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समाचार पत्रों से चयित अंश

Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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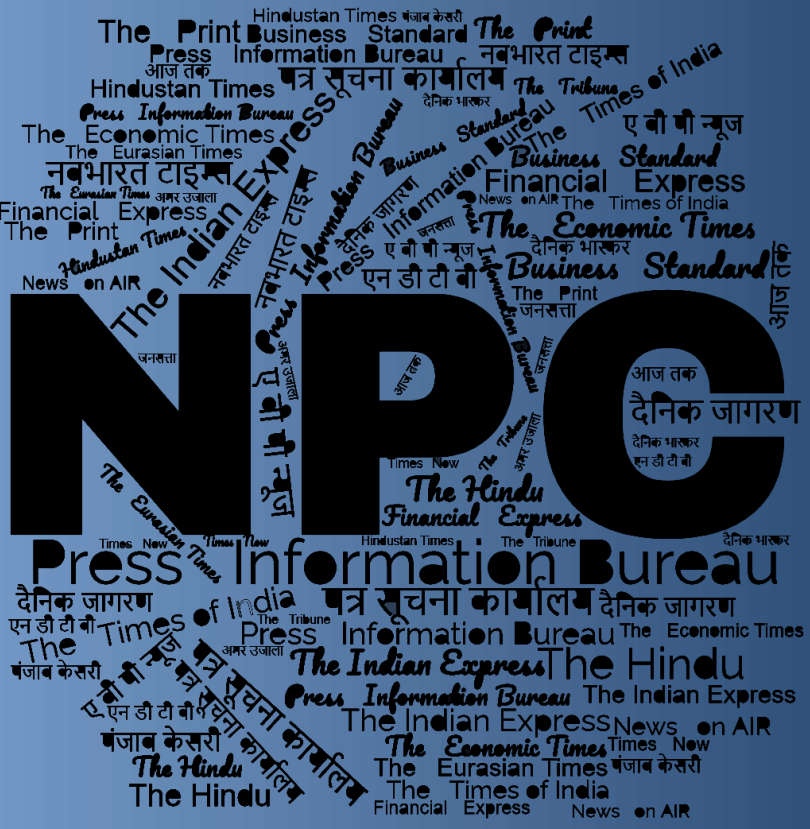

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पंजाब केसरी

Mon, 24 Apr 2023

देश की महाविनाशक मिसाइल, दुश्मन के हर वार को वायुमंडल में करेंगी खाक...PM मोदी ने DRDO-नौसेना को दी बधाई

प्रधानमंत्री नरेंद्र मोदी ने समुद्र आधारित अंत: वायुमंडलीय इंटरसेप्टर मिसाइल (atmospheric interceptor missile) का पहला उड़ान परीक्षण सफल होने पर सोमवार को रक्षा अनुसंधान एवं विकास संगठन (DRDO) और भारतीय नौसेना को बधाई दी। ओडिशा के तट से DRDO और भारतीय नौसेना ने शुक्रवार को इस मिसाइल का सफल परीक्षण किया। नौसेना की ओर से इस सफलता को लेकर किए गए एक ट्वीट के जवाब में प्रधानमंत्री ने कहा, ‘‘हमारी रक्षा क्षमताओं को और मजबूत करने के लिए हमारे वैज्ञानिकों को उनके निरंतर धैर्य और दृढ़ संकल्प के लिए बधाई।"

रक्षा मंत्रालय के मुताबिक DRDO और भारतीय नौसेना ने 21 अप्रैल, 2023 को बंगाल की खाड़ी में ओडिशा के तट पर समुद्र आधारित एंडो-ऐटमौस्फेयरिक बैलिस्टिक मिसाइल रक्षा (BMD) इंटरसेप्टर की पहली उड़ान परीक्षण का सफलतापूर्वक संचालन किया। मंत्रालय ने कहा कि परीक्षण का उद्देश्य दुश्मन के बैलिस्टिक मिसाइल खतरे के प्रभाव को लक्षित करना और नष्ट करना था। यह भारतीय नौसेना को बीएमडी क्षमताओं वाले देशों के विशिष्ट समूह में स्थान दिला सकता है। इससे पहले, DRDO ने सतह आधारित BMD प्रणाली की क्षमता का सफलतापूर्वक प्रदर्शन किया था और इस तरह दुश्मन की तरफ से आने वाली बैलिस्टिक मिसाइल के खतरों को बेअसर करने की क्षमता हासिल की थी।

https://www.punjabkesari.in/national/news/pm-congratulates-drdo-navy-on-successful-test-firing-of-bmd-missile-1809923

Defence News

Defence Strategic : National/International

THE TIMES OF INDIA

Tue, 25 Apr 2023

No Breakthrough in India-China Military Talks, all Eyes now on Defence Ministers' Meet

There was no concrete breakthrough yet again in defusing the three-year-long troop confrontation with China in eastern Ladakh despite the top-level military talks being held after a

gap of over four months, though the two sides agreed to continue dialogue and maintain "security and stability" along the frontier.

All eyes are now on the bilateral meeting between defence minister Rajnath Singh and his Chinese counterpart General Li Shangfu on April 27, a day before the main Shanghai Cooperation Organization's conclave here, to see if the trust deficit can be somewhat bridged and heightened tensions along the entire 3,488-km Line of Actual Control (LAC) from Ladakh to Arunachal Pradesh reduced.

Sources said the two sides exchanged "proposals and counter-proposals" during the marathon 18th round of corps commander-level talks on the Chinese side of the Chushul-Moldo border meeting point on Sunday.

India pushed for troop disengagement at the strategically-located Depsang Bulge area and the Charding Ninglung Nallah (CNN) track junction at Demchok as the first step towards eventual de-escalation and de-induction of the over 50,000 troops each forward deployed with heavy weapon systems in eastern Ladakh.

"But no mutually-acceptable solution could be reached. The overall bilateral relations will not improve till China restores the status quo it disrupted on the LAC in April-May 2020," a top source said, dismissing China's contention that the border row was now "shifting from a standoff to normalized management".

The persisting stalemate was reflected in the fact there was no joint statement, as has usually been the norm during previous rounds. The external affairs ministry, in a brief anodyne statement on Monday, said the two sides had "a frank and in-depth discussion on the resolution of the relevant issues along the LAC in the western sector so as to restore peace and tranquillity in the border areas, which will enable progress in bilateral relations".

"In the interim, the two sides agreed to maintain the security and stability on the ground in the western sector. They agreed to stay in close contact and maintain dialogue through military and diplomatic channels and work out a mutually acceptable resolution of the remaining issues at the earliest," the MEA said.

The statement also said the "exchange of views" was conducted "in an open and candid manner" in line with the "guidance" provided by the state leaders and the meeting between the two foreign ministers, S Jaishankar and Qin Gang, in early-March this year.

