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GS 2: INTERNATIONAL RELATIONS

INDIAN EXPRESS PAGE: 1

CEASEFIRE FATE UNCERTAIN; BOTH SIDES DRAW 'RED LINES'

Peace talks fail; US will blockade Strait of Hormuz: Trump

US President sees scope for further talks; Tehran says it has full control over Hormuz

Bo Erickson, Saad Sayeed & Asif Shahzad
Miami, Islamabad, April 12

US PRESIDENT Donald Trump said on Sunday the US Navy would start blockading the Strait of Hormuz, raising the stakes after marathon talks with Iran failed to reach a deal to end the war, jeopardising a fragile two-week ceasefire.

Trump also said in a post on Truth Social that the US would take action against every vessel in international waters that had paid a toll to Iran, and begin destroying mines that he said the Iranians had dropped in

»CONTINUED ON PAGE 2

'We've made very clear what our red lines are, what we're willing to accommodate... and what we're not...'
J D VANCE, U.S. VICE PRESIDENT

'It's time for them (U.S.) to decide whether they can earn our trust or not.'
MOHAMMAD BAGHER GHALIBAF, SPEAKER OF IRAN'S PARLIAMENT

THE GAPS

U.S. CLAIM that Iran refuses to give up its nuclear programme.

FATE of nearly 900 pounds of enriched uranium.

U.S. SEEKS reopening of Strait of Hormuz, Iran says only after deal.

IRAN'S DEMAND for release of frozen assets.

Deadlock, but with silver lining: Key takeaways from the US-Iran talks

Shubhajit Roy
New Delhi, April 12

US VICE President JD Vance's 'mission impossible' hit a wall in Islamabad on Sunday, as US and Iran failed to reach an agreement after 21 hours of talks. Vance, before leaving Islamabad, said, "They have chosen not to accept our terms."

E. This may have come as a dampener, but the moment is extraordinary. Here are the key takeaways:

Historic moment

This was the first highest-level political contact between

»CONTINUED ON PAGE 2

IDEA EXCHANGE

'India follows a policy of strategic autonomy... that doesn't mean it is neutral'

KEVIN KELLY, IRELAND'S AMBASSADOR TO INDIA PAGE 17

GS 2: INTERNATIONAL RELATIONS

INDIAN EXPRESS PAGE : 2

US-Iran peace talks fail

the Strait. Iran's Revolutionary Guards responded with a statement warning that military vessels approaching the strait will be considered a ceasefire breach and dealt with harshly and decisively, underlining the risk of a dangerous escalation. The strait is under the control and "smart management" of Iran's Navy, the Guards said in a statement, adding it is "open for the safe passage of non-military vessels in accordance with specific regulations."

Trump said in his Truth Social post: "Effective immediately, the United States Navy, the Finest in the World, will begin the process of BLOCKADING any and all Ships trying to enter, or leave, the Strait of Hormuz."

"I have also instructed our Navy to seek and interdict every vessel in International Waters that has paid a toll to Iran. No one who pays an illegal toll will have safe passage on the high seas," Trump added.

"Any Iranian who fires at us, or at peaceful vessels, will be BLOWN TO HELL!" he added.

More negotiations?

In an interview with *Fox News* after his post about the strait, Trump said that he believed Iran would continue to negotiate and called the weekend discussions "very friendly".

"I do believe they're going to come to the table on this, because nobody can be so stupid as to say, 'We want nuclear weapons,' and they have no cards," Trump told *Fox News* from his golf course near Miami, Florida.

(***AP adds:*** The US President said his threat to impose 50% tariffs on goods from countries that sold weapons to Iran was aimed at China. Trump told *Fox News* that he has heard reports of China giving anti-aircraft "shoulder missiles" to Iran. He played down the possibility of China supplying weapons to Iran, but said their goods would be taxed if they did. "I doubt they would do that, because I have a relationship, and I think they wouldn't do that, but maybe they did a little bit at the beginning," Trump said. "But if we catch them doing that, they get a 50% tariff.")

The weekend talks in Islamabad, which followed the announcement of a ceasefire last Tuesday, were the first direct US-Iranian meeting in more than a decade and the highest-level discussions since the 1979 Islamic Revolution.

"The bad news is that we have not reached an agreement, and I think that's bad news for Iran much more than it's bad news for the United States of America," said Vice President JD Vance, who headed the US delegation. "We've made very clear what our red lines are, what things we're willing to accommodate them on, and what things we're not..." he added.

