

## WEEKLY UPDATES – (2<sup>nd</sup> Oct-8<sup>th</sup> Oct)

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## ENVIRONMENT

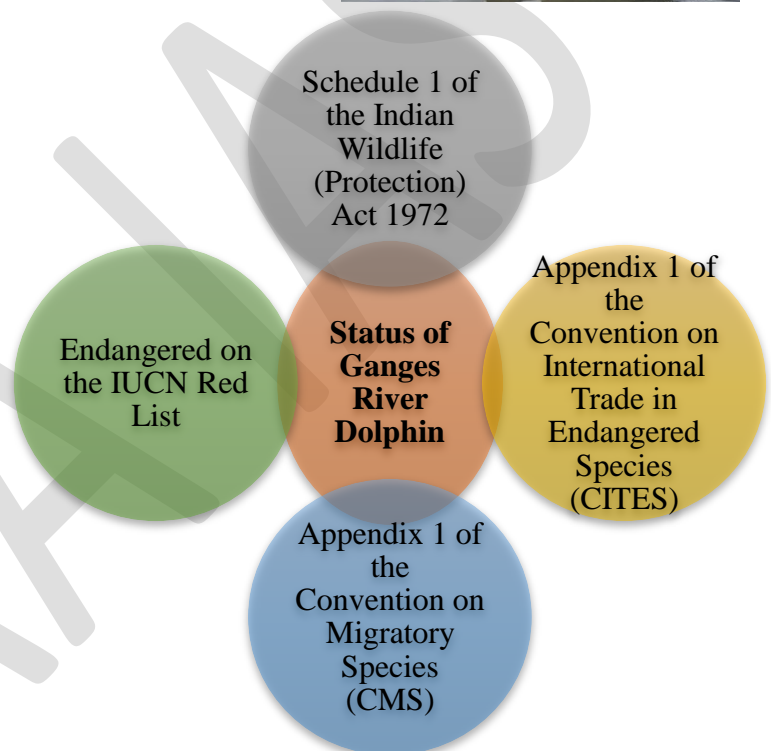
### Ganga-Ghagra Basin Canals Pose a Threat to Dolphins: Study

**Context:** A recent publication by scientists and researchers has revealed that 19 Gangetic river dolphins had been rescued from the irrigation canals of the Ganga-Ghagra basin in Uttar Pradesh between 2013 and 2020.



#### Key Highlights of Publication

- The publication, “**Rescuing Ganges river dolphins (Platanista gangetica) from irrigation canals in Uttar Pradesh, North India, 2013-2020**”, not only highlights the capture and relocation methods but also describes the behavioural and demographic details of rescued animals and locations of the canals where the animals had been trapped.
- The paper points out that 24 rescue operations had been conducted from 2013 to 2020 and five dolphins had died.
- “There were 19 successful rescue operations and 14 dolphins were identified as female and 10 as male.
- The TBL (total body length) of these dolphins was found to be between 128 cm and 275 cm.
  - The size of male dolphins ranged from 128 cm to 195 cm, whereas the females ranged from 190 cm to 274 cm.
  - Of the five dolphins that died, three had a length over 243 cm.
- The publication said **dams and barrages had severely affected this habitat** as dolphins moved into irrigation canals where they were at a risk of injury or death from a multiple factors, such as rapidly receding waters, heat stroke and human interferences.
- The researchers also pointed out the **higher proportion of females to males**, and said larger animals and pregnant females look for an easier prey base in the canal system.
- Over 70% of entrapments were reported either post monsoon or during peak winter. This suggests straying incidents are directly related to the release of water into canals during or after the monsoon.
- “The other 30% of dolphins were rescued during peak summer when water levels fall and the minimum water flow is maintained.
- Among the rescued dolphins, females were found trapped between September and May with maximum occurrence during peak winter (December to February).



- In contrast, males were mostly recorded post monsoon and during the summer season, with least occurrence in peak winter,” the paper says.
- Considering that the dolphins are found in the **Ganga-Brahmaputra-Meghna delta**, this is a huge problem to monitor this huge area and canal system.

### About Ghagra River Basin

- The river begins on the southern slopes of the Himalayas in Tibet, in the Mapchachungo glaciers, at an elevation of about 3962 meters.
- The river flows south through Nepal as the Karnali River, passing through one of Nepal's most desolate and unexplored regions.
- The Seti River, which drains the western part of the catchment and joins the Karnali River in Doti north of Dunderas Hill, is a 202-kilometer-long stream that feeds this river.
- The Bheri River, which runs for 264 kilometres through the eastern part of the Catchment and converges with the Karnali River near Kuineghat in Surkhet, is another feeder stream.



### Threats to Gangetic River Dolphins in Ganga-Ghagra Basin



- **Habitat Fragmentation:** Dams, barrages, and irrigation canals fragment the natural habitat of the Gangetic river dolphins. These structures disrupt the continuity of river systems and can isolate dolphin populations. As a result, dolphins may find themselves confined to the canals, limiting their access to their natural river habitats.
- **Risk of Entrapment:** The canals create artificial waterways that may lead dolphins away from their natural river channels. These dolphins can become trapped in the canals, as the structures may not provide easy exit points for them. The confined spaces of the canals increase the risk of dolphins getting stuck, unable to return to the main river.
- **Rapidly Receding Waters:** Irrigation canals are designed to transport water for agricultural purposes, and water levels can fluctuate rapidly. Dolphins may enter canals following prey or other

factors and may not anticipate sudden changes in water levels. When water levels drop rapidly, dolphins can become stranded or injured.

- **Heat Stroke:** Canals in the Ganga-Ghagra Basin can be exposed to intense sunlight, leading to elevated water temperatures. Dolphins are sensitive to temperature changes, and exposure to hot water can cause heat stroke and distress, potentially leading to injuries or fatalities.
- **Human Interference:** The presence of humans in and around canals can pose threats to dolphins. Activities such as fishing, boat traffic, and watercraft collisions can harm dolphins directly or disrupt their behavior.
- **Limited Prey Base:** The canals may not provide an ideal environment for the dolphins' natural prey, which includes fish. Limited food availability in the canals can lead to malnutrition and decreased reproductive success among dolphin populations.
- **Seasonal Water Flow:** Seasonal changes in water flow, such as during the monsoon or dry seasons, can influence the movement of dolphins. Water releases into canals during the monsoon may attract dolphins, but subsequent decreases in water flow can result in entrapment.

## GEOGRAPHY

### Circular Migration

**Context:** In India, internal migration, which is migration within a particular country or State, has almost always been circular. With rapid industrialisation, there has been a huge flow of migrants from rural areas to urban cities.

