

Research Briefing

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Nuclear weapons at a glance: India and Pakistan



Summary

- 1 India
- 2 Pakistan

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Summary

India and Pakistan have both acquired a nuclear weapons capability outside the framework of the Nuclear Non-Proliferation Treaty (NPT) and are therefore considered de facto nuclear weapon states.

India and Pakistan are actively expanding their nuclear arsenals, largely to maintain a deterrent effect vis-à-vis each other. Both are continuing to produce and stockpile weapons-grade fissile material, while at the same time developing new delivery systems for their respective nuclear deterrents. Tensions between Indian and Pakistan have been described by Hans Kristensen and Matt Korda, of the Bulletin of the Atomic Scientists, as constituting [“one of the most concerning nuclear hotspots on the planet”](#).

India

India’s nuclear policies are motivated by regional threats, notably Pakistan but also increasingly China. In summary, India:

- Has a policy of credible minimum deterrence and no first use.
- Continues to produce weapons grade fissile material.
- Is estimated to have a growing arsenal of 160 warheads.
- Is not a party to the NPT or the Comprehensive Test Ban Treaty (CTBT).
- Is actively expanding its delivery capabilities. Following the first deterrent patrol of a new ballistic missile submarine (SSBN) in 2018, India completed the “nuclear triad”, whereby its nuclear forces can be delivered by ground, air or sea-based forces.

Pakistan

The guiding principle of Pakistan’s nuclear policies is minimum credible deterrence. What Pakistan considers to be minimal, however, is guided by regional security considerations and the changing shape of India’s military forces. In 2013, Pakistan adopted the concept of full spectrum deterrence, to deter all forms of regional aggression. In summary, Pakistan:

- Retains a policy of first use against nuclear armed states, such as India.
- Is estimated to have a stockpile of 165 warheads.
- Is expanding its nuclear arsenal faster than any other country. Although projections vary, over the next decade further quantitative and

qualitative improvements in Islamabad's nuclear arsenal are considered inevitable.

- Is seeking to complete the nuclear triad.
- Is not a party to the NPT or the CTBT and opposes a fissile material cut-off treaty unless existing stockpiles are included in any agreement.

This short paper is intended as an introduction to India and Pakistan's nuclear weapons policies and programmes. It is part of a series of country profiles which are available on the [House of Commons Library website](#).

1 India

Successive Indian governments had maintained a policy of ambiguity on the country's nuclear status after what appeared to be a partially successful nuclear test in 1974. In May 1998, however, India conducted a series of publicised nuclear tests which established its status as a self-declared nuclear weapon state.¹

1.1 Nuclear Policy

India's nuclear policies are motivated by regional threats, notably Pakistan, but also increasingly China.

India has consistently stated that it maintains a credible minimum deterrent for self-defence, based on an assured second-strike capability. In its Draft Nuclear Doctrine, published in 1999, that concept was considered “dynamic”, however, and “related to the strategic environment, technological imperatives and the needs of national security”. That document also established “global, verifiable, and non-discriminatory nuclear disarmament” as a national security objective.

India is one of only a few states that is actively increasing its nuclear arsenal.² This has led many analysts to question India's long-term commitment to a minimum credible deterrent, given that its new and developing capabilities exceed those required for such a posture (see below).

Declaratory Policy

India has a no first use policy at the centre of its nuclear doctrine. In 2003 the Indian Government announced it would not use nuclear weapons against states that do not possess such capability, although it reserves the right to use nuclear weapons in response to any weapons of mass destruction (WMD) attack, including a biological or chemical weapons attack.³

¹ Under the Nuclear Non-Proliferation Treaty (NPT) a nuclear weapon state is defined as one that manufactured and exploded a nuclear weapon, or other nuclear explosive device, prior to 1 January 1967. The five permanent members of the UN Security Council (the P5) are, therefore, the only NPT recognised nuclear powers. Israel, India and Pakistan are considered de facto nuclear weapon states, while North Korea is considered nuclear capable.

² Along with Pakistan, China, and North Korea. In 2021 the UK announced an increase in its nuclear stockpile, but not its delivery capabilities.

³ Prime Minister's Office, [Press Release](#), 4 January 2003

In early 2010 India joined calls for the establishment of a global “no first use” policy as part of its overall support for global nuclear disarmament, an initiative described by the government as one which “harmonizes with our long-held positions”.⁴

In the last few years, doubts about India’s commitment to a no first use policy have been expressed. In 2016 former Defence Minister, Manohar Parrikar, was reported to have commented that India could not “bind itself to no first use for eternity”. In August 2019 Defence Minister, Rajnath Singh, reportedly suggested that “India’s adherence to the principle of ‘no first use’ of nuclear weapons is not sacrosanct”.⁵

The doctrine of no first use is also considered to be at odds with India’s expansionist nuclear modernisation programme which increasingly provides India with pre-emptive capability.⁶ In April 2019 Indian Prime Minister, Narendra Modi, caused further controversy after reportedly suggesting during a campaign rally that the Indian nuclear arsenal “was there to be used”.⁷

In March 2020, however, the Government confirmed that there has been no change in India’s nuclear doctrine and that it is committed to maintaining credible minimum deterrence and a policy of no first use.⁸

1.2

Nuclear arms control agreements

India is not party to the NPT and has not signed the Comprehensive Test Ban Treaty. In conjunction with Pakistan, India has consistently declined to join the NPT as a non-nuclear weapon state, arguing that it cements in place an unfair distinction between the five recognised nuclear weapon states (the P5) and the remaining states, who have to forego such a capability.

