District-Level GDP Estimation

For Prelims: Gross Domestic Product, **District Domestic Product,** Sectors of Indian Economy, Gross Value Added

For Mains: India's AI Mission and Global Competitiveness, AI and Economic Growth in India

Source:BL

Why in News?

India's economic growth has long been assessed through **national and state-level Gross Domestic Product (GDP) estimates**, leaving **districts (District Domestic Product (DDP) Estimation)** overlooked in economic assessments.

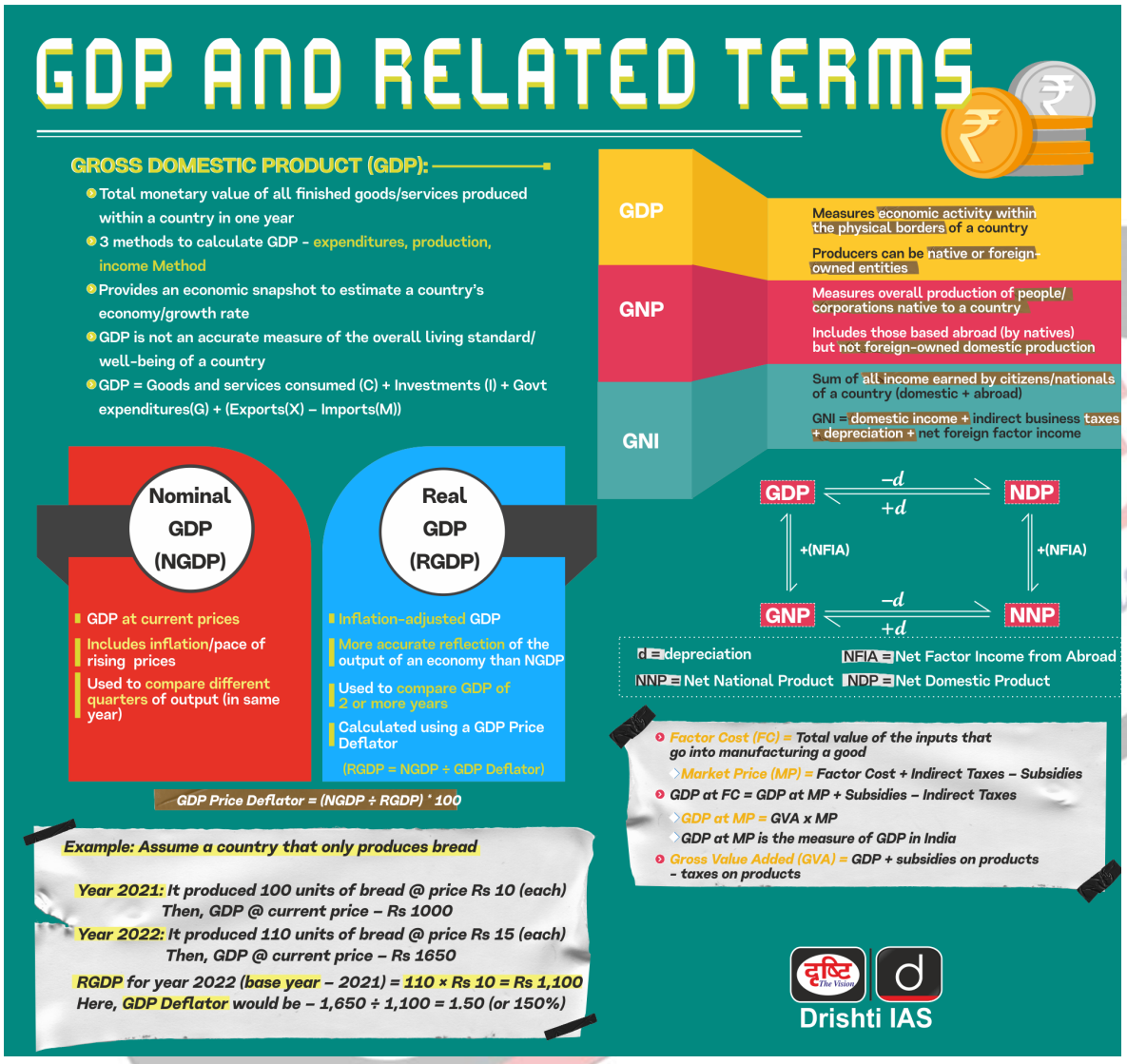
- Prime Minister Narendra Modi has emphasized that to achieve the USD 5 trillion economy target, India must determine district-wise contributions and implement localized development strategies.