Jaishankar, incidentally, had described the state of the bilateral relationship as "abnormal" then. A few days later, he had gone on to say that the situation on the LAC remained "very fragile" as there were points where Indian and Chinese troop deployments are "quite dangerous" in terms of military assessment. The assessment is that while the military commanders can continue to talk in order to maintain peace on the ground, especially after the violent skirmishes in the Galwan Valley in June 2020 saw casualties on both sides for the first time in 45 years, the overall de-escalation will require top-level political intervention.

https://timesofindia.indiatimes.com/india/no-breakthrough-in-india-china-military-talks-all-eyes-now-on-defence-ministers-meet/articleshow/99740981.cms

THE TIMES OF INDIA

Mon, 24 Apr 2023

Indo-US Joint Air Force Exercise COPE India 23 Concludes at Kalaikunda Air Force Station

The 15-day-long bilateral air exercise between the Indian Air Force (IAF) and the United States Air Force (USAF) — COPE India 23 — held at three air force stations in Panagarh, Kalaikunda and Agra culminated on Monday with a joint display and take-off of the Indian fighter aircrafts like Rafale, Sukhoi 30 MKI, LCA Tejas and Jaguar and USAF's F-15E Strike Eagle at Kalaikunda in West Midnapore in West Bengal.

The exercise aimed to enhance mutual understanding between the two air forces focussed on enhancing mutual understanding of tactical application of air power, imbibe best practices (operations and maintenance), boost cohesion in combat operations and enrich better understanding of air operations in a large force package.
The exercise also included the presence of Japanese Air Self Defence Force aircrew, who participated in the capacity of observers.

"We had a great time flying together and training together in large force exercises as well as in smaller environments. The exercise has been extremely helpful in achieving our goal to collectively grow together to ensure regional security and prosperity in the Indo-Pacific region as a whole," said USAF's lieutenant colonel Bender Gifford.
Defence experts, however, said the joint exercise was extremely important considering the Chinese show of strength at the north eastern border of the country and will send out a strong message about India–US defence unity.

"The exercise showcased US and India's efforts and commitment to a free and open Indo-Pacific region," a defence spokesperson said.

Officials said the bilateral exercise was the result of a document signed in 2005 with a goal for a broader US–India relationship.

"The first exercise of COPE India was conducted at Gwalior Air Force station in 2004 and then it was conducted again in 2005, 2006, 2009 and 2018. The exercise focuses on exchange of air combat employment philosophy and mutual understanding of force employment," said IAF's group captain Neeraj Jhamb, commanding officer of Rafale and exercise director of COPE India

This is the first time IAF's Rafale and India's indigenously developed light combat aircraft Tejas participated in COPE India.
This year also marked the debut of USAF's F-15E Strike Eagle.
Overall, the last two weeks witnessed involvement of 24 fighter aircrafts, eight transport carriers and two force multipliers.
While IAF had participation of aircrafts like Rafale, Sukhoi-30 MKI, LCA Tejas, Jaguar, C-130J, C-17, IL-76 AWACS and ERJ-145 AEW&C, USAF had flown in four F-15E Strike Eagle apart from B1B – a multi mission weapon system and military transporters like C-130J, MC-130J and C-17.
"Over-all the exercise saw participation of 564 personnel from IAF and USAF," said Jhamb.

Monday's concluding ceremony at Kalaikunda saw aircrafts like Rafale, Tejas, Jaguar, Sukhoi-30 and F-15E taking-off rejoin from the air force station and conduct a rejoin formation amidst cheers and applauds from a cluster of school children invited to the ceremony and family members of IAF personnel.

A special static display of the aircrafts was also in place beside the runway as the invitees as well as participating officers took the opportunity to click photographs standing in front of the prestigious jets.

https://timesofindia.indiatimes.com/city/kolkata/indo-us-joint-air-force-exercise-cope-india-23-concludes-at-kalaikunda-air-force-station/articleshow/99737500.cms

THE ECONOMIC TIMES

Mon, 24 Apr 2023

India to Buy More Russian, American Missile Systems for Navy

At a time when the US and Russia are pitted against each other over Ukraine, India plans to buy missile systems from both these countries worth around USD 200 million.

A proposal by the defence forces is at an advanced stage in the defence ministry as per which the Indian Navy has proposed to acquire over 20 Klub anti-ship cruise missiles from Russia and equipment for the American Harpoon anti-ship missile system, defence sources told ANI.

The Klub missile from Russia is equipped on both the surface warships and submarines of the Indian Navy and has been one of the importing weapon systems for it for a long time, they said.

The Harpoon missile system acquisition is expected to cost around USD 80 million to the Indian Navy under a foreign military sales route.

The US Congress has already approved the sale of the Harpoon Joint Common Test Set (JCTS) and related equipment to India.

The Indian Navy has already deployed the Harpoon missiles on its anti-submarine warfare aircraft and submarines.

India had requested to buy one Harpoon Joint Common Test Set (JCTS) which includes one Harpoon Intermediate Level maintenance station; spare and repair parts, support, and test equipment; publications and technical documentation; personnel training; US Government and contractor technical, engineering, and logistics support services; and other related elements of logistics and programme support.

India has traditionally been using Russian weapon systems but has diversified its acquisitions in the last two decades with procurements taking place from the U.S. and France also in a big way.

https://economictimes.indiatimes.com/news/defence/india-to-buy-more-russian-american-missile-systems-for-navy/articleshow/99738316.cms

The Tribune

Tue, 25 Apr 2023

IAF Needs Force Multipliers to Gain an Edge

Gp Capt Dinesh Kumar Pandey (retd)

In the event of an armed conflict, India would be forced to fend for itself. In this context, Air Chief Marshal VR Chaudhari had flagged the IAF's critical deficiencies, including the lack of fighter squadrons and force multipliers, in December last year.

In March 2003, the 78th Squadron of the IAF received six Uzbekistan-made Ilyushin IL-78MKI flight refuelling aircraft (FRA) with a Russian airframe based on the IL-76 and an Israeli fuel transfer system. The current FRA in use can refuel three jets at a time. A total of six to eight Su-30MKIs may be refuelled in a single mission. The IL-78 was purchased with a predicted 70 per cent serviceability rate. In practice, however, serviceability has been significantly lower than 50 per cent. Spares and maintenance have been an issue, particularly with the refuelling pods, due to frequent breakdowns, inadequate repair facilities and poor maintenance support from the original equipment manufacturers. Within three years of inducting the IL-78, the IAF started a search for new procurement due to the IL-78's low reliability and serviceability and the necessity for more than six FRAs to meet its needs in a two-front conflict.