- Circular migration is a **repetitive form of migration** wherein people move to another place (the destination country) and back (country of origin) according to the availability of employment.
- This effectively means that instead of migrating permanently or temporarily (moving for a period of time to complete any contract-based labour) to another location, people move to different locations for a brief period of time when work is available.
- It is a phenomenon mostly among low-income groups who migrate to avail of seasonally available jobs in another country, city, place etc.

- ✓ Circular migration became quite popular in the 60s and 70s with the advent of globalisation and development.
- ✓ Increased access to modern forms of transport and communication, social networks and the growth of multinational corporations have aided the advent of circular migration.
- ✓ However, only recently has the phenomenon been given its due as the seasonal movement of migrants was not properly documented or was boxed along with short-term or temporary migration

According to Philippe Fargues, migration can be defined as circular if it meets the following criteria —

There is a temporary residence in the destination location,

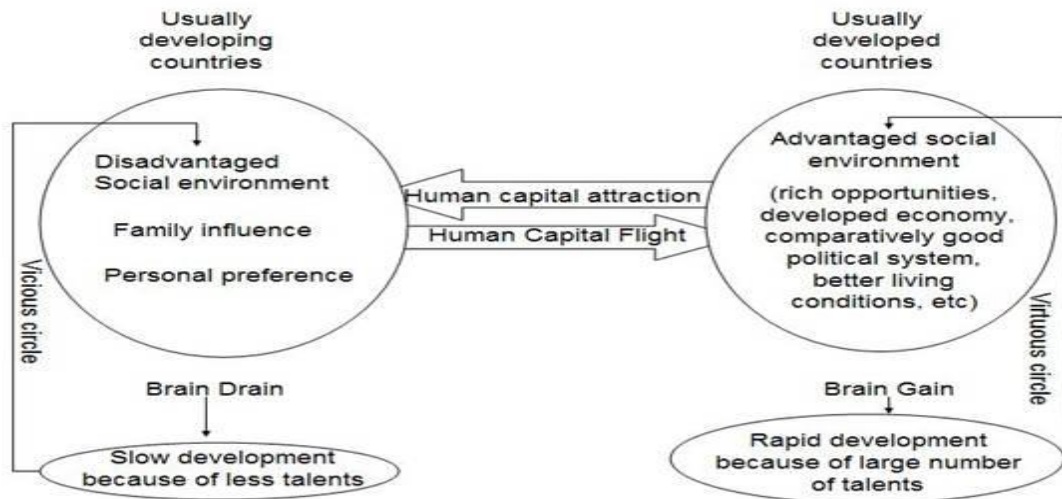
There is the possibility of multiple entries into the destination country,

There is freedom of movement between the country of origin and the country of destination during the period of residence,



There is a legal right to stay in the destination country,

There is protection of migrants' rights, and if there is a healthy demand for temporary labour in the destination country.



## Public Policy Around Migration

With the increasing fluid movement of people, policy around migration is one of the biggest debates in the world.

- ✓ The movement of citizens from the Global South to the West in search of more employment opportunities or a better standard of living creates **brain drain** for their origin countries and **competition for the citizens** of the destination countries.
- ✓ Similarly, the flow of people moving from rural areas to more urban areas of the same country, results in the **breakdown of infrastructure and**

As per the report on measuring circular migration by the **United Nations Economic Commission for Europe Task Force**, one is called a circular migrant if you have completed at least 'two loops' between two countries.

- ✓ Consider country A and B. If you move from A to B and back to A, then you are a return migrant. You had some work, you finished it and now you are back.
- ✓ If you move from A to B to A and then again to B, you have completed two loops between two countries and can be considered a circular migrant. This means you have travelled between your destination and origin country at least two times.
- ✓ This can become more complicated if more than two countries are involved. Consider one more country C.
- ✓ If you move from A to B then back to A and then to C and back to A, you would be a circular migrant as per country A (as you completed two loops) but not for countries B and C. They might classify you as a temporary, short-term or return migrant.

In short, if your primary destination is the country of origin and if you move periodically between two countries for purposes of economic advancement such as employment, business etc., you can be considered a circular migrant.

**agrarian stagnation.** Therefore, migration of any kind has become a policy hazard.

However, **circular migration is now seen as the best way forward**, as needs of development and individual economic advancement can be balanced out.

- ✓ It is seen as a balanced migration method which looks at migration not only from the point of view of the **receiving country** but also of the sending nation.
  - For the country of origin, migration, especially international migration, is beneficial due to the flow of remittances which will boost and aid the domestic economy.
  - The flow of foreign capital will enhance the economy ensuring more infrastructure, more jobs and by association, a better standard of living.
  - However, large-scale transnational migration will also lead to brain drain, wherein the most talented people of your country will use their intellect and innovation for the advancement of another country.
- ✓ From the perspective of the **host countries**, especially those of the West, a lesser population and a higher access to education has resulted in a large dearth of low-income low-skill jobs which migrants have been able to fill.
  - However, the influx of migrants have caused a wide range of anxieties and cultural conflicts in the host populations with most of them now calling for restrictions and outright ban on migration.

Circular migration aims to quell all these fears.

The negative effects of brain drain will reduce and a sort of brain circulation will be encouraged, wherein the individual can use his talents in both countries and still contribute to remittances.

Circular migration offers a way out to the governments of destination countries as migrants will circulate back to their home areas.

Labour can be introduced to undertake essential functions but it will not remain and become a permanent part of the population.

### **Circular Migration Within India**

In India, internal migration, which is migration within a particular country or State, has almost always been circular.

- With the advent of jobs in the manufacturing, construction and services sector, there has been a huge flow of migrants from rural areas to urban cities.
- Between 2004–2005 and 2011–2012, the construction sector witnessed one of the largest net increases in employment for all workers, specifically for rural males.
- This has led to rural populations and their economy dwindling and urban spaces, while booming, witnessing infrastructural collapse as they are unable to properly house incoming populations.
- In India, the uneven development post-liberalisation, has led to a lot of inter-State migration, with States like West Bengal, Odisha and Bihar having some of the highest rates of out-migration.
- Most of the rural migrants were occupied in agricultural jobs in their origin States; and when they migrated a majority of them were engaged in low-skill jobs.

- The positive outcomes of such inter-State migration include increased access to higher paying jobs when compared to origin States (as per Sarkar and Mishra, a daily wage labourer in West Bengal gets ₹150-180 per day, while in Kerala they would get somewhere between ₹260-380), better household welfare due to remittances, ease of mobility etc.
- Some reports have even stated how women get more autonomy and decision-making power in the family due to the absence of men who migrate.

However, in such migration, especially to southern States where the language barrier is a big obstacle, rural circular migrants are often at the mercy of middlemen or brokers.

