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INCREASED INTENSITY OF DUST STORMS

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF "**INCREASED INTENSITY OF DUST STORMS**". THIS TOPIC IS RELEVANT IN THE "**ENVIRONMENT AND ECOLOGY**" SECTION OF THE UPSC CSE EXAM.

Why in the News?

Recently, several cities, including Mumbai and Delhi, witnessed Dust storms with extremely high wind speeds. These dust storms caused interruptions, leading to the suspension of flight operations at Mumbai airport. Unfortunately, 14 people lost their lives in Mumbai when a billboard fell over because of the powerful winds.

ABOUT DUST STORMS

- A dust storm, or sandstorm, is a weather event frequently seen in dry and semi-dry areas. It happens when strong winds, typically generated by thunderstorms, lift loose sand and dirt from dry surfaces into the atmosphere. This process involves fine particles being carried by saltation and suspension, relocating soil from one area to another.
- Such storms are common in places like **North Africa, the Middle East, Central Asia, and China**, where dry conditions and strong winds facilitate the rise of dust particles into the air.

WHAT CAUSES THE DUST STORMS?

- **Wind:** Strong winds, often resulting from thunderstorms or significant pressure gradients, are crucial in the development of dust storms. These winds can pick up loose sand and dirt from dry surfaces, starting the formation process of dust storms.
- **Soil Conditions:** Regions that are dry and arid with loose, dry soil are particularly vulnerable to dust storms. The lack of vegetation cover and the presence of fine soil particles make it easier for the wind to lift and carry dust into the air.
- **Geographical Features:** Flat areas with little vegetation, such as deserts and semi-arid regions, are more likely to experience dust storms. These landscapes allow winds to gather speed and transport dust particles over long distances, contributing to dust storm formation.

- **Meteorological Conditions:** Certain weather patterns, such as high temperatures and low humidity, can dry out the soil further, making it more likely to be picked up by winds.
- **Human Activities:** Poor farming and grazing practices, as well as land mismanagement, can exacerbate the susceptibility of an area to dust storms.
- Activities like intensive tillage, deforestation, and overgrazing can increase soil erosion and create conditions conducive to dust storm formation.

KEY IMPACTS OF DUST STORMS

Environmental Impacts:

- **Soil Erosion:** Dust storms strip the topsoil, reducing soil fertility and leading to desertification.
- **Air Quality:** They significantly decrease air quality by increasing the concentration of particulate matter in the atmosphere.
- **Ecosystem Disruption:** Dust deposition can affect plant photosynthesis and reduce the availability of nutrients, disrupting ecosystems.

Health Impacts:

- **Respiratory Issues:** Fine dust particles can penetrate deep into the lungs, causing or exacerbating respiratory conditions such as asthma and bronchitis.
- **Eye Irritation:** Dust can cause eye irritation and infections.
- **Allergies and Skin Conditions:** Exposure to dust can trigger allergies and skin conditions.

Economic Impacts:

- **Agriculture:** Dust storms can damage crops, reduce agricultural productivity, and degrade arable land.
- **Transportation:** Reduced visibility due to dust can lead to accidents and disrupt air and ground transportation.
- **Infrastructure:** Dust accumulation can damage machinery, buildings, and other infrastructure.

Social Impacts:

- **Displacement:** Severe dust storms can displace populations, especially in rural areas dependent on agriculture.
- **Livelihoods:** The economic downturn caused by dust storms can affect livelihoods, especially those reliant on farming and livestock.

Climate Impacts:

- **Atmospheric Effects:** Dust particles can influence weather patterns and climate by affecting solar radiation and cloud formation.
- **Ocean Fertilization:** Dust deposited in oceans can affect marine ecosystems by providing nutrients that promote phytoplankton growth.

RELATION BETWEEN CLIMATE CHANGE AND DUST STORMS

Climate change is greatly influencing the frequency and intensity of dust storms globally. Dust storms are projected to become more severe and frequent in the future due to rising global temperatures. Experts suggest that as global temperatures rise, soil will become drier, making it easier for wind to carry more soil, thereby intensifying dust storms.

HOW TO MITIGATE THE EFFECTS OF DUST STORMS?