The IAF took a giant leap forward in 2009 when it decided that all of its aircraft and helicopters designed for combat and combat support would henceforth have midair refuelling capability.

Aerial refuelling, also known as air refuelling, in-flight refuelling, air-to-air refuelling (AAR) or tanking, is the transfer of aviation fuel from one military aircraft (the tanker) to another (the receiver) while both aircraft are in flight. While the flying boom refuelling technology allows for faster fuel transfer but necessitates a separate boom operator station, the probe-and-drogue refuelling technique is simpler to apply to existing aircraft.

Aerial refuelling is primarily used in military operations as an airborne station that can extend the flying time of fighter jets and surveillance aircraft, allowing them to stay on the job for longer. According to NATO's Allied Tactical Publication, AAR is air power's most vital force multiplier. It gives the recipient aircraft an essential feature that boosts its range, endurance, payload and flexibility. This capability is crucial, mainly when forward basing is restricted or impossible or when airbase operation restrictions apply.

The AAR crew training is a process of preparing pilots and aircrew to perform the complex and precise manoeuvre of transferring fuel from one aircraft to another midair. The AAR planners, tanker & receiver crews and controllers have certain roles and responsibilities to play in order to ensure the smooth running of operations. All stakeholders are required to be adequately skilled to carry out refuelling successfully. When working at an airport, aircraft refuellers are expected to have the skills necessary to operate and maintain the refuelling equipment.

Aerial refuelling has, thus, become a cornerstone of military operations worldwide. The initial impetus for the development of strategic air tankers came from the requirement to keep strategic air bombers in the air all the time to defend against a nuclear threat. After that, tactical tankers arose in response to a demand for greater flexibility in aerial operations. The ability to invest in

more tactical tankers as opposed to fewer strategic aircraft spreads the risk and increases the resilience of the network with more tankers in the air.

Non-availability of FRA has adversely affected numerous Indian air operations. The FRAs are a necessity, particularly when fighters from the IAF are required to travel to other countries for international exercises. When five Rafale fighters flew non-stop to India from France on

July 29, 2020, the aircraft were refuelled four times by a French Multi-Role Tanker Transport (MRTT).

It's widely known that the IAF has a severe shortage of combat and combat support aircraft. Acquiring combat assets requires sufficient time to place the demand, produce them, and induct them into service. This period may extend up to a decade. Until we manage these resources by procuring or manufacturing them in India, the existing threat perception cannot be overlooked. Maintaining a state of military readiness is essential in the face of potential aggression on either the eastern or western front or from both. Procuring AAR is the way to fill the gaps or deficiencies in India's operational resources.

With the employment of in-flight refuelling, it is anticipated that the radius of action (RoA) of every IAF aircraft will increase by approximately 60 per cent. As a consequence, the RoA will likely not be a limiting factor in the IAF's ability to engage all targets within the area of operations. Compared to carrying additional fuel tanks or making multiple stopovers, refuelling midair can reduce fuel consumption on long-distance flights by 35 per cent to 40 per cent. That is equivalent to being able to refuel four aeroplanes in the air while using only the amount of gasoline that would be needed to refuel three aircraft. Hence, AAR is an operation that is efficient with regard to costs.

It is necessary to have a multi-mission FRA that uses the most up-to-date technology to deliver safety. Thus, FRA must be fast, perform well, be operationally efficient, have low lifecycle costs and be readily available. Although the IAF twice put out tenders for a new aerial refuelling tanker, cost concerns ultimately shelved the project.

In January 2018, the IAF launched its third effort to expand its aerial tanker fleet by issuing a request for information for six FRAs. India and France were also negotiating a government-to-government deal, whereby India would lease one A330 MRTT from the French Air Force for use in the country's air force training programmes. But the quest still continues.

There is an urgent requirement for aerial refuelling aircraft to enable deep penetration missions due to the rapidly evolving security dynamics and the threats posed by India's neighbours. Aerial refuelling enhances the outreach to the optimum limit of air operations. Therefore, it is one of the most demanding and high-stakes aerial operations. Moreover, it enables the ability to operate even further afield. In addition, AAR enables scarce combat aircraft to be moved rapidly from one theatre to another.

Midair refuelling is worthwhile for a number of military operations that require long-range, high payload or time-sensitive capabilities. It is possible for the IAF to have improved survivability and responsiveness after undergoing midair refuelling, which, in turn, makes it possible for the aircraft to take off with a greater payload, such as more personnel, cargo or weapons.

https://www.tribuneindia.com/news/comment/iaf-needs-force-multipliers-to-gain-an-edge-500565

Firstpost.

Mon, 24 Apr 2023

China's Deploys Hypersonic IRBM DF-27: Implications and Choices for India

Air Marshal Anil Chopra

The US Justice and Defence departments are reportedly investigating the leak of hundreds of US intelligence documents, including China's military technology progress. As per the 28 February 2023, top-secret report by the Joint Chiefs of Staff intelligence directorate, China's People's Liberation Army (PLA) had mid-February this year successfully tested the new long-range DF-27 hypersonic intermediate-range ballistic missile (IRBM). The missile could probably evade US ballistic missile defences. China could now quickly strike up to nearly 8,000 kilometres. That could mean hitting targets well beyond the South China Sea (SCS) and farther than the second island chain. It could also mean all targets in India and beyond. The variants of the new missile could attack land targets and ships.

During the test, the IRBM flew for 12 minutes and travelled 2,100 kilometres. According to earlier reports, the DF-27 has a range of 5,000 to 8,000 kilometres. The manoeuvrable hypersonic weapon could evade air defences. It has the potential of being a "carrier killer". The missile could be handy to keep friends of Taiwan at long distances while invading to annex the Island nation. Russia and China lead in hypersonic weapon development, trailed by the United States, France, India, and Australia, also known to be pursuing the technology.

What is Hypersonic?

Hypersonic is a flight through the atmosphere at speeds in excess of Mach 5. At this speed dissociation of air begins to become significant and high heat loads get generated, which could affect a missile's sensitive inner electronics which need protection without adding extra weight or drag. Hypersonic weapons fall into two categories: boost-glide and scramjet. In a boost-glide system, a rocket accelerates its payload to high speeds. The payload then separates from the rocket and glides unpowered to its destination. Scramjet (supersonic combustion ramjet) technology uses a booster to reach cruising speeds. Scramjets allow combustion even in supersonic airflow. The scramjet-powered air-breathing hypersonic cruise missiles (HCM) are restricted below 100,000 feet. Hypersonic glide vehicles (HGV) can travel higher. The Boeing X-51 Wave-rider flew on scramjet for 210 seconds in 2013, finally reaching Mach 5.1 on its fourth flight test. A wave-rider is a hypersonic aircraft design that improves its supersonic lift-to-drag ratio by using the shockwave being generated by its own flight as a lifting surface, a phenomenon known as compressive lift. China's XingKong-2, also a wave-rider, had its first flight in August 2018.

