Non-state actors & WMD: Does ISIS have a pathway to a nuclear weapon?

Nada Eweiss

March 2016

INTRODUCTION

On March 2014, during the Nuclear Security Summit held in the Netherlands, President Obama identified his number one concern as being the prospect of a nuclear weapon going off in Manhattan.[1] UK Home Secretary Theresa May pinpointed her particular fear of the so-called Islamic State (ISIS) acquisition of "chemical, biological or even nuclear weapons" in the "world's first truly terrorist state".[2] Fortunately, there has not yet been a nuclear or radiological terrorist attack, but the smuggling of nuclear material remains a pivotal threat to nuclear security. Al Qaeda has previously claimed that "acquiring WMD for the defense of Muslims is a religious duty,"[3] and the attacks of 9/11 have clearly demonstrated the capabilities of groups like Al Qaeda. More recently, the Islamic State, which is an offshoot of Al Qaeda in Iraq, has demonstrated its brutality through various operations (such as the attacks in Paris in late 2015), and has attracted foreign fighters to its extremist Wahhabist ideology.

The Wahhabi mantra enshrines the principle of monotheism, and deems rituals involving chanting and dancing, alongside the shrines and the churches as places endorsing shirk (idolatry) and polytheism.[4] As a result, ISIS emphasises the importance of eliminating any religious sect, not aligning with sunniism. Their religious discourse has provided them with justifications for the slaughtering of resistant populations, such as the Yazidis, and also has granted them the ability to regard Shi'ism and Sufism as *biddah* (heretical innovations).[5]

ISIS members and supporters appear to glorify martyrdom and self-sacrifice. Promises of a post martyrdom afterlife such as the *72 Huris (virgins of Paradise*)[6] play an indispensable role in convincing its members that they are on the righteous path to heaven, which proves an

[1] Douglas Birch and R Jeffrey, "An Unknown Black Marketeer From Russia May Have The Fuel For A Nuclear Bomb", Vice News, 2015, https://news.vice.com/article/an-unknown-black-marketeer-from-russia-may-have-the-fuel-for-a-nuclear-bomb.

[2] Holly Watt, "Theresa May: Isil Will Become Nuclear Threat If We Don't Stop Them", The Telegraph, 2014, http://www.telegraph.co.uk/news/uknews/terrorism-in-the-uk/11130354/Theresa-May-Isil-will-become-nuclear-threat-if-we-dont-stop-them.html.

[3] Rolf Mowatt-Larssen, *Al Qaeda Weapons Of Mass Destruction Threat: Hype Or Reality?* (Boston: Harvard Kennedy School - Belfer Center for Science and International Affairs, 2010), http://belfercenter.ksg.harvard.edu/publication/19852/al_qaeda_weapons_of_mass_destruction_threat.html.

[4] Patrick Cockburn, *The Rise Of Islamic State*. London: Verso, 2015, 107.

[5] Charles Allen, *God's Terrorists*. London: Little, Brown, 2006, 44.

[6] Elisabeth Kendall, and Ewan Stein, *Twenty-First Century Jihad*. London: I.B.Tauris & Co Ltd, 2015, 87.

incentive to wage war. Many also see martyrdom as a way to redemption for their sins.[7]

Their demonstrated extremism serves as an indication of the extent to which they will go in order to enforce their goals. Though the claim by a British Jihadist that ISIS had acquired the materials for a dirty bomb[8] is questionable, their intentions and pathways to other weapons of mass destruction, even nuclear, remains unclear. Given the motivation, were nuclear weapons within the reach of ISIS, they would be likely to use or threaten use of them. Moreover, the group would be unsesceptible to traditional deterrence via threat of second strike as they "lack the minimum degree of risk-adversity to be capable of being deterred; religious fanaticism has made them immune from fear of death."[9]

FUNDING SOURCES

Oil: ISIS controls a number of cities in Syria and Iraq, and up to 60% of Syria's total oil output. Their oil undercuts the world market price and sells for as little as "$18 per barrel…when Brent, a world price reference crude oil was selling for about $107 per barrel".[10] Their oil is smuggled through Jordan and Turkey, and generates up to $3 million per day in income for the organisation. These profits are probably declining as a result of airstrikes targeted on oil facilities.[11]

Taxation: ISIS has placed itself in a position to be able to tax businesses and individuals wishing to do business in the territory that it occupies, particularly pharmacies, telecommunication businesses, and farmers. Moreover, ISIS has incorporated a tax, known as *jizyah*, solely addressed towards Christian communities that reside under their rule. The actual amount of the payment is undefined, but Christians are presented with an ultimatum; to either pay the *jizyah,* convert to Islam, or by death.