India only supports the CTBT within the context of general nuclear disarmament.⁹ India did, however, declare a moratorium on nuclear testing in 1998 which it has since maintained.

India supports the conclusion of a Fissile Material Cut-off Treaty (FMCT) but does not want the treaty to cover existing stockpiles.

⁴ Global Security Newswire, “India calls for global “no first use” nuke policy”, 24 February 2010

⁵ As reported in [The Economic Times](#), 17 August 2019

⁶ See Clary and Narang, “India’s counterforce temptations: strategic dilemmas, doctrine and capabilities”, *International Security*, Winter 2018

⁷ See The Times, “Nuclear arsenal is there to be used, insists Narendra Modi”, 23 April 2019 and The Diplomat, [“At Indian general election rallies Modi bangs the nuclear drums”](#), 23 April 2019

⁸ The Hindu, “No change in India’s nuclear doctrine: Minister of External Affairs”, 4 March 2020

⁹ Under Article XIV of the CTBT, India is a designated Annex 2 state, whose signature and ratification is required before the treaty can enter force.

India has not signed the [Treaty on the Prohibition of Nuclear Weapons](#).

US-India civil nuclear cooperation

In 2008 the US and India concluded a civil nuclear trade cooperation deal that would allow India to import key nuclear technologies, including reactors and nuclear fuel, from the countries of the [Nuclear Suppliers Group \(NSG\)](#). In return India would conclude a Comprehensive Safeguards Agreement with the IAEA which would subject its civilian nuclear facilities to IAEA inspection.¹⁰ It also committed to continuing its moratorium on nuclear testing, instituting effective export control systems consistent with the NSG and refraining from transferring enrichment and reprocessing technologies to states that do not already have them.¹¹

That agreement ultimately transformed into a parallel agreement of the Nuclear Suppliers Group in September 2008 which exempted India from some of its nuclear export rules. India has since negotiated nuclear cooperation agreements with a number of countries including [the UK](#), Russia, France, South Korea, Canada and Australia.

All of these agreements have been reached despite the fact that India is not party to the NPT. This is a move that several analysts have regarded as undermining a fundamental principle of the treaty, which is to deny nuclear technologies to countries that are signatories. Instead, they argue that it has placed the diplomatic and commercial interests of NSG countries ahead of their non-proliferation responsibilities.

George Perkovich labelled the deals “selective non-enforcement” of the international non-proliferation rules.¹² In 2015 John Carlson of the Nuclear Threat Initiative suggested that “as a result of the US initiative, India is now receiving the benefits of the nuclear nonproliferation treaty without assuming any of the NPT’s obligations, a situation widely seen as damaging the NPT”.¹³

Several analysts have also expressed concern that allowing India to secure foreign nuclear fuel shipments for its civilian nuclear energy programme, by default, frees up domestic resources, such as uranium, to be diverted into India’s nuclear weapons programme.¹⁴

¹⁰ India’s military nuclear facilities are however, excluded from the safeguards agreement and therefore the inspections regime.

¹¹ Further detail on the US-India deal, and associated issues, is available in a report from the Congressional Research Service entitled [US Nuclear Cooperation with India: Issues for Congress](#) (RL 33016)

¹² George Perkovich, “Global implications of the US-India deal”, *Daedalus*, Winter 2010

¹³ *Arms Control Today*, “Nonproliferation benefits of India deal remain elusive”, June 2015

¹⁴ *Bulletin of the Atomic Scientists*, Indian Nuclear Forces 2015 and *Arms Control Today*, “Nonproliferation benefits of India deal remain elusive”, June 2015

1.3

Nuclear capabilities

Stockpile

While the Indian government occasionally makes statements about missile tests, it is not transparent about the size and status of its nuclear stockpile.

SIPRI currently estimates India to have a growing arsenal of 160 warheads, compared to 120 in 2016.¹⁵

There is some debate as to how many of those warheads are fully assembled, and how many are fully operational. Indian Government sources also claim the country has developed a range of fission warheads and more powerful, two-stage thermonuclear devices, although some observers have expressed doubts about the reliability of the latter claim.¹⁶

Fissile material production

All of India's nuclear warheads are currently believed to be plutonium based.

Although the US had originally called for a halt to the production of fissile material for weapons production as part of the civil nuclear cooperation deal in 2008, the Indian Government refused to link the two issues together.