Russia first to use hypersonic weapons in combat

Russia's nuclear-capable hypersonic missiles have been operational since December 2019. Russia has claimed to have fired nine hypersonic missiles, with conventional warheads, at major armament storage facilities and command and control centres in Ukraine. The Avangard HGV, is launched atop an intercontinental ballistic missile (ICBM). After separation it can reportedly fly

at 27 times the speed of sound, and make sharp manoeuvres enroute to its target, making it harder to intercept. Avangard reportedly uses new composite materials to withstand temperatures of up to 2,000 deg C which may be reached at hypersonic speeds, and can carry a two-megaton nuclear warhead. Russia's HCM Kinzhal ("dagger") is mounted on the MiG-31 fighter and the Tu-22M3 strategic bomber. The ship-based hypersonic Tsirkon ("zircon") missile, reaches a top speed of Mach 8, and can threaten land and sea based platforms.

China's Dong Feng DF-17

The DF-17 is a solid-fuelled road-mobile medium-range ballistic missile specifically designed to mount the DF-ZF HGV. The DF-ZF glides at Mach 10, and range of 2,500 kilometres, and was first unveiled on 1 October 2019, making this China's first operational hypersonic weapon systems and one of the world's first to be put in full initial operation. These are operational with the People's Liberation Army Rocket Force (PLARF). In August 2018, China tested the Starry Sky-2, using experimental hypersonic wave-rider technology and reached speeds of Mach 5.5 for 400 seconds. China's DF-26 ballistic missile is colloquially called the "Guam killer". With DF-27, the range has got further increased. Additionally, China also possesses the HGV equipped DF-41 intercontinental ballistic missile with more than 14,000 kilometres range. They also have the YJ-21 anti-ship hypersonic missile can threaten aircraft carriers.

US hypersonic weapon approach

There are over a dozen US hypersonic projects. Also many private players like Raytheon and Lockheed Martin are developing hypersonic systems. The focus of USA is on air-breathing boost-glide hypersonic systems. USA is also developing ceramics to handle the temperatures of hypersonic systems. The US Department of Defence (DoD) has spent more than $8 billion since 2019 on hypersonic programs. In its latest five-year budget plan, DoD has requested $13 billion over the 2023–2027 period for developing hypersonic missiles and almost $2 billion for procuring missiles. The US DoD wrapped up one of its hypersonic weapons programs, the Hypersonic Air-Breathing Weapon Concept (HAWC), with a successful final flight test in January 2023. It was a Lockheed Martin-designed missile, launched from a B-52 bomber and flew at speeds greater than Mach 5 and for more than 300 nautical miles. The US anticipates having hypersonic weapons by 2024, hypersonic drones by the 2030s and recoverable hypersonic drone aircraft by the 2040s.

India's HSTDV and Indo-Russian BrahMos II

The Hypersonic Technology Demonstrator Vehicle (HSTDV) is India's Defence Research and Development Organisation's (DRDO) scramjet demonstrator for hypersonic cruise missile. The eventual target is to reach Mach 6.5 at an altitude of 32.5 km. A 1:16 scale model of the vehicle was tested at a hypersonic wind tunnel operated by Israel Aerospace Industries. The isolated intake has been tested at a trisonic wind tunnel at India's National Aerospace Laboratory (NAL) in Bangalore. The scramjet engine has been tested in the lab twice for 20s. On 12 June 2019, it was tested at Integrated Test Range (ITR) at the Abdul Kalam Island in the Balasore, Odisha. The test was a partial success. HSTDV cruise vehicle was mounted atop a solid booster stage. At 30 km altitude payload fairing separated, followed by separation of HSTDV cruise vehicle, air-intake opening, fuel injection and auto-ignition. After sustaining hypersonic combustion for 20 seconds, cruise vehicle achieved velocity of nearly 2 km per second. This test flight validated aerodynamic configuration of vehicle, ignition and sustained combustion of scramjet engine at

hypersonic flow, separation mechanisms and characterised thermo-structural materials. The HSTDV is set to serve as the building block for next-generation hypersonic cruise missiles.

Russia and India are collaborating on the hypersonic BrahMos II HCM. It is estimated to have a range of 600 km and a speed of Mach 8. Making it the fastest HCM in the world. Development could take 6–8 years to complete.

Disruptive Technology: Fast and Furiously Accurate

'One mile per second' is rather fast and gives very high kinetic energy which is a function of the square of velocity. A one-kilogram object delivered precisely at such high speed can be more destructive than one-kilogram of TNT. The low-altitude path helps mask HCMs, making invisible to early warning radars. HGVs can manouvre during flight, and so more difficult to intercept, even if detected. By offering the precision of near-zero-miss weapons, the speed of ballistic missiles, and the manoeuvrability of cruise missiles, hypersonic weapons are a disruptive technology capable of striking in short time.

Weapon Employment Approach

Russia and China initially appear to be focused primarily on the delivery of nuclear warheads, and in which case, accuracy doesn't really matter very much. Yet Russia has used it with conventional warheads in Ukraine. The United States is more interested in the delivery of non-nuclear warheads, and therefore, accuracy (few meters) is absolutely critical for the weapon to be militarily effective. Both aircraft and submarines offer a great platform for adapting new missile technologies, for a prompt theatre strike capability.

Hypersonic Trajectory and Counters

The speed and altitude at which hypersonic vehicles fly, significantly challenge an adversary's ability to detect, track, target and engage. High velocity allows to reach fleeting targets well before they get away. Their manoeuvrability allows them to change course up to the last minutes of flight, and achieve a high degree of targeting precision.

Ballistic missiles fly at much higher altitudes and follow relatively predictable trajectories. Mostly, it is possible to predict the destination of any given ballistic missile payload by using space-based and ground-based early-warning systems. Powerful radar, like the US Pave Paws or the Russian Voronezh radars, combined with space-based sensors can track a ballistic missile with a range of about 3,000 km, resulting in about 14 minutes of tactical warning.

A RAND study suggests that the detection for HGV would be only six minutes prior to impact. Even if detected by a ground-based radar, there will be a high degree of uncertainty about their destinations. This makes hypersonic missiles suitable for surprise long-range strikes. They will penetrate even the most advanced air defence systems. But one cannot not accept a defenceless stance despite the inherent difficulties of defending against hypersonic weapons speed and manoeuvrability.

