



The Carter Center

Explosive Weapons Use in Syria, Report 4

Northeast Syria: Al Hassakeh, Ar Raqqa, and Deir Ez Zor
Governorates

Syria Conflict Mapping Project

November 2020

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Executive Summary

- This nontechnical study aims to analyze and visualize The Carter Center Syria conflict mapping data to show the distribution and type of explosive weapons used in northeast Syria (Al Hassakeh, Ar Raqqa, and Deir Ez Zor governorates) from 2013 to 2019.
- This study recorded at least 22,964 uses of explosive munitions from 7,326 conflict events between October 2013 and May 2019. *This figure is likely to increase when 2020 data is added.* About 64% (14,593) of the total explosive munitions used in the northeast of Syria were air-dropped munitions and 30% (7,008) were ground-launched munitions.
- Explosive munitions affected 498 communities throughout northeast Syria. Notably, 64% (14,777) of all explosive munitions uses in the region were recorded in just 14 communities: Deir Ez Zor city, Ar Raqqa city, Al Hassakeh city and its environs, the border town of Abu Kamal, Hajin, Al Thawrah, Basira, Al Bagouz, Al Mayadin, Al Shadadah, Susa, Ein Issa, Muhasan, and Shafa.
- When added to previous studies focused on areas of northwest Syria, southern Syria and areas around Damascus city, the total adds up to at least 267,267 uses of explosive munitions in 2,485 identifiable communities, with just 23 communities totaling 43% of all explosive munitions use.
- If a failure rate of between 10% and 30% is applied to these findings, that would mean between 26,767 and 80,301 explosive munitions failed to detonate in northwest Syria, northeast Syria, southern Syria, and the Damascus area (and the count is likely much higher).
- It took 23 years to clear 86,000 items in Mozambique and four years to clear 11,540 explosive items in Iraq, so the explosive munition contamination in Syria is likely to affect multiple generations of Syrians.
- Clearance efforts should not be viewed only in monetary terms and timelines, but as a holistic activity that can encompass humanitarian action, development, conflict prevention, and peacebuilding.

Introduction

Since 2011, there has been widespread use of explosive weapons by all sides in the Syrian conflict. Because of a variety of factors, a portion of these either fails to detonate, becoming unexploded ordnance (UXO), or is abandoned, becoming abandoned explosive ordnance (AXO). These explosive remnants of war (ERW), in addition to landmines and improvised explosive devices (IEDs),¹ pose a threat to a population long after the violence has stopped. Not only can these explosive munitions continue to kill and injure people for decades, but their presence also can hold back a community's development for generations.

On-the-ground assessments, surveys, and clearance operations are some of the most effective ways to address the physical threat of explosive munitions contamination. In Syria, this can be challenging because of access and security constraints in many parts of the country, as well as because of complex international funding pressures on humanitarian entities that respond to explosive munitions (known as humanitarian mine action [HMA] organizations).

Given these restraints, such organizations have turned to desk-based studies as a way to prepare for future activities while they wait for conditions on the ground to improve enough to start operations. One method for doing this is to map and analyze conflict data to try to infer the locations of potential explosive munitions contamination. Combining this information with other data — such as casualty figures, population displacements caused by UXO, and humanitarian need assessments (to name just a few) — can help prioritize areas most in need of clearing or support the creation of a basic risk assessment tool for HMA organizations' staff

In 2019, the Carter Center's Syria Conflict Mapping Project began working on this complex, multi-generational issue by conducting its own desk-based, nontechnical study. It used its unique data set on explosive weapons use in Syria between 2013 and 2019 and an innovative new method (Figure 1), to extrapolate, analyze, and visualize data.

¹ While IEDs are generally considered separate items in this study, it is recognized there is difficulty in their classification in the HMA world. IEDs can share much with AXO, ERW and landmines. For example, a pressure-plate triggered IED can be considered a landmine. An IED that has been placed but fails to detonate can be considered UXO. An IED that has not yet been emplaced could be considered AXO.

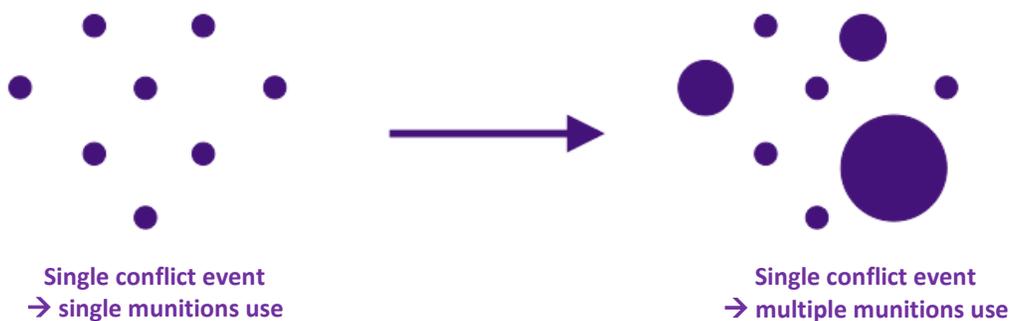


Figure 1. Traditionally, HMA entities have used conflict events to count explosive munitions by assuming that a single conflict event is equivalent to a single munition event (left). Alternatively, The Carter Center counts the number of munitions used per conflict event, to provide a more accurate depiction of potential contamination levels of explosive munitions (right). See our previous reports for further detail on the Center’s [methodology](#).

Using open-source data, a type that has not typically been used by HMA organizations, the findings provide a window into the scale and complexity of explosive munitions use (and therefore potential contamination) in Syria. It is important to note, though, that while The Carter Center has strived to record as many conflict events as possible, given the restrictive reporting environment and high volume of violence in Syria, it is likely that some incidents have not been recorded.

Through multiple reports focused on different areas of Syria, which can be accessed on the Center’s [website](#), the conclusions of the study will provide information about four broad categories of explosive weapons used in the conflict in Syria; 1) air-launched explosive weapons, 2) ground-launched explosive weapons 3) cluster munitions,² and 4) landmines, IEDs, or UXO (see Figure 2). For ease of use for humanitarian partners, the data uses United Nations Office for the Coordination of Humanitarian Affairs (UNCOHA) mapping standards, which detail locations to the neighborhood level.

This study will be helpful for entities at the working level, as it will add valuable detail and guidance when planning and prioritizing their work. At the higher level, the study will raise awareness of the complexity and scale of explosive weapons contamination in Syria to operational planners and key decision makers.

² This is counting the number of cluster munition carriers (i.e., containers that carry multiple bomblets) rather than individual bomblets themselves.

Main Study

Using primarily open source data collected by the Carter Center’s Syria Conflict Mapping Project and the [Armed Conflict Location & Event Data Project](#) (ACLED), 7,325 conflict events from the northeastern governorates of Al Hassakeh, Ar Raqqa, and Deir Ez Zor produced a minimum count of 22,964 individual uses of explosive munitions in these areas from October 2013 to May 2019. As fighting continues at the time of this writing, this figure is likely to increase.

INDIVIDUAL MUNITIONS USE IN AL-HASSAKEH, AR-RAQQA, & DEIR EZ ZOR GOVERNORATES			
Munitions Category	Munitions Type	No. of Munitions Used	% of Total
AIR-LAUNCHED	<i>Airplane-launched</i>	14370	62.58%
	<i>Helicopter-launched</i>	223	0.97%
GROUND-LAUNCHED	<i>Shells (Unknown Type)</i>	6,077	26.46%
	<i>Rockets</i>	444	1.93%
	<i>Mortar Shells</i>	225	0.98%
	<i>Artillery Shells</i>	211	0.92%
	<i>Grenades</i>	18	0.08%
	<i>Rocket Propelled Grenades (RPG)</i>	13	0.06%
	<i>Tank Shells</i>	6	0.03%
	<i>Anti-Tank Guided Missiles (ATGM)</i>	4	0.02%
CLUSTER MUNITIONS	<i>Air and Ground Launched Cluster Munitions</i>	0	0.00%
LANDMINES, IEDs, & UXO	<i>IEDs/Unknown Explosive</i>	435	1.89%
	<i>Landmines</i>	363	1.58%
	<i>Vehicle Borne IEDs (VBIEDs)</i>	250	1.09%
	<i>Suicide Vehicle Borne IEDs (SVBIEDs)</i>	180	0.78%
	<i>Person Borne IEDs (PBIEDs)</i>	142	0.62%
	<i>Unexploded Ordnance (UXO) (Unknown Type)</i>	3	0.01%
TOTAL		22,964	

Figure 2. Breakdown of explosive weapons types used in Al Hassakeh, Ar Raqqa, & Deir Ez Zor governorates.

Unlike in other areas of Syria, the majority (14,593, nearly 64%) of explosive munitions used in the northeast were from airplanes and helicopters. Ground-launched weapons made up only 30% (6,998) of all documented activity. Improvised explosive device (IED), landmine, and unexploded ordnance (UXO) detonations made up only 6% (1,389) of activity. Overall, looking at the particular types of munitions, airplane-launched munitions and shelling of unknown types made up nearly 90% of all documented activity in the northeast. See Figure 2 (above) for further details on munitions uses in northeast Syria.

Explosive weapons impacted 498 identifiable communities³ throughout northeast Syria. Notably, 64% (14,777) of all explosive munitions uses in the region were recorded in just 14 locations: Deir Ez Zor city, Ar Raqqa city, Al Hassakeh city and its environs, the border town of Abu Kamal, Hajin, Al Thawrah, Basira, Al Bagouz, Al Mayadin, Al Shadadah, Sosa, Ein Issa, Muhasan, and Shafa. The remaining 38% of activity was distributed among 484 communities throughout Al Hassakeh, Ar Raqqa, and Deir Ez Zor governorates (Figure 3 and 4).