Indian production of weapons grade fissile material continues. It operates the Dhruva research reactor which is the primary source of India's weapons grade plutonium, and uranium enrichment facilities at Rattehalli and the Bhabha Atomic Research Center near Mumbai. As military facilities they are not subject to IAEA safeguards and inspections.¹⁷

In its most recent assessment, the [International Panel on Fissile Materials](#) estimated that India holds approximately 0.7 metric tons of military grade plutonium and 5 metric tons of highly enriched uranium (HEU). The latter is used for naval reactor fuel in India's nuclear submarine programme.¹⁸

The [Nuclear Threat Initiative](#) estimates that the Dhruva reactor is capable of producing 20-25kg of plutonium each year, the equivalent of 4-6 warheads.¹⁹

In 2017 the Indian Department of Atomic Energy also proposed [plans to build six civilian fast breeder reactors](#), at three sites, by 2039. This would

¹⁵ SIPRI Yearbook 2022 and Yearbook 2016

¹⁶ Nuclear Threat Initiative, Nuclear Disarmament: India, August 2015

¹⁷ The IAEA safeguards agreement signed by India in 2008 relates solely to its civilian nuclear programme.

¹⁸ That HEU is thought to be enriched to 30-45%, much less than weapons grade HEU (90%)

¹⁹ According to the International Panel on Fissile Materials, a first-generation warhead would require 15-18kg of HEU or 5-6kg of plutonium. The amount of fissile material in a warhead can be reduced, and their yield increased, by using tritium to 'boost' the fission process. A second generation boosted warhead would require 12kg of HEU or 4-5kg of plutonium.

significantly increase India's capacity to produce civilian plutonium, which could be diverted for weapons purposes. The first prototype reactor at Kalpakkam was expected to be declared operational in 2018, although that has now been delayed to October 2022.²⁰

India is also building a dual-use uranium enrichment facility at Challakere which would produce HEU for both military and civilian purposes. In 2015 the Nuclear Threat Initiative suggested that the facility could:

Generate approximately twice the necessary enriched uranium for India's future fleet of submarines, [and] also has the potential to accumulate a stockpile of weapons-grade HEU in addition to the current stockpile of weapons-grade plutonium.²¹

Expansion of India's thermonuclear (second generation) weapons programme is also a possible consequence of expanded HEU production, which would substantially increase the explosive yield of India's current nuclear arsenal.

As outlined above, critics of the US-India civil nuclear deal have long argued that foreign imports of nuclear fuel to the civilian sector have assisted India in expanding its fissile material production for weapons purposes.

Delivery systems

India completed the nuclear triad in 2018.

Air-launched

At present India relies primarily upon its Mirage 2000H and Jaguar combat aircraft, equipped with nuclear-armed free-fall bombs, for the delivery of its nuclear capability. 48 nuclear bombs are estimated to be assigned to these aircraft.

The Indian Air Force recently began a service-life extension programme for the Mirage 2000H which will keep it in service until the 2040s.

Ground-launched

India also has an extensive ballistic missile programme, comprising an estimated 64 launchers. To date that inventory is limited to single warhead, short, medium and intermediate-range missiles (the Prithvi II, and the Agni-I, II and III). With a range of approximately 3,000-3,500km, the Agni III provides India with the ability to strike targets as far off as Shanghai.

Submarine-launched

The Indian Navy launched its first indigenous Arihant-class nuclear-powered ballistic missile submarine in 2014. The submarine completed its sea trials in early 2016 and was reported to have been commissioned into service later that year. It will initially be equipped with 12 K-15 short-range SLBM, although the longer-term aim is to additionally equip the SSBN with K-4 ballistic

²⁰ World Nuclear News, "[Indian test reactor reaches operation milestone](#)", 8 March 2022

²¹ Nuclear Threat Initiative, Nuclear Disarmament: India, August 2015

missiles with a range of up to 3,500km. The latter would put Pakistan and most of China within range if launched from the northern Indian Ocean. The K-4 is still undergoing testing and it is unclear when it will be ready for deployment.²²

Nevertheless, the launch of the Arihant-class, equipped with the K-15, represents a moderate sea-based deterrent and completes India's nuclear triad. In November 2018 the Government announced that the Arihant had completed its first deterrent patrol.²³

A second SSBN, the INS Arighat, was launched in November 2017 and is currently undertaking advanced sea trials.

India also operates a ship launched nuclear-capable, short-range ballistic missile: the Dhanush. It is a ship-based variant of the Prithvi-II, although its utility has been questioned since its range would mean that it could only be launched from very near to the Chinese or Pakistani coast in order to target facilities in either of those countries. Kristensen and Korda consider that it could be retired from service once India's SSBN programme reaches maturity.²⁴

1.4

Expansion of India's nuclear arsenal

While the initial development of a nuclear capability was undertaken with neighbouring Pakistan in mind, the development of a nuclear capability based upon the triad principle is part of India's long-standing goal to establish a credible deterrent against regional rival China.