A US official said Iran had rejected Washington's call for an end to all uranium enrichment, the dismantling of all major enrichment facilities and the transfer of highly enriched uranium. The two sides also failed to reach agreement on the US demand that Iran cease funding for Hamas, Hezbollah and the Houthis as well as fully open the strait, the official added.

Iran's Parliamentary Speaker Mohammad Bagher Ghalibaf, who led his country's delegation along with Foreign Minister Abbas Araghchi, blamed the US for not winning Tehran's trust, despite his team offering "forward-looking initiatives." Ghalibaf said on X: "The US has understood Iran's logic and principles and it's time for them to decide whether they can earn our trust or not."

Iran's President Masoud Pezeshkian, who discussed the talks in a call with Russian President Vladimir Putin, said Tehran wanted "a balanced and fair agreement."

"If the United States returns to the framework of international law, reaching an agreement is not far off," he told Putin, Iranian state media reported.

(*The Financial Times* reported that there has been minimal traffic through the Strait of Hormuz since the war began. The *FT*'s chokepoint tracker, which monitors transits through the strait based on ships' transponder signals, has recorded a total of 18 movements out of the Gulf and 18 movements into the Gulf across Saturday and Sunday. On the last Sunday before the war started, 172 total transits were recorded in one day.)

-REUTERS

GS 2: SOCIAL ISSUES : HEALTH

INDIAN EXPRESS PAGE : 1

WITH THE INTERNATIONAL CONSORTIUM OF INVESTIGATIVE JOURNALISTS (ICIJ)

Rs 1.5 lakh a shot, 'magic' cancer drug leaked from top hospitals, fakes sold to desperate patients

How nexus of pharmacists and fixers uses authentic batch numbers and used vials of Merck & Co's Keytruda; company says hospital's responsibility

Kaunain Sheriff M
New Delhi, April 12

ONE OF the world's fastest growing cancer populations and one of the world's most powerful and pricey cancer drugs intersect in a story set in a modest house in Punjab.

In early 2022, a 56-year-old woman near Chandigarh began treatment for liver cancer at PGIMER, where doctors recommended Keytruda — an immunotherapy drug manufactured by US pharma major Merck & Co (MSD) that most families cannot afford at an official market price of over Rs 1.5 lakh for a 100 mg vial.

Weighed down by the burden, the patient's family bought 12 vials between September and December that year from a local medical store at a "discount", for approximately Rs 16 lakh. But that "small relief" turned to alarm when police from Delhi called: the drugs they had used were counterfeit — filled with antifungal medication.

This is just one among several cases at the heart of a growing black market of counterfeit Keytruda in India, an investigation by *The Indian Express* in association with the International Consortium of Investigative Journalists (ICIJ) has found.

The investigation is based on scrutiny of more than 12,500 pages of police and hospital records, and interviews with several hospital staff members, including oncologists. *The Indian Express* also investigated records of more than 150 patients across the national capital who had received the original Keytruda — and found that the batch numbers matched what investigators had seized from employees at top Delhi hospitals.

On a global level, the ICIJ investigation reveals how one of the world's largest drugmakers deployed tactics to inflate the volume of prescriptions and keep the price high through lobbying, while seeking to prevent cheaper versions of the drug from reaching hundreds of thousands of cancer patients — and counterfeit rackets operating from Nepal to Mexico.

In India, counterfeiting is common across medicines from antibiotics to antacids, but as *The Indian Express* spoke to patients who received fake Keytruda, a larger story emerged: of the grey zone between global pharma, government regulations and hospital oversight.

»CONTINUED ON PAGE 14

• PLAYING WITH LIFE & DEATH: TRACKING KEYTRUDA: 11 STEPS, LEAKS AT 6, 8 AND 10

1. Oncologist prescribes Keytruda
2. Notification emailed from hospital's Oncology dept to Merck & Co vendor
3. Vendor places order, specifies dose needed
4. Vendor procures vials from company or distributor
5. Vendor delivers vials to hospital's Purchase dept
6. Purchase dept sends consignment to pharmacy for hospital patients only
7. Pharmacy issues the drug to Oncology dept
8. Drugs prepared by cytotoxic unit and sent to Nursing department
9. Used, empty vials discarded in colour-coded bag
10. Waste weighed, barcoded, binned
11. Handed over to bio medical waste vendor

Source: Police & hospital records, Delhi

TOMORROW: GETTING KEYTRUDA THE PROPER WAY — THE BATTLE AND THE CHALLENGE

What's Keytruda, why is it a big deal in India's cancer fight

Anonna Dutt
New Delhi, April 12

What is Keytruda and why is it considered so effective?