Counter-hypersonic solutions designed to stop enemy hypersonic weapons are evolving. The United States is currently working on developing a new satellite-sensor layer, which presumably would be positioned in low earth orbit (LEO), in order to provide continuous tracking of both ballistic missiles and hypersonic vehicles. It will require a constellation of hundreds of satellites. More advanced sensors are expected to be placed into space. Meanwhile new generation of over-the-horizon (OTH) radars like the Russian Konteyner radar and Chinese J27-A are likely to

detect hypersonic missiles 3,000 km away. Delayed detection, and a degraded decision-making environment may have consequences for threat perceptions, and accidental escalation.

Due to their speed, an envelope of ionized gas forms around the glide vehicle in atmosphere, making base-to-vehicle communication impossible. This cloud of ionized gas is easy for satellites to detect and track. Furthermore, the heat generated at those velocities renders external sensors inoperable and necessitates the detachment of HGVs from their carrier ballistic missiles at the upper limits of the atmosphere to avoid their burning up. Thus there are issues that the defender can exploit.

The 'point defence' systems like the US Patriot and Terminal High-Altitude Area Defence (THAAD), and Israeli David Sling and Iron Dome, and Russian S-400 can defend small areas against ballistic missiles, which are actually moving faster than hypersonic weapons. For a variety of technical reasons, using these SAMs as 'area defence weapons' against hypersonic weapons would be impractical. Russia's S-500 missile interceptor system, and the United States' THAAD-ER (Terminal High Altitude Area Defence-Extended Range) systems are conceived for area defence. It would be cost-prohibitive to deploy them to protect all possible targets. It could be realistic to use them to protect critical facilities like command and control nodes and land-based nuclear assets, mitigating first strike vulnerability fears.

Another way of defending against hypersonic weapons (as well as other types of missile) could be through directed-energy systems, in particular, laser weapons. However, the effectiveness of laser weapons against hypersonic missiles is yet to be seen and the probability is difficult to assess due to the technology being at an early stage of development.

Destabilisation effects

As more and more countries acquire hypersonic weapons destabilizing effect of hypersonic weapons will pose a challenge for arms control. The weaponisation of hypersonic technologies requires sophisticated facilities that would be cost-prohibitive for many nations. But this could change in the future. Hypersonic technologies have dual use potential, and so cannot be banned. Establishing 'Hot-line' communication might reduce the risk of misinterpretation. Assurances that early-warning radars and satellite will not be targeted, may help. However, without a reliable verification mechanism for clarifying the nature of the warheads carried by hypersonic missiles, warhead ambiguity is likely to continue.

Way ahead India

Many consider conventional hypersonic weapons or strategic non-nuclear high precision weapons to be equivalent to nuclear weapons in terms of their implications for deterrence. There is a need to worry about the potential combination of high-precision warhead delivery methods with low-yield nuclear warheads. Such weapons would be 'tactically usable'.

India has a robust survivable nuclear triad with long-range ballistic missiles, Multiple Re-entry Launch Vehicles (MIRV), air and sea based nuclear vectors, a ballistic missile defence program, and an elaborate command and control mechanism. Today it is possible to launch precision strikes on the nuclear command, communication and critical infrastructure networks, disrupting an adversary's nuclear decision-making chains or targeting nuclear assets. China is continuing the nuclear weapons modernization and expansion program by fielding more types and greater numbers of nuclear weapons. They plan to go up from current 250 to 1,000 warheads by 2030.

DF 27 gives PLA greater precision strike options both with nuclear and conventional warheads. It also impacts deterrence. Hypersonic weapons would avoid existing missile defence systems, either by continually manoeuvring or by flying at lower altitudes to reduce warning time.

The bottom line is that hypersonic weapons will determine who is 'precise and 'prompt' enough in 21st-century conflict. With credible Indian hypersonic weapons capability, the PLA Navy's large ships and aircraft carriers can be kept further away from Indian shores. Hypersonic weapons could be used to target PLA's large weapon storage areas and also main command and control centres in garrisons in Tibet and Xinjiang. India has to quickly get going and developing this 'disruptive technology' and also invest in counter-capabilities. Important Indian targets like in NCR region and other strategic and command and control sites would have to have robust air defence systems including those using Directed Energy Weapons (DEW). Modern hypervelocity guns and rail-guns could also be used.

Hypersonic weapons even in the conventional domain will provide a significant advantage. Fielding hypersonic weapons deployable from land, sea and air, and be able to perform multiple missions, has become vital to national security. Military disadvantage and technological incapacity invariably leads to a country's marginalisation in international diplomacy. India has to move with a sense of urgency on both operationalizing hypersonic technology and counters to it, lest it gets left too far behind. India needs to hasten indigenous hypersonic technology development and also accelerate the BrahMos II program, and simultaneously evolve deployable directed-energy air defence weapons.

https://www.firstpost.com/opinion/chinas-deploys-hypersonic-irbm-df-27-implications-and-choices-for-india-12496142.html

Hindustan Times

Mon, 24 Apr 2023

India 4th Biggest Military Spender in World: SIPRI

India, which has sharpened its focus on building its defence capabilities and strengthening military infrastructure along the China border, was the fourth biggest military spender in the world in 2022 after the United States, China and Russia, the Stockholm International Peace Research Institute (Sipri) said in a report published on Monday.

Saudi Arabia was in fifth place. The five countries accounted for 63% of the world's military spending.

"India's military spending of $81.4 billion was the fourth highest in the world. It was 6% more than in 2021 and up by 47% from 2013. The increase in India's spending shows the effects of its border tensions with China and Pakistan," the Sipri report said.

The report comes at a time when India and China have been locked in a standoff along the Line of Actual Control (LAC) in eastern Ladakh since May 2020, and negotiations are on to ease border tensions. The two sides on Sunday held the 18th round of military talks to resolve outstanding problems.

India's expenditure on equipment upgrades for the armed forces and strengthening military infrastructure along its disputed border with China accounted for 23% of its total military spending in 2022, the report mentioned, adding that salaries and pensions remained the largest expenditure category in the Indian military budget, and accounted for around half of all military spending.

India faces unique security challenges as it has two nuclear-armed neighbours with whom it has had full-scale wars, and the militaries continue to face each other at the borders, said Air Marshal Anil Chopra (retd), director general, Centre for Air Power Studies. "India is now the fifth largest economy, and for its size and threat perceptions, the defence spending is proportionate," Chopra added. Total global military expenditure increased by 3.7% in 2022, hitting a new high of $2,240 billion, Sipri said while highlighting that Russia's invasion of Ukraine was a major driver of the growth in spending last year.

China continues to spend more on defence than India. In 2022, China's military spending reached $292 billion, the report said.

In February, India set aside Rs. 5.93 lakh crore for defence spending in this year's budget, including a capital outlay of Rs.1.62 lakh crore for the military's modernisation, with the allocation almost 12% higher than that in last year's budget estimates, and about 2% more compared to that in the revised estimates for 2022-23.