What is the Current GDP Estimation Methodology?

- **Current GDP Estimation Methodology:** India's GDP is estimated using a mix of **top-down** and **bottom-up** approaches, depending on the sector.
    - The **primary sector** (agriculture, forestry, fishing, and mining) follows a **bottom-up** approach, aggregating data from the district level upwards.
    - The secondary **(manufacturing, construction)** and **tertiary (services, trade, banking) sectors** follow a **top-down** approach, where national GDP is apportioned to **states and districts** based on indicators like employment levels and infrastructure presence, rather than measuring economic activity directly at the district level.
- **Limitations:** Current GDP Estimation method overlooks **local sectoral strengths**, particularly in the **secondary and tertiary sectors**.
    - Economic growth varies across districts even within the same state, but a **lack of granular data leads to generic policies**.
        - The approach misses real-time activity, causing inaccuracies, while data gaps in the unorganised sector (unpaid labor (especially by women) weaken GDP estimates.
    - The **State of Working India (SWI 2023) report** highlights that the link between GDP growth and employment is weak at the national level, and this issue is even more pronounced at the district level.
        - Without employment-linked GDP data, development policies may focus solely on economic output rather than job creation and social equity.

Case Study

- During Covid-19, the **Ministry of Statistics and Programme Implementation (MoSPI)** applied a uniform GDP distribution, leading to discrepancies.
    - Uttar Pradesh (UP) objected, citing significant errors in its estimated **Gross State Value Added (GSVA)**. With **25% GSVA from agriculture** and **65% of its workforce in the sector,** UP argued that its economy was less affected than industrial states.
- The one-size-fits-all approach exaggerated UP's GDP decline, highlighting the need for a **bottom-up, district-level GDP estimation** for accuracy.



What are the Challenges in Implementing District-Level GDP Estimation?

- **Informal Sector:** Regional units like **districts** face challenges in DDP estimation due to the **high reliance on informal labor and the unorganized sector,** leading to underestimation.
    - Additionally, the free movement of goods, services, and factor payments across district boundaries further complicates accurate assessment.
- **Financial & Logistical Barriers:** Setting up a **robust statistical framework** for district-level GDP estimation requires **significant investment** in **infrastructure, training, and digital tools**.
- **Inconsistent Data Collection:** Statistics under the **Concurrent List** creates fragmentation

between the **Centre and States**, while the decentralized statistical system across ministries lacks uniformity, making **DDP estimation inconsistent.**

    - The absence of standardized district-level data collection leads to inaccuracies across states.
- **Lack of Standardized Methodology:** No internationally accepted framework, like the System of National Accounts (SNA) 2008, for estimating DDP.

    - Defining key metrics such as the **base year is challenging due to variations in economic activities across districts**.
- **Political and Administrative Hurdles:** States are responsible for compiling Sub-State/DDP but often fail to execute it effectively.

    - Variability in state policies and political priorities leads to delays and inconsistencies in data collection, affecting the uniformity and reliability of DDP estimation.

What are the Benefits of District-Level GDP Estimation?

- **Boosting Fiscal Federalism:** Decentralized economic data empowers district administrations to develop tailored strategies, ensuring **better resource utilization and targeted investments.**
- **Accurate Economic Analysis:** Helps assess how national or state-level policies impact different districts.
- **Equitable Growth:** Ensures **rural and underdeveloped districts** are included in the growth narrative, preventing economic disparities.
- **Policy Reforms:** The **15th Finance Commission** recommended **performance-based grants** for local governance, district GDP data can help allocate these resources effectively.

    - **State and national policies** should be adjusted based on **district-level economic insights.**

What Should Be the Way Forward for Robust DDP Estimation?

- **Pilot Project:** The government can start with a **pilot project** in districts with high economic activity to test DDP estimation models. Successful models can then be scaled to other districts.