Keytruda is the brand name of pembrolizumab, an immunotherapy drug manufactured by US-based global pharma major Merck & Co (MSD) for treating several cancers. It belongs to a class called "checkpoint inhibitors" — drugs that remove the brakes preventing the body's T cells, which are a crucial weapon in the body's immune system, from attacking cancerous cells. In other words, it uses the body's own immune system to fight cancer.

Pembrolizumab works by attaching to receptors called PD-1 on T cells. This prevents T cells from binding with corresponding PD-L1 receptors on cancer cells, letting them identify the abnormal cells and triggering an immune response.

First approved by the US FDA in 2014 for advanced skin cancer, Keytruda is now used globally for certain lung cancers, cervical cancer, renal cell cancer and aggressive breast cancer, among others. It is the best-selling drug globally, generating $29.5 billion in 2024 — nearly half of Merck & Co's revenue.

»CONTINUED ON PAGE 18

GS 2: INTERNATIONAL RELATIONS

INDIAN EXPRESS PAGE : 2

Deadlock, but with a silver lining

the US and Iran since the 1979 Islamic Revolution. Vance came all the way to Pakistan to meet high-level Iranian officials, with Iran's Speaker Mohammad Bagher Ghalibaf leading Tehran's team.

This moment of direct contact between the two top officials has a parallel to the phone conversation between the then US President Barack Obama and Iran's President Hassan Rouhani on September 27, 2013, during Rouhani's trip to New York. That set the stage for the two-year negotiations that led to the conclusion of the JCPOA in 2015.

The significance of the meeting is also because just six weeks ago, US strikes killed the Supreme Leader of Iran, Ali Khamenei, and Tehran vowed revenge. Iran felt betrayed by the Americans, since they were negotiating with US Special Envoy Steve Witkoff and Trump's son-in-law Jared Kushner in Geneva till February 27. And then the bombs dropped on February 28.

Hence, the Iranians didn't want to negotiate with Witkoff and Kushner, believing them to lack credibility. The Americans yielded and fielded Vance — the highest official after the US President.

The Iranians too agreed to send the top leadership – just next to the new Supreme Leader Mojtaba Khamenei, who is believed to be injured – to talk to the Americans.

The red lines

The talks were taking place in a history of animosity and war, and therefore the sticking points are well-established. "We've made very clear what our red lines are, what things we're willing to accommodate them on, and what things we're not willing to accommodate them on," Vance said.

According to reports in the US and Iranian media, there are three main sticking points — reopening of the Strait of Hormuz; the fate of more than 440 kg of highly enriched uranium; and Iran's demand that about $27 billion in frozen revenues held abroad be released.

But the fact that it has whittled down from the 10-point maximalist Iranian proposal shows some progress.

The first point is of immense value to the global economy, and Iranians have realised that their biggest weapons are not drones and missiles and the nuclear stockpile, but this waterway through which one-fifth of world's energy supply passes.

So, the US has demanded that Iran should immediately reopen the Strait of Hormuz to all international maritime traffic.

Tehran realises that this is their biggest leverage and they would not want to give it up. Already, there are reports that Iran has been charging a toll for crossing the Strait — diplomats have been calling it "Ayatoll booth".

The second red line pertains to Iran's nuclear programme. Reports suggest that Vance handed the Iranians a take-it-or-leave-it proposal to forever terminate their nuclear programme – and they left it.

Iranians feel that it is their right to enrich nuclear material and keep their stockpile as part of their sovereignty and keep their nuclear programme ongoing for power generation. Many refuse to believe that it is only for civilian use.

This again has a deja vu with the Obama era, when US and Tehran agreed on the JCPOA — the agreement was between P-5+1 and Iran. It had allowed Iran to retain a small amount of its nuclear stockpile, and gradually lifted the restrictions on its nuclear activities until 2030, when Iran would be permitted to conduct any nuclear activity permissible under the Nuclear Non-proliferation Treaty.

On February 27, before US and Israel began the attacks on Iran, the Iranians had offered to "suspend" their nuclear operations for a few years, but not to give up their stockpiles of near-bomb-grade uranium or permanently surrender the capability to enrich uranium on their own soil.

Iran's frozen assets

Iran's demand that about $27 billion in frozen revenues held abroad be released – is the third red line.