Ransom of hostages: A 2014 UN report suggested that between $35-$45 million was income generated from ransom payments.[12]

Wealthy Donors: Many individuals and even states in the Gulf region have vested interests in supporting ISIS, not least as a way of weakening President Assad's grip on power in Syria. Estimates indicate that ISIS received up to $40 million from individuals from Kuwait, Qatar, Saudi Arabia and the UAE between 2013-2014.[13]

Sales of Antiquities: ISIS has control of 4,500 cultural sites. These incorporated historical artifacts, archeological sites and museums. Some were destroyed, others were sold on, with an estimated income yielded of $100 million a year.[14]

Theft: A US intelligence officer estimates that ISIS illegally seized $1.5 billion in cash and military supplies when they took over Mosul.[15]

WMD TECHNOLOGY & COMPONENTS ALREADY ACQUIRED

Biological weapons: A laptop belonging to an ISIS supporter, was found in November 2014. It contained material on how to develop "bubonic

[7] Christian Amanpour, and Aimen Dean, *Jihadist Turned Spy: ISIS Unleashes "Inner Psychopath"*. Video, 2015. http://edition.cnn.com/videos/tv/2015/03/23/intv-amanpour-aimen-dean-former-jihadist-mi5.cnn

[8] Catherine Phillips and Damien Sharkov, "ISIS has the materials to build a dirty bomb, but its nothing to worry about", Newsweek, 2015, http://europe.newsweek.com/isis-have-materials-build-dirty-bomb-its-nothing-worry-about-290015?rm=eu

[9] Guglielmo Verdirame, 'The 'Sinews Of Peace': International Law, Strategy And The Prevention Of War'. *Ecgi.Ssrn.Com*, 2006. http://ssrn.com/abstract=2297766, 16.

[10] Ma'ad Fayad. 'ISIS In Control Of 60 Percent Of Syrian Oil: Sources'. *Asharq Al-Awsat*, 2014. http://www.aawsat.net/2014/07/article55334174/isis-in-control-of-60-percent-of-syrian-oil-sources.

[11] Carla E.Humud, Robert Pirog, and Liana Rosen. *Islamic State Financing And U.S. Policy Approaches*. Washington, D.C.: Congressional Research Service, 2015. https://www.fas.org/sgp/crs/terror/R43980.pdf, 16.

[12] *Ibid*.,10.

[13] Ana Swanson, "12 Ways ISIS Gets Funding", *World Economic Forum*, 2015, https://agenda.weforum.org/2015/11/12-ways-isis-gets-funding/?utm_content=buffer0c0e6&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer.

[14] *Ibid.*

[15] Martin Chulov, "How An Arrest In Iraq Revealed Isis's $2Bn Jihadist Network", The Guardian, 2014, http://www.theguardian.com/world/2014/jun/15/iraq-isis-arrest-jihadists-wealth-power.

plague from infected animals and turn it into a weapon".[16]

Chemical weapons: ISIS seized a chemical weapons facility called Muthana in June 2014. This was a former Iraqi government facility believed to have approximately 2,500 rockets.[17] Most were filled with sarin, a deadly nerve agent, according to Mohamed Ali Alhakim, Iraq's UN ambassador.[18]

Low-enriched uranium: The IAEA reported that ISIS seized 40 kilograms of natural uranium from Mosul University in Northern Iraq in July 2014.[19] There are many obstacles that ISIS would be unlikely to overcome in turning this low-enriched uranium into a nuclear device, but it could be used to fashion a dirty bomb.

ESCALATION TO A NUCLEAR DEVICE

For ISIS to acquire a nuclear weapon they would have to either build an improvised nuclear device (IND), or acquire an assembled nuclear weapon. Both involve a series of significant obstacles, even for well qualified technicians.

Dina Esfandiary, a MacArthur Fellow at the Centre for Science and Security Studies at King's College London, points out the scale of industrial endeavour necessary to construct a nuclear weapon:

> *It took the United States, with its vast resources and advanced knowhow, six years to develop a nuclear device. It took China roughly 10 years and Pakistan more than two decades. Needless to say, even for an established country, developing a nuclear weapon is not simple.*[20]

We should be cautious about overstating the risk, but the risk nevertheless exists. After all, hiding a programme from prying eyes in one of the many stateless zones is possible. South Africa's nuclear weapons programme was hidden in a building that was essentially a warehouse, with no indication of clandestine activity. [21]

It may not be difficult to find much of the necessary information to the make a crude nuclear weapon on the internet, but accurate blueprints are a requirement for constructing an IND.[22] ISIS has attracted engineers and scientists as recruits which could form the backbone of a scientific team using stolen blueprints to construct crude INDs.

