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# Science Service

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### **NEWTON-BHABHA FUND FOR ARSENIC RESEARCH IN GANGA BASIN**

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An India-UK Joint Team has won the Newton-Bhabha Fund for a project on Groundwater Arsenic Research in Ganga River Basin, an IIT-KGP statement said.

The Department of Science and Technology has undertaken the project with the Natural Environment Research Council, UK, to find solutions to the water challenges faced in the pervasively arsenic-affected Ganga River Basin.

The Indian team comprises representatives of the IIT Kharagpur, the National Institute of Hydrology, the IIT Roorkee and the Mahavir Cancer Sansthan and Research Centre of Patna, the statement said.

The UK team consists of representatives of the University of Manchester, the British Geological Survey, the University of Salford and the University of Birmingham.

The Newton Bhabha Fund, provided by the British Council, aims to bring together the UK and Indian scientific research and innovation sectors to find joint solutions to the challenges facing India in economic development and social welfare.

The team members involved with the project will try to assess how the problem of arsenic poisoning can get aggravated in the next 25 to 30 years and influence groundwater management practices and suggest water remedial technologies accordingly.

Prof Abhijit Mukherjee of IIT-KGPs Department of Geology and Geophysics and School of Environmental Science and Engineering is heading the project at IIT-KGP.

To begin with, Mukherjee said, the project will be conducted from three sites - Bijnor and Varanasi in Uttar Pradesh and Nadia in West Bengal.

The IIT-KGP had previously worked in assessing groundwater quality and the exploration of suitable and sustainable drinking water sources in different parts of India, the statement said.

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### **HRD MINISTRY TO SET UP INNOVATION CELL**

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The HRD ministry has decided to create an innovation cell headed by a scientist to brainstorm new ideas about promoting innovation in the country.

The decision was taken at a high-level meeting today which deliberated upon the need for such a cell after India moved six ranks up the Global Innovation Index Ranking. The country stood at 66th position in 2016, whereas it ranked 60th in 2017, out of 127 countries.

“An innovation cell will be created by the Ministry of Human Resources Development (HRD) to further strengthen the spirit of innovation. It will be headed by a scientist and also include a senior official and young professionals who bring to the table new ideas in promoting innovation,” Union HRD Minister Prakash Javadekar said after the meeting.

Under the Global Innovation Index 2017, India improved its standing in innovation inputs and efficiency.

According to HRD officials, the strongest points for the country happen to be a large number of science and engineering graduates, the increased investment by global research and development companies in India, the improved QS University rankings and high rank in the highly cited research publication, global leadership in the IT service experts and leadership in export of creative goods.

“There has been considerable improvement in India’s ranking in Global Innovation Index 2017. Since the large part of this index relates to education, the setting up of innovation cell in the ministry will lead to more focused attention on innovation and research efforts,” Javadekar said.

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### **VARDHAN UNVEILS SOLAR JACKET WITH PHONE CHARGING FEATURE**

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Union Science and Technology Minister Harsh Vardhan today unveiled a solar jacket with hi-tech features such as mobile phone charging, GPS and a solar fan.

He said the jacket, an innovation of the Department of Science and Technology, can be used by defence personnel and officials working in remote areas.

The solar jacket has facilities such as mobile phone charging, a GPS, a torch with a beam and a pocket solar fan.

Displaying the solar jacket by wearing it himself, Vardhan highlighted the features of the solar jacket.

“This solar jacket is particularly useful for defence personnel and forest officials working in remote and far-flung areas,” the minister stated.

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### **STEPHEN HAWKING DEFIED DEATH IN 1960S, RECALLS JAYANT NARLIKAR**

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British theoretical physicist Stephen Hawking proved his medical prognosis wrong in 1964 and went on with his pioneering work in astrophysics, recalled his Cambridge contemporary and noted Indian scientist Dr Jayant Narlikar.

“In 1964, a close friend of Hawking’s family told me about his illness and said that he had only two years (to live). It was a shock to me but he outlived (it) and the medical prognosis was wrong,” Narlikar said, adding that the condition of the iconic British physicist worsened over the years.

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Hailing Hawking, who was his junior at Cambridge, the Pune-based astrophysicist said he was “unusual personality in cosmology who did a solid work on Black Holes, radiation emitted by them and overall physics”.

“He was an unusual type of personality in cosmology, relativity and black holes. The unusual thing about him was that he could do all the sums in his head and though his body was not responding, his work was commendable,” Narlikar recalled.

He said Hawking showed to the world that radiation can escape from black holes which are believed to absorb everything, and this was his “biggest discovery”.

“It was an unexpected result, which he derived when he was quite young,” Narlikar said.

Reminiscing his Cambridge days, Narlikar said during a summer vacation at Royal Greenwich Observatory, they had arranged a table tennis tournament.

