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INDEX

1. New Technology: Edible QR Code enabled Medicine for the future
2. The Great Blue Hole
3. Vaccine for Brucellosis
4. Translational Medicine
5. Internet Shutdown Report

VETRII'S UPSC SCIENCE REPORT July - 2018

NEW TECHNOLOGY: EDIBLE QR CODE ENABLED MEDICINE FOR THE FUTURE

Researchers at the University of Copenhagen have developed a new method for the production of medicine. They print medical drugs in QR coded patterns onto an edible material.

Background:

- For the last 100 years, researchers have constantly pushed the boundaries for our knowledge about medicine and how different bodies can respond differently to it.
- However, the methods for the production of medicine have not yet moved itself away from mass production.
- Many who have a given illness get the same product with equal amount of an active compound.
- At present the same amount for multiple people suffering from the same condition, even if some will benefit from the medicine more than others.
- The shape of a QR code enables storage of data which can be used to label and description.

Significance:

- This technology is promising, because the medical drug can be dosed exactly the way you want it.
- It is possible that the prescribed drug just doesn't work as effectively as it does in other people due to genetic or environmental factor. This gives an opportunity to tailor the medication according to the patient's conditions.
- The consumption of 'fake' medicines in developing countries, which could contain incorrect doses, wrong ingredients or no active ingredients at all. Even some authorized medicines fall in this category because they fail to meet quality standards. This might be due to improper storage, amongst other issues.

VETRII'S UPSC SCIENCE REPORT July - 2018

- Simply doing a quick scan, you can get all the information about the pharmaceutical product. In that sense it can potentially reduce cases of wrong and fake medicines.
- If we are successful with applying this production method to relatively simple printers, then it can enable the innovative production of personalized medicine and rethinking of the whole supply chain.
- Can prevent overuse and misuse of antibiotics.
- If we are successful with applying this production method to relatively simple printers, then it can enable the innovative production of personalized medicine and rethinking of the whole supply chain.

THE GREAT BLUE HOLE

- The Great Blue Hole is a giant marine sinkhole off the coast of Belize.
- The giant submarine sinkhole is located just 100 Kilometres off the coast of Belize.
- It lies near the centre of lighthouse reef, where coral atolls encircle the shallow, light turquoise coloured waters of a lagoon.
- The world's largest natural formation of its kind, the great blue hole is a part of the larger Belize barrier reef reserve system, a world heritage site of the United Nation Educational, Scientific and Cultural Organisation (UNESCO).
- It was formed during several episodes of quaternary glaciations when sea levels were much lower.
- The site originated as typical limestone cave during ice age.
- Huge stalactites and stalagmites were retrieved from submerged caves.
- A large amount of Different coral types thrive in the shallower portions of the blue hole.
- There are over 500 rare forms of animal and plant life found in the Great Blue Hole of Belize. There are several unique species of fish, including Midnight Parrotfish, Caribbean Reef Shark, and other rare fishes.

VETRII'S UPSC SCIENCE REPORT July - 2018

- A superlative destination to dive in crystal clear water and see myriad species of marine life, the great blue hole is one of the top scuba diving sites in the world.

TRANSLATIONAL MEDICINE

The Translational Medicine aims to understand complex, integrated bodily systems to bridge in vitro approaches with in vivo applications, preclinical models of human disease and translate these findings into human health.

VACCINE FOR BRUCELLOSIS

A new vaccine is developed by GADVASU Ludhiana to cure the deadly disease Brucellosis.

Brucellosis in India:

- Brucellosis is an important but neglected disease in India.
- In India brucellosis is present in different species of mammalian farm animals including cattle, goats, buffalo, yaks, camel, horses and pigs.
- At present, there is no cure for Brucellosis.
- The available antibiotics as well as vaccine currently used in India have not been able to control the disease.
- It causes production losses worth about 25000 crore rupees annually.

Brucellosis:

- Brucellosis of cattle, also known as "contagious abortion" and "Bangs disease", is caused by infection with the bacterium *Brucella abortus*.
- It is a Zoonotic disease affecting humans which is known as "undulant fever".
- Brucellosis infection of cattle causes abortion or premature calving of recently infected animals, most often between the fifth and eighth month of pregnancy.
- *Brucella* is highly contagious, spreading very easily between cattle as the calf, the membranes and the uterine fluids all contain large quantities of bacteria.

VETRII'S UPSC SCIENCE REPORT July - 2018

- Infected cows frequently suffer from retained afterbirth, are difficult to get rebred and sometimes become sterile.
- The bacteria can spread to humans by consuming infected meat or in contact with the placenta of infected animals, or by having unpasteurised milk or cheese.

INTERNET SHUTDOWN REPORT

ICRIER launched a report on, "Internet Blackout: Measuring the Economic Blackout of Internet Shutdowns in India".