- They are made to work in unhygienic and unsafe conditions with little to no protective equipment.
- They are routinely exploited and suffer significant ‘unfreedoms’ in host States.
- Additionally, indigenous wage groups and unions resent these migrants as they are seen as taking away their jobs by agreeing to work for lower wages.
- The study also says that this kind of migration is merely subsistence migration — it’s the bare minimum.
- The migrants are able to barely provide for themselves and their families, with no scope for further asset creation or savings.
- There is also a certain precarity associated with these jobs as they are seasonal and often irregular.
- A lack of jobs in the host States means that they will either have to go back home or look for work in other urban cities.
- This precarity was on clear display during the pandemic in 2020 when migrants en-masse started walking back to their home towns when a lockdown was announced.

## ECONOMY

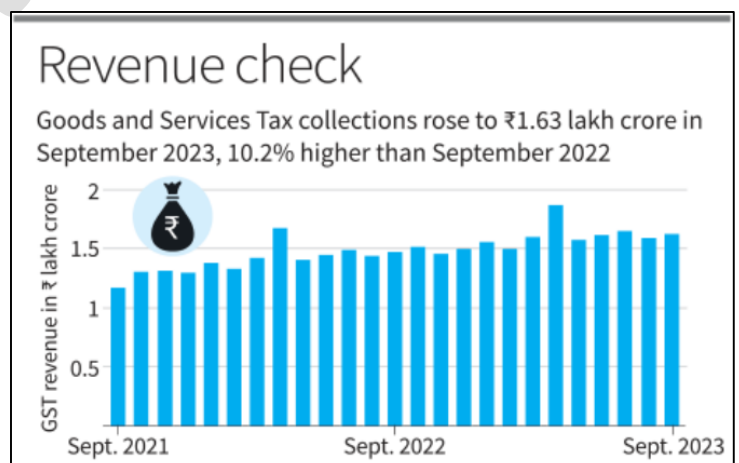
### Gross GST Revenue Growth Slowed to 10.2% in Sept

**Context:** Growth in India’s gross Goods and Services Tax (GST) revenues slowed to a 27-month low of 10.2% in September, from around 10.8% in the previous two months. However, collections improved 2.3% over August revenues to touch ₹1,62,712 crore.

- Revenues from domestic transactions, including services imports, were 14% higher than the tax collected from these sources during September 2022.
- This is the fourth time that the gross GST kitty has crossed the ₹1.60 lakh crore mark in 2023-24, the Finance Ministry said.

#### Key Highlights

- GST inflows from goods imports had recovered from two months of contraction to grow 3% in August, but shrank again in September, albeit by a fraction.
  - GST revenues from goods imports dropped 0.11% from last September.



- The last time that GST revenues grew at a slower pace was in June 2021, when collections rose a mere 2% amid the second wave of the COVID-19 pandemic.
- The revenues in that month were based on domestic transactions between June 5 and July 5, since taxpayers were given various relief measures in the form of waivers and reduction in interest on delayed filings for firms with an aggregate turnover up to ₹5 crore.
- Last month's GST revenues, based on transactions carried out in August, included Central GST (CGST) collections of ₹29,818 crore, State GST (SGST) of ₹37,657 crore, and Integrated GST (IGST) of ₹83,623 crore, which included ₹41,145 crore collected on goods imports.
- GST compensation cess inflows were ₹11,613 crore, including ₹881 crore collected on the import of goods.
- "The government has settled ₹33,736 crore to CGST and ₹27,578 crore to SGST from IGST. The total revenue of Centre and the States in the month of September, 2023 after regular settlement is ₹63,555 crore for CGST and ₹65,235 crore for the SGST," the Finance Ministry said.

### **Manipur Highest, Bihar Sees Contraction**

- Revenues in strife-torn Manipur, which recovered from a contraction in August, recorded the highest growth among States in September, rising 47%.
- GST revenues in Telangana grew 33%, followed by Jammu and Kashmir (32%), Arunachal Pradesh (27%), Tamil Nadu (21%), and Karnataka (20%).
- As many as 17 States recorded revenue growth below the national average of 14%, while 12 States reported 14% or higher growth. States seeing a slower uptick included Gujarat, Uttar Pradesh, Kerala, Haryana, Odisha, and Jharkhand, with Delhi, Meghalaya, and Assam recording the weakest growth of 2%, followed by West Bengal (3%).
- Bihar was the only State to report an actual contraction in GST collections in September, with revenues down 5%.
- The Union Territories of Lakshadweep, and Andaman and Nicobar Islands also clocked a sharp decline in revenues, which fell 45% and 30% year-on-year, respectively.
- By contrast, revenues shot up 81% in the Union territory of Ladakh.

### **Kerala Registers 12% Growth In GST Revenues In Sept.**

- Kerala has registered 12% year-on-year growth in Goods and Services Tax (GST) revenue in September.
- The collection for a given month pertains to the consumption of goods and services in the previous one. The State has recorded steady growth in GST revenues in the first and second quarters of the 2023-24 fiscal compared to the corresponding period last year.
- In the first quarter of the 2023-24 fiscal, Kerala had recorded 12% growth in GST revenues in April 2023, 11% growth in May and 26% growth in June compared to same months in 2022.
- In the second quarter, the State had recorded 10% growth in GST revenues in July and 13% growth in August compared to the same months in 2022. And as per the latest figures, 12% in September.
- The collection for July 2023 stood at ₹2,381 crore against ₹2,161 crore. The collection for August 2023 stood at ₹2,306 crore. It was ₹2,036 crore in August 2022.



## GOVERNANCE

### Rules of Entitlement for Disability Compensation Tightened

**Context:** The Defence Ministry has issued new entitlement rules (ER) for grant of disability pensions to military personnel, tightening some of the provisions and introducing a new ‘impairment relief’ (IR) in lieu of the ‘disability element’ to cover lifestyle diseases such as hypertension and diabetes.

- The development comes after the Comptroller and Auditor General (CAG) asked the Ministry early this year to carry out an analysis of the disability among soldiers based on its report, which said that almost 40% of officers and 18% of personnel below officer rank (PBOR) who retire every year were drawing disability pensions.

#### Key Highlights

The ‘Casualty Pension and Disability Compensation Awards to Armed Forces Personnel’ stipulates the conditions for the award of death/disability compensation to military personnel with effect from September 21.

- The new IR is defined as a monthly disability compensation, calculated as a defined percentage of the last reckonable emoluments, awarded to armed forces personnel who are retired or discharged from service voluntarily or otherwise with a disability sustained under circumstances accepted as Category B or C and assessed not less than 20%.

#### The Efficiency Perspective

- The primary aim of these rules is not cost-saving but rather the efficient management of the armed forces cadre.
- The presence of a significant number of individuals in lower medical categories sends an unintended message, and these changes aim to address that issue.

#### Streamlined Assessment and Entitlement

- The revised policy is designed to streamline the assessment and entitlement procedures, reducing ambiguity and the likelihood of litigation.
- This clarity will ensure that military personnel receive the support they need without unnecessary complications.