    - Strengthen collaboration between states and research institutions, as seen in the Assam-Pahle India Foundation MoU, to develop **district vision documents.**
- **Local Data Collection Mechanisms:** The government should strengthen district statistical offices, train local data collectors, and ensure strong Central-State collaboration for accuracy.

    - Every **USD 1 investment in data yields USD 32** in development benefits, underscoring its long-term value.
- **Real-Time Economic Indicators:** Aligning with the Sub-National Accounts Committee's recommendations for improving GSDP and DDP estimation, district-level economic dashboards can be developed to track employment trends, tax collections, credit growth, and business activity.

    - Digital tools like **Artificial Intelligence**, **satellite imagery, and big data analytics** should be leveraged to improve **district-level economic measurement.**
- **Expand Role of MoSPI:** The role of MOSPI should be expanded beyond technical guidance and capacity building to ensure uniformity and interstate comparability in DDP estimation.

Drishti Mains Question:

Discuss the limitations of India’s current GDP estimation methodology. How can a bottom-up approach improve economic policymaking?

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Prelims

Q. A rapid increase in the rate of inflation is sometimes attributed to the "base effect". What is "base effect"? (2011)

(a) It is the impact of drastic deficiency in supply due to failure of crops
(b) It is the impact of the surge in demand due to rapid economic growth
(c) It is the impact of the price levels of previous years on the calculation of inflation rate
(d) None of the statements (a), (b) and (c) given above is correct in this context

Ans: (c)

Mains

Q. Explain the difference between computing methodology of India's Gross Domestic Product (GDP) before the year 2015 and after the year 2015. **(2021)**

India's Pharma Industry

For Prelims: **Pharmaceutical**, **Section 3(d)**, **Patents Act, 1970**, **Generic Drug**, **Biotechnology Sector**, **Active Pharmaceutical Ingredients (APIs)**, **Production-Linked Incentive (PLI) Scheme, Promotion of Bulk Drug Parks Scheme**, **Good Manufacturing Practice (GMP)**, **National List of Essential Medicines (NLEM)**, **mRNA Vaccine**.

For Mains: Opportunities and challenges in India's pharmaceutical industry.

Source: FE

Why in News?

The **Indian Pharmaceutical Alliance (IPA)** has proposed **zero customs duty** on US medicine imports to **prevent reciprocal US tariffs** and maintain **India's dominance** in the American pharmaceutical market.

Why is the IPA Advocating for Zero Import Duties?

- **Importance of US Market:** The **US imports USD 9 billion** worth of **pharmaceutical formulations** from India annually, making up **one-third o**f India's total pharma exports.
- **Zero Import Duties:** India has **minimized import duties** on life-saving medicines. A **zero-duty policy** helps counter **reciprocal US tariffs** and safeguard exports.
    - Lower duties **strengthen trade ties** and prevent **strict US measures** against Indian pharma like amending India's **Patents Act, 1970** to **dilute** its **Section 3(d)**.
- **Amending Patent Act, 1970:** The US and other western countries urge India to **remove or dilute Section 3(d)** of the Patents Act, 1970 which prevents evergreening of patents.
    - Amending **Section 3(d)** to allow easier patenting of modified drugs (evergreening of patents) could threaten Indian pharma companies by restricting **reverse engineering** and

delaying **generic drug production**.

What is the Status of India's Pharmaceutical Industry?