The budget also includes a revenue expenditure of Rs.2.7 lakh crore and a pension outlay of Rs. 1.38 lakh crore. This year's defence budget accounts for 2% of the country's projected gross domestic product (GDP) for 2023-24.

This year's capital outlay is about 6% higher than last year's budget estimates and about 8% more compared to that in the revised estimates for 2022-23. The capital allocation will power of purchase of fighter aircraft, helicopters, warships, missiles and several land systems, including tanks and artillery guns.

India allocated Rs.5.25 lakh crore for military spending in last year's budget, ₹4.78 lakh crore in 2021-22, and Rs.4.71 lakh crore the year before.

In another report published in March 2023, Sipri said India's arms imports fell 11% between 2013-17 and 2018-22 but the country is still the world's top importer of military hardware. That report came at a time when India has sharpened its focus on achieving self-reliance in the defence manufacturing sector.

Also, India's share of the global arms imports was the highest during the last five years at 11%, followed by Saudi Arabia (9.6%), Qatar (6.4%), Australia (4.7%) and China (4.7%), according to data published by Sipri that measures weapons imports over five-year periods.

The March report said the reasons for the decline in India's imports included attempts to replace imports with local military hardware and a complex procurement process. India has taken a raft of measures over the last four to five years to boost self-reliance in defence. These include creating a separate budget for buying locally made military hardware, increasing foreign direct investment (FDI) from 49% to 74%, and notifying hundreds of weapons and systems that cannot be imported and are planned to be indigenised over the next five to six years.

https://www.hindustantimes.com/india-news/india-fourth-biggest-military-spender-in-2022-says-sipri-report-china-spends-more-101682342537768.html

THE TIMES OF INDIA

Tue, 25 Apr 2023

Global Military Spend at Record High, India Fourth

India, overtaken by Russia over the last one year, is now the world's fourth largest military spender, while China continues to spend almost four times and the US more than 10 times its defence budget, as global military spending grew for the eighth consecutive year to reach an all-time high in 2022.

The total global military expenditure increased by 3.7% in real terms to reach $2,240 billion in 2022, with Europe registering its steepest year-on-year increase in at least 30 years due to Russia's invasion of Ukraine, as per the latest data released by think-tank Stockholm International Peace Research Institute (SIPRI) on Monday.

The 10 largest military spenders are the US ($877 billion), China ($292 billion), Russia ($86.4 billion), India ($81.4 billion), Saudi Arabia ($75 billion), UK ($68.5 billion), Germany ($55.8 billion), France ($53.6 billion), South Korea ($46.4 billion) and Japan ($46 billion). While the figures for China and Russia are estimates due to lack of transparency, Ukraine is placed at 11th rank with $44 billion and Pakistan at 24th spot with $10.3 billion. "The continuous rise in global military expenditure in recent years is a sign that we are living in an increasingly insecure world. States are bolstering military strength in response to a deteriorating security environment, which they do not foresee improving in the near future," SIPRI said.

India, of course, faces a clear and present threat from an aggressive and expansionist China, while Pakistan continues to fuel cross-border terrorism. But with huge competing demands from other sectors, India's defence budget for 2023-24 is just 1.97% of the projected GDP when at least 2.5% is required, as reported by TOI.

This becomes all the more important because India's military modernization of its over 14-lakh strong armed forces also remains constrained by the ballooning salary and pension bills that eat up over half of its defence expenditure. The Rs 5.93 lakh crore defence budget for 2023-24, for instance, includes Rs 1.38 lakh crore for pensions and Rs 1.8 lakh crore for salaries.

Consequently, the armed forces continue to contend with critical operational shortages, ranging from fighters, submarines and helicopters to modern infantry weapons, anti-tank guided missiles and night-fighting capabilities, despite the ongoing military confrontation with China.

SIPRI, on its part, said India's spending was up by 6% from 2021 and by 47% from 2013. "The increase in India's spending shows the effects of its border tensions with China and Pakistan," it said.

But the think-tank also took note that India's capital expenditure for modernization amounted to just 23% of its total military spending in 2022. "Personnel expenses (salaries and pensions) remained the largest expenditure category in the Indian military budget, accounting for around half of all military spending," SIPRI said. India's failure to formulate concrete long-term plans to systematically build military capabilities with proper inter-Service prioritization in tune with its geopolitical objectives as well as the relatively weak domestic defence-industrial base also remain major problems.

India's arms exports did reach an all-time high of Rs 15,920 crore in the 2022-23 financial year. But the country continues to also languish in the strategically-vulnerable position of being the world's largest arms importer, accounting for 11% of the total global imports in 2018-2022.

https://timesofindia.indiatimes.com/india/global-military-spend-at-record-high-india-fourth/articleshow/99741599.cms

the pioneer

Mon, 24 Apr 2023

Australia New Defence Review- Focus on Stronger Ties with India, Japan amidst China Military Build-up

Australia on Monday released the public version of the Defence Strategic Review (DSR) that has proposed a strategy of greater self-sufficiency combined with stronger relationships with its allies and key powers in the region, including Japan and India.

The country plans to prioritise its long-range precision strike capability, domestic production of guided weapons, and diplomacy, in its biggest defence shake-up since World War II.

The review said Australia is facing a "radically different" strategic environment, including a military build-up by China, which is "the largest and most ambitious of any country since the end of the (World War II)."

"We commissioned the Defence Strategic Review to make sure Australia is more secure. Today, we've released our response to the review. It shows how determined we are to keep Australians safe. Because national security is every government's most solemn responsibility," Australian Prime Minister Anthony Albanese said in a tweet.

Commissioned in the first 100 days of Government, the Review sets the agenda for ambitious, but necessary, reform to Australia's Defence posture and structure.

The review said the United States is no longer the "unipolar leader of the Indo-Pacific", intense competition between the US and China is defining the region, and that this competition has "potential for conflict".

The review called for the acquisition of nuclear-powered submarines through AUKUS (comprising of Australia, UK and US); develop the Australian Defence Force's (ADF) ability to precisely strike targets at longer range and manufacture munitions in Australia; improve ADF's ability to operate from Australia's northern bases; improve the growth and retention of a highly skilled Defence workforce; lifting capacity to rapidly translate disruptive new technologies into ADF capability, in close partnership with Australian industry; and deepening of diplomatic and defence partnerships with key partners in the Indo-Pacific, read the press release of Australian Government, Defence.

"My Government commissioned the Defence Strategic Review to assess whether Australia had the necessary defence capability, posture and preparedness to best defend Australia and its interests in the strategic environment we now face," said Albanese.

