

The Hindu Important News Articles & Editorial For UPSC CSE

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➔ A research team from China and Japan observed signs of a Bose metal in niobium diselenide, advancing understanding of anomalous metallic states and superconductivity.

Research team takes big step towards making a Bose metal

Traditional theories for disordered metals say that at absolute zero temperature, the metals should either become an insulator or a superconductor. A Bose metal challenges this description because its conductivity stays between zero and infinity as the temperature tends to absolute zero

Vasudevan Mukunth

A metal is a material defined by specific properties, including conducting electricity well. Every metal has a finite conductivity – a measure of how well it conducts – in particular conditions. It changes when the metal is heated or cooled.

For example, at a pleasant 20° C, the electrical conductivity of zinc is roughly 16.9 million siemens per metre. But cool it to a frigid -272.3° C and its conductivity becomes infinite. This is because at this temperature zinc becomes a superconductor: able to conduct an electric current with zero resistance.

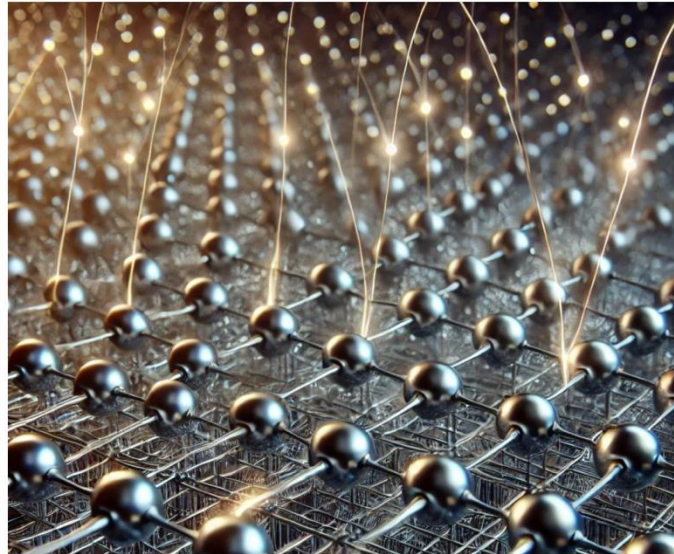
Scientists know of many metals that have a finite conductivity at room temperature and infinite conductivity at very low temperatures. This drastic change in behaviour is because of something that happens to the metals' electrons. At room temperature, the electrons in a grid of zinc atoms move freely throughout the material, transporting electricity if a voltage is applied. Each electron itself repels other electrons and is also acted on by other forces imposed by the 3D grid of atoms around it, including vibrations in the grid, impurities in the material, and attractive forces exerted by protons in the nuclei.

When this grid is cooled to a low temperature, many of the forces weaken. At under a critical temperature, in zinc's case -272.3° C, the net force on electrons is weakly attractive. That is, the electrons are mildly attracted to each other across large distances (i.e., beyond the short range across which they still repel each other). This net force causes the electrons to 'pair up' without getting closer and together behave in a way that individual electrons can't. These pairs are called Cooper pairs. Thanks to the low temperature, at some point these pairs of electrons undergo a phase transition, forming an exotic state of matter within the zinc grid called a superconductor. It is this superconductor that has infinite conductivity.

Almost a superconductor, yet not Metals that don't become superconducting at very low temperatures still become better conductors because the forces that resist the flow of an electric current also weaken at lower temperatures. ('Current' here refers only to a direct current. The flow of an alternating current in a superconductor elicits a variety of effects, including those that resist its flow.)

Some metals, or metallic substances, do something weird. Below the critical temperature, their electrons experience the net attractive force and pair up – but then they don't yet condense to form a superconductor. That is, the material doesn't become a superconductor but just a better conductor, and it conducts electricity with Cooper pairs, not electrons. In this state, the material is said to have become a Bose metal.

A Bose metal is a kind of anomalous metallic state (AMS). The 'anomaly' is that the Cooper pairs are formed but don't condense into a superconductor. In technical terms, they fail to establish long-range superconducting coherence. Studying AMSs, in a wider field called condensed matter physics, is important to



This is a rough illustration of a grid of nuclei (metal nodes) in a metal through which electrons are flowing (golden streaks). IMAGE CREATED WITH CHATGPT

understand disordered metals, where the grid of atoms has an irregular structure or impurities or the material is alloyed in a way that prevents it from behaving like a 'regular' metal. Disordered metals thus have deviant properties but we don't fully understand the different ways in which they can deviate. Studying them helps scientists probe a variety of quantum processes.

For example, traditional theories that describe disordered metals say that at absolute zero temperature, the metals should have either zero conductivity (become an insulator) or infinite conductivity (become a superconductor). A Bose metal challenges this description because its conductivity is between zero and infinity as the temperature tends to absolute zero – or at least it may be if we saw one in action.

So far, Bose metals have only been predicted to exist in specific materials; scientists haven't synthesised or found them. It's possible in fact that Bose metals may not exist at all, but that would be useful to know, too, for the implications for physicists' theories of AMS.

But on February 13, a team of researchers from China and Japan reported in the journal *Physical Review Letters* that they had found strong signs that niobium diselenide (NbSe₂) can become a Bose metal.

