate lynchpin around which it would have been possible to build international consensus for serious action short of regime-change. The subsequent experience of retributive strikes following the chemical attacks of Khan Shaykhoun in 2017 and Douma in 2018, in a much more contentious regional environment, showed that the threat of escalation could have easily been contained.

In each case, the United States and its allies succeeded at reestablishing deterrence (there have been no new Sarin attacks since 2017 and no new chlorine attacks since 2018) without getting drawn into a wider confrontation with Damascus. At the same time, our analysis shows that the regime’s strategy of indiscriminate violence had little direct effect on the movements of frontlines. Its disruption could have prevented – or slowed – regime victory without leading to the regime’s immediate collapse.

Recommendations

- The **United States, the United Kingdom and France**, as well as other countries willing to uphold the “red line” over chemical weapons use, should maintain their current, publicly stated position that any use of chemical weapons by the Assad regime, including chlorine, will trigger an immediate military response.

In the meantime, **national intelligence agencies** should continue to monitor the Syrian regime’s formal chemical weapons program as well as units and materiel associated with use of chlorine. Additionally, they should continue to collect information on and analyze past incidents to shorten the response time in future crisis situations and minimize the risk of intelligence missteps.

- In case of another incident, **policymakers and military planners** should prioritize targeting facilities and materiel directly connected to the attack. In the case of improvised chlorine attacks, targeting bottlenecks such as production facilities and helicopters would prove most effective at disrupting the Syrian regime’s ability to deliver chemical weapons while disrupting its wider ability to make war on opposition-held areas.

Planners may wish to stop short of hitting units or officers responsible to minimize the risk of inadvertently killing Russian military advisors known to be embedded with Syrian units such as the Tiger Forces. In such cases, the **United States** should follow the procedures established during previous strikes and provide sufficient advance warning to Russian forces in Syria to separate them from potential hard targets.

- **Western governments** should continue to support civilian efforts at mitigation, including through the provision of funding and specialized training to first responders and medical personnel on the ground such as the White Helmets, as well as early warning systems, such as Syria Sentry/Hala Systems.
- **European governments** in particular must reckon with the secondary effects of campaigns of indiscriminate mass violence or population warfare on regional stability and refugee flows. In future cases, they might consider taking early or preemptive action even with the limited goal of mitigating rather than resolving conflict.
- The **international community** should continue to support efforts, through multilateral bodies as well as civil society, to bring about accountability for those responsible for war crimes and crimes against humanity in the Syrian conflict.

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Annex: List of Confirmed Incidents (2012-2018)

As of 23 January 2019, we assessed 336 incidents as either “credibly substantiated,” “confirmed,” or “comprehensively confirmed.” We dismissed 162 reports.