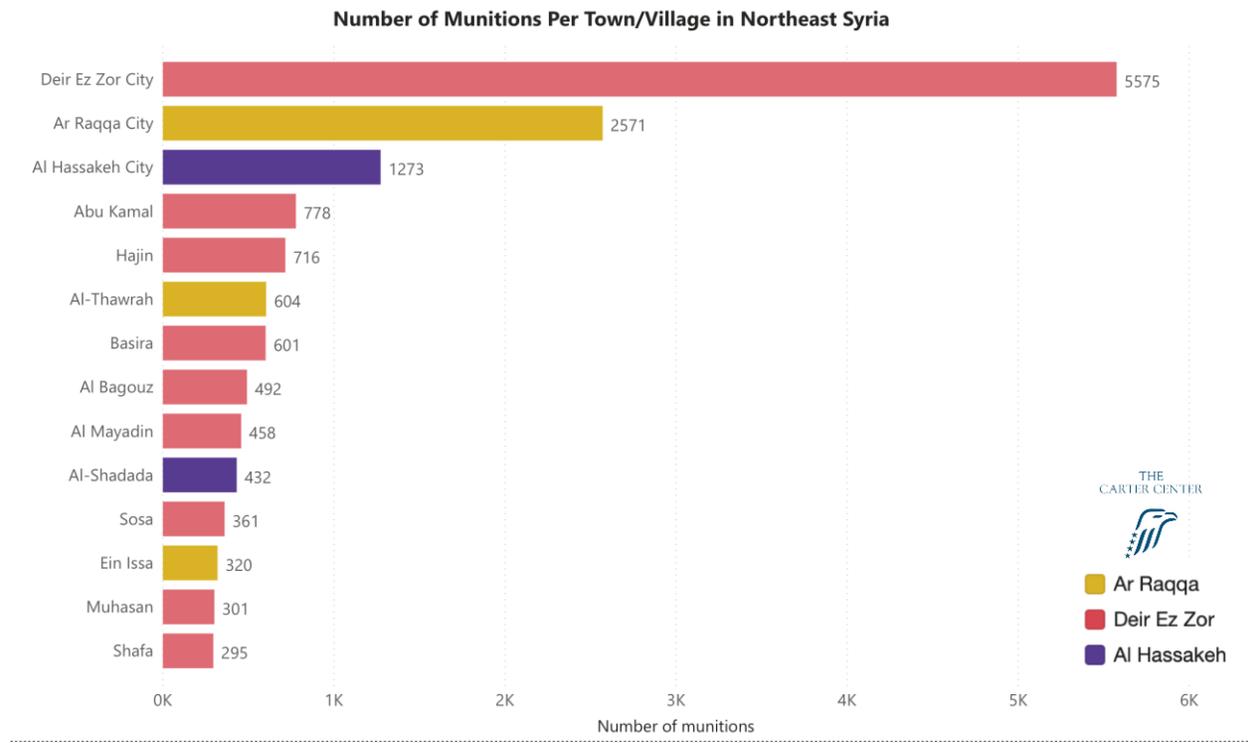


Figure 3. The 14 communities that saw 64% of all munitions use in northeast Syria.

³ The term “communities” refers to a town, city, neighborhood, or point of interest with an associated latitude and longitude.

Explosive Munitions Uses Across Al Hassakeh, Ar Raqqa, & Deir Ez Zor Governorates

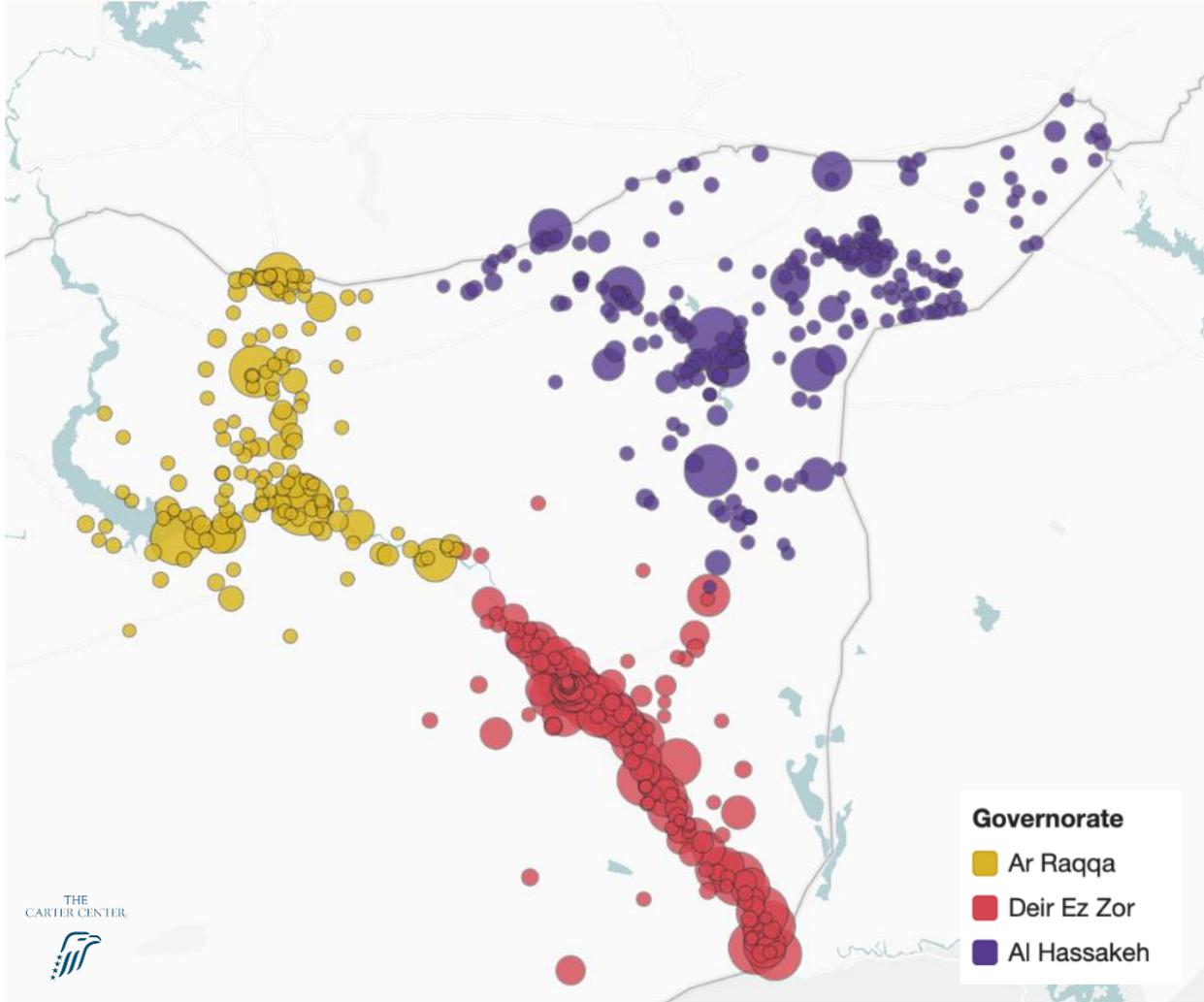


Figure 4. Explosive Munitions use across Al Hassakeh, Ar Raqqa, & Deir Ez Zor governorates.

The following sections review each governorate in detail.

Al Hassakeh Governorate

At least 3,633 uses of explosive munitions were recorded in Al Hassakeh Governorate during 1,364 conflict events. This activity affected 215 identifiable communities.

Breakdown of Explosive Munitions Categories in Al Hassakeh Governorate

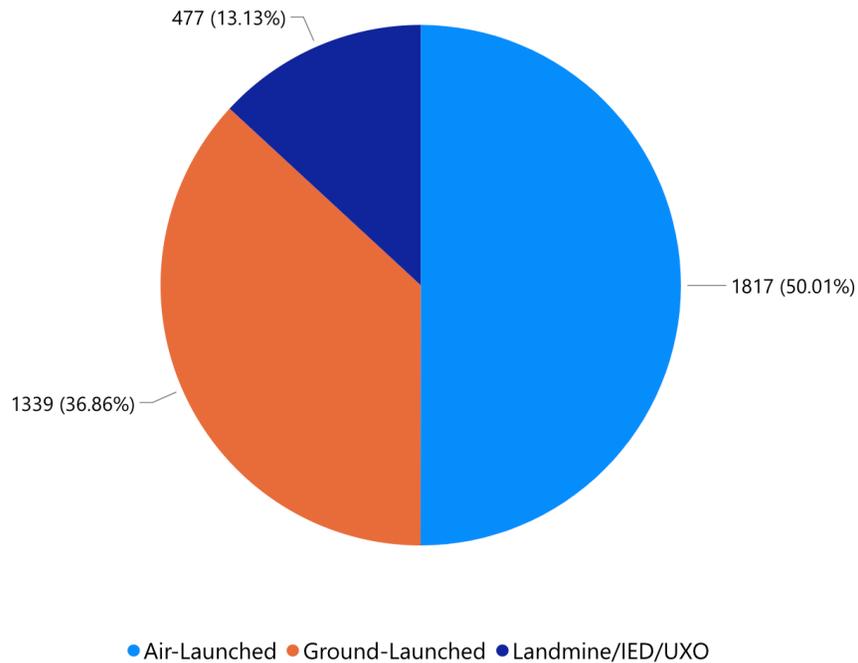


Figure 5. Breakdown of explosive munitions categories in Al Hassakeh Governorate

Air-launched explosive weapons made up 50% (1,817) of all explosive munitions used in the governorate, followed by ground-launched weapons, which made up 37% (1,339) of activity. IED, landmine, and UXO detonations made up 13% (477). There were no records of cluster munitions being used in Al Hassakeh Governorate.

