small arms survey

NUMBER 46 • OCTOBER 2014

Research Notes WEAPONS & MARKETS

Countering Improvised Explosive Devices

Insurgents are increasingly using improvised explosive devices (IEDs) against government forces and civilians.[1] The ease of access to components and low-tech assembly requirements have fuelled the proliferation of these weapons. While IEDs are often constructed from commercially available and relatively inexpensive products—such as ammonium nitrate, acetone, hydrogen peroxide, and potassium chlorate (WCO, 2013, p. 3)—the main charge and booster can also be sourced from conventional ammunition, such as artillery shells and mortar bombs (Wilkinson, Bevan, and Biddle, 2008, p. 137). As discussed in this Research Note, effective stockpile management of such conventional munitions[2] is key to curbing the use of stockpile-derived materials in IED fabrication. The Note highlights ongoing counter-IED efforts, building on the Small Arms Survey's earlier work on these devices.[3]

Trends and humanitarian impacts

Although the use of IEDs is highest in Afghanistan, Iraq, Pakistan, and Syria, they are a global problem. Between 2011 and 2013, more than 4,300 IED events in 66 countries resulted in an estimated 65,400 casualties,[4] as recorded by the Action on Armed Violence Explosive Violence Monitoring Project.[5] In 2013 alone, 1,455 IED incidents in 41 countries claimed almost 27,000 casualties, the vast majority of them civilian (AOAV, 2014).[6] Although these figures offer only a conservative estimate of IED attacks and related civilian casualties, they reveal a clear upward global trend between 2011 and 2013, with IEDs increasingly being used in populated areas, markets, and other sites of congregation. Table 1 shows the ten most heavily affected countries in this time period.[7]

The disproportionate impact of IEDs on civilians is evident both in lives lost and in physical injuries. In the countries listed in Table 1, civilians accounted for more than 80 per cent of all casualties: 70 per cent of all deaths and more than 85 per cent of all injuries. In addition to these costs, the long-term economic, social, and psychological damage of IEDs can be significant. Furthermore, by blocking access to services, fields, and transport routes, IEDs have a real—if still unmeasured—impact on long-term security and development (Dodd and Perkins, 2014, p. 2).

Table 1 **Countries experiencing the highest number of IED casualties, 2011–13**

Country	No. of IED incidents	Total casualties	Civilian deaths	Civilian injuries	Armed state, non-state, and security actor deaths	Armed state, non-state, and security actor injuries
Iraq	1,596	27,782	5,671	18,742	1,455	1,914
Pakistan	568	10,160	2,092	6,190	752	1,126
Afghanistan	932	8,005	1,911	3,540	1,371	1,183
Syria	218	5,586	1,233	3,347	721	285
Nigeria	107	2,101	687	1,182	143	89
Thailand	151	1,548	61	987	99	401
Yemen	70	1,407	140	380	410	477
Lebanon	17	1,330	101	1,198	5	26
Somalia	89	1,298	376	697	151	74
India	110	1,093	113	737	60	183
Totals	**3,858**	**60,310**	**12,385**	**37,000**	**5,167**	**5,758**

Source: AOAV (2014)

IED proliferation and stockpile mismanagement

Explosive items such as military demolition materials, small-arms ammunition, and large-calibre ammunition—including artillery shells and mortar bombs—are all useful components for IED fabrication and thus need to be effectively controlled (Wilkinson, Bevan, and Biddle, 2008, p. 137; see photo). In countries where IED use by insurgents is high—such as Afghanistan, Iraq, Somalia, Syria, and Yemen—mismanagement of government stockpiles has been a serious problem. In Iraq, for example, at least half of the estimated 650,000 tons of explosives held by the regime in 2003 were not effectively secured following the US-led intervention; monitoring of IED attacks in Iraq showed an exponential increase, from 100 IED attacks per month in 2003 to 100 attacks per *week* in 2004 to 100 attacks per *day* in 2007 (Berman and Leff, 2008, p. 14). In Libya, unknown quantities of explosives were lost in 2011 (Binnie and Wright, 2013, p. 233). The use of large-calibre artillery shells as the main explosive charge of IEDs is a frequent tactic of a wide range of insurgents, including Al Shabaab in Somalia (Schroeder and King, 2012, p. 339).