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
2	23/12/2012	Bayada	Homs	Other	Assad regime
1	23/12/2012	Al-Khalidiya	Homs	Other	Assad regime
2	25/12/2012	Zafarana	Homs	Unknown	Assad regime
3	19/03/2013	Khan Alassal	Aleppo	Sarin	Assad regime
1	19/03/2013	Baba Amr	Homs	Unknown	Assad regime
3	19/03/2013	Al-Otaiba	Reef Damascus	Sarin	Assad regime
2	24/03/2013	Adra	Reef Damascus	Other	Assad regime
2	04/04/2013	Jobar	Damascus	Unknown	Assad regime
1	06/04/2013	Jobar	Damascus	Unknown	Assad regime
2	07/04/2013	Jobar	Damascus	Unknown	Assad regime
2	09/04/2013	Al-Otaiba	Reef Damascus	Unknown	Assad regime
3	13/04/2013	Sheikh Maqsood	Aleppo	Sarin	Assad regime
2	14/04/2013	Jobar	Damascus	Sarin	Assad regime
2	17/04/2013	Ein Tarma	Reef Damascus	Unknown	Assad regime
2	25/04/2013	Darayya	Reef Damascus	Sarin	Assad regime
2	27/04/2013	Kweiris	Aleppo	Unknown	Assad regime
3	29/04/2013	Saraqeb	Idlib	Sarin	Assad regime
1	17/05/2013	Adra	Reef Damascus	Unknown	Assad regime
2	23/05/2013	Adra	Reef Damascus	Unknown	Assad regime
2	26/05/2013	Harasta	Reef Damascus	Unknown	Assad regime
1	26/05/2013	Qaboun	Damascus	Unknown	Assad regime
1	26/05/2013	Bahariyah	Reef Damascus	Unknown	Assad regime
1	27/05/2013	Harasta	Reef Damascus	Unknown	Assad regime
2	29/05/2013	Al-Ahamadiya	Reef Damascus	Unknown	Assad regime
2	09/06/2013	Bahariyah	Reef Damascus	Unknown	Assad regime
1	19/06/2013	Zamalka	Reef Damascus	Unknown	Assad regime
2	23/06/2013	Zamalka	Reef Damascus	Unknown	Assad regime
2	24/06/2013	Qaboun	Damascus	Unknown	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
2	27/06/2013	Qaboun	Damascus	Unknown	Assad regime
2	05/07/2013	Al-Khalidya	Homs	Unknown	Assad regime
2	21/07/2013	Al-Yarmouk	Damascus	Unknown	Assad regime
1	05/08/2013	Douma	Reef Damascus	Sarin	Assad regime
1	05/08/2013	Adra	Reef Damascus	Sarin	Assad regime
3	21/08/2013	East Ghouta	Reef Damascus	Sarin	Assad regime
3	21/08/2013	Moadamiya	Reef Damascus	Sarin	Assad regime
2	22/08/2013	Bahariyah	Reef Damascus	Unknown	Assad regime
2	28/08/2013	Jobar	Damascus	Unknown	Assad regime
1	23/12/2013	Al-Khalidya	Homs	Unknown	Assad regime
1	13/01/2014	Darayya	Reef Damascus	Unknown	Assad regime
1	11/02/2014	Muzayrib	Daraa	Unknown	Assad regime
2	02/03/2014	Adra	Reef Damascus	Unknown	Assad regime
1	09/03/2014	Jobar	Damascus	Unknown	Assad regime
1	27/03/2014	Harasta	Reef Damascus	Unknown	Assad regime
2	03/04/2014	Jobar	Damascus	Chlorine	Assad regime
1	04/04/2014	Jobar	Damascus	Chlorine	Assad regime
3	10/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	11/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
2	11/04/2014	Harasta	Reef Damascus	Unknown	Assad regime
3	12/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	12/04/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
2	13/04/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
3	14/04/2014	Atshan	Hama	Chlorine	Assad regime
3	14/04/2014	Halfaya	Hama	Chlorine	Assad regime
3	16/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
1	16/04/2014	Harasta	Reef Damascus	Unknown	Assad regime
3	18/04/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
3	18/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
1	19/04/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	21/04/2014	Talmenes	Idlib	Chlorine	Assad regime
1	22/04/2014	Darayya	Reef Damascus	Chlorine	Assad regime
3	24/04/2014	Talmenes	Idlib	Chlorine	Assad regime
1	26/04/2014	Taybat Al-Iman	Hama	Chlorine	Assad regime
3	28/04/2014	Ibn Warden Qastel	Hama	Chlorine	Assad regime
1	28/04/2014	Latamenah	Hama	Chlorine	Assad regime
3	29/04/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