#### Impairment Relief Concept

- The introduction of impairment relief, a new concept in the rules, has garnered some criticism due to its lack of tax exemption.
- General Chauhan clarified that this change in terminology does not affect the nature of entitlement or the quantum of emoluments.
- It applies to personnel who are not invalidated out due to the nature of their disabilities and continue to serve until the end of their engagement.

## Caravan Park in Kerala

**Context:** The Kerala Tourism Development Corporation (KTDC) will develop the caravan park and camp shelter at Bekal fort.

- The KTDC has also submitted proposals to set up caravan parks at Ponmudi in Thiruvananthapuram and Bolgatty Palace in Kochi.
- The well-protected fort on a hillock overlooking the Arabian Sea boasts a stunning architecture and lush green environs.
- The caravan park at Bekal will be the first park in the public sector in the State.
- At present, there is only one Caravan Park in the State, run by a private player at Wagamon.

Caravan Park – It is a place where people with recreational vehicles can stay overnight, or longer, in allotted spaces known as "sites" or "campsites".

### About Bekal Fort

- Bekal Fort is located in **Kasargod district**, Kerala.
- It is the **largest fort in Kerala**.
- It was built in the **17th century** by **Shivappa Nayaka** of the **Keladi dynasty**.
- The fort has seen rise and fall of several dynasties and later came under the control of the **Kingdom of Mysore**.
- **Structure:** The fort appears to emerge from the sea. Almost three-quarters of its exterior is in contact with water.
  - An **important feature of the fort** is the water-tank and the flight of steps leading to an observation tower built by Tipu Sultan.
  - The **fort's zigzag entrance** and surrounding trenches reveal its defensive strategy.
  - **Holes on the outer walls** are designed to defend the fort effectively from naval attacks. The upper holes are meant for aiming at the farthest targets; lower holes below for striking as enemy nearer and the lowest holes to attacking enemy closest to the fort.
  - The fort's solid construction **resembles** the Thalassery Fort and the St. Angelo Fort at Kannur built by the Dutch.

## HEALTH

### An Ageing India Needs Age-Responsive TB Care

**Context:** India is moving towards a future where the elderly will make up a significant proportion of society, primarily due to advances in health care and increased life expectancy.

- In 2011, about 9% of India's population were over the age of 60. This is expected to increase to 12.5% by 2030.
- Tuberculosis (TB) affects over 25 lakh Indians every year, and kills at least 1,000 every day. India's
- National TB Prevalence Survey, 2021, revealed that the prevalence of TB in people over the age of 55 was 588 (per one lakh population), much higher than the overall national prevalence of 316.
- These findings were the starting point for a first-of-its-kind rapid assessment report on TB among the elderly, which we published earlier this year in collaboration with the National TB Elimination

Programme and the U.S. Agency for International Development, highlighting TB’s impact on the elderly and the need for age-specific TB guidelines.

## How TB Impacts the Elderly

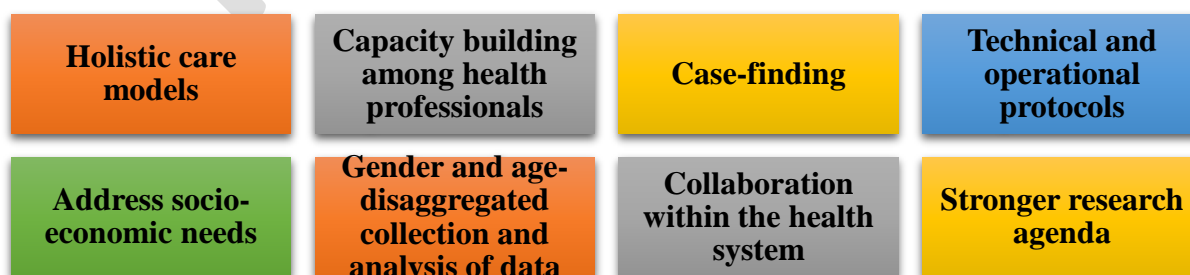
Interviews with older persons with TB revealed that their TB care journeys were fraught with challenges at every step, resulting in an overall sub-optimal experience.



- **Delayed or Missed Diagnosis:** Symptoms of TB including cough, fatigue and weight loss are mistaken as signs of other diseases or dismissed as signs of old age. The risk of having a TB diagnosis delayed or missed altogether is higher for the elderly compared to other adults.
- **Complicated TB Management in Elderly:** Once diagnosed, management of TB among the elderly is often complicated by multiple comorbidities, particularly diabetes.
  - **At an individual level,** this means a higher pill count and an increased likelihood of side effects.
  - **At a health system level,** this can result in irregular treatment adherence and poor outcomes, including death.
  - Some older people with TB spoke about their lowered ‘will to live’, especially in the absence of social and emotional support systems.
- **Access to Health services:** Older people, and older women in particular, also face specific challenges in accessing health services.
  - For instance, in rural and hilly areas, they struggle to travel to health facilities by themselves.
  - Their access to reliable information on health is also limited — social networks inevitably shrink for the elderly.
- **Lack of Infrastructure:** Older persons also experience infrastructure-related challenges such as lack of adequate seating.
- **Lack of Nutritious Food:** They may not have access to high-quality nutritious food, which is critical for recovery.

All of this is augmented by a loss of economic independence. Most people over the age of 60 are no longer working; they are living off savings or they are completely dependent on families. There are some social welfare schemes for the elderly but these are limited in scope and difficult to access.

## Building Age-Responsive Care



- We must move away from disease-specific, vertical care programmes to **holistic care models** that reduce the need for the elderly to interact with multiple providers and facilities.
- We must also **build capacity among health professionals** at all levels for an improved clinical understanding of TB in the elderly and better management of multiple morbidities.
- **Case-finding** among the elderly can be improved through effective sputum collection and transportation systems, access to mobile diagnostic vans and active case finding at geriatric OPDs, residential homes for the elderly and other institutional settings.
- **Technical and operational protocols** that provide clear guidance on diagnosing and treating TB in the elderly — for example, sample extraction protocols, comprehensive assessment of co-morbidities and drug dosage adjustments — need to be developed.
- To **address socio-economic needs**, we must design and roll out well-considered support protocols, with inputs from elderly people with TB.
  - Examples include an elder-focused community care model with linkages to local caregivers; doorstep delivery of medicines; age-responsive peer support and counselling for older people and their families; special help desks for the elderly at facilities; and support with documentation to access social support schemes.
- At a macro level, we must ensure rigorous **gender and age-disaggregated collection and analysis of data**, to identify TB trends across age groups, and to make sure that the elderly are included as a separate age category in all TB reports.
- An important step towards building elderly-friendly systems is strengthening **collaboration within the health system**.
- We need a **stronger research agenda** focused on TB in the elderly, to better understand State-specific trends in case finding and outcomes among elderly people with TB; substance use; drug-resistance and co-morbidity patterns across geographies; uptake of TB preventive therapy in the elderly; and inter-sectionality with other aspects of equity such as gender, disability, class, and caste.