India has thus made significant progress toward developing both a credible submarine-based deterrent capability and a more credible long-range ballistic missile programme, beyond its current inventory of short to medium-range missiles.

It has been noted, however, that the development of new nuclear capabilities over the next decade intended to counter China, could potentially influence how India subsequently views the role of nuclear weapons against Pakistan. In an article for *The Washington Quarterly* in 2013 Vipin Narang suggested:

We may be witnessing what I call a 'decoupling' of Indian nuclear strategy between China and Pakistan. The force requirements India needs in order to credibly threaten assured retaliation against China may allow it to pursue more aggressive strategies- such as escalation dominance or a 'splendid first strike' against Pakistan.²⁵

²² Global Security, "India successfully completes developmental trial of its submarine launched ballistic missile", 24 January 2020

²³ The submarine spent most of 2017 and the early part of 2018 undergoing repairs.

²⁴ SIPRI World Yearbook 2022, [World Nuclear Forces](#)

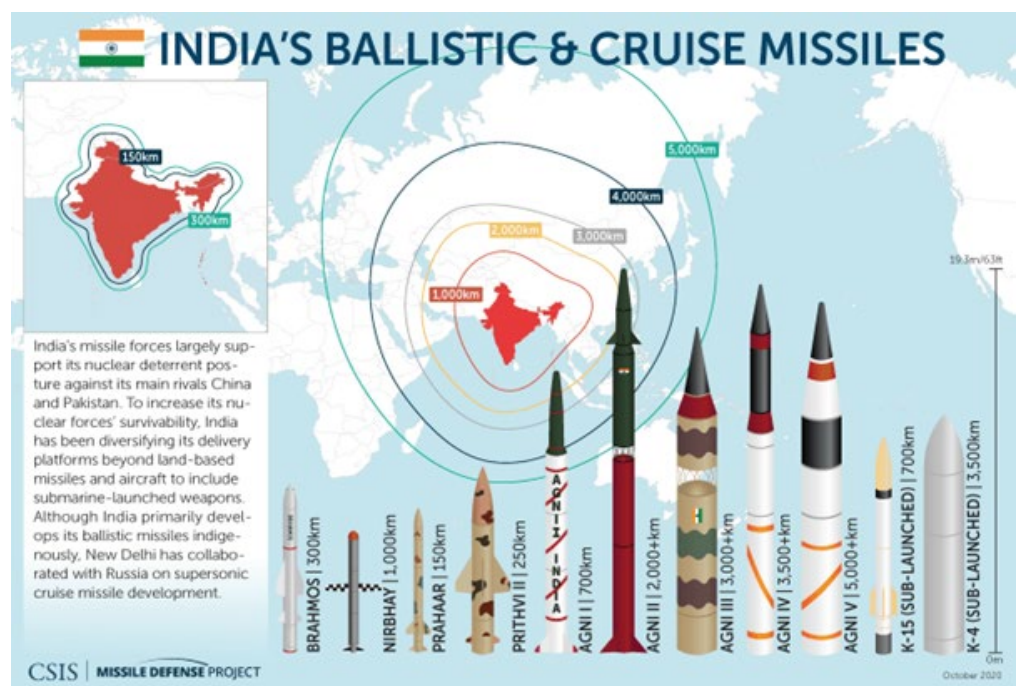
²⁵ Vipin Narang, "Five myths about India's nuclear posture", *The Washington Quarterly*, October 2013

Land-based capabilities

India has been developing additional ballistic missiles, including a new medium range Agni-P and the intermediate-range Agni-IV, which has a range in excess of 3,500km. Both missiles have been undergoing testing but are not yet operational.

The Agni-P, with its advanced navigation and manoeuvrability allowing it to evade regional missile defences, is expected to replace the Agni-I and potentially the Prithvi II and Agni-II once it becomes operational.

Once the Agni-IV is deployed, if launched from northeast India it will be capable of striking targets across almost all of China, including Beijing.



CSIS Missile Defense Project

India's first intercontinental ballistic missile (the Agni-V), which is reported to be road and rail-mobile and has a reported range of over 5,000km, is also in development. The extra range would allow it to be deployed from central and southern India, away from the Chinese border. Its first user trial took place in October 2021,²⁶ leading experts to conclude that it could enter service in 2022/23.²⁷

In 2013 the Indian Government suggested that the Agni-V would be deployed with multiple, independently targetable, re-entry vehicle (MIRV) capability, thereby allowing it to target several locations at once. However, analysts have questioned India's ability to develop such a capability given its

²⁶ The missile undertook its first developmental test in 2012.

²⁷ SIPRI World Yearbook 2022, [World Nuclear Forces](#)

technological complexity and expense. Loading multiple warheads on the Agni-V would also reduce its extra range which was arguably the reason for developing it in the first place. It has also been argued that introducing a MIRV capability into its nuclear arsenal would raise questions over the credibility of India's doctrine of minimum deterrence, given that the whole purpose of multiple warheads is to quickly strike numerous targets.²⁸ It is expected to enter service in 2025.