About:

- The Internet has dramatically revolutionized the way we live. From the basic to the most complex, many facets of economic and social activity are now affected by the Internet. Internet has grown massively to become a fundamental and integral part of our social and economic lives.
- Much like electricity, the Internet is also considered a general-purpose technology.
- Internet shutdowns are a growing concern in India. India with 54 shutdowns had topped the list of 30 countries that witnessed shutdowns in the preceding 21 months.

What is internet Shutdown:

- Internet shutdown is an intentional disruption of Internet or electronic communications, rendering them inaccessible or effectively unusable, for a specific population or within a location, often to exert control over the flow of information.
- It targets either mobile or fixed line Internet access or both and disables users access to the Internet in that country or region.

Types of Internet Shutdown:

There are broadly two types of Internet shutdowns

VETRII'S UPSC SCIENCE REPORT July - 2018

1. Complete - A complete or total shutdown is when all Internet services are blocked without specific targeting of applications or websites.
2. Partial- A partial Internet shutdown involves blocking of specific content and communication platforms.

India has witnessed mobile-only and mobile plus fixed-line Internet shutdowns.

Facts:

- With approximately 194 million Facebook users² (largest user base in the world), 200 million monthly active WhatsApp users and the second highest monthly active users on Twitter globally, India is vulnerable to the rising menace of social media crimes.
- India is already the highest ranked in mobile data consumption, at volumes which are 50 percent more than that in China, indicating the disruptive effect of Reliance Jio that entered the market 2016 and resulted in significant adoption through its free data and voice plans. This growth is led by rural areas, where the recent rate of uptake is higher than that in urban areas.
- By 2016, India was topping the global charts on the number of Internet shutdowns.
- Jammu & Kashmir, Rajasthan, Gujarat, West Bengal and Bihar are clearly the states to have seen the maximum duration of shutdowns over the period 2012 and 2017.

Laws:

- Shutdowns in India are mostly ordered under Section 144 of the Criminal Procedure Code.
- The Government of India issued rules on shutdowns under the legacy legislation - The Telegraph Act, 1885.
- India recently issued The "Temporary Suspension of Telecom Services (Public Emergency or Public Safety) Rules, 2017" (Internet Shutdown Rules, 2017) explicitly define an Internet

VETRII'S UPSC SCIENCE REPORT July - 2018

shutdown which prescribed clearly the competent authorities that can order an Internet shutdown and the periodic review for such orders but the rules have not had any discernible impact on the number of ordered shutdowns.

- United Nations Human Rights Council (UNHRC) passed a resolution on the promotion, protection and enjoyment of human rights on the Internet. The resolution specifically expresses concern about “measures aiming to or that intentionally prevent or disrupt access to or dissemination of information online, in violation of international human rights law.

Impact:

The impacts of internet shutdown are heterogeneous. The important stakeholders are government, business and society

Government:

- Governments are increasingly investing in e-governance initiatives to provide efficient citizen services that are easily scalable.
- Government services and public infrastructure such as railways were affected by Internet shutdowns, traffic had drastically reduced for railway tickets which were largely made online.
- Common Service Centres could not function and civilians, who used CSCs for banking services, were also unable to use these services.
- With implementation of GST, filling of taxes was difficult due to frequent Internet shutdowns in the state. This not only signals a problem for businesses, but an impact on the government revenues as tax payments get delayed.
- Shutting down the Internet has also prevented administrators from securing instantaneous and updated information about troublemakers.
- It is the authority ordering and enforcing the Internet shutdown, and is also affected when services and functions that utilize the Internet are disrupted due to a shutdown.

VETRII'S UPSC SCIENCE REPORT July - 2018

Business:

- Internet's role in improving productivity and inspiring innovation can be seen in almost every sector of the economy. With a substantial policy push, the Internet is now central to most socio-economic activities in India.
- We find that businesses such as e-commerce suffer most during shutdowns along with online freelancers who operate out of small towns and are completely dependent on a functioning Internet.
- The impact on banking services is limited as their operations run on private leased lines and remain uninterrupted by shutdown of the public Internet. Other sectors that are Internet dependent, such as tourism, IT services and the news media industry are also adversely affected.
- Smaller businesses relatively more than larger businesses that are able to find alternatives given resources at hand.
- Interruptions that occur repetitively or last for longer durations magnify the GDP impacts as they increase uncertainty in the business environment and often influence service providers to rethink business models and investments in network infrastructure.
- While qualitatively there is erosion of investor confidence and enhanced reputational risk.
- Tourism is one sector that showed high impact. States with significant dependence on tourism such as Kashmir, Darjeeling and Rajasthan saw tourism related businesses suffer major losses.
- As Many tourism related businesses rely on the Internet for promotion of their services, and attempt to boost their business during tourist seasons.
- E-commerce the cornerstone of the e-commerce industry is reliable Internet at both ends - demand and supply gets affected.
- The impact of Internet shutdowns on journalists and the news media is enormous affecting both the medium of consumption and dissemination. Shutting down the Internet restricted access to information and the ability of some to express themselves.