2	29/04/2014	Talmenes	Idlib	Chlorine	Assad regime
1	30/04/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
2	09/05/2014	Kafr Zita	Hama	Chlorine	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
3	19/05/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	21/05/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	22/05/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	22/05/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
2	22/05/2014	Latamenah	Hama	Chlorine	Assad regime
1	22/05/2014	Atshan	Hama	Chlorine	Assad regime
3	25/05/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
1	25/05/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	26/05/2014	Khan Shaykhoun	Idlib	Chlorine	Assad regime
3	29/05/2014	Latamenah	Hama	Chlorine	Assad regime
1	29/05/2014	Al-Tamanah	Idlib	Chlorine	Assad regime
1	06/06/2014	Irbin	Reef Damascus	Unknown	Assad regime
1	29/06/2014	Kafromeh	Idlib	Chlorine	Assad regime
3	17/07/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	27/07/2014	Kafr Zita	Hama	Chlorine	Assad regime
1	29/07/2014	Old City	Aleppo	Chlorine	Assad regime
2	01/08/2014	Latamenah	Hama	Chlorine	Assad regime
2	19/08/2014	Atman	Daraa	Chlorine	Assad regime
2	20/08/2014	Jobar	Damascus	Chlorine	Assad regime
1	22/08/2014	Irbin	Reef Damascus	Chlorine	Assad regime
1	23/08/2014	Halfaya	Hama	Chlorine	Assad regime
1	24/08/2014	Halfaya	Hama	Chlorine	Assad regime
3	28/08/2014	Kafr Zita	Hama	Chlorine	Assad regime
3	28/08/2014	Al-Sayyad	Hama	Chlorine	Assad regime
2	28/08/2014	Halfaya	Hama	Unknown	Assad regime
3	30/08/2014	Kafr Zita	Hama	Chlorine	Assad regime
1	08/09/2014	Haytet Al-Jarash	Reef Damascus	Chlorine	Assad regime
2	13/09/2014	Morek	Hama	Chlorine	Assad regime
2	13/09/2014	Jobar	Damascus	Chlorine	Assad regime
2	14/09/2014	Haytet Al-Jarash	Reef Damascus	Chlorine	Assad regime
1	15/09/2014	Dukhaniyya	Reef Damascus	Chlorine	Assad regime
1	22/09/2014	Dukhaniyya	Reef Damascus	Chlorine	Assad regime
2	24/09/2014	Adra	Reef Damascus	Chlorine	Assad regime
2	26/09/2014	Morek	Hama	Chlorine	Assad regime
2	26/09/2014	Dukhaniyya	Reef Damascus	Chlorine	Assad regime
2	27/09/2014	Deir Ezzor	Deir Ezzor	Chlorine	Assad regime
2	01/10/2014	Deir Al-Adas	Daraa	Chlorine	Assad regime
1	05/10/2014	Deir Ezzor	Deir Ezzor	Chlorine	Assad regime
2	09/10/2014	Handarat	Aleppo	Chlorine	Assad regime
2	09/10/2014	Inkhil	Daraa	Chlorine	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
3	15/10/2014	Jobar	Damascus	Chlorine	Assad regime
1	15/10/2014	Jobar	Damascus	Chlorine	Assad regime
1	16/10/2014	Jobar	Damascus	Unknown	Assad regime
2	20/10/2014	Harasta	Reef Damascus	Chlorine	Assad regime
1	28/10/2014	Deir Al-Adas	Daraa	Chlorine	Assad regime
1	29/10/2014	Jobar	Damascus	Chlorine	Assad regime
2	04/11/2014	Jobar	Damascus	Chlorine	Assad regime
1	04/11/2014	Jobar	Damascus	Unknown	Assad regime
1	14/11/2014	Khan Al-Shih	Reef Damascus	Chlorine	Assad regime
1	30/11/2014	Al Sabea Bahrat	Aleppo	Unknown	Assad regime
2	06/12/2014	Deir Ezzor	Deir Ezzor	Chlorine	Assad regime
1	07/12/2014	Sheikh Misikin	Daraa	Chlorine	Assad regime
2	12/12/2014	Jobar	Damascus	Chlorine	Assad regime
1	15/12/2014	Jobar	Damascus	Unknown	Assad regime
2	24/12/2014	Harasta	Reef Damascus	Chlorine	Assad regime
1	26/12/2014	Jobar	Damascus	Unknown	Assad regime
1	27/12/2014	Jobar	Damascus	Unknown	Assad regime
1	29/12/2014	Jobar	Damascus	Unknown	Assad regime
3	26/01/2015	Ibtaa	Daraa	Chlorine	Assad regime
1	15/02/2015	Darayya	Reef Damascus	Sarin	Assad regime
2	21/02/2015	Hayan	Aleppo	Unknown	Assad regime
1	23/02/2015	Kafr Nasij	Daraa	Chlorine	Assad regime