Iranian diplomats told The Indian Express that they need money to rebuild their country after the devastating strikes for more than a month, and one of the ways is to release the frozen assets and give them some sanctions relief.

Iran also sought reparations for damage from six weeks of airstrikes and asked for frozen oil revenues held in Iraq, Luxembourg, Bahrain, Japan, Qatar, Turkey and Germany to be released, the officials said. The Americans have rejected those requests, according to The New York Times.

The deadlock & a thin silver lining

The Vance-Ghalibaf talks did not lead to immediate results, but did not block the way ahead.

Vance left the door open, saying, "We leave here with a very simple proposal: a method of understanding that is our final and best offer...We'll see if the Iranians accept it."

Iranians will get back to Tehran and consult with the hardline IRGC and clergy, and the Supreme Leader, before any movement. The American establishment will surely defer to the US President, who will take a call on the next steps.

Whether he resumes the war and the bombing is difficult to say, but there is something on the table for both sides to chew on as they have a two-week ceasefire to negotiate.

For India

India has been watching the negotiations very carefully and hoping the talks will lead to reopening of the Strait of Hormuz. The war's economic impact on the Indian economy has been quite adverse, as gas shortages in LPG and possible price hikes in petrol are expected in the coming weeks. The shortages have had an impact on India's domestic consumers, and has been felt on the small and medium enterprises, from ceramics to plastics to textiles.

Also, the disruption in the fertiliser sector and helium have also complicated India's agriculture, health and semiconductor spaces.

Delhi has been careful in navigating the diplomatic space by talking to Iran continuously in the last six weeks, and has even expressed concern at the strikes on Lebanon by Israel (without naming Israel). It has got about eight vessels to pass through the Strait. A ninth one was passing through on Saturday evening.

Delhi is also looking at Iran's benefactors — how China and Russia respond after the lack of breakthrough in the talks will also determine the next steps.

GS 3: SCIENCE AND TECHNOLOGY

THE HINDU PAGE :7

Study unravels why men experience more skin infections than women

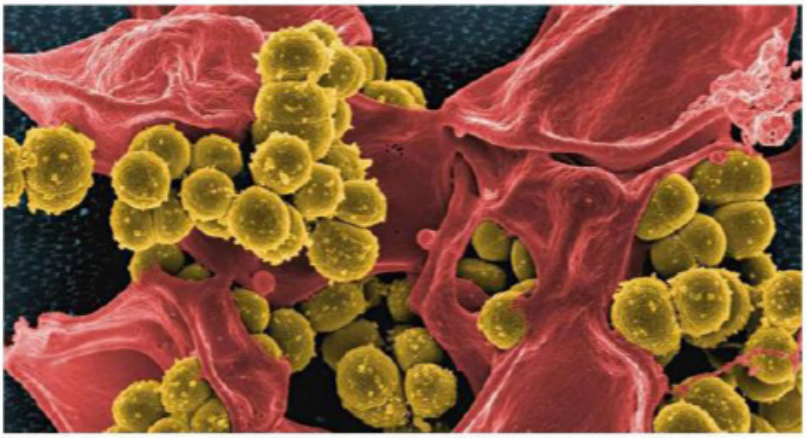
Hormones may do more than regulate mood, behaviour, and reproduction — and new findings suggest they may also determine how vulnerable we are to skin infections and how we fight them; male sex hormones, which include testosterone, help bacteria communicate and cause skin infections by activating a bacterial signalling system

Kavi Bharathi R.

Men experience more skin infections than women – doctors have known this for a while. They have proposed both behavioural and physiological reasons for this difference but the exact mechanism has been unclear.

Recently, scientists at UT Southwestern Medical Centre in Texas in the U.S. reported that the male sex hormones, androgens, which include testosterone, help bacteria communicate and cause skin infections by activating a bacterial signalling system called quorum sensing.

Their findings, published in *Nature Microbiology*, show that reducing testosterone levels in mouse models increased the animals' resistance to infections. When the researchers applied testosterone topically to female mice, the infection became more severe.