“In the final, I was playing Hawking and I defeated him,” he said, Though Hawking was my junior, we could discuss a lot of things.

Though Hawking at that time looked normal from the outside, he may not be quite so internally, Narlikar said, adding, “It is quite commendable that although his body was not functioning properly, he did some wonderful work for science.”

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### **CLIMATE CHANGE HAS RESULTED IN SUBSTANTIAL REDUCTION OF CORAL COVER: WWF**

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Climate change has resulted in “substantial” reduction of the country’s coral cover and growth in the last two decades, according to conservation group WWF India which has stressed the need for formulating a “holistic” approach for their protection.

It said the connectivity of India’s freshwater, coastal, offshore and marine systems must be taken into account when conserving such (corals) habitats and the management regimes must reflect this.

Coral diversity and formation of reefs are centred around four major regions - the Gulf of Kutchh and the Lakshadweep atolls on the west to the Gulf of Mannar and the Andaman and Nicobar islands on the East.

Besides these hotspots, patchy reefs are present in other coastal regions, from the coast of Goa and parts of the Malvan marine national park to the Kanyakumari district in southern Tamil Nadu.

Ajay Arun Venkataraman of WWF-India said that recent years have seen a slew of anthropogenic impacts threaten the future and health of coral reefs.

“Climate change is the primary threat, with multiple bleaching events occurring in the last two decades, resulting in substantial reductions to coral cover and growth.

“Increased atmospheric carbon dioxide levels have other more insidious effects on reefs, decreasing the pH of oceans and resulting in ocean acidification, which seriously hinder the reef building capacity of corals,” he said.

He pointed out that under the looming shadow of climate change, overfishing, unregulated coastal development, nutrient, heavy metal and chemical pollution, coral and coal mining, and sedimentation are a few examples of human impacts, all working together to degrade the world’s reefs.

“Increased coastal infrastructural development and a high dependency on coral reef systems, as a source of nutrition and livelihoods, place the future of not only our natural habitats but also our economic and social stability at risk.

“In addition, altered freshwater inputs into the ocean, bringing more sediment can cause siltation on existing reefs. Development plans for the Lakshadweep atolls and the Andaman and Nicobar Islands similarly threaten our island’s reefs,” Venkataraman pointed out.

He said in India, efforts to safeguard coral reefs have been in place since 1986, including the establishment of marine parts and biosphere reserves.

Coral restoration and research and monitoring efforts have been conducted in parts of India, such as the Gulf of Kutchh, in Gujarat to assess the status and health of the country’s reefs, he said.

There has also been significant protective legislation resulting in the inclusion of nearly all groups of coral under the Wildlife Protection Act, 1972, preventing the harvest and exploitation of all these species, he pointed out.

“However, protecting corals in a targeted fashion is not enough, from past experiences across the globe. These complex and sensitive ecosystems require a holistic approach, taking into account their vulnerability to all human impacts.

“The connectivity of our freshwater, coastal, offshore and marine systems must be taken into account when conserving such habitats and management regimes must reflect this,” Venkataraman said.

Observing that the economic value of coral reefs is extremely hard to estimate, given the transient nature of worth assigned to their goods, he said two-thirds of the base economic value assigned to oceans is a product of assets that rely on healthy oceans.

“Direct value can be estimated from fisheries revenue, with Southeast Asia’s coral reefs estimated to generate up to USD 2.4 billion annually. Fish catch off India’s coral reefs account for about 25 per cent of the total catch.

“In addition, the structure of the reef itself is comprised of calcium carbonate (limestone), valuable as a building material. What is harder to estimate is indirect economic generation from coral reefs, such as recreational activities to be carried out on reefs, and their own set of livelihood functions,” he added.

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### **WB GOVT TO SET UP VIRTUAL CLASSROOMS IN COLLEGES, VARSITIES**

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The West Bengal government will be setting up virtual classrooms in universities and colleges of the state as part of its initiative to give a digital boost to higher education, a senior official said today.

The government plans to bring higher educational institutes on a digital platform, Additional Chief Secretary Dr R S Shukla told PTI on the sidelines of the 25th West Bengal Science and Technology Congress here.

Shukla, who is in charge of the Department of Higher Education, Science and Technology, said virtual classrooms will help the students of different colleges and universities connect with each other.

“What is being said at a particular lecture at a university will be available to students of other institutes as well,” Shukla said.

Talking about the West Bengal Science and Technology Congress, Shukla said the state-level meet is organised every year to nurture young minds in their pursuit of scientific knowledge and make them aware of the opportunities that lay ahead of them.

Of the 1250 research papers submitted by the students to the department this year, 154 have been selected for presentation before a panel of eminent scientists at the two-day meet, he said.

“Three outstanding papers will receive awards tomorrow,” he said.