2	01/03/2015	Jobar	Damascus	Chlorine	Assad regime
2	09/03/2015	Muzayrib	Daraa	Chlorine	Assad regime
1	10/03/2015	Al Shqeif	Aleppo	Unknown	Assad regime
1	12/03/2015	Al Jbiel	Deir Ezzor	Unknown	Assad regime
2	15/03/2015	Qabr Al-Inglizi	Aleppo	Chlorine	Assad regime
1	15/03/2015	Haritan	Aleppo	Chlorine	Assad regime
1	16/03/2015	Handarat	Aleppo	Unknown	Assad regime
3	16/03/2015	Qaminas	Idlib	Chlorine	Assad regime
3	16/03/2015	Sarmin	Idlib	Chlorine	Assad regime
3	23/03/2015	Sarmin	Idlib	Chlorine	Assad regime
3	24/03/2015	Binnish	Idlib	Chlorine	Assad regime
3	24/03/2015	Qaminas	Idlib	Chlorine	Assad regime
2	25/03/2015	Qadam	Damascus	Chlorine	Assad regime
3	26/03/2015	Sarmin	Idlib	Chlorine	Assad regime
3	30/03/2015	Idlib	Idlib	Chlorine	Assad regime
3	31/03/2015	Idlib	Idlib	Chlorine	Assad regime
1	10/04/2015	Al-Tamanah	Idlib	Unknown	Assad regime
2	10/04/2015	Kafr Zita	Hama	Chlorine	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
1	13/04/2015	Hbit	Idlib	Chlorine	Assad regime
3	16/04/2015	Idlib	Idlib	Chlorine	Assad regime
2	16/04/2015	Kurin	Idlib	Chlorine	Assad regime
1	18/04/2015	Al-Tamanah	Idlib	Chlorine	Assad regime
1	19/04/2015	Kurin	Idlib	Chlorine	Assad regime
1	25/04/2015	Kurin	Idlib	Chlorine	Assad regime
3	26/04/2015	Al-Hawash	Hama	Chlorine	Assad regime
2	26/04/2015	Kafr Awed	Idlib	Chlorine	Assad regime
2	27/04/2015	Al-Nairab	Idlib	Chlorine	Assad regime
2	28/04/2015	Kansafra	Idlib	Chlorine	Assad regime
3	29/04/2015	Kansafra	Idlib	Chlorine	Assad regime
3	29/04/2015	Saraqeb	Idlib	Chlorine	Assad regime
2	30/04/2015	Kastoon	Hama	Chlorine	Assad regime
1	30/04/2015	Kafr Awed	Idlib	Chlorine	Assad regime
2	01/05/2015	Al-Nairab	Idlib	Chlorine	Assad regime
1	01/05/2015	Kafr Shams	Daraa	Chlorine	Assad regime
3	02/05/2015	Al-Nairab	Idlib	Chlorine	Assad regime
3	02/05/2015	Saraqeb	Idlib	Chlorine	Assad regime
3	03/05/2015	Ablin	Idlib	Chlorine	Assad regime
3	03/05/2015	Kansafra	Idlib	Chlorine	Assad regime
3	03/05/2015	Jouzif	Idlib	Chlorine	Assad regime
3	03/05/2015	Jobar	Damascus	Chlorine	Assad regime
3	06/05/2015	Al-Bashiria	Idlib	Chlorine	Assad regime
3	07/05/2015	Kafr Bateekh	Idlib	Chlorine	Assad regime
3	07/05/2015	Al-Janudiya	Idlib	Chlorine	Assad regime
1	07/05/2015	Kansafra	Idlib	Chlorine	Assad regime
2	10/05/2015	Al-Bashiria	Idlib	Chlorine	Assad regime
3	15/05/2015	Mashmshan	Idlib	Chlorine	Assad regime
3	15/05/2015	Ain Souda	Idlib	Chlorine	Assad regime
1	15/05/2015	Latamenah	Hama	Chlorine	Assad regime
3	16/05/2015	Al-Sukhna	Homs	Chlorine	Assad regime
1	16/05/2015	Palmyra	Homs	Unknown	Assad regime
3	16/05/2015	Sarmin	Idlib	Chlorine	Assad regime
1	16/05/2015	Mashmshan	Idlib	Unknown	Assad regime
3	17/05/2015	Mashmshan	Idlib	Chlorine	Assad regime
3	17/05/2015	Al-Kastan	Idlib	Chlorine	Assad regime
3	19/05/2015	Jisr Al-Shoghour	Idlib	Chlorine	Assad regime
3	19/05/2015	Al-Bashiria	Idlib	Chlorine	Assad regime
3	19/05/2015	Mashmshan	Idlib	Chlorine	Assad regime
3	20/05/2015	Idlib	Idlib	Chlorine	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
2	22/05/2015	Palmyra	Homs	Chlorine	Assad regime
1	25/05/2015	Al-Bashiria	Idlib	Unknown	Assad regime
1	29/05/2015	Jouzif	Idlib	Unknown	Assad regime
1	30/05/2015	Al-Tamanah	Idlib	Chlorine	Assad regime
1	02/06/2015	Al-Bashiria	Idlib	Unknown	Assad regime
3	07/06/2015	Al-Kastan	Idlib	Chlorine	Assad regime
1	07/06/2015	Mashmshan	Idlib	Unknown	Assad regime
3	08/06/2015	Saraqeb	Idlib	Chlorine	Assad regime
3	08/06/2015	Kansafra	Idlib	Chlorine	Assad regime
3	09/06/2015	Al-Bashiria	Idlib	Chlorine	Assad regime
3	09/06/2015	Sfouhen	Idlib	Chlorine	Assad regime
1	09/06/2015	Saraqeb	Idlib	Chlorine	Assad regime