A second ICBM, the Agni-VI, with a range in excess of 6,000km, is also in the early design stages of development.

Although the Indian Government has made no comment about the future size and composition of its land-based ballistic missile force, experts have pointed out that fielding a missile force as diverse as is currently planned, will be expensive to maintain and operate.²⁹

In October 2020 India also conducted its first successful test of an indigenously designed and built hypersonic cruise missile. A statement from the Indian Defense Research and Development Organisation outlined India's intention to conduct another three tests over the next five years "to make this platform into a fully-fledged hypersonic weapon that is capable of carrying both conventional and nuclear warheads".³⁰

Submarine-launched capabilities

A further two SSBN of the Arihant class are expected over the next few years in line with the expansion of HEU production for India's naval propulsion programme. A third submarine was reportedly launched in 2021, with a fourth scheduled for 2023.³¹ Both are expected to be larger than the first two vessels of class, capable of deploying with 24 K-15 missiles, compared to the current 12 aboard the Arihant.

A base for the SSBN is also believed to be under construction on India's east coast.³²

Development has also reportedly started on two longer range SLBM: the K-5 and K-6 and a next generation SSBN: the S-5 class.

Air Force

While India relies primarily on the air force for its nuclear mission at present, its original combat aircraft are ageing. In 2016 India and France agreed the sale of 36 Rafale aircraft to the Indian Air Force. Delivery of the aircraft is expected to be complete in 2022. The Rafale is already used in a nuclear role

²⁸ Kristensen and Korda, [Indian nuclear forces 2020](#), Bulletin of the Atomic Scientists

²⁹ Kristensen and Korda, [Indian nuclear forces 2020](#), Bulletin of the Atomic Scientists

³⁰ Arms Control Today, "India tests hypersonic missile", October 2020

³¹ SIPRI Yearbook 2022, p.396

³² Kristensen and Norris, [Indian Nuclear Forces 2015](#), Bulletin of the Atomic Scientists: Nuclear Notebook, 2015

in the French air force and therefore conversion to a similar role within the Indian Air Force is widely expected.

India's first intermediate-range land-attack cruise missile (the Nirbhay), which could be deployable from land, sea and air, is also understood to be in development. India tested the missile several times in 2013 and 2014, although the success of those tests was questionable. It is currently unclear whether the missile is nuclear-capable.

Box 1: Suggested reading

- SIPRI Yearbook 2022, [World Nuclear Forces](#) (PDF)
- Arms Control Association, [Arms Control and Proliferation Profile: India](#), March 2022
- Rakesh Sood, [India-Pakistan Nuclear Dynamics](#), September 2021
- Hans Kristensen and Matt Korda, [Nuclear Notebook: Indian nuclear forces 2020](#)
- D Rishi Paul, Foregrounding India's nuclear responsibilities, BASIC, May 2018
- The World Today, "Delhi's nuclear ambitions", June/July 2016

2

Pakistan

Pakistan's nuclear programme began in the early 1970s, following the 1971 war with India that led to East Pakistan becoming Bangladesh. It was spurred on by India's first nuclear test in 1974, although it was not until the late 1980s that the US concluded that Pakistan had acquired the capability to build a primitive nuclear device.³³

US officials believe the Pakistani nuclear programme originally received material and technical assistance from China, although key information on uranium enrichment was also illegally obtained during the mid-1970s by Abdul Qadeer Khan, a Pakistani scientist who became a leading figure in Pakistan's illicit nuclear weapons establishment.³⁴

In line with India, Pakistan conducted a series of publicised nuclear tests in May 1998 which established its status as a self-declared nuclear weapon state.

2.1

Nuclear policy

Intended to primarily offset the conventional superiority of India and its own nuclear capabilities, the guiding principle of Pakistan's nuclear policies is minimum credible deterrence.

What it considers to be minimal however, is guided by regional security considerations and the changing shape of India's military forces. In 2013, Pakistan's National Command Authority declared that it "would not remain oblivious to the evolving security dynamics in South Asia and would maintain a full spectrum deterrence capability to deter all forms of aggression".³⁵ That has been interpreted as including any conventional incursion by India into Pakistani territory. Concerns have been expressed that adopting this stance dangerously lowers the nuclear threshold, in the event of conflict in the region.

Declaratory policy

Pakistan has pledged to retain a general position of "no first use" against non-nuclear weapon states. However, it retains a position of first use against

³³ US Congressional Research Service, [Pakistan's nuclear weapons](#), February 2016

³⁴ A Q Khan was accused of trading nuclear technology and expertise with Iran, Libya and North Korea.