## World Reported Twice as Many Cholera Cases in 2022 as in 2021: WHO

**Context:** World Reported Twice as Many Cholera Cases in 2022 as in 2021 says WHO. Most cholera cases continue to be reported from Africa and Asia, with Europe accounting for a few “imported cases”

| Cholera             |  |
|---------------------|--|
| <b>About</b>        | <ul style="list-style-type: none"> <li>• It is a life-threatening infectious disease and a public health hazard.</li> <li>• Cholera is an acute, diarrheal illness caused by infection of the intestine with the bacterium <i>Vibrio cholerae</i>.</li> <li>• The infection is often mild or without symptoms, but sometimes can be severe.</li> </ul> |
| <b>Symptoms</b>     | <ul style="list-style-type: none"> <li>• Profuse watery diarrhoea</li> <li>• Vomiting</li> <li>• Leg cramps</li> </ul>   |
| <b>Transmission</b> | <ul style="list-style-type: none"> <li>• A person may get cholera by drinking water or eating food contaminated with the cholera bacterium.</li> <li>• The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.</li> </ul>  |

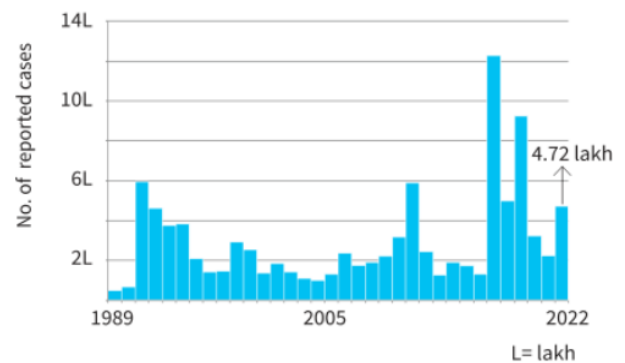


|                                    |  |
|------------------------------------|--|
| <b>Vaccine</b>                     | <ul style="list-style-type: none"> <li>• Currently there are three WHO pre-qualified oral cholera vaccines (OCV), Dukoral, Shanchol, and Euvichol-Plus.</li> <li>• All three vaccines require two doses for full protection.</li> </ul>  |
| <b>Initiatives to Curb Cholera</b> | <ul style="list-style-type: none"> <li>• A global strategy on cholera control, Ending Cholera: a global roadmap to 2030, with a target to reduce cholera deaths by 90% was launched in 2017.</li> <li>• Global Task Force for Cholera Control (GTFCC): WHO revitalized the Global Task Force for Cholera Control (GTFCC) to strengthen WHO’s work in eradicating cholera.             <ul style="list-style-type: none"> <li>○ The purpose of the GTFCC is to support increased implementation of evidence-based strategies to control cholera.</li> </ul> </li> </ul> |

### Key Highlights

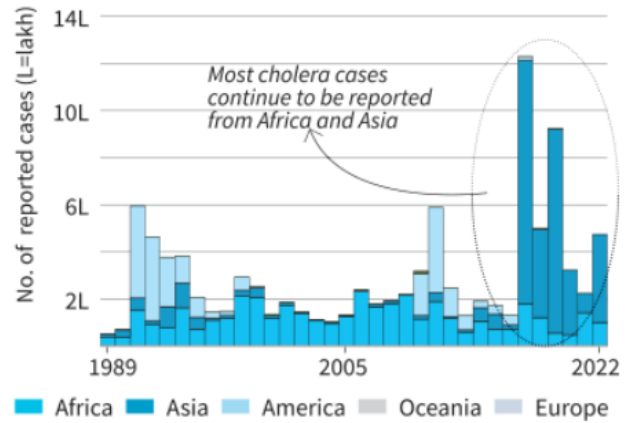
- Cholera is a water-borne disease caused by two strains called O1 and O139 of the bacteria *Vibrio cholerae*.
- Of these, O1 is responsible for almost all outbreaks; outbreaks of O139 are rare and none have been recorded outside Asia.
- According to the World Health Organization (WHO)’s weekly epidemiological record, published on September 22, the world reported more than twice as many cholera cases in 2022 as it did in 2021 (Chart 1).
- Between these years, more than twice as many countries also reported at least 10,000 suspected as well as confirmed cases of cholera.
- Both these trends suggest a reversal of a short-term trend, of declining prevalence since 2019. The reversal also complicates a target the WHO specified in 2017, to reduce the number of cholera deaths worldwide by 90% by 2030.
- According to the United Nations health body, “Cholera transmission is closely linked to inadequate access to clean water and sanitation facilities.” *Vibrio cholerae* bacteria also favour warmer waters with lower salinity.
- All these conditions are created as a result of climate change — which increases the likelihood of floods, heatwaves, intense monsoonal rains and storms, and the duration of warm periods — and war.
- The epidemiological record report blames the uptick on the decline of the COVID-19 pandemic, and its restrictions; “limited investments” in providing care to those most vulnerable to the disease; the effects of climate change; and increasing conflict.
- A 2021 study published in the journal *The Lancet Planetary Health* concluded that the length of the coastline favourable to the development of *Vibrio* bacteria could increase by 38,000 km by 2100 over the 1850-2014 average, in the SSP5-8.5 emissions scenario.