2	13/06/2015	Jobar	Damascus	Chlorine	Assad regime
1	17/06/2015	Al-Tamanah	Idlib	Chlorine	Assad regime
2	28/06/2015	Al-Hasakah	Al-Hasakah	Sulfur Mustard	ISIS
1	28/06/2015	Tall Brak	Al-Hasakah	Sulfur Mustard	ISIS
2	07/07/2015	Al-Rashideen	Aleppo	Chlorine	Assad regime
3	08/07/2015	Sheikh Yassin	Deir Ezzor	Chlorine	Assad regime
1	08/07/2015	Al Hwyeqa	Deir Ezzor	Unknown	Assad regime
2	21/07/2015	Harasta	Reef Damascus	Chlorine	Assad regime
2	27/07/2015	Jobar	Damascus	Chlorine	Assad regime
1	27/07/2015	Zamalka	Reef Damascus	Chlorine	Assad regime
2	30/07/2015	Jobar	Damascus	Chlorine	Assad regime
3	06/08/2015	Jobar	Damascus	Unknown	Assad regime
1	07/08/2015	Al-Rastan	Homs	Chlorine	Assad regime
1	11/08/2015	Irbin	Reef Damascus	Unknown	Assad regime
3	21/08/2015	Marea	Aleppo	Sulfur Mustard	ISIS
1	29/08/2015	Al-Rastan	Homs	Unknown	Assad regime
1	01/09/2015	Marea	Aleppo	Unknown	ISIS
1	03/09/2015	Jamaiyet Zahraa	Aleppo	Unknown	Assad regime
1	12/09/2015	Juneinah	Deir Ezzor	Unknown	Assad regime
1	25/09/2015	Harasta	Reef Damascus	Unknown	Assad regime
3	25/10/2015	Jobar	Damascus	Chlorine	Assad regime
1	31/10/2015	Talbisah	Homs	Unknown	Assad regime
2	20/12/2015	Teir Maalah	Homs	Chlorine	Assad regime
2	22/12/2015	Moadamiya	Reef Damascus	Chlorine	Assad regime
3	10/01/2016	Sakhour "M10" Hospital	Aleppo	Chlorine	Assad regime
2	31/01/2016	Moadamiya	Reef Damascus	Chlorine	Assad regime
2	03/04/2016	Qaboun	Damascus	Unknown	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
3	05/04/2016	Sheikh Maqsood	Aleppo	Chlorine	Assad regime
1	06/04/2016	Deir Ezzor	Deir Ezzor	Chlorine	Assad regime
1	07/04/2016	Deir Ezzor	Deir Ezzor	Chlorine	Assad regime
1	18/04/2016	Amiqa	Hama	Chlorine	Assad regime
2	24/04/2016	Jisr Al-Shoghour	Idlib	Chlorine	Assad regime
1	09/06/2016	Sukkari	Aleppo	Chlorine	Assad regime
1	17/06/2016	Aleppo	Aleppo	Chlorine	Assad regime
1	23/06/2016	Haritan	Aleppo	Chlorine	Assad regime
1	29/06/2016	Al-Mallah	Aleppo	Chlorine	Assad regime
1	29/06/2016	Jobar	Damascus	Chlorine	Assad regime
1	20/07/2016	Kafr Hamrah	Aleppo	Chlorine	Assad regime
3	01/08/2016	Saraqeb	Idlib	Chlorine	Assad regime
1	07/08/2016	Ramouseh	Aleppo	Chlorine	Assad regime
1	08/08/2016	Khan Alassal	Aleppo	Chlorine	Assad regime
3	10/08/2016	Zabdia	Aleppo	Chlorine	Assad regime
2	12/08/2016	Haritan	Aleppo	Chlorine	Assad regime
3	16/08/2016	Marea	Aleppo	Sulfur Mustard	ISIS
3	06/09/2016	Sukkari	Aleppo	Chlorine	Assad regime
1	06/09/2016	Ein Tarma	Reef Damascus	Chlorine	Assad regime
3	15/09/2016	Um Howsh	Aleppo	Sulfur Mustard	ISIS
3	16/09/2016	Um Howsh	Aleppo	Sulfur Mustard	ISIS
2	01/10/2016	Aleppo (M10 Hospital)	Aleppo	Unknown	Assad regime
2	01/10/2016	Kafr Zita	Hama	Chlorine	Assad regime
2	25/10/2016	Latamenah	Hama	Chlorine	Assad regime
2	30/10/2016	Al-Rashideen	Aleppo	Chlorine	Assad regime
2	31/10/2016	Al-Rashideen	Aleppo	Chlorine	Assad regime
2	02/11/2016	Khan Alassal	Aleppo	Chlorine	Assad regime
1	02/11/2016	Kafr Naha	Aleppo	Chlorine	Assad regime
2	07/11/2016	Khan Alassal	Aleppo	Chlorine	Assad regime
1	15/11/2016	Zabdia; Mashhad	Aleppo	Chlorine	Assad regime
3	18/11/2016	Hanano	Aleppo	Chlorine	Assad regime
2	18/11/2016	Ard Al-Hamra	Aleppo	Chlorine	Assad regime
3	20/11/2016	Al-Sakhour	Aleppo	Chlorine	Assad regime
3	20/11/2016	Tariq Al-Bab	Aleppo	Chlorine	Assad regime
1	21/11/2016	Al-Haj Bridge	Aleppo	Chlorine	Assad regime
2	22/11/2016	Daheet Awwad, Karm Al-Qaterji, Karm Al-Jamati	Aleppo	Chlorine	Assad regime
3	23/11/2016	Karm Al-Jazimat	Aleppo	Chlorine	Assad regime
2	23/11/2016	Ard Al-Hamra	Aleppo	Chlorine	Assad regime
1	27/11/2016	Al Khaliliya	Aleppo	Unknown	ISIS