³⁵ [Pakistani Government press release](#), PR-133/2013-ISPR, 5 September 2013

a nuclear-armed aggressor, such as India. In July 2016 the Pakistani Defence Minister also suggested that it would use nuclear weapons for defensive purposes in any armed conflict with India.³⁶

2.2

Nuclear arms control agreements

Pakistan is not a party to the NPT arguing, in a similar vein to India, that its principles are discriminatory. It has also stated that it will not sign the NPT while India has nuclear weapons. In February 2010 the Pakistani Government used its concerns over the US-India civil nuclear deal to reiterate that the country would not join the NPT, even if India agreed to do so. Foreign Ministry Spokesman, Abdul Basit, reportedly commented at the time:

We cannot sign the treaty. We cannot give up nuclear weapons. If you have a conventional imbalance between Pakistan and India, then obviously our reliance on nuclear deterrence increases correspondingly. At one point in time we were ready to sign the treaty, provided it was also done by India. That is the position that we took, but it has become outdated.³⁷

Pakistan has not signed the Comprehensive Test Ban Treaty, although it has maintained a moratorium on testing since 1998. It has linked its signature of the CTBT to that of India.³⁸

Pakistan supports the negotiation of a non-discriminatory fissile materials cut-off treaty, but only if it covers existing stockpiles. This position is in contrast to the majority of nuclear weapon states. Pakistan has maintained that it will be at a disadvantage if existing stockpiles are not included, due to India's larger stockpile, production capabilities and the effect of the 2008 US and NSG agreements with India on the foreign import of nuclear materials. Due to the need for consensus within the UN-mandated Conference on Disarmament, which is responsible for negotiating any agreement, Pakistan has effectively used this issue to block the start of negotiations on a fissile material cut-off treaty. It has stated that it will continue to do so until an agreement on existing stockpiles is added to the treaty text.

The Pakistani Government has urged the US to establish a civilian nuclear cooperation deal with Pakistan, to bring it into parity with India. Successive US administrations have been noncommittal on the issue, citing concerns over Pakistan's proliferation legacy, the safety of Pakistan's nuclear assets and the ability of those weapons to fall into the hands of terrorists or other non-governmental actors. In February 2016, a report from the US Congressional Research Service noted "the main security challenges for Pakistan's nuclear

³⁶ Arms Control Today, "Is India shifting nuclear doctrine?", May 2017

³⁷ Global Security Newswire, "Pakistan rules out joining non-proliferation treaty", 23 February 2010

³⁸ Like India, under Article XIV of the CTBT, Pakistan is a designated Annex 2 state, whose signature and ratification is required before the treaty can enter force.

arsenal are keeping the integrity of the command structure, ensuring physical security and preventing illicit proliferation from insiders”.³⁹

2.3

Nuclear capabilities

Stockpile

Like India, the Pakistani Government occasionally makes statements about missile tests, but it is not transparent about the size and status of its nuclear stockpile.

SIPRI estimates Pakistan’s nuclear weapons inventory to be approximately 165 nuclear warheads. In 2016 Pakistan had 130 warheads.⁴⁰

Fissile material production

Pakistan continues its production of fissile material for weapons and is augmenting its already diverse and well-established production facilities. Pakistan has finished constructing a fourth heavy water reactor at its plutonium production complex at Khushab⁴¹ and is expanding uranium enrichment facilities at Kahuta and Gadwal, near to Islamabad. In anticipation of increased capacity, Pakistan has also been expanding its reprocessing capabilities. None of these facilities are subject to an IAEA safeguards agreement.

The [International Panel on Fissile Materials](#) estimates Pakistan’s current stockpile of HEU to be in the region of 4 metric tons; while its stockpile of plutonium for weapons purposes is 0.5 metric tons.

On the basis of current annual fissile material production rates, warhead design choices and figures on the size of its overall inventory, Pakistan is thought to be producing 10-12 new nuclear warheads each year.⁴² Subsequently it is currently expanding its arsenal faster than any other country.⁴³

Over the next decade, further quantitative and qualitative improvements in Islamabad’s nuclear arsenal are considered inevitable. Projections vary considerably, however. As Hans Kristensen and Matt Korda observe in their 2021 assessment of Pakistani nuclear capabilities:

“Despite the uncertainties, Pakistan is clearly engaged in a significant build-up of its nuclear forces and has been for some time”.

Hans Kristensen and Matt Korda, [Pakistani nuclear forces 2021](#)

³⁹ US Congressional Research Service, [Pakistan’s nuclear weapons](#), February 2016

⁴⁰ SIPRI Yearbook 2022 and Yearbook 2016.

⁴¹ Three of those reactors have been constructed in the last 12 years.

⁴² The actual amount of fissile material produced across all of Pakistan’s production facilities is estimated to be sufficient for between 14 and 27 new warheads annually. Some of that fissile material is, however, kept in reserve.

⁴³ Arms Control Association, [Arms Control and Proliferation Profile: Pakistan](#), March 2022

The size of this projected increase will depend on several factors, including how many nuclear capable launchers Pakistan plans to deploy, how its nuclear strategy evolves, and how much the Indian nuclear arsenal grows.