- **Soil Management and Conservation:**
 - **Vegetation Cover:** Planting trees and maintaining vegetation cover helps anchor the soil and reduce wind erosion.
 - **Crop Rotation and Cover Crops:** Crop rotation and planting cover crops can improve soil health and stability.
 - **Terracing and Contour Ploughing:** These agricultural techniques reduce surface runoff and soil erosion.
- **Land Use Management:**
 - **Sustainable Grazing Practices:** Implementing controlled grazing to prevent overgrazing and land degradation.
 - **Afforestation and Reforestation:** Establishing new forests and restoring degraded ones can help reduce soil erosion.
 - **Controlled Urban Development:** Planning and regulating urban development to minimise land disturbance and soil exposure.
- **Technological Solutions:**
 - **Windbreaks and Shelterbelts:** Installing barriers such as trees, shrubs, or artificial structures reduces wind speed and protects soil.
 - **Soil Binding Agents:** Applying substances that help bind soil particles together, reducing the likelihood of wind erosion.
 - **Dust Suppression Techniques:** Using water sprays, mulch, or other suppressants on exposed soil surfaces in construction sites and other vulnerable areas.
- **Monitoring and Early Warning Systems:**
 - **Satellite and Remote Sensing:** Utilizing satellite imagery and remote sensing technology to monitor soil conditions and predict dust storms.
 - **Weather Forecasting and Alerts:** Developing advanced weather forecasting systems to warn early about impending dust storms.
- **Policy and Community Initiatives:**
 - **Environmental Regulations:** Implementing and enforcing regulations to control activities contributing to soil erosion and dust storms.
 - **Public Awareness and Education:** Educating communities about the causes and impacts of dust storms and promoting best practices for soil conservation.
 - **Disaster Preparedness Plans:** Developing and implementing plans for and responding to dust storms, including health advisories and infrastructure protection measures.

Prelims Based Question

Q1. Which of the following regions is most vulnerable to Dust storms?

- (a). Temperate grasslands
- (b). Boreal forest
- (c). Arid and semi-arid regions
- (d). Tropical evergreen forest

ANSWER: C

Mains Based Question

Q1. What strategies and measures can be implemented to mitigate the impacts of dust storms, and how can communities and policymakers work together to reduce their occurrence and effects?

[Vikas](#)

THE HUMAN PAPILLOMAVIRUS

THIS ARTICLE COVERS 'DAILY CURRENT AFFAIRS' AND THE TOPIC DETAILS OF "THE HUMAN PAPILLOMAVIRUS". THIS TOPIC IS RELEVANT IN THE "SCIENCE & TECHNOLOGY" SECTION OF THE UPSC CSE EXAM.

WHY IN THE NEWS?

A study by Cancer Research UK and Queen Mary University of London shows the HPV vaccine lowers cervical cancer rates, especially in less affluent communities, marking a significant impact in England.

KEY POINTS OF THE STUDY:

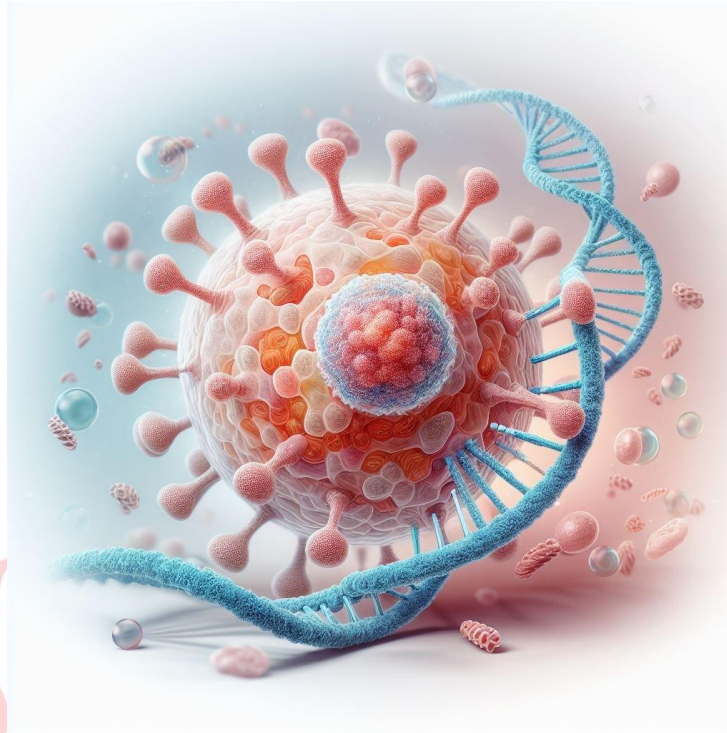
1. The study shows the HPV vaccine reduces cervical cancer across all socio-economic levels, especially in more deprived groups.
2. Researchers found that cervical cancer prevention was higher in the most deprived group due to its higher incidence rate.
3. The study showed the school vaccination program significantly reduced health inequalities through effective public health measures.
4. Studies have shown that, over 12 years, the HPV vaccine led to a decrease in cervical cancer rates by almost 90%.
5. The occurrence of pre-cancerous conditions dropped by approximately 95%.
6. These significant reductions were observed in women who were vaccinated at the ages of 12 to 13 in England.
7. The study shows the vaccine is much more effective when given to children 12-13 years old than later in life.