Effective stockpile management and the destruction of surplus defence and security sector weapons and ammunition—key factors in any country's internal stability—can serve to mitigate the proliferation of IEDs (King, 2011, p. 1). In countries that are experiencing conflict, military stockpiles require particular attention, not least to lower the risk that lost or stolen munitions may eventually be used to manufacture IEDs.[8] Such management requires investment in infrastructure, professional capacity building, and sustained government commitment, which are not always available in conflict-affected nations. However, coordinated international efforts are under way to share knowledge and expertise and to develop harmonized standards for strengthened stockpile management. The International Ammunition Technical Guidelines (IATG) were developed under the UN's Safe*r*Guard Programme to provide technical guidance on stockpile management of conventional ammunition; they cover issues such as risk management, infrastructure, and operations of explosive storage facilities, as well as accounting, processing, transport, security, demilitarization, and the destruction of ammunition (United Nations, 2011a).[9]

Counter-IED initiatives and the need for increased information sharing

The increasing use and ever-improving technological sophistication of IEDs reflects the ability of insurgents to adapt and evolve in response to counter-IED measures. The rapid and widespread transfer of capacity among these highly mobile and increasingly well-funded and organized groups is largely conducted via the Internet. Porous borders facilitate the smuggling of IED components (UNMAS, n.d.); meanwhile, corruption and weak administrative capacities undermine regulations to stem the flow of IED precursors (Binnie and Wright, 2013, p. 243).

Despite these challenges, counter-IED (C-IED) initiatives are making progress. Advances in vehicle-mounted C-IED technologies are being complemented by other innovations, such as the defence industry surveillance and inspection technologies sponsored by the Joint Improvised Explosive Device Defeat Organization (JIEDDO).[10] In addition, efforts have been made to enhance controls of precursor chemicals at borders—as demonstrated by Programme Global Shield, a joint initiative of the World Customs Organization, the United Nations Office on Drugs and Crime, and the International Criminal Police Organization (INTERPOL).[11] Another key aspect of C-IED efforts is the exploitation of information, biometric data, and materials following IED attacks; forensic data collection, along with intelligence and information analysis, can lead to more effective prevention strategies and contribute to judicial processes against individuals and organizations that use IEDs.[12]

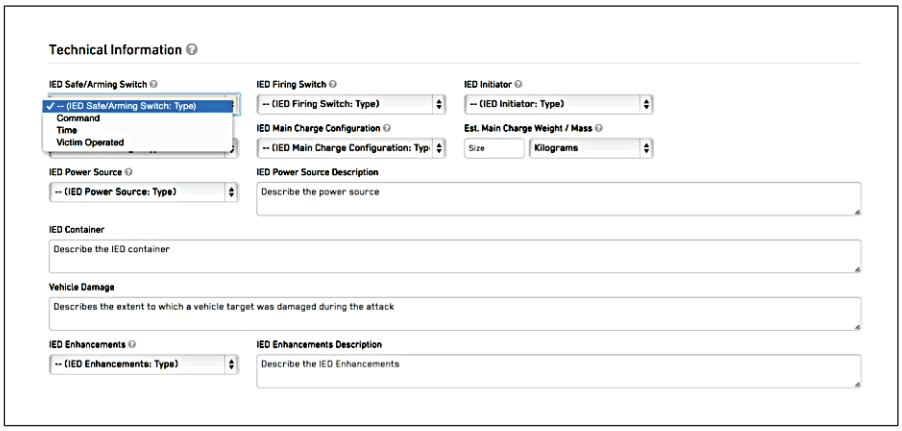
If meaningful action is to be taken to curb the impact of IEDs, the scale, distribution, and details of IED fabrication and use must be better understood. In 2014 the Group of Experts of the High Contracting Parties to Amended Protocol II of the Convention on Certain Conventional Weapons (CCW) highlighted the need for enhanced information exchange on national measures and best practices regarding C-IED efforts (Group of Experts, 2014). Although numerous countries support various regional Bomb Data Centres, there is scope for improved information sharing on IEDs and the diversion and illicit use of material that can be used for IEDs between countries and other relevant actors (see Box 1).