Nearly 81% of munitions used in the governorate were either airplane-launched munitions or shelling of unknown type. Various types of IED also made sizable counts of activity in the governorate but amounted to only 11% of activity. The remaining 8% of activity was split among helicopter-dropped munitions, landmines, and various other ground-launched explosive munitions.⁴

⁴ The remaining 8% of activity were divided among helicopter-dropped munitions (86), landmines (79), rockets (42), artillery (37), mortar shells (24), grenades (8), RPG (3), and tank shells (3).

See Figure 5 and 6 for more details.

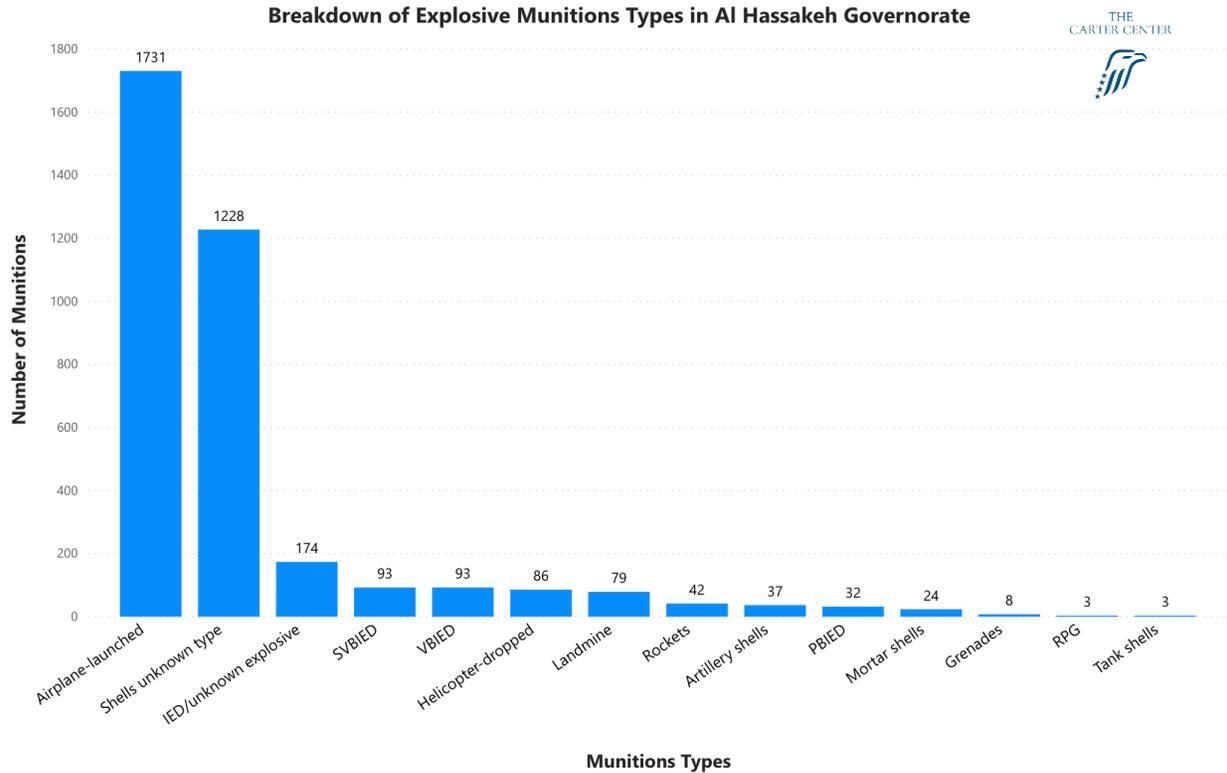


Figure 6. Breakdown of explosive munitions types in Al Hassakeh Governorate.

About 86% of all activity in Al Hassakeh Governorate was recorded in six subdistricts along the Khabour River and Jaghjagh River Valleys, home to most of the large population centers in the governorate. Al Hassakeh subdistrict recorded the most munitions use (46%), which is unsurprising given that Al Hassakeh city and its surroundings were hotly contested by ISIS/Jabhat al Nusra,⁵ various groups that eventually came under the umbrella of the Syrian Democratic Forces (SDF), and the government of Syria, which retained a small security zone in the city and its military airport. Equally contested were the Shadadah, Tal Hmeis, Al Hawl, Ras al Ein, and Tal Tamr subdistricts, which recorded 40% of explosive munitions activity among them.

⁵ ISIS & Jabhat al Nusra operated as a unified organization until 2013.

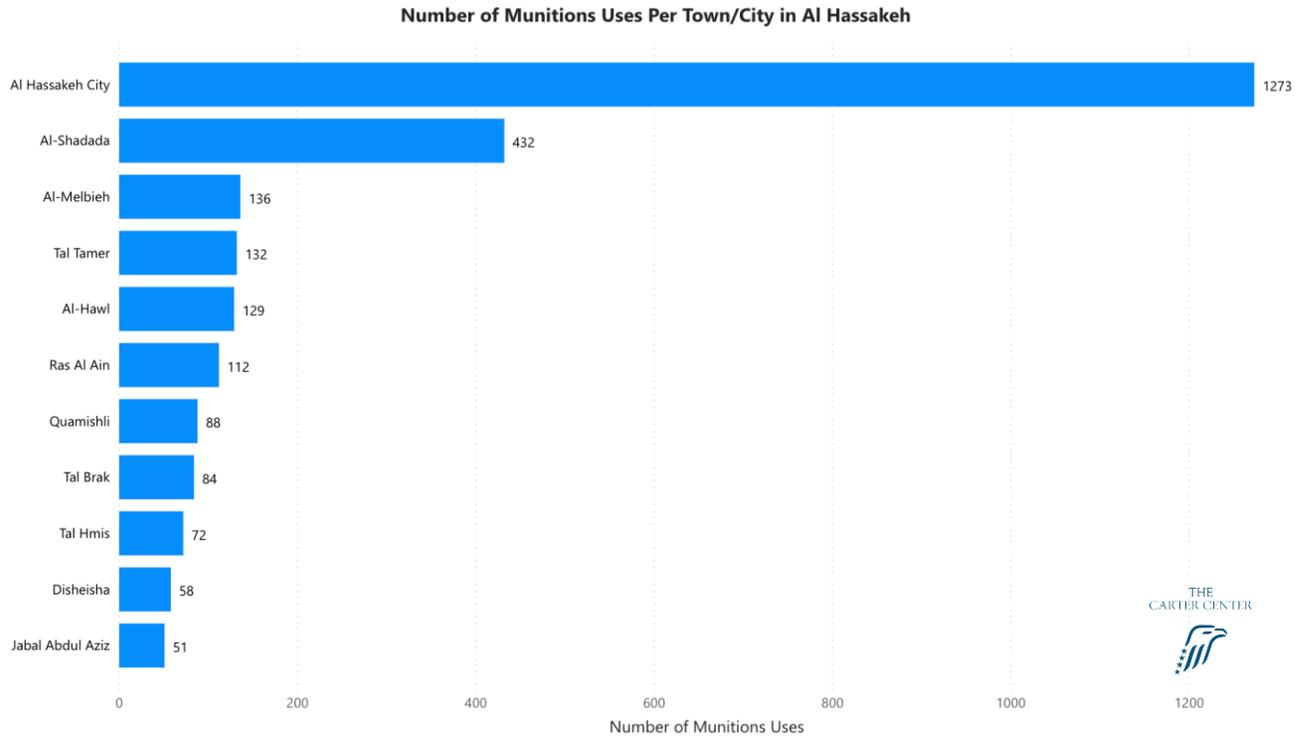


Figure 7. The 11 communities that saw 70% of all munitions use in Al Hassakeh Governorate.

At the city and town level, 70% (2,561) of all activity in Al Hassakeh Governorate was recorded in just 11 communities with about 35% in Al Hassakeh city and its surroundings (Figure 7). The remaining 30% of activity was distributed among 204 communities throughout the governorate (Figure 8).