**Chart 1** | The chart shows year-wise reported cholera cases between 1989 and 2022

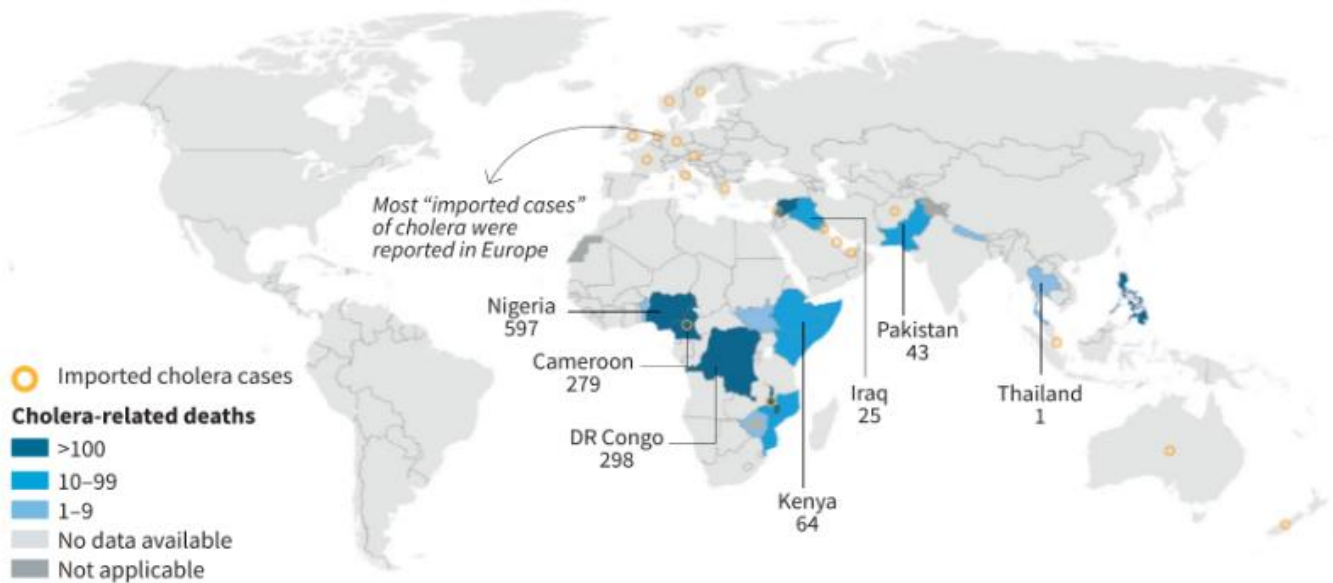


- A June 2023 study by researchers at the University of Florida found that “Vibrio pathogens have a unique ability to ‘stick’ to microplastics, and that these microbes might be adapting to plastic”, including in the open ocean, according to a statement by the National Science Foundation.
- In response to the world’s growing cholera burden, and while waiting for investments in manufacturing to bear fruit, the body that manages the emergency stockpile of the oral cholera vaccine shrank the recommended vaccination regime from two doses to one.
- According to the report, most cholera cases continue to be reported from Africa and Asia, with Europe accounting for a few “imported cases” (Chart 2 and Map 3).

**Chart 2** | The chart shows year-wise cholera cases reported to WHO across continents



**Map 3** | The map shows the country-wise reported cholera deaths and imported cases in 2022



- In Africa, cases were more spread out in 2022 than they were in 2021, which the report qualifies as no single country having reported more than 25% of all cases and 30% of all deaths.
- The report also says that between 2021 and 2022, the continent reported 29% fewer cases and 52% fewer deaths.
- This isn’t the good news it appears to be: in 2021, Nigeria had a large cholera outbreak that accounted for 78% of all cases in Africa that year.
- But in 2022, both the numbers of cases and of deaths in all the other countries (that reported data) more than doubled.
- Cameroon and Malawi in particular reported over 5,000 cases after more than a decade.

- Similarly, in Asia, both Lebanon and Syria have reported cases at all for the first time in a decade.
- Yemen had reported nearly 90% of the cases in West Asia in 2021 but didn't report data in 2022.
- In Afghanistan, more than half of all cases were among those aged five years.
- But there is one silver lining: whereas 20% of the countries that declared cases in 2021 reported using rapid diagnostic tests, 56% did so in 2022.

## WHO Approves Use of Malaria Vaccine with Adjuvant Tech

**Context:** The **R21/Matrix-M malaria vaccine** developed by the University of Oxford and the Serum Institute of India, leveraging Novavax's adjuvant technology, was recommended for use by the World Health Organization (WHO), after meeting required safety, quality and effectiveness standards.

- The vaccine was developed by the Jenner Institute at Oxford University and the Serum Institute of India with support from the European and Developing Countries Clinical Trials Partnership (EDCTP), the Wellcome Trust, and the European Investment Bank (EIB).
- Three countries — Nigeria, Ghana, and Burkina Faso — have already approved the use of the vaccine to immunise children aged less than 36 months.

### War against malaria gets a shot in the arm

Three countries — Nigeria, Ghana, and Burkina Faso — have already approved the vaccine for children aged less than 36 months

- A phase-3 trial in 4,800 children was conducted at five sites in four countries with different malaria transmission intensities and seasonality

- The participants received three vaccine doses four weeks apart, and a booster shot at the end of 12 months after the last dose

- Primary vaccination was carried out prior to malaria season where it is seasonal or at any time of year in countries where malaria is perennial

- Vaccine efficacy at the end of one year in children aged 5-36 months was 75% where

malaria is seasonal and 68% when malaria is perennial

- In children aged 5-17 months, who are more likely to die due to severe malaria, the vaccine efficacy was higher — 79% where malaria is seasonal and 75% where malaria is perennial

- In children aged 18-36 months, vaccine efficacy was 73% where malaria is seasonal and 63% when malaria is perennial

- The vaccine efficacy was well maintained to 18 months with a single booster dose given 12 months after the primary series



**Humongous:**  
In 2021, there were 247 million malaria cases worldwide and 6,19,000 deaths

### Adjuvant

- An adjuvant is an ingredient in a vaccine that enhances the immune system's response to that vaccine.
- Adjuvants help the immune system better recognize what's in a vaccine and remember it longer, increasing the amount of time that a vaccine may offer protection.
- Matrix-M adjuvant is derived from saponins, naturally occurring compounds found in the bark of the Quillaja saponaria tree in Chile. Saponins have a history of medicinal use.
- The Matrix-M component is a proprietary saponin-based adjuvant from Novavax, which is licensed to the Serum Institute for use in endemic countries, while Novavax retains commercial rights in non-endemic countries.

## Features of R21

High efficacy when given just before the high transmission season: In areas with highly seasonal malaria transmission (where malaria transmission is largely limited to 4 or 5 months per year), the R21 vaccine was shown to reduce symptomatic cases of malaria by 75% following a 3-dose series.

Cost-effectiveness is favorable, with a price range of \$2 to \$4 per dose, making it comparable to other recommended malaria interventions.

Safety: The R21 vaccine was shown to be safe in clinical trials.

Significance: The R21 vaccine is the second malaria vaccine recommended by WHO, following the RTS,S/AS01 vaccine, which received a WHO recommendation in 2021.