Magnetic field as villain

Like zinc, NbSe₂ also becomes a superconductor at low temperature but with additional 'abilities'. This is due to a key detail: magnetic fields and a material's superconducting state never get along. If

A Bose metal is a kind of anomalous metallic state. The 'anomaly' is that the Cooper pairs are formed but don't condense into a superconductor. In technical terms, they fail to establish long-range superconducting coherence

a zinc sample is placed in an external magnetic field and cooled slowly to under its critical temperature, the moment it becomes a superconductor the sample will expel the magnetic field from within its body.

NbSe₂ goes through the same transition at a particular temperature and magnetic field strength. But when the field strength is slowly increased, NbSe₂ enters a 'mixed state': it remains superconducting but also allows the magnetic field to enter its body in small, isolated pockets without spreading through its bulk. If the field continues to strengthen beyond an upper threshold the superconducting state will collapse and NbSe₂ will revert to its pre-superconducting state.

Materials with this more dynamic road through superconductivity are called type-II superconductors. The forces that act on electrons in such a material as it is cooled and magnetised become more pronounced if the material is physically thinner. And one theory of Bose metals predicts that if a 2D version of this material – i.e. a single layer of NbSe₂ molecules – is subjected to a magnetic field oriented a certain way, a Bose metal will be created.

The researchers set out to check this and found all the hallmarks of such an AMS, but the study's lead investigator and Nanjing University professor Xiaoxiang Xi stopped short of calling it a Bose metal, telling *Physics* magazine the definition of the AMS is "somewhat ambiguous."

In particular, the team used Raman spectroscopy to find the thin NbSe₂ had Cooper pairs without entering a superconducting state and the material's Hall resistance vanished as the team increased its thickness. When a piece of regular metal is placed in a magnetic field and a current is passed through it, the piece develops a voltage in the perpendicular direction. The resistance associated with this voltage is called the Hall resistance. The Hall resistance vanishing in NbSe₂ is a sign that its charge-carriers are Cooper pairs rather than electrons.

"Our results suggest that the AMS is characterised by fluctuating local pairing, which fails to condense," the team wrote in its paper. "Theories focusing on the role of phase fluctuation in disrupting global superconductivity could provide valuable understanding of the phenomena observed."

They added that the findings impose "limitations on theories centred around" pockets of superconductivity in a non-superconducting material and the coexistence of superconducting and non-superconducting phases in the same material. Bose metals don't have concrete applications today but they are a rich playground for physics research that could inform future innovation.

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What is a Bose Metal?

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Daily News Analysis

- A Bose metal is a type of anomalous metallic state, where the 'anomaly' refers to the presence of Cooper pairs without the material transitioning into a superconducting state.
- It conducts electricity better than regular metals but not with zero resistance like superconductors.

How Does It Form?

- At very low temperatures, some metals allow electrons to pair up into Cooper pairs.
- However, these pairs do not fully organize into a superconducting state.

Why is It Important?

- It challenges traditional physics, which states that metals should either be superconductors (infinite conductivity) or insulators (zero conductivity) at absolute zero.
- Studying Bose metals helps scientists understand quantum materials better.

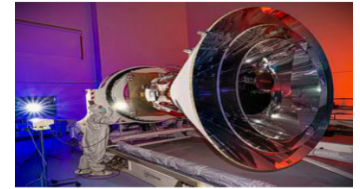
Current Status

- Bose metals are still theoretical.
- Recent studies suggest that niobium diselenide (NbSe_2) might be a Bose metal.
- There are no practical applications yet, but research continues.

- ➔ NASA is set to launch SPHEREx to study cosmic inflation, galaxy formation, and water ice, unveiling mysteries of the universe's early moments.

SPHEREx: NASA's New Space Telescope:

- ➔ SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer) is a space telescope by NASA.
- ➔ It is set to launch on March 4 aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base, California.
- ➔ The mission aims to study the early universe, galaxy formation, and water ice in space.
- ➔ It will map the entire sky in 102 colors to create a 3D cosmic map.
- ➔ SPHEREx will study cosmic inflation, the rapid expansion of the universe after the Big Bang.
- ➔ It will collect data on 450 million galaxies and over 100 million stars in the Milky Way.
- ➔ The telescope will also help scientists find water ice in space, which is important for life.
- ➔ It will work for two years to better understand how galaxies and planets form.
- ➔ SPHEREx will be launched along with NASA's PUNCH mission, which will study the Sun's outer atmosphere and solar wind.



The SPHEREx telescope at a facility in Boulder, Colorado, in the US. AP

NASA to launch SPHEREx to explore what happened right after Big Bang

Reuters

NASA is preparing to launch a megaphone-shaped observatory on a mission to better understand what happened immediately after the Big Bang that initiated the universe and to search the Milky Way for reservoirs of water, a crucial ingredient for life.

The US space agency's SPHEREx space telescope is tentatively scheduled to be launched on March 4 aboard a SpaceX Falcon 9 rocket from Vandenberg Space Force Base in California.

SPHEREx, short for Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer, is looking to answer questions about the origin of the universe while mapping the distribution of galaxies.

It will also look within our galaxy for reservoirs of water frozen on the surface of interstellar dust grains in large clouds of gas and dust that give rise to stars and planets. The observatory, during its planned two-year mission, will collect data on more than 450 million galaxies, as well as more than 100 million stars in the Milky Way, as it explores the origins of the universe. It will create a three-dimensional map of the cosmos in 102 colors.