Explosive Munitions Uses Across Al Hassakeh Governorate

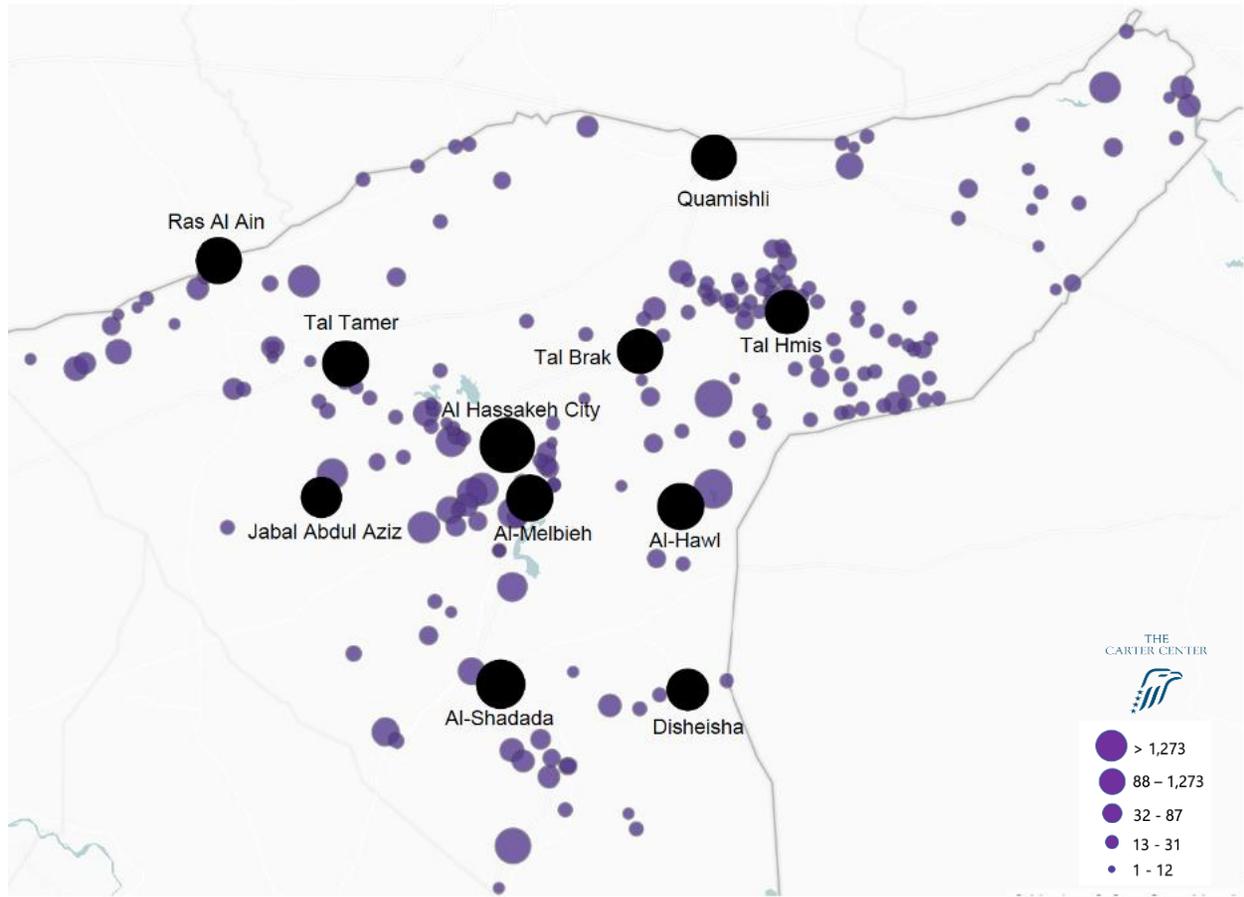


Figure 8. Explosive munitions use across Al Hassakeh Governorate, with the 11 communities that saw nearly 70% of explosive munitions use in the governorate highlighted.

Ar Raqqa Governorate

During 1,592 conflict events, at least 5,076 individual uses of explosive munitions were recorded in 146 identifiable communities across Ar Raqqa Governorate.⁶

Similar to Al Hassakeh Governorate, air-dropped munitions were the most common explosive munition used in Ar Raqqa and accounted for 80% (4,054) of all activity. Ground-launched explosive munitions made up just 13% (683) of all explosive munitions uses in the governorate, the majority being shells of unknown type. The remaining 7% (339) of activity was divided among various IED, landmine, and UXO detonations (Figures 9 and 10).

Breakdown of Explosive Munitions Categories in Ar Raqqa Governorate

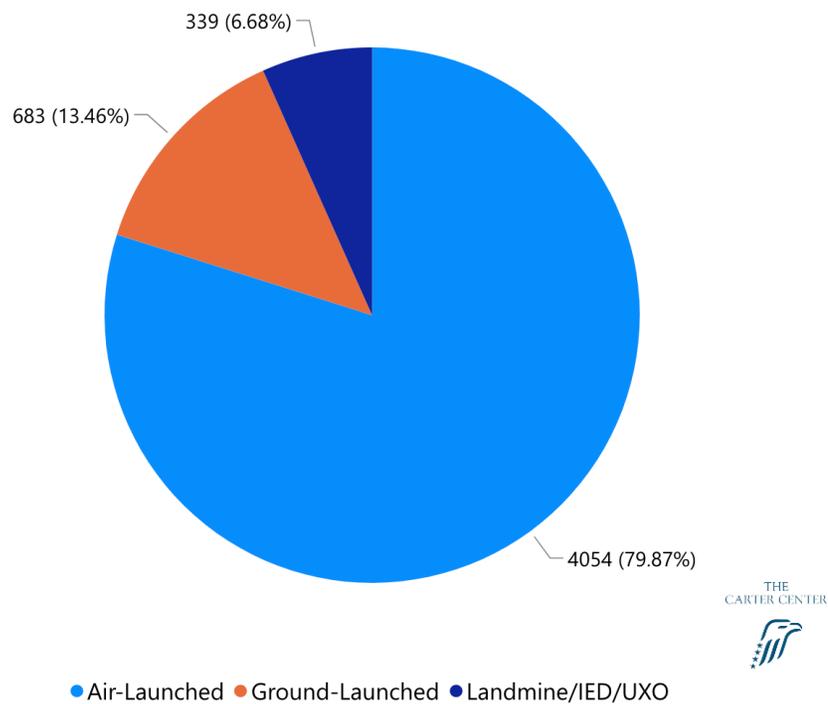


Figure 9. Breakdown of explosive munitions categories in Ar Raqqa Governorate.

⁶ Including 29 areas and neighborhoods in and around Ar Raqqa city.

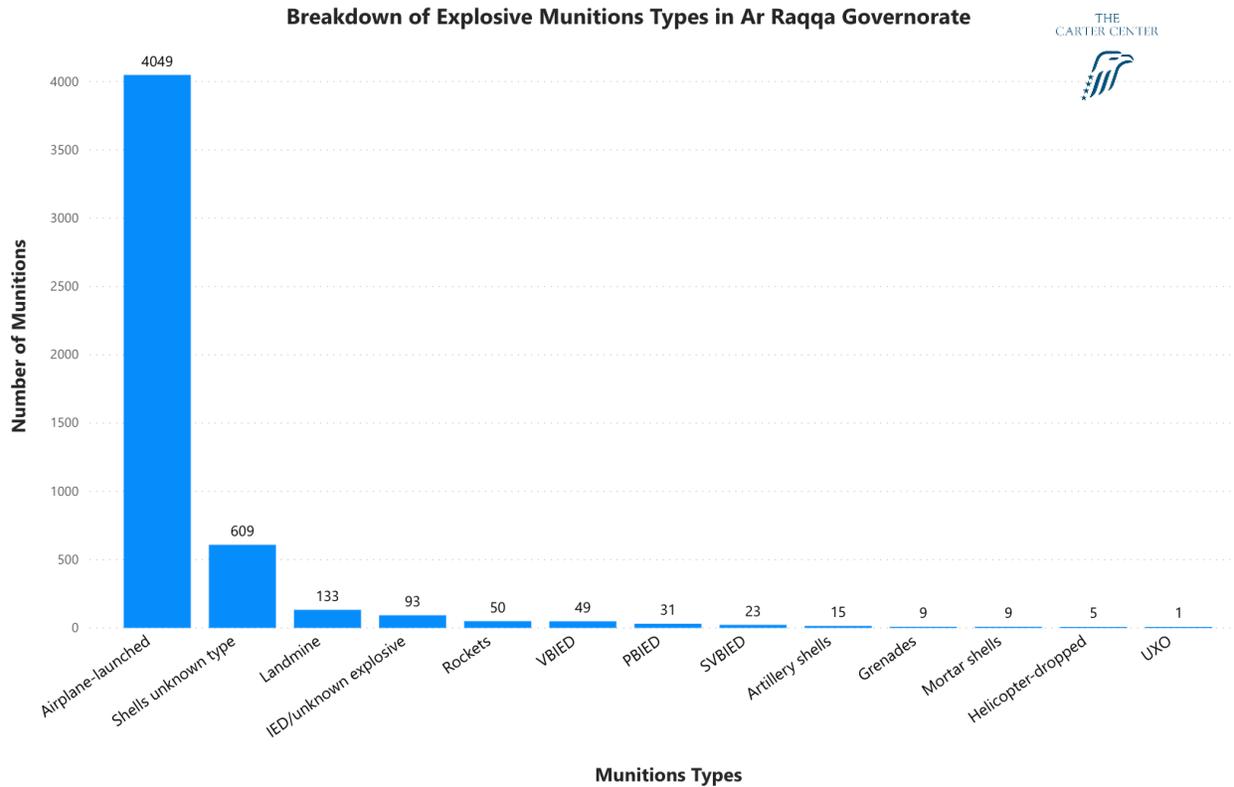


Figure 10. Breakdown of explosive munitions types in Ar Raqqa Governorate.