- **About:** India **ranks 3rd globally** in pharmaceutical production by volume and **14th largest** in terms of value, supplying over **50% of global vaccine** demand and **40% of generic medicines** in the US.
- **Size:** India's pharmaceutical market for FY 2023-24 is valued at **USD 50 billion**, contributing around **1.72% to the GDP**, and is projected to reach **USD 130 billion by 2030.**
    - India's **biotechnology sector**, valued at **USD 137 billion in 2022**, aims for **USD 300 billion by 2030.**
- **Key Segments:**
    - **Generic Medicines**: India is the world's largest supplier, meeting **20% of global demand.**
    - **Active Pharmaceutical Ingredients (APIs)**: India produces over **500 APIs**, contributing **8%** to the **global API market.**
    - **Medical Devices**: The market is projected to grow from **USD 11 billion to USD 50 billion by 2030.**
- **Growth Drivers:**
    - **Affordable Pricing**: Indian drugs are **significantly cheaper** than Western alternatives.
    - **Government Support**: Policies such as the **Production-Linked Incentive (PLI) scheme** promote domestic manufacturing.
    - **Strong R&D Base**: India has a **large pool of scientists and engineers** driving innovation e.g., India now ranks 6th globally in terms of **patent applications**, with **64,480 patent filings in 2023.**
    - **Increasing Global Demand**: Rising chronic diseases and an **aging global population** fuel demand for cost-effective medicines.
- **Exports:** India exports medicines to **over 200 nations**, with FY24 exports reaching **USD 27.82 billion.**
    - India ranks **12th globally** in medical goods exports, driven by rising demand for biosimilars and specialty drugs.
- **Government Initiatives: Production Linked Incentive Scheme** (PLI), **Promotion of Bulk Drug Parks Scheme**, **National Medical Device Policy 2023.**

Note: APIs are the **biologically active components** in a drug that produce the intended **therapeutic effect**. They are the key ingredients responsible for **treating or managing a medical condition.**

What Challenges Does the Pharma Industry Face?

- **Quality Issues:** Concerns over the **quality of Indian medicines** have emerged due to incidents like the **Gambia cough syrup deaths** in 2022**.**
- **Regulatory Hurdles**: Compliance with evolving **Good Manufacturing Practice (GMP)** and **quality control regulations** is costly.
- **Dependence on API Imports:** India imports **70% of APIs**, primarily from **China**, creating **supply chain vulnerabilities.**
- **Pricing Pressures:** Strict price controls under **National List of Essential Medicines (NLEM)**, impact the profitability of pharma companies hindering innovation incentives for Industry.
- **Global Competition:** There is rising competition from **China, the US, and the EU** (highly sophisticated and well researched products), while **Vietnam and Indonesia** emerge as manufacturing hubs.
- **Skill Shortage:** There is a lack of **trained professionals in biotechnology, biosimilars, and drug discovery.**
    - E.g., dependence on **generic drugs** rather than **innovative formulations** affects global competitiveness.

Way Forward

- **Domestic API Manufacturing: PLI 2.0, bulk drug parks, fermentation-based APIs,** and **green chemistry** can strengthen API production, ensuring self-reliance and supply stability.
- **Expanding High-Value Drug Markets:** Indian firms should expand R&D in **gene therapies,** personalized medicine, **and mRNA** and next-gen vaccines to tap into growing specialty therapy opportunities.
- **Enhancing R&D:** R&D incentives through **tax benefits, research grants, and public-private partnerships (PPPs)**, AI-driven drug discovery, big data in clinical
- trials, and telemedicine will boost innovation and patient outcomes.
- **Regulatory & Quality Compliance:** Faster approvals for **biosimilars, innovative drugs, and breakthrough therapies** will improve time-to-market.
    - Enhancing **drug safety monitoring** will boost consumer trust and regulatory credibility.
- **Global Market Penetration:** Expanding exports to **Africa, Latin America, and ASEAN** via trade deals and **overseas manufacturing** will overcome trade barriers and boost growth.

Conclusion

India's pharmaceutical industry is poised for **strong growth, driven by exports, affordability, and government support.** However, challenges like **API dependence, regulatory hurdles, and global competition** must be addressed. Strengthening **R&D, domestic API production, and global market penetration** will ensure India's continued leadership in the global pharmaceutical sector.

Drishti Mains Question:

Evaluate India's role as the 'Pharmacy of the World.' What factors contribute to its leadership, and what challenges does it face?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Which of the following are the reasons for the occurrence of multi-drug resistance in microbial pathogens in India? (2019)

1. Genetic predisposition of some people
2. Taking incorrect doses of antibiotics to cure diseases
3. Using antibiotics in livestock farming
4. Multiple chronic diseases in some people

Select the correct answer using the code given below.