The mission is intended to gain insight into a phenomenon called cosmic inflation, the rapid and exponential expansion of the universe from a single point in a fraction of a second after the Big Bang that occurred roughly 13.8 billion years ago.

"We have pretty good evidence that inflation occurred, but the physics driving that event is really uncertain," said cosmologist Olivier Dore of Caltech and NASA's Jet Propulsion Laboratory, a SPHEREx project scientist.

The mission is to gain insight into cosmic inflation, the rapid and exponential expansion of the universe from a single point in a fraction of a second after the Big Bang 13.8 billion years ago

"By mapping the distribution of galaxies over the whole sky, we can directly constrain unique properties of inflation. This is why we want to map the whole sky and why we need spectroscopy (studying objects based on color) to make the map 3D. The fact that we can connect these two things – the distribution of galaxies on large scales all the way to the physics of inflation – is very powerful and very mind-boggling and almost magical," Dore added.

Jim Fanson, SPHEREx project manager at the Jet Propulsion Laboratory, called cosmic inflation "the consensus framework for explaining aspects of the universe that we observe on large scales."

"It postulates that the universe expanded by a trillion-trillion-fold in a small fraction of a second after the Big Bang," Fanson said.

SPHEREx is set to take pictures in every direction around the earth, splitting the light from billions of cosmic sources such as stars and galaxies into their component wavelengths to determine their composition and distance.

Researchers will also measure the collective glow of light from the space between galaxies. Being launched along with SPHEREx is a constellation of satellites for NASA's PUNCH mission to observe the sun's corona, the outermost layer of its atmosphere. The aim is to better understand the solar wind, the continuous flow of charged particles from the sun.

- ▶ India's Income Tax Bill, 2025 establishes a legal framework for Virtual Digital Assets, ensuring taxation clarity and alignment with global practices on digital assets.

CACHE



The implications of treating Virtual Digital Assets as taxable properties

For the first time in India, the Income Tax Bill, 2025 explicitly treats VDAs as property and capital assets. By defining them as such, India gains the ability to tax, regulate, and seize crypto assets when necessary, preventing their misuse for illicit financial activities

Sanhita Chauriha

As digital economies expand and blockchain technology reshapes global finance, governments worldwide are grappling with the classification, regulation and taxation of Virtual Digital Assets (VDAs). India's Income Tax Bill, 2025 introduces a comprehensive legal framework for VDAs defined in Section 2(11), aligning the country's tax structure with global precedents. This move is crucial, considering how major economies like the U.K., the U.S., Singapore, Australia, New Zealand, and the UAE have approached VDAs – primarily as property or securities.

VDAs as property and capital assets
For the first time in India, the Income Tax Bill, 2025 explicitly treats VDAs as property (Section 52 (SI)) and capital assets. This classification has far-reaching consequences in terms of taxation, compliance, and legal recognition. The bill categorically states that VDAs, which include crypto assets, Non-Fungible Tokens (NFTs), and similar digital assets, should be considered property. This move aligns India with global practices, where digital assets are either classified as securities (like in the U.S.) or property (like in the U.K., Australia, and New Zealand). VDAs are classified as capital assets under Section 76(1). This means that any gains arising from their sale, transfer, or exchange will be taxed under capital

gains provisions, similar to real estate, stocks, and bonds. For example, if an individual purchases Bitcoin at ₹10 lakh and sells it for ₹20 lakh, the ₹10 lakh profit will be subject to capital gains tax – either short-term or long-term, depending on the holding period. By treating VDAs as capital assets, the government ensures that transactions are subject to standard asset taxation principles, preventing their misuse as unregulated financial instruments. This classification is similar to the U.K. policy, where HM Revenue & Customs (HMRC) recognises crypto assets as property for tax purposes, subjecting them to the Capital Gains Tax (CGT). Likewise, New Zealand's Inland Revenue Department also treats crypto assets as property, making them subject to income tax on trades.

Continuing the precedent set in 2022, the bill imposes a 30% tax on income from VDA transfers. Unlike traditional capital assets, no deductions (other than the cost of acquisition) are allowed. This means that expenses related to mining, transaction fees, platform commissions, and gas fees cannot be deducted when calculating taxable income. For instance, if an investor buys Ethereum for ₹5 lakh and sells it for ₹7 lakh, the ₹2 lakh profit is taxed at a flat 30% – with no relief for transaction costs. This tax treatment is harsher than that in the UAE, where the Virtual Assets Regulatory Authority (VARA) allows businesses and individuals to hold and trade VDAs under regulated conditions, with 0% personal income tax

on gains in certain cases. Similar to previous amendments, Section 393 states a 1% TDS (Tax Deducted at Source) on transfers of VDAs. This applies even in peer-to-peer (P2P) transactions and ensures that the government tracks large crypto transactions. The threshold for TDS exemption is ₹50,000 for small traders and ₹10,000 for others.