A coloured scanning electron micrograph of methicillin-resistant Staphylococcus aureus (MRSA) bacteria, shown in gold, interacting with a human neutrophil, in red. WHO

THE GIST

- Skin's sebaceous glands can produce hormones, making testosterone readily available to microbes living on the skin's surface. This is relevant to bacteria like *Staphylococcus aureus*
- *S. aureus* is the leading cause of skin infections worldwide. It commonly colonises the skin and nose but when it enters the bloodstream, it can cause septicaemia, a life-threatening condition
- Instead of killing the bacterium, the researchers wanted to suppress its virulence and restore it to a harmless state

Skin's hormones

Sex hormones are generally thought to be produced by the testes or ovaries. However, Tamia Harris-Tryon, Associate Professor of dermatology and immunology at UT Southwestern, and her team had previously shown using an advanced technique called liquid chromatography tandem mass spectrometry that the skin also generates and secretes extremely small concentrations of these hormones.

"We continue to be fascinated by how the skin makes sex hormones and how this changes in skin diseases," Dr. Harris-Tryon said.

The skin is a hormonally responsive organ. Its sebaceous glands can produce hormones, making testosterone readily available to microbes living on the skin's surface. This is relevant to bacteria like *Staphylococcus aureus*. They don't begin an infection right away. Instead, they wait and multiply, and activate their disease-causing machinery only once the colony is dense enough to have a fighting chance. Bioinformatic analysis further revealed that the bacteria also respond to the host's hormones.

"Together, these observations led the team to explore a potential connection between host hormonal changes and microbial dynamics on the skin," Maria Sindhura John, the study's first author and a postdoctoral researcher at UT Southwestern, said.

To test whether testosterone from the skin drives infection, the researchers engineered mice that were unable to produce testosterone in the skin. These animals had markedly less severe infections and less skin barrier damage compared to normal mice. When testosterone was applied to hormone-deficient female mice, the infection became more severe.

The effect was specific to androgens. Female sex hormones, oestradiol and progesterone, didn't affect the bacteria's quorum sensing – where bacteria release chemical signals into their environment and as the bacterial population grows, the concentration of these signals rises.

"This elegant study shows that host-derived androgen hormones modulate the quorum sensing system to make the bacteria more virulent," Ferric C. Fang, a clinician scientist at the University of Washington School of Medicine, who wasn't involved in the study, said. "Thus, the bacteria not only talk to each other, but the host also talks to the bacteria. This may help to explain why men are more susceptible to staphylococcal skin infections than women and could lead to new approaches for the treatment or prevention of these infections."

> The bacteria not only talk to each other, but the host also talks to the bacteria. This may help to explain why men are more susceptible to staphylococcal skin infections than women
>
> FERRIC C. FANG
> Clinician scientist at the University of Washington School of Medicine

Beyond antibiotics

S. aureus is the leading cause of skin infections worldwide. It commonly colonises the skin and nose but when it enters the bloodstream, it can cause septicaemia, a life-threatening condition that could lead to organ failure.

These infections have been increasingly harder to treat, thanks to the rise of multidrug-resistant *S. aureus*, a strain that resists methicillin and other related antibiotics. Doctors have associated it with prolonged hospital stays and higher mortality.

Conventional antibiotics try to kill bacteria or inhibit their growth, which creates strong evolutionary pressures that encourage bacteria to develop resistance to antibiotics. However, the new study targeted quorum sensing, which disrupts the bacteria's ability to coordinate harmful behaviours without necessarily threatening their survival.

"This also reduces selective pressure for resistance and may preserve beneficial microbes, making it a potentially more sustainable strategy in combating antimicrobial resistance," Dr. Sindhura John said.

The researchers identified a mirror-image form of testosterone called enantiomer-testosterone (*ent*-T). While testosterone activated quorum sensing, *ent*-T blocked the bacterial communication pathway and reduced toxicity in human skin cells, red blood cells, and neutrophils in laboratory experiments. Computational modelling revealed how *ent*-T interacted with the bacterial targets, pointing to a possible strategy to tackle antibiotic resistance.

"This was an unexpected but exciting discovery," Dr. Sindhura John said.

'Imagine someone is angry'

While studying how bacteria respond to natural testosterone and exploring structurally similar molecules to understand the specificity of the response, they found bacteria could distinguish between subtle molecular differences. This opened a new avenue to design compounds that can deliberately switch off harmful bacterial behaviour.

"Imagine if someone is angry – you don't remove or kill the person," Dr. Sindhura John said. "Rather, you calm them down so they behave normally again. We are doing something similar with bacteria."

Similarly, *S. aureus* is usually a normal skin resident but it becomes harmful when its environment changes. Instead of killing it, the researchers want to suppress its virulence and restore it to a harmless state. "This way, we reduce antibiotic resistance and maintain skin balance," Dr. Sindhura John added.