(a) 1 and 2

(b) 2 and 3 only

(c) 1, 3 and 4

(d) 2, 3 and 4

Ans: (b)

Mains

Q. How is the Government of India protecting traditional knowledge of medicine from patenting by pharmaceutical companies? **(2019)**

Pashu Aushadhi Kendras under LHDCP

For Prelims: Pradhan Mantri Bharatiya Janaushadhi Kendras, Foot and Mouth Disease, Brucellosis, National Animal Disease Control Programme

For Mains: Government initiatives to enhance livestock health and productivity, Affordable veterinary care

Source: IE

Why in News?

The government of India will launch **Pashu Aushadhi Kendras** under the **Livestock Health and Disease Control Programme (LHDCP)** to provide affordable **veterinary medicines** to people engaged in animal husbandry and dairying.

What are Pashu Aushadhi Kendras?

- **About: Pashu Aushadhi Kendras**, modeled after **Pradhan Mantri Bharatiya Janaushadhi Kendras (PMBJKs)**, provide **"generic medicines" veterinary medicines** to improve **livestock health** and reduce **farmers' expenses**.
    - Pashu Aushadhi Kendras will also **sell ethnoveterinary medicines**, which are based on traditional Indian knowledge and indigenous practices.
    - Pashu Aushadhi initiative introduced under the **LHDCP,** has a Rs 75 crore allocation for veterinary medicines and sales incentives.
- **Operation Model:** These stores will be run by cooperative societies and **Pradhan Mantri Kisan Samriddhi Kendras (PMKSKs).**
    - PMKSKs are one-stop-shops for farmers for multiple products such as seeds, fertilizers, pesticides etc.
- **Aim:** Prevent and treat livestock diseases such as **Foot and Mouth Disease (FMD)**, **Brucellosis**, Peste des Petits Ruminants (PPR) **(also known as sheep and goat plague)**, Classical Swine Fever (CSF) (affecting pigs) and **Lumpy Skin Disease** (affects cattle).
- **Importance:** India's **20th Livestock Census (2019) reports around 536 million livestock,** including 303 million bovines. Diseases impact milk, meat yield, and farm income, with high medicine costs burdening farmers.
    - This initiative, alongside vaccination drives, aims to **reduce disease prevalence and financial strain.**

Note: "Generic medicines" are basically **non-branded drugs**, which are marketed under a non-proprietary or approved name rather than a proprietary or brand name.

What is a Livestock Health and Disease Control Programme?

- **About:** The LHDCP is a Centrally Sponsored Scheme implemented by the **Department of Animal Husbandry and Dairying (DAHD)**, Ministry of Fisheries, Animal Husbandry, and Dairying.
    - LHDCP focuses on enhancing livestock health, productivity, and disease management, with a total outlay of Rs 3,880 crore from 2024-26.
- **Objective:** The program aims to eradicate **PPR by 2030**, **control CSF** through nationwide pig vaccination.
- **Components:** LHDCP consists of three components: **National Animal Disease Control Programme (NADCP), Livestock Health & Disease Control (LH&DC), and Pashu Aushadhi.**
    - LH&DC has three sub-components which are **Critical Animal Disease Control Programme** (targets PPR and CSF for eradication), **Establishment and Strengthening of Veterinary Hospitals and Dispensaries - Mobile Veterinary Unit** (supports doorstep livestock healthcare), and **Assistance to States for Control of Animal Diseases** (addresses state-prioritized diseases).

Livestock Sector in India

- **Growth and Contribution:** The livestock sector has grown at a **Compound Annual Growth Rate (CAGR) of 12.99% (2014-15 to 2022-23)**. It contributed **5.50%** of India's **total Gross Value Added (GVA)** in 2022-23.
    - The livestock sector contribution to **agriculture and allied sector GVA** increased from **24.38% (2014-15) to 30.23% (2022-23)**.
    - Livestock provides livelihood to **two-third of rural communities.** It also provides employment to about **8.8 % of the population in India.**
- **Milk, Meat, and Egg Production: India ranks 1st in milk production**, contributing **24.76% of global production**.
    - **Milk production** increased from **146.31 million tonnes (2014-15) to 239.30 million tonnes (2023-24)**, growing at a CAGR of **5.62%**.
    - **India ranks 2nd in egg production (1st China)** and **5th in meat production** globally (Food and Agriculture Organization, 2022).
        - **Egg production** grew from **78.48 billion (2014-15) to 142.77 billion (2023-24)** at a CAGR of **6.87%**.
        - **Meat production** increased from **6.69 million tonnes (2014-15) to 10.25 million tonnes (2023-24)** at a CAGR of **4.85%**.
- **Government Initiatives Driving Growth:** **Rashtriya Gokul Mission** promotes indigenous breed conservation. The **National Programme for Dairy Development** enhances milk processing, while the **National Livestock Mission** expands insurance and fodder production.
    - **Animal Husbandry Infrastructure Development Fund (AHIDF)** supports private investments in dairy, meat, and veterinary infrastructure.