On the need to report
Another crucial provision is the inclusion of VDAs in undisclosed income taxation and asset seizure regulations. Section 301 states that if an individual fails to report VDA holdings in their tax filings, they can be classified as undisclosed income and taxed accordingly. Furthermore, Section 52(4) allows tax authorities to seize VDAs during investigations or tax raids, similar to how cash, gold, or real estate is confiscated in cases of tax evasion. This aligns with global enforcement trends. The U.K. High Court has ruled that crypto assets can be considered property, allowing courts to freeze or seize them in legal disputes. By treating VDAs as property for seizure purposes, India ensures that crypto-assets do not remain a shadow asset class, immune from regulatory oversight.

Under Section 509, any entity dealing in crypto assets – including exchanges, wallet providers, and even individual traders – is required to report transactions in a prescribed format. This provision mandates compliance from platforms facilitating crypto trades, making it harder to launder money

through digital assets. The bill also mandates that VDAs be included in Annual Information Statements (AIS), ensuring that all crypto transactions are automatically recorded in taxpayers' financial profiles.

A global standard
India's decision to treat VDAs as property and capital assets is a step towards aligning with international legal standards. The United States SEC classifies many crypto assets as securities, bringing them under financial market regulations. This shift is critical for ensuring that VDAs do not exist in a legal grey area. By defining them as property, India gains the ability to tax, regulate, and seize crypto assets when necessary, preventing their misuse for illicit financial activities. However, it is crucial to recognise that despite the developments in the taxonomy and taxation of VDAs, there remains a lack of a clear and comprehensive regulatory framework.

The current legal approach operates in silos, addressing taxonomy and taxation but leaving significant gaps in areas such as investor protection, market regulation, enforcement mechanisms, and a lack of standard guidelines. The treatment of VDAs extends far beyond – it requires a cohesive policy framework that integrates financial regulations, consumer rights, and technological advancements to ensure a balanced and secure digital asset ecosystem.

Sanhita Chauriha is a Technology Lawyer. Views are personal

Introduction

- ▶ As digital finance grows, governments are working on ways to classify, regulate, and tax Virtual Digital Assets (VDAs) like cryptocurrencies and NFTs.
- ▶ India's Income Tax Bill, 2025, brings a structured legal framework for VDAs, aligning with global practices.

VDAs as Property and Capital Assets

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- ➔ The bill clearly denotes VDAs as property and capital assets, similar to how the U.K., Australia, and New Zealand treat them.
- ➔ This means profits from buying and selling VDAs will be taxed just like real estate or stocks.
- ➔ If a person buys Bitcoin and sells it at a higher price, the profit will be taxed under capital gains.

Taxation of VDAs

- ➔ A flat 30% tax applies to profits from VDA transactions.
- ➔ No deductions are allowed, except for the initial cost of purchase (e.g., transaction fees cannot be deducted).
- ➔ A 1% TDS (Tax Deducted at Source) applies to VDA transfers, even in direct person-to-person transactions.
- ➔ The tax rules are stricter than in the UAE, where certain crypto trades are tax-free.
- ➔ VDAs must be reported in tax filings; failure to do so can result in them being classified as undisclosed income and taxed heavily.
- ➔ Authorities can seize VDAs if they suspect tax evasion, just like they do with cash or gold.
- ➔ Crypto exchanges and traders must report all transactions, making illegal activities harder.

Aligning with Global Standards and Challenges

- ➔ India's classification of VDAs as property and capital assets aligns with international tax frameworks.
- ➔ The U.S. SEC treats many crypto assets as securities, bringing them under financial regulations.
- ➔ Despite progress in taxation and classification, there is no comprehensive regulatory framework yet.
- ➔ Issues like investor protection, enforcement mechanisms, and standard guidelines remain unresolved.
- ➔ A cohesive policy is needed to integrate financial regulations, technology, and consumer protection for a secure digital assets system.

UPSC Mains Practice Question

Ques : Discuss the implications of India's Income Tax Bill, 2025, in classifying Virtual Digital Assets (VDAs) as property and capital assets. How does this align with global practices, and what challenges remain in regulating VDAs comprehensively?
(250 Words /15 marks)

- ➔ US President Donald Trump's policies indicate a shift away from globalization and free trade, established with the WTO in 1995.
- ➔ This shift has significant consequences for both the country and the world.

The wider implications of Trump's economic and trade policies

Mr. Trump is signalling to the world that the era of globalisation and free trade, which culminated in the birth of the WTO in 1995 after years of global consultations and negotiations, is practically dead; his policies have wider ramifications not only for Americans but also for the rest of the world

NEWS ANALYSIS

B. Bhagwan Das

U.S. President Donald Trump's economic and tariff policies and measures to secure his country's borders may seem justified in terms of promoting his nation's interests. But they have wider ramifications not only for Americans themselves, but also for the rest of the world. His tariff proposals will result in supply chain disruptions, lead to market and currency volatility, disrupt capital and trade flows, contribute to inflation and cause a decline in world trade and economic growth, worsening the plight of the poor, especially in developing economies.

The essence of Mr. Trump's economic and trade policies can be summarised as follows: a) cut down the size of his nation's public debt, b) improve his country's trade balance with its major trading partners, c) woo businesses to relocate or to invest in the domestic economy through a policy of carrot and stick, d) make the American economy efficient by reducing its fiscal deficit, which involves cutting the size of its bureaucracy and eliminating unwanted expenditure on international aid, and e)



Utter chaos: Mr. Trump has already rattled markets and plunged many national currencies. REUTERS

improve the competitiveness of American products through innovation, technology infusion and through lower prices of energy.