WHAT IS HUMAN PAPILLOMAVIRUS?

- Human Papillomavirus (HPV) is a group of related viruses that can infect human skin and mucous membranes. There are over 200 types of HPV, and they are categorised into low-risk

and high-risk types based on their association with certain health conditions. The HPV virus causes more than 95% of cervical cancer.

- It is the most common sexually transmitted infection (STI) globally. It can be transmitted through skin-to-skin contact.
- Most individuals don't show symptoms after infection and remain unaware of the virus's presence. In most cases, the immune system can detect and eliminate HPV. However, when the virus persists in the body over an extended period, it has the potential to lead to cancer.
- Preventing diseases related to HPV, such as cervical cancer, is possible through vaccination and safe sex practices.



ABOUT CERVICAL CANCER:

Cervical cancer is a type of cancer that occurs in the cells of the cervix, which is the lower part of the uterus that connects to the vagina. In a small percentage of people, the virus survives for years, contributing to the process that causes some cervical cells to become cancer cells. It is one of the most common cancers affecting women worldwide.

The leading cause of cervical cancer is infection with certain types of human papillomavirus (HPV), which is a common sexually transmitted infection. While most individuals who are sexually active may contract HPV at some stage, often, the body's immune system successfully eradicates the virus without leading to any health issues. Nonetheless, there are cases where the infection does not get cleared and instead causes gradual alterations in the cells of the cervix, which may ultimately progress into cancer. **There are several risk factors for cervical cancer, including:**

- **HPV infection:** Certain strains of HPV, particularly high-risk types such as HPV 16 and 18, are strongly associated with cervical cancer.
- **Sexual activity:** Early age at first sexual intercourse, multiple sexual partners, and having a partner with multiple sexual partners increase the risk of HPV infection and, subsequently, cervical cancer.

- **Smoking:** Smoking tobacco increases the risk of cervical cancer, possibly due to the harmful substances in tobacco smoke affecting the cells of the cervix.
- **Weakened immune system:** Conditions or medications that weaken the immune system, such as HIV infection or immunosuppressive drugs, can increase the risk of HPV persistence and cervical cancer.
- **Not getting screened regularly:** Regular screening with Pap smears or HPV tests can detect precancerous changes in the cervix, allowing for early treatment and prevention of cancer.

Globally, cervical cancer ranks as the second most prevalent type of cancer and is the second leading cause of cancer-related deaths among women aged 15 to 44. The International Agency for Research on Cancer (IARC) of the World Health Organization reports that India bears about 20% of the worldwide incidence of this disease. Annually, India sees around 123,000 new cases and suffers close to 67,000 fatalities due to cervical cancer, translating to a loss of one woman every eight minutes.

CERVAVAC, India's first indigenously developed cervical cancer vaccine by the Serum Institute of India, is a quadrivalent vaccine targeting four HPV types. It is based on VLP (virus-like particles), similar to the hepatitis B vaccine, and protects by generating antibodies against the HPV protein. The VLP approach stimulates an immune response from the body, resulting in the production of antibodies.

In the initial stages, cervical cancer might not show any symptoms, emphasising the importance of routine check-ups. However, as cancer progresses, symptoms may include Abnormal vaginal bleeding, such as bleeding between periods, after sex, or after menopause. Pelvic pain or pain during intercourse. Unusual vaginal discharge that may be bloody, watery, or foul-smelling.

Treatment options for cervical cancer depend on factors such as the stage of the cancer, the woman's age and overall health, and her preferences. Treatment may include surgery, radiation therapy, chemotherapy, or a combination.

Prevention is also a key aspect of managing cervical cancer. This includes:

- **Vaccination:** HPV vaccines are available to protect against certain high-risk strains of the virus. Vaccination is recommended for adolescents, ideally before they become sexually active.
- **Safe sex practices:** Using condoms during sexual activity can reduce the risk of HPV transmission.
- **Regular screening:** Pap smears or HPV tests are essential for early detection of precancerous changes in the cervix, allowing for timely intervention and treatment.

PRELIMS PRACTICE QUESTION:

Q. Consider the following statements:

1. Cervical Cancer is mainly caused by long-term infection with particular forms of Human Papillomavirus (HPV).
2. The Human Papillomavirus can spread through skin-to-skin contact.

Which of the statement(s) given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

ANSWER: C

MAINS PRACTICE QUESTION:

Q. What is cervical cancer, and how does it develop? Discuss the latest research and developments in the treatment of cervical cancer.

[Amit Pradhan](#)



Yojna IAS
योजना है तो सफलता है