Drishti Mains Question:

Analyze the role of Pashu Aushadhi Kendras in ensuring affordable veterinary care for livestock farmers.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Mains

Q. Livestock rearing has a big potential for providing non-farm employment and income in rural areas. Discuss suggesting suitable measures to promote this sector in India. **(2015)**

Ancient Stone and Bone Tools

Source: IE

A recent study found that **ancient ancestors** used **bone tools 1.5 million years ago**, nearly **a million years earlier** than believed, **challenging** the idea that toolmaking was **unique to humans.**

- **Origin of Toolmaking:** The earliest **stone tools** (**3.3 million years**) and **bone tools (1.5 million years)**, indicating that tool use **predates Homo** and was likely practiced by **earlier hominins.**
    - It is argued that toolmaking required **conceptual thought** and was **unique to humans.**
- **Fossil of Human Evolution:** Discovered in **1974**, Lucy, a **3.2-million-year-old human ancestor**, played a key role in evolution, possibly **using her hands for tools**.
- **Stone Tools in India's Human History:**

Period	Tools & Technology	Key Sites
Lower Palaeolithic (600,000 – 150,000 BCE)	**Hand axes**, cleavers, choppers (for cutting, chopping, skinning)	Bori (Maharashtra), **Son & Sohan valleys (Punjab)**, Didwana (Rajasthan), Bhimbetka (MP)
Middle Palaeolithic (150,000 – 35,000 BCE)	**Flakes, blades, points,** borers, scrapers (from small stone pieces)	Narmada valley, **Belan valley (UP),** Tungabhadra region (South India)
Upper Palaeolithic (35,000 – 10,000 BCE)	**Blades, burins, scrapers** (more refined and diverse)	**Bhimbetka (MP)**, Karnataka, Maharashtra, Gujarat sand dunes
Mesolithic Age (9000 – 4000 BCE)	**Microliths** (tiny stone tools, often used as composite tools)	Bagor (Rajasthan), **Adamgarh (MP),** South of Krishna River
Neolithic Age (7000 – 5500 BCE)	**Rectangular axes**, polished stone axes	**Mehrgarh (Balochistan),** Burzahom (Kashmir), Gufkral (Kashmir), Senuwar (Bihar)

Read More: Wooden Artifacts of Stone Age

Hydrogen Peroxide

Source: PIB

Researchers have developed an **efficient, eco-friendly, and energy-saving** method for synthesizing **hydrogen peroxide (H_2O_2).** using a **hydrazone-linked Covalent Organic Framework (COF).**

- **The COF enables H_2O_2** production under **visible light without external sacrificial electron donors** or additional reagents, making it a cleaner and more efficient alternative to conventional methods.
- **About Hydrogen Peroxide (H_2O_2)**: It is a **colorless liquid** with a **bitter taste** at room temperature, highly **unstable**, and **decomposes into oxygen and water**, releasing heat.
- **Uses: Antiseptic** for wounds (diluted solutions), disinfectant in hospitals and clinics.
    - **Industrial Uses: Bleaching agent** in paper, textile, and cosmetic industries.
    - **Rocket Propulsion:** High-concentration H_2O_2 used as a **propellant**.
    - **Chemical Applications:** Employed in **food processing** for sterilization.
    - **Hazards:** It is a **strong oxidizer** and may cause **spontaneous ignition** with combustible

materials.
- Peroxide chemicals are **organic compounds** that contain a peroxide functional group (**two linked oxygen atoms**).