VETRII'S UPSC SCIENCE REPORT July - 2018

- Internet shutdowns impacted educational institutions .Students from states like Kashmir and Gujarat reported inability to register for exams and access study material on the Internet.
- The healthcare sector in India is getting increasingly digitized. Hospital records and various medical schemes are maintained online.

Society:

- For the average citizen, the Internet has facilitated easier engagement with the state, indeed enabled citizens to push the state to higher levels of accountability, besides empowering society at large.
- Social media networks have also enabled civil society to coordinate and gather voices of dissent like never before, crucial to the functioning of a democracy.
- Cutting off the mobile telecommunication network in Nepal in 2005 was found to have a negative impact on the economy and the resultant social alienation led to the eventual downfall of the reigning king.
- The increasing incidents of Internet shutdowns across the world raised much concern, particularly with regard to infringement of human right.
- Lifestyles and livelihoods were altered due to prolonged shutdowns.
- Safety, access to emergency services, access to education etc., get affected.
- As online ecosystems mature and infiltrate, the impact of such shutdowns is only likely to increase.

Reasons for Shutdown:

- Besides driving a reorientation of economic activities, Internet based crimes have also become a cause of worry for governments across the world.
- Some of the earliest and most prominent cases of Internet shutdowns across the world arose from political compulsions.

VETRII'S UPSC SCIENCE REPORT July - 2018

- The practice of shutting down the Internet spread quickly to other countries from Arab spring and the reasons were no longer restricted to issues of large scale political opposition or violence.
- The reasons for shutdown now included fair administration of school exams, limit circulation of illegal content, etc.,
- While social media undoubtedly enables rapid and wider information exchange, it is a double-edged sword. Popular platforms such as Facebook, Twitter and WhatsApp are being leveraged for illegal activities.
- Shutdowns are justified when instances of civil unrest provoked or perpetuated by rumour-mongering on social media become serious security concerns.
- The larger objective cited by most administrators is the need to protect national security and lives of ordinary civilians as shutdowns helped control spread of violence and civilian clashes. However some shutdowns were reported to have a counterproductive effect.
- Ordering a shutdown is often an easy measure, not only to control a law and order situation but for the optics.

Alternatives:

- The importance of capacity building of law enforcement agencies and counter-speech among other necessary efforts. The state's investment in better public communication and counter-speech during law and order situations can prevent the need for Internet shutdowns in the long run.
- Timely action is thus decisive and involves planning and developing a containment strategy by law enforcement.
- Identify the source and thereafter restrict or eliminate the circulation of inflammatory messages.
- To invest in better cyber forensics capabilities, and educative campaigns that target the spread of disinformation.

VETRII'S UPSC SCIENCE REPORT July - 2018

- Social media and instant messaging platforms must not be seen only as part of the problem but also part of the solution.

Way Forward:

- Building a Civilian Line of Reporting: While ordering or evaluating an Internet shutdown, having a civilian line of reporting provides the much-needed multidimensional perspective on ground realities.
- Blanket and prolonged shutdowns are a disproportionate response- -instead restricting the Internet shutdown to specific geographies is technically feasible. This can be done by targeting specific range of a communications tower in an affected area.
- Providing Official Notification or Communication of Internet Shutdowns: Stakeholders can be better prepared, and possibly mitigate some of the adverse impacts of Internet shutdowns if proper notification or communication of shutdowns is provided by the state.
- The lack of reliable data on Internet shutdowns limits an understanding of the nature and scale of the problem. Official documentation with impact analysis of each Internet shutdown would be an invaluable resource for future course of action
- Educative campaigns can address some of the primary concerns of provocative messaging and rumour-mongering that is often the basis of decisions to shut down the Internet.
- Fact-checking on fake news as an additional, independent mechanism will address some concerns related to law and order situations. Citizen driven fact checking initiatives have had some success in controlling the proliferation of fake news and provide an avenue for reasonable dialogue.
- Sharing best practices in controlling law and order situations with due cost-benefit analysis of measures would create a more predictable environment. While some states have turned to others in understanding the modalities of an Internet shutdown, others have mostly worked in isolation.

VETRII'S UPSC SCIENCE REPORT July - 2018

Conclusion:

- Social media has alleged to have disproportionately influenced outcomes of elections in US and the Brexit vote in the UK4. Sometimes the integrity of the process of convening on social media is suspected for the right reasons because of the increasing popularity of fake news and the growing influence of 'keyboard warriors.
- Governments that on the one hand support development of the Internet and associated infrastructure for digital enablement and on the other clamp down on its functioning using ordered measures such as censorship, blocking and shutdowns.
- Shutdowns, by administrators, are often an outcome of weaknesses in the law enforcement network around an occurrence, but in some cases have also been employed as a pre-emptive measure to nip potential security concerns in the bud.
- From being the last resort, it has gradually become a quick option even in situations where Internet use would have little impact on the outcome.