Free Syrian Army fighters prepare explosive materials. Latakia province, Syria, February 2014. © Alaa Khweled/Reuters

Box 1 **The AXON Global IED Partnership**

The AXON Global IED Partnership is a pilot programme initiated in April 2014 by the Australian Defence Force in partnership with Palantir Technologies. AXON is a secure web-based system that captures unclassified IED event data, which it then makes available to contributing governments. The IED event information repository is designed with intuitive tools to facilitate collaboration and information sharing. Through advanced analytical methods, AXON allows stakeholders to search and identify IED events by date, location, type, or component; the system is based on an established IED lexicon to facilitate information sharing across borders, jurisdictions, and languages (ADF CIEDTF, 2014; see Figure 1).

Figure 1 **AXON IED data entry page**



An excerpt from the AXON IED event data entry form. The system also allows bulk loading of data. © AXON

The systematic monitoring and collection of data relating to IED events contribute to efforts to curb insurgents' use of the devices. In addition, efforts are under way to stigmatize IED use among armed non-state actors that aim to gain political legitimacy; the organization Geneva Call, for instance, encourages insurgents to demonstrate their respect for international humanitarian law by refraining from causing civilian casualties (Geneva Call, 2011). Similarly, the UN Assistance Mission in Afghanistan is engaged in awareness raising on the breach of international humanitarian law in its efforts to reduce Taliban use of IEDs in civilian-dominated areas; at the same time, the mission is supporting the institutionalization of C-IED efforts via the Afghan National Security Forces (United Nations, 2014).

Conclusion

Curbing the use of IEDs requires concerted, multifaceted, cross-jurisdictional, international efforts. As this Note highlights, improvements in stockpile management will help to reduce the amount of explosive material available for use in IEDs. By paying greater heed to the IATGs and being more active in the control of conventional munitions stockpiles, states and international bodies can mitigate the proliferation of IEDs. Concurrently, they can step up the sharing of information on IED events to enhance awareness of the threat and to inform national and international counter-IED decision-making. Wider state participation in international forums such as the CCW and its Group of Experts under Amended Protocol II is also likely to strengthen global C-IED efforts. ■

Notes

1 The 2011 *International Ammunition Technical Guidelines* define an IED as 'a device placed or fabricated in an improvised manner incorporating explosive material, destructive, lethal, noxious, incendiary, pyrotechnic materials or chemicals designed to destroy, disfigure, distract or harass' (United Nations, 2011b, p. 15).

2 As is common practice, this Research Note uses the term 'munitions' to refer to military weapons, ammunition, and equipment; however, the term can also be used to refer solely to complete rounds of ammunition.

3 See, for example, Berman and Leff (2008); Binnie and Wright (2013); and Wilkinson, Bevan, and Biddle (2008). This Note also benefitted from expert round-table discussions on the humanitarian impact of IEDs, co-hosted by Chatham House and Action on Armed Violence (AOAV) in London on 18 September 2014.

4 Of these casualties, 12,878 were civilian deaths and 40,220 were civilian injuries—compared to 5,552 armed actor deaths and 6,751 armed actor injuries (AOAV, 2014).

5 The AOAV Explosive Violence Monitoring Project gathers data from English-language open source documents and thus records only a portion of all IED incidents.

6 The 27,000 casualties included almost 5,800 civilian deaths and an estimated 2,000 deaths among armed actors (state, non-state, and security actors); of the 19,190 injuries, an estimated 17,036 were civilian while 2,154 affected armed actors (AOAV, 2014).

7 For example, in Yemen's Abyan province, 2,685 IEDs were encountered between June and December 2012, all within an area of approximately 1 million m² (or an approximate IED spatial density of one device per 414 m²). This is one of the highest densities of IEDs in the world (Wilkinson, 2013, p. 6). IEDs are also a growing problem in other areas, including in northern Mali, where conflict flared in early 2012, leading to the deployment of French military forces and the establishment of the UN Multidimensional Integrated Stabilization Mission in Mali in 2013. Although Mali does not appear in the AOAV data set, it is important to note that since January 2013, IEDs have killed 118 people and injured 201 others in the country, including Malian forces, peacekeeping troops, French forces, and civilians (UNMAS, 2014a, p. 1; author's correspondence with UNMAS Mali Programme Officer, 22 October 2014).