Read More: Explosive Substances Act and Peroxide Chemicals

Hantavirus

Source: TH

Hantavirus is a rare but severe virus that spreads through the urine, droppings, and saliva of **rodents (mammals of the order Rodentia, such as rats),** causing life-threatening illnesses like **Hantavirus Pulmonary Syndrome (HPS) and Hemorrhagic Fever with Renal Syndrome (HFRS).**

- **Transmission:** Spread primarily through **aerosolization** of rodent waste, **direct contact**, or **rarely through bites**. **Human-to-human transmission is extremely rare**.
- **Symptoms:**
  - **Prodromal Phase (1-8 weeks after exposure): Flu-like symptoms** (fever, chills, muscle aches, fatigue, nausea, vomiting, and diarrhea).
  - **Severe Phase (HPS onset): Shortness of breath, coughing, chest tightness, fluid buildup in the lungs, and potential heart failure**.
- **High-Risk Groups: Farmers, construction workers, hikers, campers**, and those handling rodent-infested areas.
  - **Children under five, pregnant women, and immunocompromised individuals** should avoid contact with pet rodents.
- **Treatment:** No specific **antiviral treatment**, management includes **oxygen therapy and intensive care for severe cases**.
- **Prevention:** Keeping homes and workplaces rodent-free by sealing entry points, and wear protective gear when cleaning areas with rodent activity can significantly reduce the risk.

Read more: HMPV Virus

North Sea

Source: DTE

A cargo ship carrying toxic chemicals collided with a US military-chartered oil tanker in the **North Sea.**

North Sea:

- **Location:** A shallow, northeastern arm of the Atlantic Ocean between the British Isles and mainland northwestern Europe.
  - It is connected to the **Atlantic by the Strait of Dover and the English Channel** and to the **Baltic Sea through the Skagerrak and Kattegat**.
  - The deepest point in the North Sea is the Norwegian Trench (725 meters).
- **Borders:** Surrounded by the United Kingdom, Norway, Denmark, Germany, the Netherlands, Belgium, and France.
- **Economic Importance:** Major trade route for Europe, linking key ports in the UK, Scandinavia, and mainland Europe.
  - The **1958 Geneva Convention on the Continental Shelf** established countries' rights

over adjacent shelves, enabling North Sea exploration, which is rich in oil and gas with extensive offshore drilling.

Read more: [UK's North Sea Drilling]

6th Edition of Exercise Dharma Guardian

[Source: DD]

The 6th edition of **[Exercise Dharma Guardian,]** a bilateral military exercise between **India and Japan,** successfully concluded in Japan enhancing defense and interoperability cooperation.

- **Exercise Dharma Guardian:** It is an **annual exercise conducted alternately in India and Japan**, enhancing **combat readiness** through **counter-terrorism training in urban terrain** and including **[United Nations Peacekeeping Operations (UNPKO)] and Humanitarian Assistance and Disaster Relief (HADR) drills**.
- **India-Japan Multilateral Exercises: [Veer Guardian (air force)], [SHINYUU Maitri (air force)]** , **[JIMEX (naval)]**, and **[Malabar (naval) (along with Australia and the US)].**

Read more: India-Japan Forum 2024

Kyrgyzstan & Tajikistan Border Deal

Source: TH

Kyrgyzstan and Tajikistan have agreed to **exchange disputed lands**, improving access to farmland and water resources, bringing an **end to their long-standing border conflict.**

- **Reasons for Conflict:** The conflict arises from border disputes due to **differing maps and the arbitrary division of the Fergana Valley**, leading to ethnic tensions **among Kyrgyz, Tajiks, and Uzbeks.**
- **Kyrgyzstan and Tajikistan:** Both are **Central Asian nations,** gained independence from the **Soviet Union in 1991.**
    - **Kyrgyzstan** borders **Kazakhstan, China, Tajikistan, and Uzbekistan**, with **Bishkek** as its capital.
    - **Tajikistan** shares borders with **Afghanistan, China, Kyrgyzstan, and Uzbekistan**, with **Dushanbe** as its capital.
    - Both share the **Fergana Valley with Uzbekistan.**

Read More: [India Central Asia Relations]