Around 75% of explosive munitions activity in Ar Raqqa Governorate was in just five communities (Figure 11). Unsurprisingly, there was a focus of explosive munitions use on Ar Raqqa city, which recorded 51% of munitions uses. The city was ISIS' long-standing de facto capital and routinely bombarded by U.S.-led coalition airstrikes after ISIS captured the city from the Al Qaeda-affiliated Jabhat al Nusra in 2014. Shelling and airstrikes further impacted the city during the battle to take Ar Raqqa city in 2017 led by U.S.-backed Syrian Democratic Forces (SDF). Landmine and IED booby traps were left in many buildings, and the city still experiences periodic explosive attacks by various groups. Tell Abiad, a major border town with Turkey, and Ein Issa, strategically located at the crossroads of the M4 Highway and the Ar Raqqa-Tell Abiad road, saw sizable counts of explosive munitions after they were heavily contested by ISIS and the Kurdish People's Protection Units (YPG) during the Tell Abiad offensive in 2015. The remaining 25% of activity was distributed among 141 other communities, largely along the Euphrates River Valley or areas between Tell Abiad and Ar Raqqa city (Figure 12).

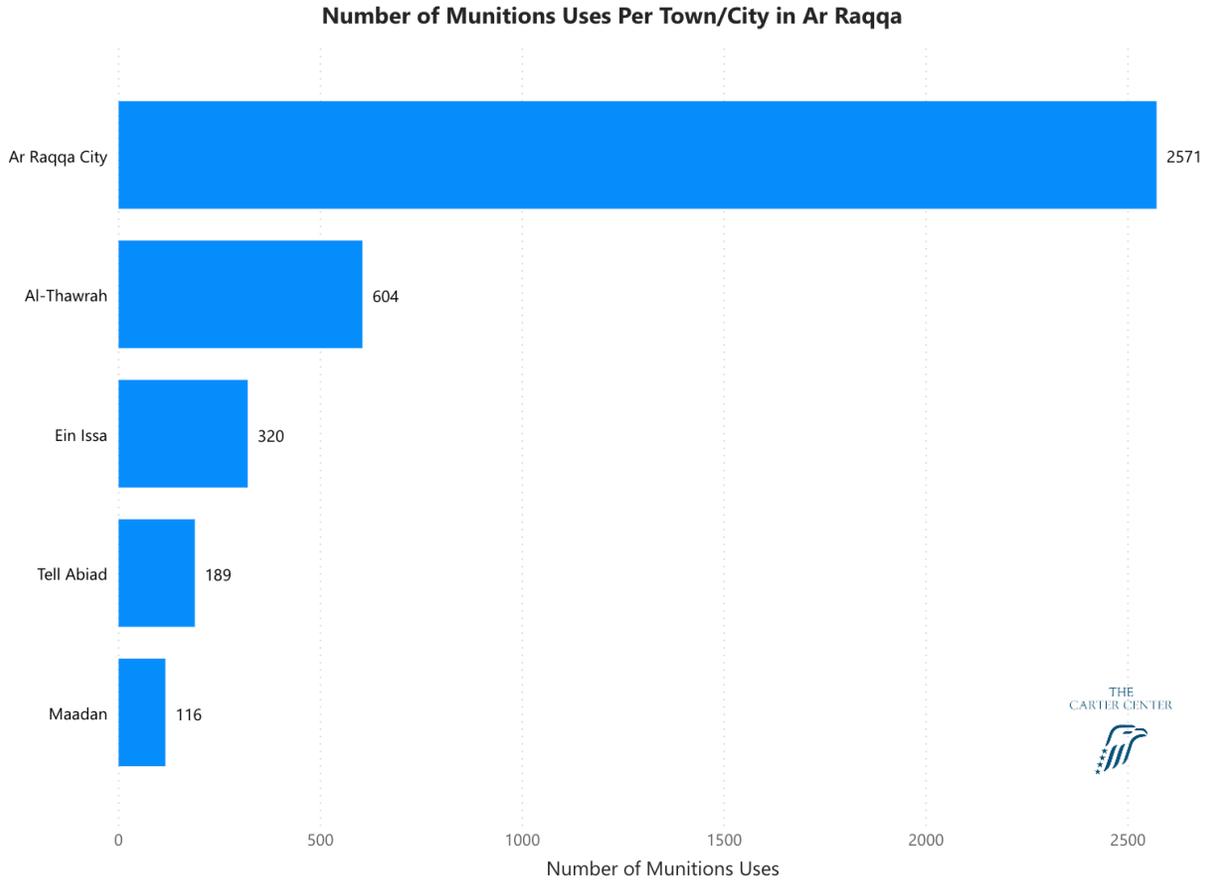


Figure 11. The five communities that saw just over 75% of all munitions use in Ar-Raqqa Governorate

Explosive Munitions Uses Across Ar Raqqa Governorate

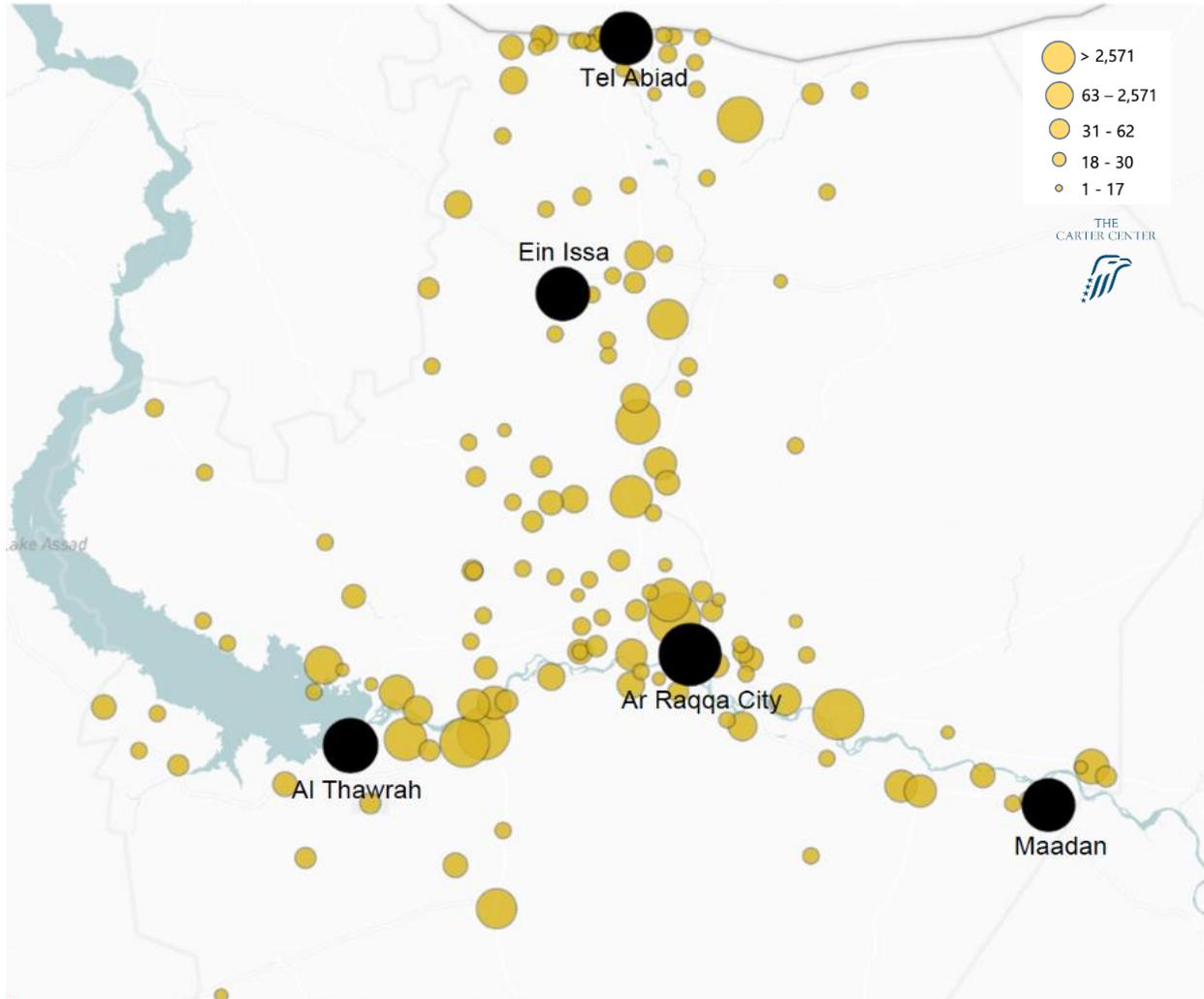


Figure 12. Explosive munitions use across Ar Raqqa Governorate, with the five communities that saw nearly 75% of explosive munitions use in the governorate highlighted.

Deir Ez Zor Governorate

From 4,795 conflict events, at least 14,255 individual uses of explosive munitions were recorded in 144 identifiable communities in Deir Ez Zor Governorate,⁷ more than Al Hassakeh and Ar Raqqa governorates combined.

Like the other governorates in the northeast, the most common explosive munitions used in Deir Ez Zor Governorate were air-launched munitions, which accounted for 61% of all activity in the governorate. Ground-launched munitions made up 35% of activity, while the remaining 4% was IED, landmine, and UXO (Figure 13).