Speculation that Pakistan may become the world's third-largest nuclear weapon state – with a stockpile of some 350 warheads a decade from now – are, we believe, exaggerated, not least because that would require a buildup two to three times faster than the growth rate over the past two decades.

We estimate that the country's stockpile could more realistically grow to around 200 warheads by 2025, if the current trend continues.⁴⁴

However, they go on to state:

But unless India significantly expands its arsenal or further builds up its conventional forces, it seems reasonable to expect that Pakistan's nuclear arsenal will not continue to grow indefinitely but might begin to level off as its current weapons programs are completed.⁴⁵

Delivery Systems

Over the last decade Pakistan has prioritised the development of new nuclear delivery systems as part of efforts to achieve a full spectrum deterrence capability, i.e. one that provides it with both strategic and non-strategic options.

Ground-launched

Pakistan's ability to deliver a nuclear weapon remains largely focused on its short to medium-range ballistic missile and cruise missile capabilities.⁴⁶ Notably:

- The short-range Abdali, Ghaznavi, and Shaheen-I ballistic missiles.
- The medium-range Gauri and Shaheen-II ballistic missiles.
- The ground launched Babur cruise missile which was deployed in 2014.
- The air launched Ra'ad cruise missile. An upgraded version of the Ra'ad, the Ra'ad-II, was displayed in 2017 and [tested in February 2020](#). The missile is thought to have entered service, but the number of operational missiles is not known.⁴⁷

Pakistan is also considered among some observers to have “dangerously lowered the threshold for nuclear weapons” by developing very short-range tactical nuclear weapon capabilities to counter India's conventional superiority on the battlefield and to deter the likelihood of any conventional

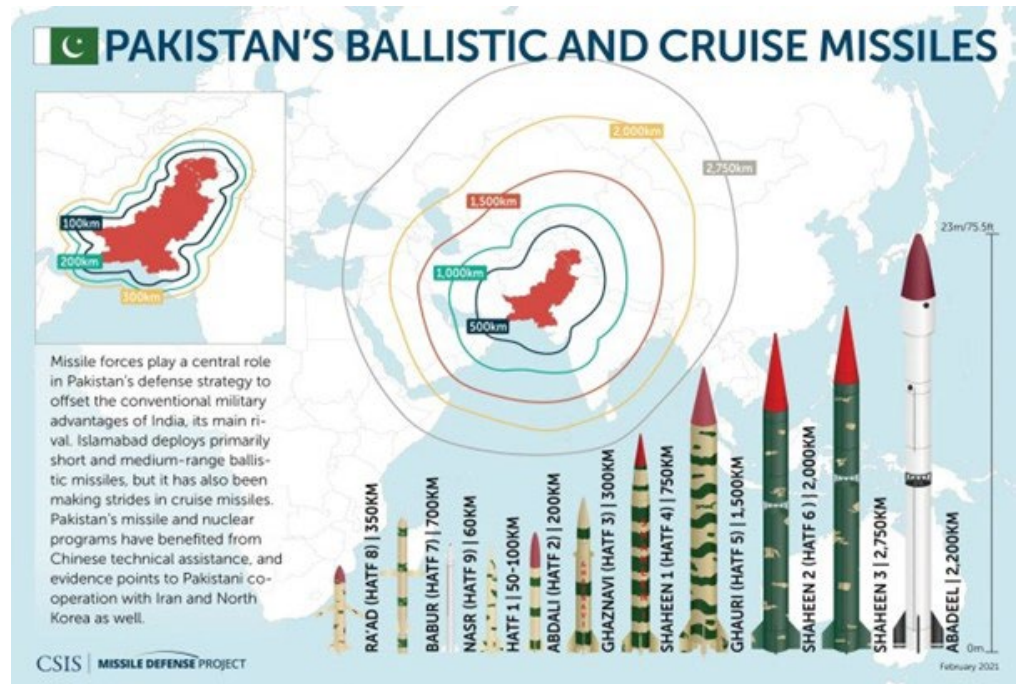
⁴⁴ Hans Kristensen and Matt Korda, [Pakistani nuclear forces 2021](#), Bulletin of the Atomic Scientists

⁴⁵ Hans Kristensen and Matt Korda, [Pakistani nuclear forces 2021](#), Bulletin of the Atomic Scientists

⁴⁶ In the early years, Pakistan's ballistic missile programme is thought to have had considerable assistance from China, North Korea and Iran (CSIS, [Missile Defense Project](#)).

⁴⁷ Jane's Intelligence Review, “Pakistan continues nuclear build-up and modernisation”, 30 November 2021

attack by India.⁴⁸ The Nasr ballistic missile has a range of only 60km and is thought to have been deployed in 2014 after a series of successful tests. In 2015 one Pakistani military official said the Nasr missile was the result of “some people on the other side toying with the idea of finding space for conventional war, despite Pakistan’s nuclear weapons”.⁴⁹



CSIS, Missile Defense Project (accessed 26 July 2022)

Air-launched

The Pakistani Air Force also has a nuclear role. In 2008 and 2011 its Mirage III combat aircraft was used for developmental test flights of the nuclear-capable Ra'ad air-launched cruise missile. Its Mirage V combat aircraft is also believed capable of deploying with nuclear gravity bombs.