Though unlikely, it is not impossible. Dr A.Q. Khan, using the resources of the Pakistani state, constructed an global underground nuclear smuggling network selling nuclear technologies and Chinese-designed warhead blueprints to Libya and Iran. He was caught trafficking centrifuge components for uranium enrichment to Libya's Muammar Al Ghaddafi.[23] It is not beyond the realms of possibility that ISIS could acquire blueprints, though the designs would be crude and

[16] European Parliament, ISIL/Da'esh And 'Non-Conventional' Weapons Of Terror (European Parliament, 2015), http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/572806/EPRS_BRI%282015%29572806_EN.pdf.

[17] Andrea Taylor, "FACTBOX: Evolution Of The Islamic State's Chemical Weapons Capacity", Blog, Atlantic Council, 2015, http://www.atlanticcouncil.org/blogs/menasource/factbox-evolution-of-the-islamic-state-s-chemical-weapons-capacity.

[18] Catherine Phillips and Damien Sharkov, "ISIS has the materials to build a dirty bomb, but its nothing to worry about", Newsweek, 8 December 2014, http://europe.newsweek.com/isis-have-materials-build-dirty-bomb-its-nothing-worry-about-290015

[19] Michelle Nichols, "Exclusive: Iraq Tells U.N. That 'Terrorist Groups' Seized Nuclear Materials",Reuters, 2014, http://www.reuters.com/article/us-iraq-security-nuclear-idUSKBN0FE2KT20140709.

[20] Dina Esfandiary and Mathew Cottee, "The Very Small Islamic State WMD Threat", Bulletin Of The Atomic Scientists, 2014, http://thebulletin.org/very-small-islamic-state-wmd-threat7729.

[21] Matthew Bunn and Anthony Wier. "Terrorist Nuclear Weapon Construction: How Difficult?." Chap. in*Confronting the Spector of Nuclear Terrorism*. Philadelphia: The Annals of the American Academy of Political and Social Science, September 2006.

[22] Christoph Wirz and Emmanuel Egger, "Use of nuclear and radiological weapons by terrorists?", International Review of the Red Cross, Vol. 87 No. 859, 2005. https://www.icrc.org/eng/assets/files/other/irrc_859_egger_wirz.pdf, 499.

[23] Graham T Allison, *Nuclear Terrorism –The Ultimate Preventable Catastrophe*, (New York: Times Books/Henry Holt, 2004), 61.

inefficient.[24] But the principle obstacle to a working device is the essential fissile material.

ENRICHING URANIUM

Highly enriched uranium (HEU) (U235, U233), and Plutonium (Pu239) are the three main fissile materials used for all current types of nuclear bombs involving either implosion or gun-type bombs. Uranium that occurs naturally needs to be converted into uranium hexafluoride gas and enriched from 0.7% U235 to approximately 90% weapons grade uranium before being converted into a metal and incorporated into a bomb core.
HEU is dangerous to handle and challenging to prepare because it is far more unstable and radioactive than natural uranium, and ignites spontaneously in the air at 150-175° C.

Enrichment can be achieved through gas centrifuge cascades, gaseous diffusion, laser separation or other less common techniques. These require specialist materials, precision, extensive testing and development. Plutonium does not occur in nature, and is a product of the chain reaction in a nuclear reactor core. It is extracted from the waste stream using reprocessing technologies, and presents just as many complications to non-state actors.

It is far more likely that fissile materials would be acquired by buying materials on the black market, or by stealing from orphaned sources or nuclear facilities. However, for uranium to be useful in a nuclear weapon it needs to be highly enriched; most nuclear reactors use low enriched uranium that would require further specialised enrichment in order to be relevant. There remain some civilian research and power reactors that do use HEU, as do some naval propulsion reactors.[25] If stolen in some forms it would require industrial processes to convert to a form useful for weapons. For example, research reactor fuel is “a mixture of uranium and aluminium, with aluminium cladding”, requiring a separation process that dissolves pieces of fuel in acid to separate the uranium.[26]

Theoretically, such processes are not beyond the capability of non-state actors. Al-Qaeda has been indirectly involved in extracting heroine from opium using similar procedures, “and because of the toxicity of airborne heroin, primitive glove boxes of the kind that might be used to handle nuclear material are sometimes used in the illegal narcotics industry as well”.[27]