Tariff as a weapon

For the first time in history, customs tariffs are being used as a weapon to achieve both geopolitical and economic objectives and in so doing, Mr. Trump is signalling to the rest of the world that the era of globalisation and free trade, which culminated in the birth of the World Trade Organisation (WTO) in 1995 after years of global consultations and negotiations, is practically dead and a new set of global trade rules based on equality and reciprocity need to



For the first time in history, customs tariffs are being used as a weapon to achieve both geopolitical as well as economic objectives

be evolved in its place.

The WTO recognised the differences in the level of economic and industrial development of the member nations to permit some privileges (the Most Favoured Nation clause) and the right to protect domestic agriculture and industry from foreign competition through protectionist barriers for emerging economies. Now, by demand-

ing equal market access and reciprocity in import taxation, Mr. Trump is not only disrupting global trade relations and global supply chains, evolved over years of intense negotiations, but also equating poorer countries which depend on mono-product exports with the rich industrialised countries.

For example, monocrop countries like Chad, Ivory Coast and Western African Union which only grow and export cotton, cannot survive without some protection for their domestic cotton growers.

Now coming to Mr. Trump's tariff wars with his trading partners, some seem to have capitulated to his demands of lower tariffs by voluntarily reduc-

ing import tariffs across the board, like the recent measures announced by India in its Annual Budget for 2025-26 in the form of customs duty cuts for various imported products, especially the cut in import tariffs for luxury and second-hand cars priced over \$40,000 and Harley Davidson motorbikes above 1600cc, from 125% and 50%, respectively, to 70% and 30% now.

EU tariff parity

The EU has also agreed to achieve parity with the U.S. on import tariffs on automobiles (a reduction from 10% earlier to 2.5% now, which is the tariff America levies on European cars), while at the same time threatening to reciprocate if the U.S. imposed additional tariffs of 25% on other European products. The U.S. however went ahead and announced 25% import taxes on steel and aluminium, which some believe will adversely affect car manufacturing and push up the domestic prices of automobiles in the U.S., hurting German car companies more than anyone else.

There is also a belief that China will dump its steel and aluminium products in India and other emerging economies to avoid the U.S. markets due to its steep tariffs, which will hurt domestic steel and aluminium manufacturers

in India. Mr. Trump is just a few weeks into his Presidency and his pronouncements on economic and trade measures have already rattled the markets and plunged many national currencies to their lowest levels against the dollar.

Mr. Trump's tariff announcements also have a potential to disrupt global supply chains and have a negative impact on not just his trading partners, but a whole lot of other countries which are indirectly connected to U.S. trade through its trading partners.

For example, the mobile phones, laptops, personal computers, television sets which are exported to the U.S. from China may have components and accessories that are manufactured and supplied by other South-East Asian countries like South Korea, Vietnam, Thailand, Malaysia, etc., whose export earnings may also suffer along with those of China. Similarly, the 25% tariffs slapped on Canada and Mexico is going to impact Japanese and South Korean car manufacturers who have manufacturing or assembling plants in these countries and have established reliable supply chains within their immediate neighbourhoods and with their own trading partners.

(The author is former professor of economics at Loyola College)

Implications of US President Donald Trump's Economic and Tariff Policies

- ➔ **Global Supply Chain Disruptions** – Increased tariffs disrupt established supply chains, affecting manufacturers and raising production costs.
- ➔ **Market and Currency Volatility** – Trade wars lead to fluctuations in global stock markets and depreciation of national currencies.
- ➔ **Inflationary Pressures** – Higher import duties increase the cost of goods, leading to inflation in both the US and global markets.
- ➔ **Decline in Global Trade** – Protectionist policies discourage international trade, slowing global economic growth.
- ➔ **Impact on Developing Nations** – Emerging economies relying on exports, such as mono-crop agricultural nations, face economic hardship.
- ➔ **Retaliatory Measures** – Other countries impose counter-tariffs, escalating trade tensions.
- ➔ **Impact on Businesses** – Companies face uncertainty, leading to reduced investments and job losses.

Way Forward

- ➔ **Negotiated Trade Agreements** – Encourage diplomatic trade talks to balance economic interests.
- ➔ **Strengthening WTO Mechanisms** – Reinforce multilateral institutions to ensure fair trade policies.
- ➔ **Diversifying Export Markets** – Countries should explore alternative markets to reduce dependency.
- ➔ **Encouraging Domestic Manufacturing** – Nations should invest in self-sufficiency and local production.
- ➔ **Reducing Trade Barriers Gradually** – Phased tariff reductions can prevent economic shocks.
- ➔ **Strengthening Regional Cooperation** – Countries should enhance regional trade partnerships to mitigate external disruptions.

In News : White Island

- The owners of New Zealand's White Island volcano that erupted in 2019, killing 22 tourists and local guides, have had the conviction against them overturned by the country's High Court recently.