Pakistan's fleet of US purchased F-16 combat aircraft are thought, by some analysts, to have been modified to a dual-use role, thereby making them potentially nuclear capable. It is unclear, however, whether the F-16 has an official nuclear role.

⁴⁸ What has been referred to as India's Cold Start doctrine, which envisages rapid ground attacks into Pakistan. The existence of this doctrine has, however, been questioned by analysts who regard the Indian military as having a number of viable options for any military action against Pakistan.

⁴⁹ Kristensen, Norris and Diamond, [Pakistan nuclear forces 2018](#). Bulletin of the Atomic Scientists Nuclear Notebook

2.4

Expansion of Pakistan's nuclear arsenal

The modernisation of Pakistan's nuclear arsenal has been, and continues to be, driven by the nuclear expansion of India. Following the example of other nations, Pakistan is seeking to improve its weapon designs, moving beyond its first-generation capabilities. Central to that effort has been the construction of the Khushab plutonium production reactor complex and the ongoing expansion of its fissile material production and reprocessing facilities (see above).

Ballistic missile programme

Since 1998 Pakistan and India have embarked upon a tit-for-tat testing programme of their ballistic missile capabilities. In an effort to keep technological pace with India, Pakistan is actively pursuing programmes to increase the effectiveness of its current ballistic missile inventory, including multiple independent re-entry vehicle technologies (MIRV), while at the same time developing longer range ballistic missiles than it currently possesses.

Investment in the Nasr missile programme continues; while a new medium-range ballistic missile (the Shaheen 1-A) and a new road-mobile, intermediate range ballistic missile (the Shaheen-III) are under development. The Shaheen III was last tested in April 2022 and once it becomes operational, it will give Pakistan the ability to reach targets throughout India for the first time.⁵⁰ A variant of the Shaheen-III, the Ababeel, which is possibly equipped with MIRV technology, is also under development. It was last successfully flight tested in 2017.

Speculation that Pakistan is developing an ICBM with a range of 7,000km, codenamed Taimur, continues. However, many analysts have refuted this, suggesting that it would be contrary to the regional focus of Pakistan's nuclear doctrine.⁵¹

Aircraft

In 2019 Pakistan was reportedly planning to purchase an additional 36 Mirage V aircraft from Egypt. In the longer term, the Mirage is expected to be replaced by the JF-17, which Pakistan is jointly developing with China. It is unclear whether the aircraft will be configured to carry the dual capable Ra'ad ALCM.

Completion of the nuclear triad?

Pakistan is also thought to be seeking to complete the nuclear triad by developing submarine-launched capabilities. After India announced its

⁵⁰ Jane's Defence weekly, "Pakistan conducts test of Shaheen-III ballistic missile", 11 April 2022

⁵¹ US Congressional Research Service, [Pakistan's nuclear weapons](#), February 2016

intention to develop an SSBN capability in 2009, Pakistan followed suit and in 2012 the Pakistani Navy established Headquarters Naval Strategic Forces, for the development and deployment of that sea-based strategic nuclear force. The Pakistani government said that it would provide the nation's "second strike capability" and would "strengthen Pakistan's policy of credible minimum deterrence and ensure regional stability".⁵²

The Pakistani Navy conducted the first test launch of a Babur-3 submarine-launched cruise missile in January 2017, and again in March 2018. The missile is intended to be deployed aboard Pakistan's three Agosta class submarines. Pakistan also has eight submarines (the Hangor class) on order from China, the first of which is expected to be delivered in 2022-23. It is possible that the Babur-3 may be deployed aboard, giving the submarines a nuclear role.

Box 2: Suggested reading

- SIPRI Yearbook 2022, [World Nuclear Forces](#)
- Arms Control Association, [Arms Control and Proliferation Profile: Pakistan](#), March 2022
- Jane's Intelligence Review, "Pakistan's nuclear fuel cycle", 7 March 2022
- Hans Kristensen and Matt Korda, [Pakistani nuclear weapons 2021](#), Bulletin of the Atomic Scientists
- SIPRI, [Enhancing South Asian nuclear dialogues](#), September 2021
- Sadia Tasleem & Toby Dalton, "Nuclear Emulation: Pakistan's Nuclear Trajectory", *The Washington Quarterly*, January 2019
- Ben Barry, "Pakistan's tactical nuclear weapons: practical drawbacks and opportunity costs", *Survival*, Feb-March 2018
- Arka Biswas, *Pakistan's Tactical Nukes: Relevance and Options for India*, *The Washington Quarterly*, October 2017
- US Congressional Research Service, [Pakistan's nuclear weapons](#), August 2016

⁵² Kristensen, Norris and Diamond, [Pakistani nuclear forces 2018](#), Bulletin of the Atomic Scientists: Nuclear Notebook

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