NUCLEAR SMUGGLING

The United Nations International Atomic Energy Agency’s Incident and Trafficking Database recorded 1,088 incidents of theft, loss or smuggling of nuclear material around the world between 1993 and 2013. Nuclear smuggling, involving organised criminal networks with lucrative operations often operating in under-regulated and corrupt economies, presents a prime threat to nuclear security.[28]

Soon after the dissolution of the Soviet Union, countries near the Black Sea were rife with profound unemployment, political dissent, porous and under policed borders, and an abundance in unregulated sources of nuclear material. [29] A third of the world’s HEU-fuelled-research reactors are in this region.[30] These are often neglected and under-supervised, making it even more difficult for western countries to provide assistance and neutralise the threat. Those seeking to acquire WMD or fissile material would deem it an optimum environment. Especially since there is no figure to

[24] Christoph Wirz and Emmanuel Egger, “Use of nuclear and radiological weapons by terrorists?”, International Review of the Red Cross, Vol. 87 No. 859, 2005. https://www.icrc.org/eng/assets/files/other/irrc_859_egger_wirz.pdf, 500.

[25] *Ibid.*

[26] Matthew Bunn and Anthony Wier. "Terrorist Nuclear Weapon Construction: How Difficult?." Chap. in*Confronting the Spector of Nuclear Terrorism*. Philadelphia: The Annals of the American Academy of Political and Social Science, September 2006,137.

[27] *Ibid*., 138.

[28] Bruce Lawlor, "LAWLOR: Nuclear Trafficking: A Growing Threat", The Washington Times, 2011, http://www.washingtontimes.com/news/2011/jun/3/nuclear-trafficking-a-growing-threat/.

[29] *Ibid.*

[30] M. G. B. Lawlor, "The Black Sea: Center Of The Nuclear Black Market", Bulletin Of The Atomic Scientists 67, no. 6 (2011): 73-80, doi:10.1177/0096340211426506.

quantify how much material existed under the Soviet rule, and no way to determine how much has been lost.

There have been a number of incidents of nuclear smuggling in the region, most small and largely ignored by the media. Vitalie Bricaeg, an official within Moldova's Interior Ministry, referred in 2011 to Moldova's breakaway region, Transnistria, as an uncontrollable black hole, even with the involvement of Western Security services.[31] Teodor Chetrus, a former KGB informant, was arrested that year for attempting to carry out the first of five shipments of HEU amounting to 22 pounds – "a fifth of what might be needed to fuel a Hiroshima-sized nuclear explosion — but enough to power a more technically-advanced "implosion-style" nuclear bomb".[32] He was sentenced to only five years in prison. A wiretapped conversations exposed him saying," I am seeking an Islamic buyer because they will bomb the Americans".[33]

Often black market ogranisations mix nuclear smuggling with other high-value goods, like drugs, and are involved in widespread corruption. Georgia's security service arrested Oleg Khinstagov, a Russian native from North Ossetia, and three other Georgians, including a low-ranking Georgian interior ministry official, for attempting to sell HEU enriched to 89% U235 to "an Islamic buyer".[34]

[31] Mark Hay, "How Worried Should We Be About Moldova's Recent Uranium-Smuggling Bust?", Vice News, 2014, http://www.vice.com/read/moldovas-recent-uranium-smuggling-busts-arent-something-to-worry-about-at-least-not-yet-000.

[32] Douglas Birch and R Jeffrey, "An Unknown Black Marketeer from Russia may have the fuel for a nuclear bomb", Vice News, November 2015, https://news.vice.com/article/an-unknown-black-marketeer-from-russia-may-have-the-fuel-for-a-nuclear-bomb

[33] Desmond Butler, "Driven By Profit, Hatred Of U.S., Ex-Soviet Nuclear Smugglers Seek Islamist Clients", Japan Times, 2015, http://www.japantimes.co.jp/news/2015/10/07/world/driven-profit-hatred-u-s-ex-soviet-nuclear-smugglers-seek-islamist-clients/#.VofyGMCLS1s.

[34] Lawrence Scotts Sheets, "A Smuggler's Story", The Atlantic, 2008, http://www.theatlantic.com/magazine/archive/2008/04/a-smuggler-s-story/306736/?single_page=true.