| <b>Malaria</b>                |  |
|-------------------------------|--|
| <b>About</b>                  | <ul style="list-style-type: none"> <li>• Malaria is a life-threatening disease caused by the Plasmodium parasite.</li> <li>• This parasite is transmitted to humans through the bites of infected female Anopheles mosquitoes.</li> </ul>  |
| <b>Plasmodium Parasite</b>    | <ul style="list-style-type: none"> <li>• There are 5 Plasmodium parasite species that cause malaria in humans and 2 of these species, P. falciparum and P. vivax, pose the greatest threat.</li> <li>• P. falciparum is the deadliest malaria parasite and the most prevalent on the African continent.</li> <li>• P. vivax is the dominant malaria parasite in most countries outside of sub-Saharan Africa.</li> <li>• The other malaria species which can infect humans are P. malariae, P. ovale and P. knowlesi.</li> </ul> |
| <b>Symptoms</b>               | <ul style="list-style-type: none"> <li>• Mild symptoms are fever, chills and headache. Severe symptoms include fatigue, confusion, seizures, and difficulty breathing.</li> </ul>  |
| <b>Prevalence</b>             | <ul style="list-style-type: none"> <li>• According to the WHO's World Malaria report 2022, there were 247 million cases of malaria in 2021 compared to 245 million cases in 2020.</li> <li>• It is mostly found in tropical countries. Four African countries accounted for just over half of all malaria deaths worldwide: Nigeria (31.3%), the Democratic Republic of the Congo (12.6%), United Republic of Tanzania (4.1%) and Niger (3.9%)</li> </ul>  |
| <b>Vaccine</b>                | <ul style="list-style-type: none"> <li>• Along with the recently confirmed R21/Matrix-M vaccine, WHO also recommends broad use of the RTS,S/AS01 malaria vaccine among children living in regions with moderate to high P. falciparum malaria transmission.</li> </ul>   |
| <b>Elimination Strategies</b> | <p>Global:</p> <ul style="list-style-type: none"> <li>• The WHO Global Technical Strategy for Malaria 2016–2030, updated in 2021, sets ambitious but achievable global targets, including:                             <ul style="list-style-type: none"> <li>○ reducing malaria case incidence by at least 90% by 2030</li> <li>○ reducing malaria mortality rates by at least 90% by 2030</li> <li>○ eliminating malaria in at least 35 countries by 2030</li> </ul> </li> </ul>   |



- preventing a resurgence of malaria in all countries that are malaria-free.

India:

- National Framework for Malaria Elimination (2016-2030)
- Malaria Elimination Research Alliance-India (MERA-India)

## DEFENCE

### Astra BVR Air-To-Air Missile

**Context:** The Indian Air Force (IAF) has placed two contracts with Bharat Dynamics Ltd. (BDL) for the indigenous **Astra Beyond Visual Range (BVR) air-to-air Missile** and the first batch is expected to be inducted by the end of the year, according to defence sources.

#### Key Highlights

- The Astra is fully integrated on the Su-30MKI.
- In August, it was successfully test fired from the Light Combat Aircraft (LCA) Tejas off the coast of Goa during which the missile was released from the aircraft at an altitude of about 20,000 ft.
- The IAF plans to arm its frontline fighters with the Astra-Mk1 and officials have said that the Astra-2 would become the mainstay of the IAF's BVR missile arsenal, reducing import dependency.
- In May 2022, the Defence Ministry signed a contract with BDL for supply of Astra Mk-I missiles and associated equipment for the IAF and the Navy at a cost of ₹2,971 crore.

#### Astra Missiles

Astra is an Indian family of all-weather beyond-visual-range air-to-air missile, developed by the Defence Research and Development Organisation.

- Different missiles of this family are capable of engaging targets at varying distances of 500 m up to 340 km.

#### Astra Mark 1

Limited series production of Astra Mk-1 missiles began in 2017.

- The Astra Mark 1, has a maximum head-on launch range of 100 kilometres, a speed of 4.5 Mach, and launch clearance up to 20 kilometres in height (66,000 ft).
- The Astra may either be launched by the mother ship or in buddy mode.
- Extensive and rigorous trials have validated the Astra missile's warhead capability, maximum launch ranges against head-on and maneuvering targets, long-range target engagement capability, clear missile separation at supersonic speeds, and launch under high 'G' forces, and multiple missile launches against multiple targets.



**ASTRA MISSILE**  
A SNAPSHOT

Meaning: **Weapon** (sanskrit)  
Range: **70 km**  
Speed: **Over 5,555 km/hr**

An all-weather Beyond Visual Range Air-to-Air **missile (BVRAAM)**

The first-ever BVRAAM **developed in India**

Indigenously designed and **developed by DRDO**

Can locate and track targets **at different altitudes**

Source: DRDO website, PIB, news reports

- The Astra-1 is meant to carry a 15-kilogram pre-fragmented high explosive warhead that is ignited by a radio proximity fuse.
- The missile’s Electronic Counter-Countermeasure (ECCM) capabilities allow for unrestricted operation in an Electronic Counter-Countermeasure (ECM) environment.
- Astra MK-1 already in Service is better than the Chinese PL-12 used by Pakistan and China.

### Astra Mark 2

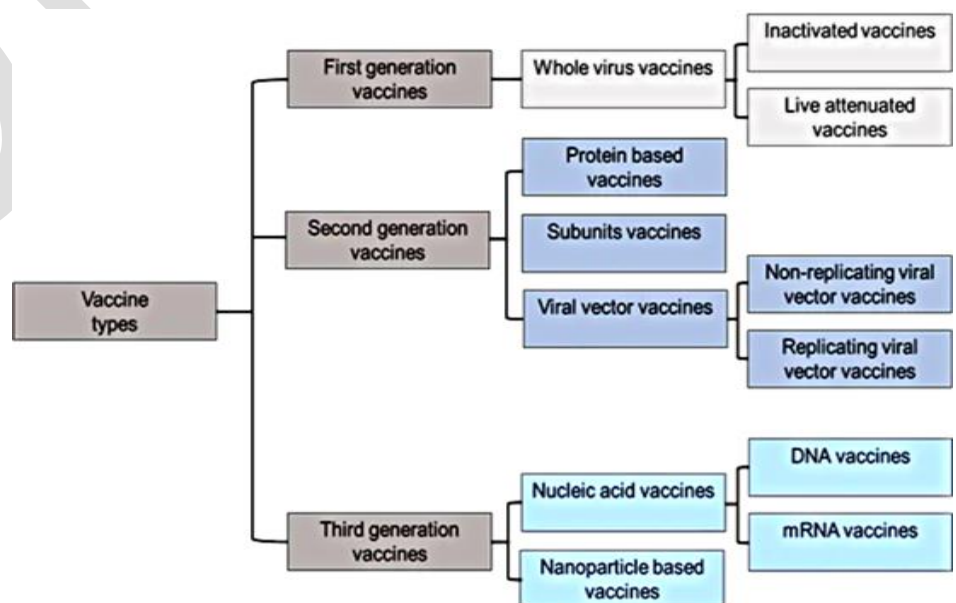
Astra MK-2 is the new version of Astra MK-1 with better range and launched from an ejector.

- The Astra MK-2 has conventional dual-pulse rocket motor with improved grain quality and with solid fuel.
- It is longer in length as a result of which more quantity of fuel can be loaded resulting in better range.
- Thus Astra Mk2 missile easily exceeds the performance of the USA made AIM-120D AMRAAM & Chinese made PL-15. It has been tested to 180 km. What sets it apart is its striking affordability.
- Astra MK-2 shares most of the key features of its predecessor Astra MK-1 such as aerodynamics, design, smokeless propulsion, Ku band AESA seeker, etc., so its development process has been very fast.
- Astra MK-2 is likely to be inducted into IAF service by end of 2023 or Q1 2024 max as every system from design, body, dual pulse rocket motor, actuators, various sensors, warhead, instruments and Ku band AESA seeker has been validated and tested.
- It will also come with improved high-angle off boresight capability, improved ECCM system, will sport a way data link (first for Indian missile) & an AESA radar which will improve the first kill probability by a significant margin.