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
2	28/11/2016	Karm Al-Qater-ji, Qadi Askari	Aleppo	Chlorine	Assad regime
3	08/12/2016	Al-Fardous	Aleppo	Chlorine	Assad regime
3	08/12/2016	Bustan Al-Qasr	Aleppo	Chlorine	Assad regime
3	08/12/2016	Kallaseh	Aleppo	Unknown	Assad regime
3	08/12/2016	Al-Maghayer	Aleppo	Chlorine	Assad regime
3	09/12/2016	Kallaseh	Aleppo	Chlorine	Assad regime
3	09/12/2016	Bustan Al-Qasr	Aleppo	Chlorine	Assad regime
3	10/12/2016	Kallaseh	Aleppo	Chlorine	Assad regime
2	12/12/2016	Jrouh	Hama	Sarin	Assad regime
3	12/12/2016	Salaliyah	Hama	Sarin	Assad regime
2	12/12/2016	Uqairabat	Idlib	Sarin	Assad regime
1	12/12/2016	Hamadi Omar		Unknown	Assad regime
1	12/12/2016	Al-Qastal		Unknown	Assad regime
1	05/01/2017	Bassimeh	Reef Damascus	Chlorine	Assad regime
3	08/01/2017	Bassimeh	Reef Damascus	Chlorine	Assad regime
1	09/01/2017	Bassimeh	Reef Damascus	Chlorine	Assad regime
3	30/01/2017	Al-Marj	Reef Damascus	Chlorine	Assad regime
2	07/02/2017	Irbin	Reef Damascus	Chlorine	Assad regime
3	09/02/2017	Irbin	Reef Damascus	Chlorine	Assad regime
2	10/02/2017	Irbin	Reef Damascus	Chlorine	Assad regime
1	21/02/2017	East Ghouta	Reef Damascus	Chlorine	Assad regime
2	26/02/2017	Harasta	Reef Damascus	Chlorine	Assad regime
3	24/03/2017	Latamenah	Hama	Sarin	Assad regime
3	25/03/2017	Latamenah	Hama	Chlorine	Assad regime
3	29/03/2017	Qaboun	Damascus	Chlorine	Assad regime
3	30/03/2017	Latamenah	Hama	Sarin	Assad regime
1	03/04/2017	Hbit	Idlib	Chlorine	Assad regime
1	03/04/2017	Latamenah	Hama	Chlorine	Assad regime
3	04/04/2017	Khan Sheykhoun	Idlib	Sarin	Assad regime
3	07/04/2017	Mashhad	Aleppo	Unknown	Assad regime
3	07/04/2017	Qaboun	Damascus	Chlorine	Assad regime
2	22/04/2017	Zamalka	Reef Damascus	Unknown	Assad regime
1	25/04/2017	Al-Mayadeen	Deir Ezzor	Unknown	Assad regime
1	29/04/2017	Al-Tamanah	Idlib	Chlorine	Assad regime
1	30/04/2017	Massassina	Hama	Chlorine	Assad regime
2	22/06/2017	Jobar	Damascus	Chlorine	Assad regime
3	01/07/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
3	02/07/2017	Zamalka	Reef Damascus	Chlorine	Assad regime
3	06/07/2017	Jobar	Damascus	Chlorine	Assad regime