The interaction between humans and the resident bacteria is complex and poorly understood. "This study provides an interesting new angle, with the potential for exploitation to reveal new ways to combat important human infections," Simon J. Foster, the West Riding Chair in microbiology at the University of Sheffield, said.

Early phase trials

The researchers aim to test these findings in human skin models and move to early-phase trials to assess safety and efficacy. They are also keen to understand how these mechanisms operate within the complexity of the human microbiome.

"If successful, this approach could represent a paradigm shift in how we treat infections – moving away from broadly killing bacteria toward more precise modulation of their behaviour," Dr. Sindhura John said.

This approach could lead to therapies that are more effective, less disruptive to the body's natural microbiome, and less likely to drive antibiotic resistance.

(Kavi Bharathi R. is a science writer based at the Indian Institute of Science, Bengaluru. bharathi.colors@gmail.com)

GS 3: ENVIRONMENT

THE HINDU PAGE : 10

Are biomass stoves a cleaner, cheaper alternative to LPG?

Can modern cookstoves turn the return of firewood into a sustainable alternative during the LPG crisis?

Ankit Mathur

The story so far:

Owing to the LPG crisis, many areas–especially rural regions–have reported going back to firewood that are generally seen as increasing drudgery for women, while also causing pollution and health hazards.

Are today's firewood-based stoves less polluting and benign to human use?

Modern biomass stoves, often called improved cookstoves (ICS), represent a major step up from traditional cooking methods. Unlike old-fashioned mud stoves, they can cut fuel use by up to two-thirds while dramatically reducing smoke.

Traditional "chulhas" waste most of their heat through poor airflow and have an efficiency of barely 10%. By contrast, modern stoves reach thermal efficiency levels of 38% to 45%. Technologies such as secondary aeration help to catch soot and harmful gases before they turn into smoke.

How can mass firewood-based cooking be made sustainable?

Cooking with firewood can be sustainable, provided the wood is harvested and used responsibly. Firewood is a renewable resource as long as the rate of extraction does not exceed the rate of regrowth. Since improved cookstoves burn fuel more efficiently, they can reduce the amount of wood needed for a meal.

Modern cookstoves can also run on alternative biomass fuels, including pellets and briquettes made from sawdust or agricultural waste. This widens the fuel base and takes some pressure off raw firewood.

Financing is key to achieving deployment at scale. Emissions savings enabled by improved cookstoves can be tracked and turned into carbon credits, creating a funding stream that makes stoves more affordable for lower-income families.

What about the cost of equipment and fuel expenses?

Upfront costs vary significantly. Household models start below ₹2,000, while commercial systems can exceed ₹20,000, depending on the manufacturer and purchase channel (whether direct, through e-commerce, or via distributors). For low- and middle-income households, managing upfront costs can be made easier through financing partnerships involving microfinance, CSR programs, and carbon finance.

The principal operating cost is fuel, and modern cookstoves' high thermal efficiency can significantly reduce fuel requirements. Today's stoves have cut firewood consumption by more than 50%.

Firewood is highly cost-effective compared with LPG, especially during the ongoing supply crunch when commercial LPG rates in major cities have exceeded ₹100/kg. From the wide range of prices available for different firewood types, it is possible to assume a rough average cost of around ₹10/kg (if firewood is being bought instead of being simply scavenged). Considering that 4 kilos of firewood deliver the same cooking energy output as 1 kg of commercial LPG (in an improved cookstove), firewood could potentially offer cost savings of well over 60%.

What supply chain would be needed for mass adoption? Will this be a massive investment?

Adopting biomass cookstoves on a large scale absolutely does not require a massive investment in fuel supply chains. Since the primary fuels - like firewood, crop waste, and dung cakes - are already widely available in rural and semi-urban areas, there is less need for expensive, centralised infrastructure.

Scaling up is therefore more about strengthening distribution networks. Success depends on improving logistics, last-mile delivery, and local partnerships. Just as importantly, building user awareness and providing reliable after-sales support are essential to making sure these stoves remain a permanent part of daily life.

(The author is co-founder and CEO, Greenway Grameen)

THE GIST

- Improved Cookstoves (ICS) offe a sustainable solution by increasing thermal efficiency, reducing smoke, and cutting firewood usage by over 50%.
- Mass adoption of efficient biomass stoves does not requi massive infrastructure investment, as local, renewabl fuels (wood, agricultural waste are readily available.