Breakdown of Explosive Munitions Categories in Deir Ez Zor Governorate

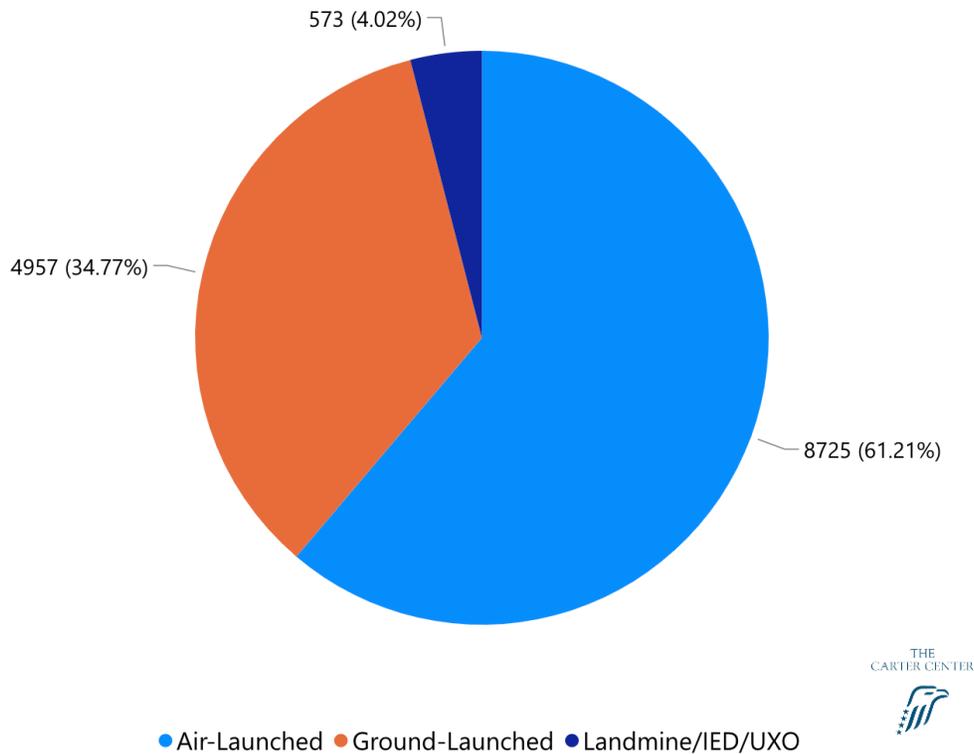


Figure 13. Breakdown of explosive munitions categories in Deir Ez Zor Governorate.

⁷ Including 30 areas and neighborhoods in Deir Ez Zor Governorate.

Exploring these figures further, airstrikes and shelling of unknown type made up the majority of munitions uses, with rockets and mortars also making up sizable counts of munitions uses in the governorate (Figure 14).

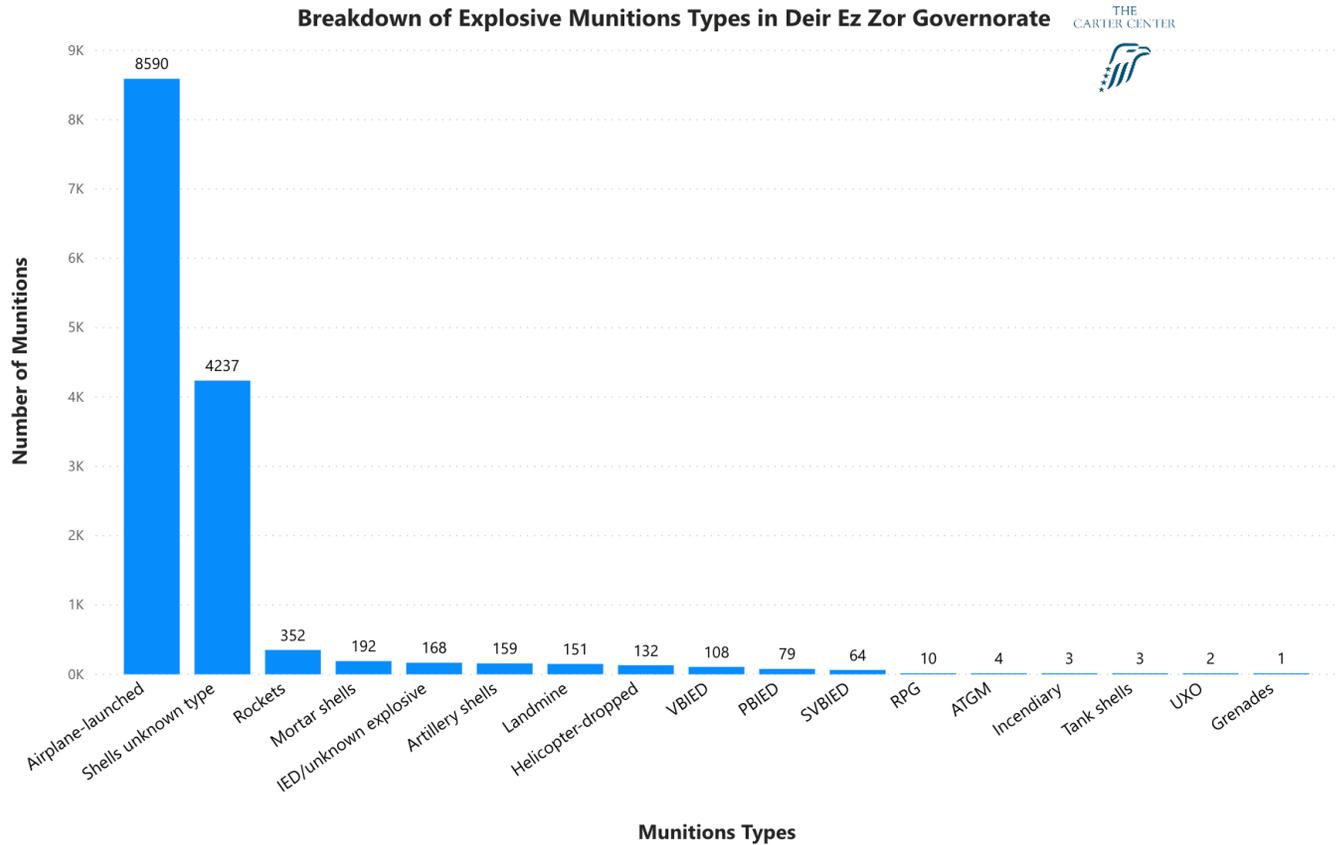


Figure 14. Breakdown of explosive munitions types in Deir Ez Zor Governorate.

Explosive munitions use in Deir Ez Zor Governorate was concentrated in communities along the Euphrates River Valley. In particular, the five subdistricts of Deir Ez Zor, Susa, Hajin, Abu Kamal, and Muhasan — all between Deir Ez Zor city and Abu Kamal town — recorded 77% of the governorate’s explosive munitions activity. At the city or town level, just 11 communities accounted for 71% of the total number of explosive munitions used in Deir Ez Zor Governorate: Deir Ez Zor city, the border town of Abu Kamal, Hajin, Basira, Al Bagouz, Al Mayadin, Susa, Muhasan, Shafa, Mreiyeh, and Jafra. With the exception of Deir Ez Zor city, which remained under GoS control and was besieged by ISIS for more than three years, the other communities were some of the first places where resistance to GoS formed. Initially coming under Free Syrian Army control in 2012, the towns were taken by ISIS by the end of 2014 before being captured by the SDF in early 2018. In the towns of Susa, Shafa, and Al Bagouz, most explosive munitions uses were recorded over a relatively short period of time, largely in 2018 and 2019. This provides insight into the

significant efforts required to dislodge ISIS from its last stronghold in Syria, with Bagouz coming under SDF control by March 2018. The remaining 29% of munitions uses were split among 133 communities. Figures 15 and 16 summarize the above in more detail.