## SCIENCE & TECHNOLOGY

### Medicine Nobel 2023 & mRNA COVID Vaccines

**Context:** The 2023 Nobel Prize in Physiology or Medicine has been awarded to Hungarian biochemist Katalin Karikó and American physician-scientist Drew Weissman. Announcing the names, the Royal Swedish Academy of Science said they had been feted for “discoveries concerning nucleoside base modification that enabled the development of effective mRNA vaccines against COVID-19”. Dr. Karikó is only the 13th woman to win the prize.



### Key Highlights

- mRNA stands for messenger RNA, a type of molecule that carries

instructions from the DNA to a cell's cytoplasm, where those messages are 'read' to produce various proteins.

- In the late 1980s, scientists realised that mRNA could become the basis for a new kind of vaccines if some hurdles could be overcome.
- The idea was to inject the body with a modified mRNA that would instruct cells to build a certain protein, which could then provoke the body's immune system to 'attack' it as well as prepare itself to encounter with the same protein in future.
- This protein could be something produced by a virus — such as the spike protein of SARS-CoV-2. But the mRNA would have to survive its journey inside the body and be able to enter a cell.

## Nobel prize for medicine 2023

**Hungarian Katalin Kariko and American Drew Weissman, from the University of Pennsylvania, whose research paved the way for the therapeutic use of mRNA**

**Messenger RNA (mRNA)**  
Transmits instructions to cells to produce proteins

**OBSTACLES**  
Synthetic mRNA provokes a massive inflammatory reaction

**mRNA is unstable**

**DISCOVERIES**  
A slight modification of the mRNA can fix this problem

Uridine

Pseudouridine

**No more inflammatory response**

mRNA is placed in lipid nanoparticles, a protective coating

**APPLICATIONS**  
A new type of vaccine, with messenger RNA

Teaches the body to produce antigens, to which the immune system learns to react

Until now, vaccine immunity functioned by injecting the body with a weakened form or part of the virus.

Inactivated or live-attenuated virus

Protein-based vaccine

Viral vector

Other applications are being explored, such as fighting against certain cancers and genetic diseases.

## How mRNA vaccines work

**Virus**

**Virus spike**

mRNA

**Vaccine**

**Immune cell**

Spike protein

**Antibody**

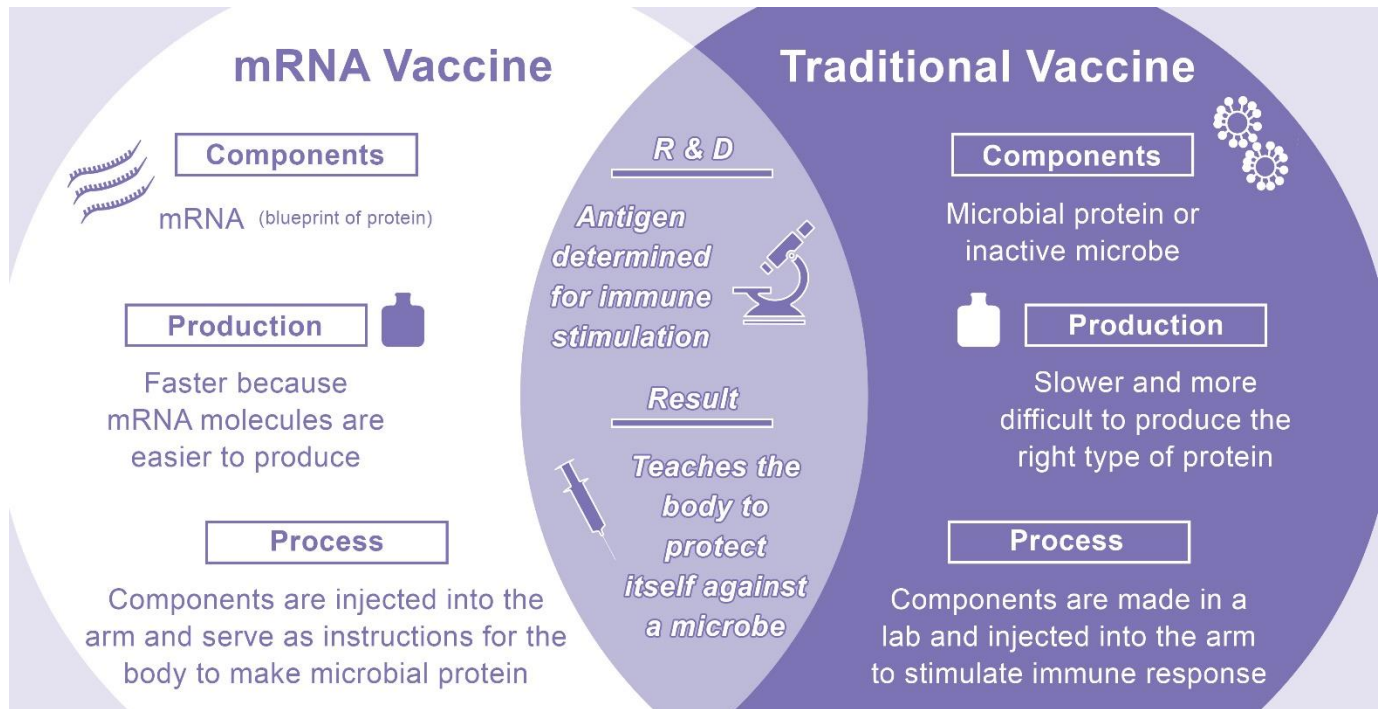
T cells

The genetic sequence of the virus spike is used to make a synthetic mRNA sequence - the instructions to make the spike protein

The mRNA is packaged into a nanoparticle - the vaccine - which can deliver the mRNA to immune cells

The immune cells follow the mRNA code to produce spike protein, which is displayed on the cell surface. This stimulates an immune response





### Advantages of mRNA Based Vaccines

- mRNA vaccines are considered safe as mRNA is non-infectious, non-integrating in nature, and degraded by standard cellular mechanisms.
- They are highly efficacious because of their inherent capability of being translatable into the protein structure inside the cell cytoplasm.
- Additionally, mRNA vaccines are fully synthetic and do not require a host for growth, e.g., eggs or bacteria. Therefore, they can be quickly manufactured inexpensively to ensure their "availability" and "accessibility" for mass vaccination on a sustainable basis.