8 For example, the conflict in Ukraine has raised concerns about the management of vast stockpiles; see Luhn (2014).

9 The IATGs were developed under the guidance of the Conventional Arms Branch of the UN Office for Disarmament Affairs.

10 The 2014 JIEDDO research challenge elicited potential solutions to the IED threat, including unmanned systems, micro-radars, seismic and electromagnetic sensors, and robots (JIEDDO, 2014).

11 Programme Global Shield aims to prevent the diversion of the 14 main precursor chemicals used in manufacturing IEDs: acetic anhydride, acetone, aluminium powder and flakes, ammonium nitrate, calcium ammonium nitrate, hydrogen peroxide, nitric acid, nitromethane, potassium chlorate, potassium nitrate, potassium perchlorate, sodium chlorate, sodium nitrate, and urea (WCO, 2013, p. 3). Many of these chemicals are readily available in fertilizers, cleaning solvents, bleach, and fireworks. Initiated in 2010, Global Shield now counts 94 participating states whose customs and police administrations work together to identify and seize illicit shipments of precursor chemicals. As of June 2014, Global Shield had led to 87 enforcement actions and 79 seizures, including more than 242 metric tons of solid precursors and more than 55,000 litres of fluid chemicals (author correspondence with World Customs Organization programme manager, 23 September 2014).

12 Important lessons have emerged from the EU Multinational Theatre Exploitation Laboratory, established in 2011 in Kabul to analyse elements of IED incidents and to carry out forensic analysis, chemical analysis, and the identification of electrical components (Group of Experts, 2014).

References

ADF CIEDTF (Australian Defence Force Counter Improvised Explosive Device Task Force). 2014. 'AXON: The Global IED Partnership.' Information brochure.

AOAV (Action on Armed Violence). 2014. 'Explosive Violence Monitoring Project (EVMP) IED Casualties Analysis (2011–2013).' Unpublished Excel file.

Berman, Eric G. and Jonah Leff. 2008. 'Light Weapons: Products, Producers, and Proliferation.' In Small Arms Survey. *Small Arms Survey 2008: Risk and Resilience.* Cambridge: Cambridge University Press, pp. 7–41. <http://www.smallarmssurvey.org/fileadmin/docs/A-Yearbook/2008/en/Small-Arms-Survey-2008-Chapter-01-EN.pdf>

Binnie, Jeremy and Joanna Wright. 2013. '"Infernal Machines": Improvised Explosive Devices.' In Small Arms Survey. *Small Arms Survey 2013: Everyday Dangers*. Cambridge: Cambridge University Press. <http://www.smallarmssurvey.org/fileadmin/docs/A-Yearbook/2013/en/Small-Arms-Survey-2013-Chapter-10-EN.pdf>

Dodd, Henry and Robert Perkins. 2014. 'Explosive Events: Monitoring Explosive Violence in 2013.' London: Action on Armed Violence. <http://aoav.org.uk/wp-content/uploads/2014/05/AOAV-Explosive-Events-2013.pdf>

Geneva Call. 2011. 'Geneva Call's Experience Engaging Armed Non-state Actors on Improvised Explosive Devices and Explosive Remnants of War.' Geneva: Geneva Call. 8 April. <http://www.genevacall.org/wp-content/uploads/dlm_uploads/2013/11/20110408_experience_engaging_armed_non-state_actors.pdf>

Group of Experts (Group of Experts of the High Contracting Parties to Amended Protocol II of the Convention on Certain Conventional Weapons). 2014. *Coordinators' Report on Improvised Explosive Devices*. <http://www.unog.ch/80256EDD006B8954/(httpAssets)/4344AE557961FF51C1257D4F003DAD27/$file/Coordinator's+Report+on+IEDs_Advance+Version.pdf>

JIEDDO (Joint Improvised Explosive Device Defeat Organization). 2014. 'Innovative Acquisition Promoted through "Culvert Denial Challenge".' <https://www.jieddo.mil/news_story.aspx?ID=1538>

King, Benjamin. 2011. *Safer Stockpiles: Practitioners' Experiences with Physical Security and Stockpile Management (PSSM) Assistance Programmes*. Occasional Paper No. 27. Geneva: Small Arms Survey. <http://www.smallarmssurvey.org/fileadmin/docs/B-Occasional-papers/SAS-OP27-Safer-Stockpiles.pdf>