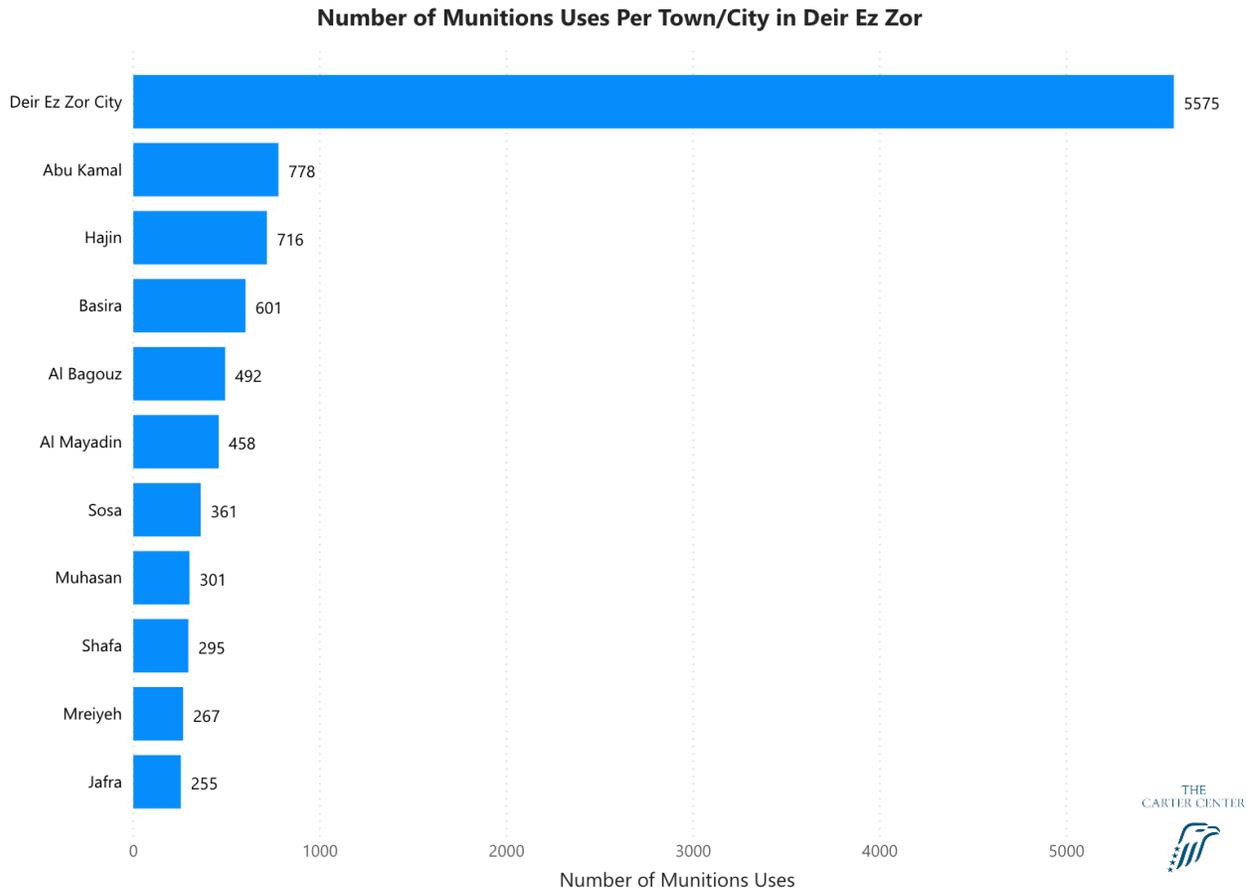


Figure 15. The 11 communities that saw 71% of all munitions use in Deir Ez Zor Governorate.

Explosive Munitions Uses Across Deir Ez Zor Governorate

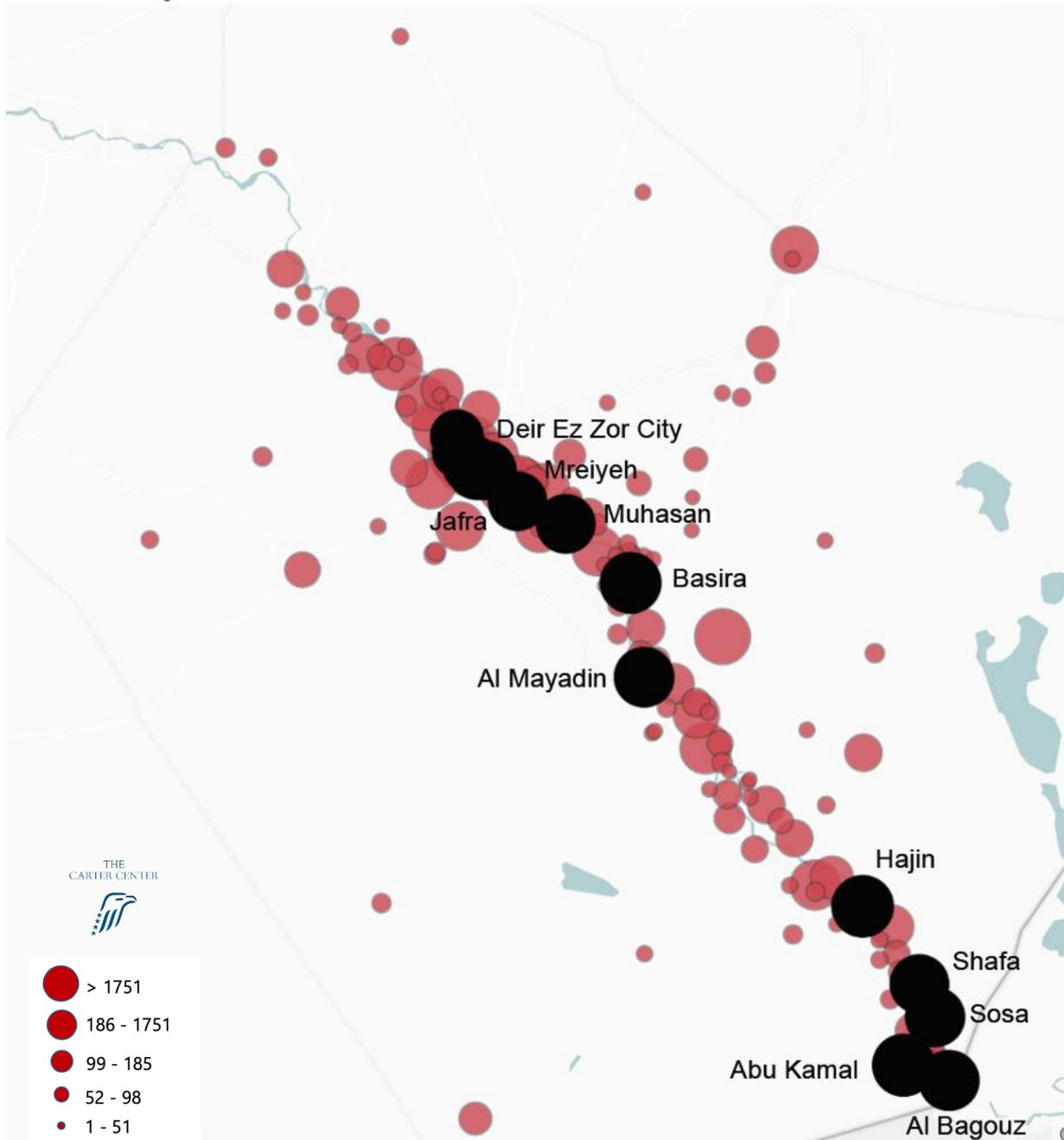


Figure 16. Explosive Munitions uses across Deir Ez Zor Governorate, the 11 communities that saw 71% of explosive munitions uses in the governorate highlighted.

Conclusion

The findings in this analysis could provide operational planners guidance for the prioritization of humanitarian mine action activity, especially with respect to directing on-the-ground surveys, clearance operations, and risk-education programs. It can also serve as a preliminary guide to assess risk for staff doing this clearance on the ground. It helps illustrate the scale and complexity of potential explosive munitions contamination in the northeast, helpful for strategic-level engagement, especially with political and donor advocacy. When the findings of this report are combined with findings from the Center’s previous reports on [southern Syria](#), [Damascus city and its surroundings](#), and [northwest Syria](#), the scale of the issue begins to become apparent. At least 267,267 individual explosive munitions were used in 2,485 identifiable communities across Aleppo, Al Hassakeh, Ar Raqqa, As Sweida, Damascus, Daraa, Deir Ez Zor, Idleb, Latakia, Quneitra, and Rural Damascus governorates. Just 25 communities recorded nearly half of the explosive munitions use in these governorates (Figure 17).

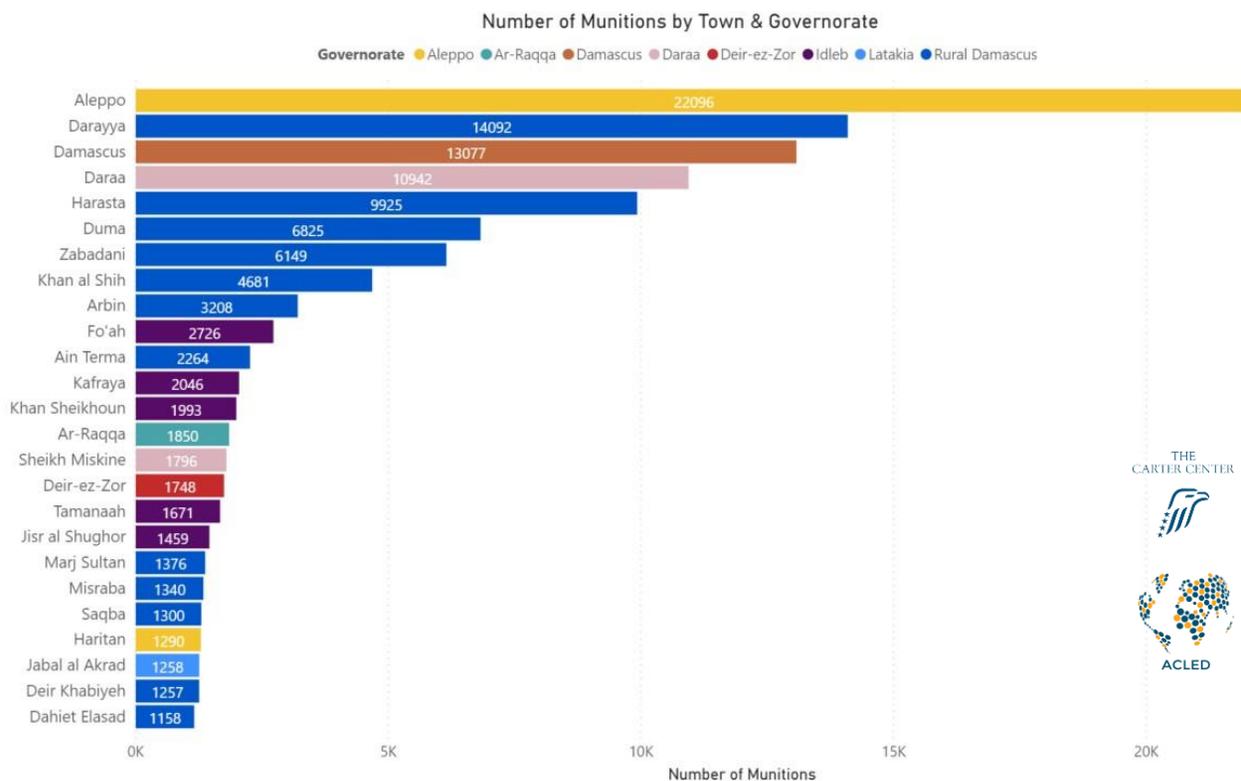


Figure 17. The 25 communities that saw nearly half of all munitions use in southern Syria, northwest Syria, northeast Syria, and areas around Damascus.