PURCHASE OR THEFT OF A NUCLEAR WEAPON

The challenges associated with construction of a nuclear device may lead a non-state group towards buying or stealing a fully assembled nuclear weapon. It is unlikely that a state would sell a nuclear device to a non-state actor, risking threat of nuclear attack against its own public.[35]

However, some nuclear weapons are at risk of theft. Most nuclear weapons have Permissive Action Links (PALs), codes privy to a few and extremely challenging to unlock, but some do not.[36] Smaller tactical nuclear weapons are particularly vulnerable, not least as they are designed to be portable and have minimal safeguards. A combination of radicalised ideologies, minimal security, low pay, personnel shortages and secrecy could increase the risk of theft of weapons from any nuclear armed state, but some are more vulnerable than others.

DIRTY BOMBS

Radiological Disperal Devices (RDD), also known as "dirty bombs", are far more accessible to terrorist groups, and could have the advantage of having a psychological effect without necessarily being so devastating as to illicit a crushing response. Radiological materials are used in a large number of civilian applications, and are therefore easier to steal without detection. The construction of a dirty bomb is also relatively simple; incorporating the easily acquired material with conventional explosives for the purpose of distributing that material widely. No enrichment processes are involved in the making of a dirty bomb, eliminating a huge obstacle necessary for nuclear weapons. Additionally, the radiological material is greatly accessible and can be used directly without the need for any adjustments. The material can even be strapped to conventional explosives and disguised in the form of a suitcase.

Dirty bombs have the potential to cause panic and massive economic costs. Though a large dirty bomb is unlikely to cause many deaths beyond

[35] *Ibid.*

[36] Daisy Muibu, "Is It Possible To Deter Terrorists Willing To Use A Nuclear Device?"Current Affairs Society, 2015, http://www.currentaffairssociety.com/2882015-daisy-muibu1.html.

those caused by the conventional explosive, the radiation would need to be cleaned up before anyone would be willing to return to the area to live and work - a hugely expensive and complex operation.[37] People would suffer health impacts, some fatal, in the longer term, depending on the radioactive material used and the proximity of the individual to the site of the attack.

CONCLUSIONS

There are many factors that could facilitate ISIS having access to materials for weapons of mass destruction, or fully assembled weapons. Employees at all levels within organisations handling sensitive technology and materials ought to be screened regularly. Weak spots need to be strengthened when assessing system-level risks, and locks placed on all sensitive materials and weapons to prevent unauthorised use, with controls such that any one individual is unable to circumscribe these controls. [38]

Currently, the security of nuclear facilities and material is the responsibility of the states in which they exist, and there is little or no independent assurance of the voracity of the systems in place and no penalties for non-compliance with the relevant conventions or treaties. For example, Iraq is a member of the Convention on the Physical Protection of Nuclear Material (CPPNM), and yet failed in its duty to "protect nuclear facilities and material in peaceful domestic use, storage and transport"[39], when ISIS seized uranium from Mosul University and chemical weapons from the Muthanna facility.

States need to consider how to better coordinate to identify weak points in nuclear security architecture systems in a manner that respects sovereignty but offers mutual assurance and sufficient funding. According to the IAEA, the CPPNM also "provides for expanded cooperation between and among states regarding rapid measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offences".[40] However, resources and cooperation has yet to be forthcoming. States in the Middle East are in turmoil and have weak governing structures.

Nuclear smuggling could be addressed through greater coordination between western and central Asian states, as well as Russia, and stregthening of the Global Intiative to Combat Nuclear Terrorism. States could also work together to stop funding sources associated with terrorist activities that could lead to the acquisition of a WMD. These initiatives at the multilateral state level need to be insulated from wider political and diplomatic differences.

States can strengthen their control over activities likely to facilitate this threat, but they also need to ensure systems are robust and resilient in the face of attack. This may require greater education so that people do not respond with panic, but that all practical measures receive political support and appropriate funding to minimise the threat.

[37] Charles D Ferguson, William C Potter and Amy Sands, *The Four Faces Of Nuclear Terrorism* (New York: Routledge, 2005).

[38] Daisy Muibu, "Is It Possible To Deter Terrorists Willing To Use A Nuclear Device?", Current Affairs Society, 2015, http://www.currentaffairssociety.com/2882015-daisy-muibu1.html.

[39] Michelle Nichols, "Exclusive: Iraq tells U.N. that 'terrorist groups' seized nuclear materials", Reuters, July 2014, http://www.reuters.com/article/us-iraq-security-nuclear-idUSKBN0FE2KT20140709

[40] *Ibid.*

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Nada Eweiss holds an MA in International Peace and Security from King's College London and a BA in International Affairs and Economics from Northeastern University in Boston. Her areas of research and interest include: nuclear weapons disarmament, counter-terrorism, cyberterrorism, international human rights law and the Middle East and North Africa.

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