CONF	Date	Locale	Governorate	Chemical Agent	Perpetrator
3	06/07/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
1	13/07/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
2	14/07/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
2	20/07/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
1	26/07/2017	Douma	Reef Damascus	Unknown	Assad regime
1	16/08/2017	Ein Tarma	Reef Damascus	Chlorine	Assad regime
1	19/08/2017	Jobar	Damascus	Unknown	Assad regime
1	15/11/2017	Beit Jinn	Reef Damascus	Chlorine	Assad regime
2	18/11/2017	Harasta	Reef Damascus	Unknown	Assad regime
2	30/12/2017	Douma	Reef Damascus	Chlorine	Assad regime
3	13/01/2018	Douma	Reef Damascus	Chlorine	Assad regime
1	22/01/2018	Douma	Reef Damascus	Unknown	Assad regime
2	22/01/2018	Douma	Reef Damascus	Chlorine	Assad regime
2	23/01/2018	Abu Duhur	Idlib	Unknown	Assad regime
1	23/01/2018	Jisrein	Reef Damascus	Unknown	Assad regime
1	25/01/2018	Jisrein	Reef Damascus	Unknown	Assad regime
1	01/02/2018	Saraqeb	Idlib	Unknown	Assad regime
2	01/02/2018	Douma	Reef Damascus	Chlorine	Assad regime
3	04/02/2018	Saraqeb	Idlib	Chlorine	Assad regime
1	04/02/2018	Hamoryah	Reef Damascus	Unknown	Assad regime
3	25/02/2018	Shafuniyeh	Damascus	Chlorine	Assad regime
1	05/03/2018	Irbin	Reef Damascus	Unknown	Assad regime
2	05/03/2018	Hamoryah	Reef Damascus	Chlorine	Assad regime
2	07/03/2018	Hamoryah	Reef Damascus	Chlorine	Assad regime
1	10/03/2018	Irbin	Reef Damascus	Unknown	Assad regime
2	11/03/2018	Irbin	Reef Damascus	Chlorine	Assad regime
1	12/03/2018	Eastern Ghouta	Reef Damascus	Unknown	Assad regime
1	14/03/2018	Hamoryah	Reef Damascus	Chlorine	Assad regime
1	18/03/2018	Douma	Reef Damascus	Chlorine	Assad regime
1	21/03/2018	Zamalka	Reef Damascus	Unknown	Assad regime
3	07/04/2018	Douma	Reef Damascus	Chlorine	Assad regime

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