Australia would work more closely with the United States, including increased bilateral military planning, joint patrols and hosting more rotations of US forces, including submarines, said the review.

Australia must also strengthen defence cooperation with Pacific and Southeast Asian nations, the Review said.

Australia must continue to expand its relationships and practical cooperation with key powers, including Japan and India, the Review stated.

“We support the strategic direction and key findings set out in the Review, which will strengthen our national security and ensure our readiness for future challenges. The Government will continue to invest in our capabilities and invest in our relationships to help build a more secure Australia and a more stable and prosperous region,” said Albanese.

The Albanese Government apart from the public version of the Defence Strategic Review (the Review) also released the Government’s response to the Review, and the National Defence Statement 2023.

Australia must be able to defend its territories and the immediate region, deter any adversary’s attempt to project power through its northern approaches, and protect trade routes and communications, Defence Minister Richard Marles said in the government’s response to the review.

“The Defence Strategic Review, and the Government’s response, is about maintaining peace, security and prosperity in our region. There are a lot of tough decisions which need to be made, but in doing so, we are making them in the best interest of our Defence Force and our nation. Work to implement the Review starts today, ensuring our ADF and our Defence personnel has the capability they need to keep Australians safe,” he said.

https://theprint.in/world/australia-new-defence-review-focus-on-stronger-ties-with-india-japan-amidst-china-military-build-up/1536308/

THE ECONOMIC TIMES

Mon, 24 Apr 2023

China, Singapore Plan Military Drills as Beijing Forges Defence Ties

China and Singapore will hold a joint military exercise as soon as this week, their first combined drills since 2021, as Beijing deepens its defence and security ties with Southeast Asia, a region with strong existing U.S. alliances.

The Chinese navy will deploy a missile-bearing frigate, the Yulin, and a mine-hunting ship, the Chibi, to the joint maritime exercise which will last from late April to early May, the Chinese defence ministry said in a statement on its website on Monday, without specifying the location.

Two years ago, China and Singapore held a combined military drill in international waters at the southern tip of the South China Sea, following the upgrade of a bilateral defence pact in 2019 to include bigger-scale exercises among their army, navy and air force.

The deeper China-Singapore military cooperation comes as a time of heightened tensions in the South China Sea, an area spanning 3.5 million square km (1.4 million square miles) that is often traversed by Western navies including U.S. vessels conducting freedom of navigation operations. Such passages annoy China, which lays claims to nearly all of the South China Sea despite an international ruling to the contrary.

In August last year, the U.S. military conducted an expanded Super Garuda Shield exercise with Indonesia that saw the participation of Singapore, Japan and Australia for the first time.

Around the same time, China sent fighter-bombers to Thailand in joint air force drills code named Falcon Strike 2022. Both countries say the exercises, in northeast Thailand near the border with Laos, were defensive in nature.

The drills last summer also took place against the backdrop of elevated tensions in the Taiwan Strait following the visit of former U.S. House Speaker Nancy Pelosi to the democratically governed Taiwan, which China claims as its own.

China's increased military engagement in Southeast Asia is widely expected to challenge the influence that the United States has shaped with countries including Singapore and Indonesia in coming years.

https://economictimes.indiatimes.com/news/defence/china-singapore-plan-military-drills-as-beijing-forges-defence-ties/articleshow/99724204.cms

R. REPUBLICWORLD.COM

Mon, 24 Apr 2023

Defence Ministers of Russia, Iran, Egypt and Syria to Meet in Moscow: Official

The defense ministers and intelligence chiefs of Turkey, Russia, Syria, and Iran are scheduled to meet in Moscow on April 25, according to an announcement from Turkish Defense Minister Hulusi Akar. The meeting aims to discuss and address the ongoing conflicts in the region with the goal of finding peaceful solutions.

"Our aim is to solve the problems through negotiations and bring peace and tranquility to the region as soon as possible," stated Akar, as per a report from the Kyiv Independent. Turkish, Russian, and Syrian defense ministers, along with their intelligence heads, had previously met in Moscow in December last year and decided to continue such meetings. Iran's participation in these talks was later approved by the relevant authorities, according to Akar.

Significance of the Meet

Turkey has expressed its willingness to facilitate a ceasefire between Russia and Ukraine, as per a statement from President Recep Tayyip Erdogan's spokesman Ibrahim Kalin. Turkey has been

actively advocating for local ceasefires and de-escalation measures in Ukraine. It is worth flagging that Iran has been reportedly supplying Russia with kamikaze drones that are being used in conjunction with missiles, guided aerial bombs, and other weapons in attacks against Ukraine. These developments make this meeting more important.

The meeting in Moscow comes amid escalating tensions and conflicts in the region, and the outcome of the talks could have significant implications for the ongoing conflicts and the prospects for regional peace. The four countries involved are expected to engage in discussions on various regional issues and explore ways to mitigate conflicts and restore stability in the region. The international community will closely monitor the outcome of the meeting, as it could potentially impact the geopolitical landscape in the region and have wider implications for global security dynamics.

https://www.republicworld.com/world-news/europe/defence-ministers-of-russia-iran-egypt-and-syria-to-meet-in-moscow-official-articleshow.html

Science & Technology News

Hindustan Times

Mon, 24 Apr 2023

India Ready to Take the Lead in Quantum Tech

Under the dynamic leadership of Prime Minister (PM) Narendra Modi, Covid-19 proved that India can provide solutions to address global urgencies, be it in health care, food or other sectors. We are also one of the largest information technology (IT) consumers and service providers, and now it's time for India to achieve global leadership in deep technologies, such as Quantum Technologies (QT), to ensure that India provides digital solutions for future demands, addressing issues in fintech, automotive, banking and security, defence and agriculture.

QT — the potential technologies of the future — are an outcome of the progression of the first quantum revolution into the second quantum revolution. India's major advantage is the prioritisation and patronage that its quantum dreams have received from PM Modi and the government headed by him. As a result, India is preparing to be quantum-ready — be it indigenous quantum computer development or skilled workforce or an infrastructure needed to adopt QT, including the standards required for quantum systems.

Quantum information and computing is one of the verticals of the much broader QT that India is preparing its capabilities for. The vertical covers the development of the hardware of a quantum computer, based on the quantum mechanical properties, for instance, of neutral atoms or ions and their use as information bits or qubits.

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Quantum communications is another important vertical under QT that national institutes and agencies focus on. It provides safe and quantum-secure communications over optical fibre or in free space and secures key distribution that forms the core of any cryptographic system, such as the foundations of any banking and security and defence communications systems. In addition, multi-node quantum networks are being established nationwide for large-area secure communications based on trusted quantum repeaters.