About White Island

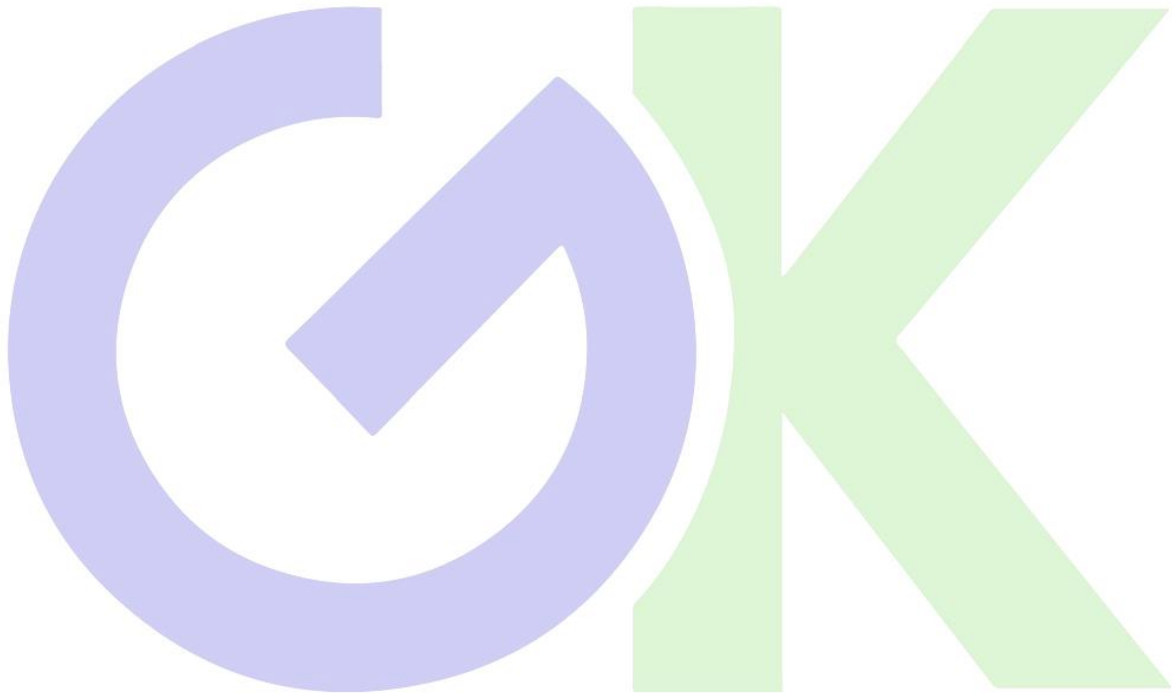
- White Island (also known as Whakaari) is an active composite stratovolcano in the Bay of Plenty, New Zealand.
- It is currently New Zealand's most active cone volcano, sitting 48 km off the coast of Whakatāne in the North Island.
- Last major eruption: December 9, 2019 (caused fatalities and injuries)
- The cone has been built up by continuous volcanic activity over the past 150,000 years.

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- The island covers an area of around 325 hectares, and this is only about 30 percent of the volcano's mass-the rest is under the sea.
- It is two kilometres in diameter, and its peak rises 321 m above sea level.
- The island was sighted and named by Capt. James Cook in 1769.
- It has numerous hot springs, geysers, and fumaroles.
- It is privately owned. In 1953 it was declared a private scenic reserve and has been the focus of tourism activities along with geological and ecological science.



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India's burden of rising obesity, the hefty cost to pay

In the last two decades in India, a major epidemiological transition has happened that has not captured sufficient public attention – the challenge of overweight and obesity. The National Family Health Survey round 5 (NFHS-5, 2019-21) suggests that nearly one in every four men or women is obese. The proportion of those who are overweight and obese ranges from 8% to 50% across States, in both men and women, and in rural and urban settings. The World Obesity Federation estimates that India's annual increase in childhood obesity is one of the world's steepest. Overweight and obesity in adults and children have doubled in the last 15 years and tripled in the last three decades. A nationwide study by the Indian Council of Medical Research in *The Lancet Diabetes and Endocrinology* (2023) had estimated that amongst adults over 20 years of age in India, one in every third (35 crore) has abdominal obesity, one in every fourth person (25 crore) has generalised obesity and one in every fifth person (21 crore) has high levels of blood cholesterol.

Why the subject needs urgent attention

Being overweight and obese is often considered to be a personal issue. Also, the general societal attitude in India normalises obesity or being overweight. Over the past few decades, India has made another positive epidemiological shift: from being a 'food or calorie deficient' to becoming 'food or calorie sufficient (with inequitable distribution) nation. Yet, the State of Food Security and Nutrition in the World' report (2024), estimated that around 55% (78 crore) of India's population could not afford a healthy diet and that nearly 40% of people fall short of an adequate-nutrient diet. In the last two decades, easy and low-cost availability of high fat, salt, sugar (HFSS) and the ultra-processed food (UPF) has compounded the challenge. Urbanisation has led to a sedentary lifestyle for many. A recent World Health Organization (WHO) report says that 50% of Indians fail to meet recommended physical activity levels.