Luhn, Alec. 2014. 'Protesters in Ukraine Guard Biggest Weapons Cache in Eastern Europe.' *Guardian*. 24 April. <http://www.theguardian.com/world/2014/apr/24/protesters-ukraine-weapons-cache-mine>

Schroeder, Matt and Benjamin King. 2012. 'Surveying the Battlefield: Illicit Arms in Afghanistan, Iraq, and Somalia.' In Small Arms Survey. *Small Arms Survey 2012: Moving Targets*. Cambridge: Cambridge University Press. <http://www.smallarmssurvey.org/fileadmin/docs/A-Yearbook/2012/eng/Small-Arms-Survey-2012-Chapter-10-EN.pdf>

United Nations. 2011a. 'International Ammunition Technical Guidelines.' <http://www.un.org/disarmament/un-saferguard/guide-lines/>

—. 2011b. *International Ammunition Technical Guideline: Glossary of Terms, Definitions and Abbreviations*. IATG 01.40:2011(E). <http://www.un.org/disarmament/convarms/Ammunition/IATG/docs/IATG01.40.pdf>

—. 2014. *Afghanistan—Midyear Report 2014: Protection of Civilians in Armed Conflict*. Kabul: United Nations. <http://unama.unmissions.org/LinkClick.aspx?fileticket=m_XyrUQDKZg%3D&>

UNMAS (United Nations Mine Action Service). 2014a. 'Mali Fact Sheet September 2014.' <http://www.humanitarianresponse.info/system/files/documents/files/Mali%20Fact%20Sheet%20September%202014_0.pdf>

—. 2014b. 'Weekly Update: Mali (Since Minusma Arrival).' Unpublished PowerPoint presentation. 17 October.

—. n.d. 'Improvised Explosive Devices.' Accessed 19 September 2014. <http://www.mineaction.org/issues/ied>

WCO (World Customs Organization). 2013. 'Programme Global Shield.' Brussels: WCO. <http://www.wcoomd.org/en/topics/enforcement-and-compliance/activities-and-programmes/programme-global-shield.aspx>

Wilkinson, Adrian. 2013. 'IED Threat Assessment: Abyan, 1 February.' Unpublished document. Sana'a: United Nations Development Programme Yemen.

—, James Bevan, and Ian Biddle. 2008. 'Improvised Explosive Devices: An Introduction.' In James Bevan, ed. *Conventional Ammunition in Surplus: A Reference Guide*. Geneva: Small Arms Survey, pp. 136–44. <http://www.smallarmssurvey.org/fileadmin/docs/D-Book-series/book-05-Conventional-Ammo/SAS-Conventional-Ammunition-in-Surplus-Book-16-Chapter-14.pdf>

Acknowledgements

The author gratefully acknowledges the valuable input provided by Maj. Simon Patching (ADF), Robert Perkins (AOAV), Marc Vaillant (UNMAS Mali), Jeffrey Wickett (WCO), and Adrian Wilkinson (arms expert, UN Monitoring Panel for Sudan).

For more information on stockpile management and security, please visit www.smallarmssurvey.org/?pssm.html

About the Small Arms Survey

The Small Arms Survey serves as the principal international source of public information on all aspects of small arms and armed violence, and as a resource centre for governments, policy-makers, researchers, and activists. In addition to Research Notes, the Survey distributes its findings through Issue Briefs, Working Papers, Occasional Papers, Special Reports, Handbooks, a Book Series, and its annual flagship publication, the *Small Arms Survey*.

The project has an international staff with expertise in security studies, political science, international public policy, law, economics, development studies, conflict resolution, sociology, and criminology, and works closely with a worldwide network of researchers and partners.

The Small Arms Survey is a project of the Graduate Institute of International and Development Studies, Geneva. For more information, please visit:

www.smallarmssurvey.org

Publication date: October 2014

Credits

Author: Claudia Seymour

Copy-editing: Tania Inowlocki

Design and layout: Rick Jones (rick@studioexile.com)

Contact details

Small Arms Survey
47 Avenue Blanc
1202 Geneva
Switzerland

t +41 22 908 5777
f +41 22 732 2738
e info@smallarmssurvey.org