If applying the baseline failure rate of 10% to these explosive munitions (see [Conclusions section in Report 3](#)), there are a minimum of 26,726 unexploded munitions in Syria. Considering that in [Iraq](#) it took three years to destroy 11,549 UXO and landmines in federal and Kurdish Regional Government-controlled parts of the country, the challenge that faces the Syrian government and its people cannot be underestimated.

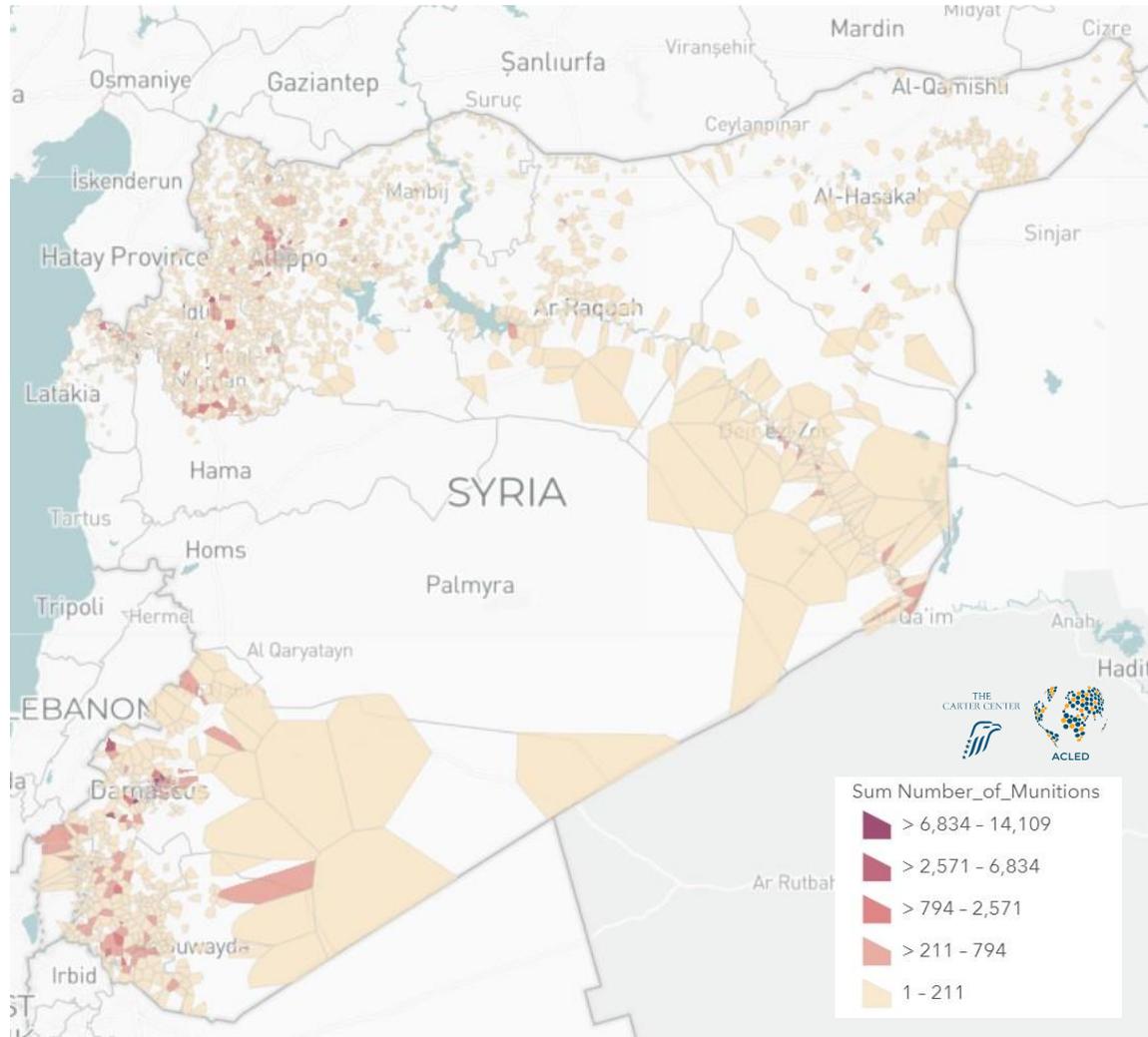


Figure 18. Map of explosive munitions totals per community polygon. Suburbs in Rural Damascus (such as Darayya) and neighborhoods in Aleppo city

Appendix - Terminology

Terminology used in the explosive weapons clearance and demining field is highly specialized and often used loosely outside the sector. The following section highlights commonly used terms in this study and the demining field. Definitions for these terms were compiled from [International Mine Action Standards \(IMAS 04.10\) Second Edition \(May 2013\)](#) as well as from [Conflict Event Data and Beyond](#) from World Bank Training Workshop, March 2018.

Ammunition, munition, or munitions are complete devices charged with explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological, or chemical material for use in military operations, including demolition. In common usage, “munitions” are often referred to as military weapons, ammunition, and equipment.

Clearance in the context of mine action refers to the tasks or actions to ensure the removal and/or the destruction of all mine and ERW (see below) hazards from a specified area to a specified depth.

Cluster Munition(s) refers to a conventional munition that is designed to disperse or release explosive submunitions that each weigh less than 20kg and includes those explosive submunitions. It does not include a) munition or submunition designed to dispense flares, smoke, pyrotechnics, or chaff, or a munition designed exclusively for an air defense role; b) a munition or submunition designed to produce electrical or electronic effects; c) a munition that, in order to avoid indiscriminate area effects and the risks posed by unexploded submunitions, has all of the following characteristics (i) each munition contains fewer than 10 explosive submunitions; (ii) each explosive submunition weighs more than 4kg; (iii) each explosive submunition is designed to detect and engage a single target object; (iv) each explosive submunition is equipped with an electronic self-destruction mechanism; and (v) each explosive submunition is equipped with an electronic self-deactivating feature.

Demining involves activities that lead to the removal of mine and ERW hazards, including technical survey, mapping, clearance, marking, postclearance, documentation, community mine action liaising and handover of cleared land. International Mine Actions Standards (IMAS) considers mine and explosive remnants of war (ERW) clearance one part of the demining process.

Explosive Ordnance Disposal (EOD) is the detection, identification, evaluation, rendering safe, recovery, and disposal of explosive ordnance or munitions.

Explosive Ordnance (EO) or munitions refers to all munitions containing explosives, nuclear fission or fusion materials, and biological and chemical agents. This includes a broad range of weapons that use components that are explosive in nature, such as bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket, and small-arms ammunition; all mines, torpedoes, and depth charges; pyrotechnics; clusters and dispensers; clandestine and improvised explosive devices. The explosive munitions included in this study are airstrikes, incendiary airstrikes, barrel bombs, cluster munitions, drone attacks, rockets, improvised rockets, incendiary rockets, artillery, incendiary artillery, tank shelling, mortars, shelling of unknown type, incendiary shelling, anti-tank guided missiles (ATGM), rocket-propelled grenades (RPG), grenades, suicide vehicle-borne improvised explosive devices (SVBIEDs), vehicle-borne improvised explosive devices (VBIEDs), person-borne improvised explosive devices (PBIED), improvised explosive devices (IED), unidentified explosives, landmines, and unexploded ordnance of unidentified type (UXO).

Explosive Remnants of War (ERW) refers to both abandoned explosive ordnance and unexploded ordnance (UXO), though not landmines. These are all explosive munitions left behind after a conflict and can be used or unused. This includes conventional ground- and air-launched explosive weapons, such as artillery and cluster munitions, as well improvised weapons.

Improvised Explosive Device(s) (IED) are devices placed or fabricated in a makeshift or improvised manner (with whatever materials are available) incorporating explosive material, destructive, lethal, noxious, incendiary, pyrotechnic materials, or chemicals designed to destroy, disfigure, distract, or harass.

Landmines are explosive devices designed to lie hidden in an area (sometimes for years) and kill or injure people who trigger them. These victim-triggered devices can be classified as anti-personnel, which are activated by a person or animal stepping on them, or anti-vehicle, which are activated when a vehicle drives over them. The International Mine Ban Treaty prohibits their use, and their clearance is conducted in a specialized way. Increasingly, this category covers improvised explosive devices (IEDs), which act as improvised landmines as they are also typically victim-triggered.

Unexploded Ordnance (UXO) refers to munitions that are used in conflict and for some reason fail or partially fail to detonate. These unstable explosive devices are left behind during and after conflicts and pose dangers similar to landmines.

For queries or comments about this report, please contact kate.keator@cartercenter.org

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THE CARTER CENTER SYRIA PROJECT'S CONFLICT MAPPING

Since 2012, The Carter Center's Conflict Resolution Program has endeavored to analyze open-source information related to the Syrian conflict in as much detail as possible, with the goal of assisting mediators and conflict responders with up-to-date, detailed analysis of developments on the ground. Using these publicly available resources, as well as information gleaned from regular consultations with stakeholders, the Center has documented and mapped 155,000 conflict events in Syria, with support from ACLED, as well as the ever-changing relations among armed groups. For more information, visit our [Support for Peace in Syria](#) page on The Carter Center website.

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