The 'thin fat Indian' is a scientifically validated hypothesis: that Indians even with normal body mass index (BMI) often have higher body fat. The 'common soil hypothesis' highlights obesity as a cause and risk factor for diabetes (one in every fourth Indian adult, or 25 crore Indians, is either diabetic or prediabetic). Overweight and obesity are associated with an estimated 3.4 million deaths annually in the world. This, *inter alia*, WHO and the professional association of doctors and endocrinologists across the world have recognised that obesity is both a risk factor/lifestyle challenge and a complex and



Dr. Chandrakant Lahariya

is a practising physician, who has worked with the World Health Organization and other United Nations agencies for nearly 17 years. He is the author of 'Obesity care in India: a national white paper'

The general societal attitude in the country which normalises overweight or obesity must change; holistic interventions are needed to ensure a healthy nation

chronic disease. The global obesity observatory estimates that the annual economic cost of obesity and being overweight in India in 2019 was \$28.95 billion (₹1,800 per capita), or 1.02% of India's GDP. These costs are linked to health-care expenditures and lost productivity, among others. Without sufficient interventions, it is estimated that the economic burden is likely to increase to ₹4,700 per capita by 2030 (or 1.57% of GDP). India's Economic Survey 2024-25 takes note of obesity as an emerging health challenge, recommending higher taxation on UPF.

Yet, unlike undernutrition, there are not enough programmatic initiatives to tackle obesity. Though, the national government promotes the 'Khelo India', 'Fit India Movement' or 'Eat Right India' campaigns, and there has been public discourse also for a reduction in cooking oil use in households, these are initiatives which place far too much of a responsibility on the individual, even as and the responsibility of most other stakeholders is underplayed.

Policy and programmatic solutions

Tackling obesity needs a multipronged approach.

First, start a nuanced societal dialogue, and a structured science communication and public awareness campaign to highlight that obesity is a disease with rising burden and which contributes to other diseases such as diabetes, hypertension and liver disorders. Obesity needs prevention, care and management, just like any other health condition.

Second, more must be done to promote and facilitate regular physical activity. There needs to be better urban planning and urban infrastructure development with place for bicycle lanes, free access to parks and other public spaces and open gymnasiums.

Third, HFSS and UPF products are major contributors to the rising burden of overweight and obesity. These food items need to be taxed at a higher rate, with subsidies for healthier food items including fruits and vegetables and actions to ensure their easy and widespread availability. The food industry should volunteer to adopt ethical practices in food marketing.

Fourth, the 'weight, height and waist circumference' measurement has to be an integral part of all health visits and preventive health check-ups. Discussions regarding optimal weight should be done in every engagement with health-care providers. People need to know basic information such as what one's optimal weight or waist circumference should be. A very generic but useful parameter to know one's ideal weight is the height in centimetre minus 100 for males and minus 105 for females. The waist

circumference of more than 80 cm in women and 90 cm in men is unhealthy.

Fifth, anti-obesity medicines are being licensed in various settings. There is a need for developing and widely disseminating clinical practice guidelines about the ideal candidates for anti-obesity medicines, which need to be used as per medical indication.

Sixth, every office and workplace needs to raise awareness about 'unhealthy weight' in the workforce and make weighing scales easily available. There must be regular awareness campaigns about obesity prevention. Body fat and composition analysis should be made routine practice.

Seventh, schools and colleges should be engaged in knowledge sharing on healthy eating habits and healthy diets. School canteens should serve healthy food. The proven good practices such as health promoting schools need to be adopted in India. The learnings from countries such as Japan, where dietitians are a part of every school network, should be explored.

Coordinated interventions

Eighth, obesity prevention requires multiple ministry engagements (health, finance, education, agriculture, urban planning and development) to work together. One of the learnings from implementing feeding and nutrition programmes is that isolated interventions make a limited difference. India's nutrition intervention programme needs to be reimagined as 'Suposhan Abhiyan' with a focus on not just feeding but also 'mindful under-feeding' and 'rightful micronutrient supplementation'.

Ninth, the research community, medical and public health professionals need to generate additional evidence including epidemiological data on overweight and obesity. This evidence needs to be communicated in easily comprehensible messages for the general public. The professional association of doctors needs to build the capacity of health-care providers in tackling overweight and obesity.

Tenth, in India, eating healthy is becoming more expensive than eating junk food. The food industry, especially online food delivery platforms, must facilitate healthy eating. Corporate social responsibility funds from this sector should be earmarked to promote a health lifestyle and eating habits.

Obesity is a public health challenge, waiting for holistic, multipronged and comprehensive interventions. Tackling overweight and obesity is a *sine qua non* for a healthy, economically prosperous and developed India.

GS Paper 02 Social Justice: Health

UPSC Mains Practice Question: Discuss the rising burden of overweight and obesity in India and suggest a multipronged approach to tackle this growing public health challenge. (250 Words /15 marks)

Context :

- The general societal attitude in the country which normalises overweight or obesity must change; holistic interventions are needed to ensure a healthy nation.

Introduction

- In the last two decades in India, a major epidemiological transition has happened that has not captured sufficient public attention the challenge of overweight and obesity.
- The National Family Health Survey round 5 (NFHS-5, 2019-21) suggests that nearly one in every four men or women is obese.
- The proportion of those who are overweight and obese ranges from 8% to 50% across States, in both men and women, and in rural and urban settings.