India has capabilities in materials employed in the development of QT, and the area is heading towards advanced research stages, and devices are being fabricated based on such materials. Quantum materials cover the design and synthesis of materials, such as superconductors, semiconductors, 2D materials and topological materials. The vertical also includes the fabrication of quantum devices to develop qubits for quantum computing applications, single photon sources or detectors and entangled photon sources for quantum communications, sensing and metrological applications. The area is resource- and infrastructure-intense but is evolving faster.

With nations such as China, the United Kingdom, Germany, France and the United States allocating and spending considerable budgets on national quantum missions, India has taken baby steps in launching the quantum missions.

However, it was primarily the personal indulgence of PM Modi that India embarked on this journey in 2018 with the launch of the Quantum Enabled Science and Technology (QuEST) programme that funded 51 national quantum labs with a budget of ₹250 crore and developed infrastructure required to progress with developments in QT.

It also helped the government identify national quantum labs and experts and provide a national umbrella and an ecosystem for them to work together for the nation. In addition, the programme boosted research in quantum areas and enhanced the interaction within the quantum ecosystem. Following the QuEST programme, India established a national quantum hub — the I-HUB Quantum Foundation or I-HUB QTF in Pune in 2020 under the dedicated National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) with a budget of ₹170 crore dedicated to the development of QT.

This breakthrough mission is gearing up technology development at high scales. In both the QuEST programme and the NM-ICPS mission, quantum effects are harnessed for developing quantum sensors, quantum computers, subsystems for quantum communications using platforms that use photons, isolated atoms and ions, artificial “atoms”, electronics spins, atomic defects in solid matrices, the ensemble of atoms/molecules in the liquid state. The hub encompasses quantum technology and product development, quantum skilling, and promoting innovation and entrepreneurship via the support of quantum-based startups and international collaborations. Enabling technologies are also being encouraged at the hub to promote indigenisation, such as

the indigenisation of key technology enablers — materials, devices, instrumentation and control systems, algorithms and software required for quantum technologies.

With the National Quantum Mission announcement, India is on the global quantum map. It is expected to be a dedicated mission towards use-case development and applications that will boost the efforts of QuEST and NM-ICPS quantum mission and take India a step closer towards achieving quantum readiness and hence also leadership in future.

https://www.hindustantimes.com/opinion/indias-quantum-revolution-pm-modi-s-push-for-global-leadership-in-deep-technologies-101682344038853.html

THE TIMES OF INDIA

Mon, 24 Apr 2023

World Malaria Day 2023: Time to Deliver Zero Malaria, says WHO

To commemorate World Malaria Day 2023, World Health Organization has urged the countries affected by the disease globally to accelerate the reach of high-impact tools and strategies to prevent, detect and treat malaria, with a focus on reaching the most vulnerable, ensuring that no person or population is left behind.

According to WHO Regional Director for South-East Asia, Dr Poonam Khetrapal Singh, in the shadow of the Covid-19 crisis, the world is not on track to reach the two critical targets of the WHO Global technical strategy (GTS) for malaria 2016-2030: reducing global case incidence and mortality by 90 per cent or more by 2030, based on 2015 levels.

Dr Poonam said that in 2021, an estimated 619,000 people globally died of malaria compared to 625,000 in 2020. There were an estimated 247 million new cases of malaria, compared to 245 million in 2020.

The WHO South-East Asia region continues to lead globally.

By the end of 2020, the South-East Asia region was the only WHO region to achieve a 40 per cent reduction in malaria case incidence and mortality compared to 2015 - the first GTS milestone, the Director said.

Amid the COVID-19 response, Maldives and Sri Lanka have maintained their malaria-free status, and five countries of the Region - Bhutan, DPR Korea, Nepal, Thailand and Timor-Leste - are among 25 countries and one territory globally identified as having the potential to eliminate malaria by 2025, Dr Poonam Khetrapal Singh said.

In September 2023, Timor-Leste is likely to complete three consecutive years of reporting zero local malaria transmission. It would therefore be eligible to be certified malaria-free.

Dr Poonam said that in 2022, ministers of health from across the region unanimously endorsed a Statement on Renewed Commitment for Malaria Elimination, emphasizing the urgent need to scale up proven implementation strategies, while also adopting innovative strategies and tools. "The Statement is aligned with the Region's 2017 Ministerial Declaration for Accelerating and

Sustaining Malaria Elimination, as well as the 2018 Ministerial Call for Action to eliminate malaria in the Greater Mekong Subregion," she said.

Today, the region is at a crossroads. Since 2010, overall funding for malaria prevention and control in the Region has decreased by 36 per cent, mostly on account of flagging global support, Dr Poonam stated.

Reductions in the efficacy of artemisinin-based combination therapies, especially in the Greater Mekong Subregion, as well as increased vector resistance to pyrethroids, the risk of increased morbidity, mortality and spread. In several countries, cross-border transmission continues to be a major impediment to achieving the elimination targets.

Across the region, gaps in services persist: In 2021, there were an estimated 385,000 more cases in the region compared to 2020.

WHO is calling for action in several key areas.

According to Dr Poonam, first, strengthening capacity at the sub-national level, with a focus on identifying clear and actionable goals, increasing resource allocations, and empowering local decision-makers.

"Second, shifting power to the peripheries, with a focus on increasing cross-border collaboration, especially in high-burden countries and neighbouring countries on the verge of elimination. For this, decision-makers should develop action-oriented roadmaps with strong frameworks for monitoring and evaluation," she said.

"Third, ensuring adequate and sustained financing for malaria programmes, recognizing that transitions in funding must be anticipated, planned for and implemented gradually, based on a time-bound strategy," the Director added.

She said that the fourth is transforming surveillance into a core malaria intervention ensure that last-mile barriers are identified and overcome.

"Fifth, accelerating high-impact innovations, not just in diagnostics and treatments, but also in service delivery, in line with the Region's primary healthcare approach to achieving universal health coverage - since 2014, one of eight Flagship Priorities in the region," she said.

Crucially, intensified efforts must be made to reach at-risk and vulnerable populations with currently available strategies and tools.

Globally, children in the poorest households are five times more likely to be infected with malaria. Malaria is also more prevalent among young children whose mothers have a lower level of education and live in rural areas, she said.

"Reaching these populations with available malaria prevention, diagnosis and treatment is critical for achieving the Global technical strategy for malaria 2016-2030 and Sustainable Development Goal targets and delivering on the promise of zero malaria for everyone, everywhere," Dr Poonam said.

"On World Malaria Day, WHO reiterates its support to all countries of the Region to accelerate and/or sustain malaria elimination, building on the Region's world-leading progress, and uniting our partners to leave no person or population behind," she added.

https://timesofindia.indiatimes.com/india/world-malaria-day-2023-time-to-deliver-zero-malaria-says-who/articleshow/99723739.cms