India's Rising Obesity Crisis

- **Childhood Obesity in India:** The World Obesity Federation estimates that India's annual increase in childhood obesity is one of the world's steepest.
- **Increase in Overweight and Obesity:** Overweight and obesity in adults and children have doubled in the last 15 years. Overweight and obesity in adults and children have tripled in the last three decades.
- **Findings from Nationwide Study (ICMR - The Lancet Diabetes and Endocrinology, 2023):** Amongst adults over 20 years of age in India. One in every third person (35 crore) has abdominal obesity. One in every fourth person (25 crore) has generalised obesity. One in every fifth person (21 crore) has high levels of blood cholesterol.

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Why the subject needs urgent attention

- ➔ **Personal and societal perception:** Being overweight and obese is often considered a personal issue. The general societal attitude in India normalises obesity or being overweight.
- ➔ **Epidemiological shift:** Over the past few decades, India has transitioned from being 'food or calorie deficient' to becoming 'food or calorie sufficient' (with inequitable distribution). Estimated that around 55% (78 crore) of India's population could not afford a healthy diet. Nearly 40% of people fall short of an adequate-nutrient diet.
- ➔ **HFSS and UPF consumption:** In the last two decades, the easy and low-cost availability of high fat, salt, sugar (HFSS) and ultra-processed food (UPF) has worsened the issue.
- ➔ **Urbanisation and sedentary lifestyle:** A WHO report states that 50% of Indians fail to meet recommended physical activity levels.
- ➔ **The 'thin fat Indian' hypothesis:** Indians with normal BMI often have higher body fat.
- ➔ **Common soil hypothesis:** Obesity is a cause and risk factor for diabetes. One in every fourth Indian adult (25 crore) is either diabetic or prediabetic.
- ➔ **Global health impact:** Overweight and obesity contribute to an estimated 3.4 million deaths annually worldwide.
- ➔ **Obesity as a disease:** WHO and professional associations recognize obesity as both a lifestyle challenge and a chronic disease.
- ➔ **Economic burden of obesity (2019):** The global obesity observatory estimated the annual economic cost of obesity in India at \$28.95 billion (₹1,800 per capita), or 1.02% of GDP.
- ➔ **Projected economic burden (2030):** Expected to rise to ₹4,700 per capita (or 1.57% of GDP) without sufficient interventions.
- ➔ **India's economic survey 2024-25:** Recognised obesity as an emerging health challenge. Recommended higher taxation on UPF.
- ➔ **Lack of programmatic initiatives:** Unlike undernutrition, there are not enough programmatic measures to address obesity.
- ➔ **Government initiatives:** Campaigns such as 'Khelo India', 'Fit India Movement', and 'Eat Right India' exist, but they place too much responsibility on individuals, while other stakeholders' roles are underplayed.

Policy and programmatic solutions

- ➔ **Multipronged approach needed:** Tackling obesity requires multiple strategies.

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Daily News Analysis

- ➔ **Societal dialogue and awareness:** A structured science communication and public awareness campaign is needed to highlight obesity as a disease that contributes to diabetes, hypertension, and liver disorders. Obesity needs prevention, care, and management like any other health condition.
- ➔ **Promotion of physical activity:** Better urban planning and infrastructure development should include bicycle lanes, free access to parks, public spaces, and open gymnasiums to facilitate regular physical activity.
- ➔ **Regulating HFSS and UPF products:** Higher taxation on HFSS and UPF products. Subsidies for healthier food like fruits and vegetables. Food industry should adopt ethical marketing practices.
- ➔ **Health monitoring and preventive care:** Weight, height, and waist circumference measurements should be integral to all health visits. Discussions about optimal weight should be routine in health-care checkups.
- ➔ **Ideal weight formula:** Height (cm) minus 100 for males, minus 105 for females.
- ➔ **Unhealthy waist circumference:** More than 80 cm in women and 90 cm in men.
- ➔ **Guidelines for anti-obesity medicines:** Licensed anti-obesity medicines are emerging. Need for clinical guidelines to identify ideal candidates for these medicines, ensuring medical supervision.
- ➔ **Workplace initiatives:** Workplaces should raise awareness about unhealthy weight. Weighing scales should be easily available. Regular awareness campaigns and routine body fat analysis should be implemented.
- ➔ **Schools and colleges' role:** Knowledge sharing on healthy eating and diets should be promoted. School canteens should serve healthy food. Health-promoting school practices should be adopted. Learnings from Japan, where dietitians are part of every school network, should be explored.

Coordinated interventions

- ➔ **Inter-ministerial collaboration:** Obesity prevention requires multiple ministries (health, finance, education, agriculture, urban planning, and development) to work together. Isolated interventions have limited impact. India's nutrition intervention programme should be reimagined as 'Suposhan Abhiyan', focusing not just on feeding but also on 'mindful under-feeding' and 'rightful micronutrient supplementation'.
- ➔ **Research and evidence generation:** The research community, medical and public health professionals need to generate additional evidence on overweight and obesity. This evidence should be communicated in simple messages for the general public. Professional medical associations should train health-care providers to tackle obesity.
- ➔ **Making healthy eating affordable:** Healthy food is becoming more expensive than junk food... The food industry, especially online food delivery platforms, must encourage healthy eating... Corporate

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socialresponsibility (CSR) funds from this sector should be allocated to promote healthy lifestyles and eating habits.

Conclusion

- ➔ Obesity is a public health challenge, waiting for holistic, multipronged and comprehensive interventions.
- ➔ Tackling overweight and obesity is a sine qua non for a healthy, economically prosperous and developed India.