India-born American physicist Mani Lal Bhaumik, who was present at the meet today, said the governments effort will go a long way to encourage students to pursue science after school.

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### **ENCOURAGE WOMEN PARTICIPATION IN FIELD OF SCIENCE: PRESIDENT**

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President Ram Nath Kovind today called for encouraging participation of women in science in every way possible, saying if gender disparity was not addressed, scientific achievements would be “less than perfect and less than desirable”.

Addressing the directors of IISc, IITs and IISERs in the concluding session of the meet, the president said the country was facing enormous challenges like ensuring people’s health and well-being, lifting them out of poverty, or attaining food and energy security.

These institutes could play an important role, he said and suggested that the incubation centres could also help develop solutions to the problems experienced on a daily basis — from pollution of natural resources to the traffic jams in rapidly expanding cities.

He stressed on collaboration between these institutes and said they should share ideas and pool resources. “Such a synergy would help you to better address some of the problems we face,” he said.

The president said there is a need for promotion of the participation of girl students and of women in science and technology.

“If this disparity is not addressed, our scientific achievements will always be less than perfect and less than desirable. Two days from now, we shall be celebrating the International Women’s Day. Let us re-dedicate ourselves to ensuring a higher participation of women in science,” he said.

He said he was delighted to know that the Indian Institute of Technology was taking steps to improve gender ratio in enrolment for its B.Tech programmes and had set a goal of ensuring that by year 2020, 20 per cent of such students were women.

“This is huge task given that presently less than 10 per cent of B.Tech students in IITs are women. We must remember that none of our developmental goals have any meaning without gender parity and without equal opportunities for our daughters and girl-children,” he said.

The president said these institutes of national importance had an important responsibility to ensure that research and developments in science and technology were linked to the needs of the country and its people.

“At the heart of a scientific endeavour is often a problem that the scientist wants to solve. It is important that challenges that confront our nation and our society become the prime instigator of their quest for knowledge, discovery and innovation,” he said.

The president called upon the directors of 31 IISc, IITs and IISERs to discharge their key role as leadership mentors for the next generation of scientists.

“This would ensure that we have a ready talent pool of scientist-administrators who can conceive, establish and administer our scientific institutes,” he said.

Among those who participated in the one-day meet were HRD Minister Prakash Javadekar, Minister of State for HRD Satya Pal Singh, AICTE Chairman Anil D Sahasrabudhe, representatives of HRD Ministry, Finance Ministry and Department of Science and Technology.

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### **KIDNEY-RELATED DISEASES ALMOST DOUBLED IN PAST DECADE: IMA**

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On World Kidney Day today, the IMA said the prevalence of kidney-related diseases has almost doubled in the past decade and is expected to rise further.

IMA General Secretary R N Tandon said the prevalence of diabetes and hypertension in urban adult population has risen to 20 per cent as per the Indian Council of Medical Research data.

“With rising prevalence of various lifestyle diseases in India, prevalence of kidney disease has also almost doubled in the last decade and is expected to rise further,” Tandon said.

“Besides the large and ever growing burden of non-communicable diseases (diabetes and hypertension), various people are affected by kidney diseases due to over-the-counter drugs and traditional medicines containing heavy metals which harm the kidneys,” the IMA general secretary said.

On this World Kidney Day, which coincides with the International Women’s Day, the IMA said it wishes to bring the focus back on kidney health and emphasises the important role played by women in the health of their family and the society.

The risk of developing chronic kidney disease (CKD) is at least as high in women as in men, and may even be higher. However, the number of women on dialysis in India is lower than the number of men, Tandon said.

The IMA launched a Kidney Disease Prevention project today, as part of which screening and awareness drives will be organised to identify the population at risk.

Garima Aggarwal, the convener of the project, said: “Every year pregnancy related kidney diseases account for a major cause of maternal mortality in our country. The burden of chronic kidney diseases in India is approximately 800 affected per million people (pmp) with 230 pmp with advanced kidney disease needing some form of renal replacement therapy in the form of dialysis or renal transplantation.”

“It is clear that treatment of kidney disease and its advanced stage end stage renal disease is expensive and beyond the reach of average Indian. Thus, it is crucial that prevention of chronic kidney disease has to be the goal of medical fraternity, government of India and the general public,” Aggarwal said.

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### **OLIVE RIDLEY TURTLES APPEAR IN GAHIRMATHA FOR MASS NESTING**

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Nearly one lakh female olive ridley sea turtles have turned up on the tranquil nesting ground of the Gahirmatha beach off the Bay of Bengal, forest officials said today.

The turtles are seen at the beach, the worlds largest rookery of these species, for mass nesting for the past 24 hours and dug out nests to lay eggs, they said.

After laying eggs, the marine animals are spotted loitering around the beach before leaping back to the sea.

The mass nesting process begins after the day break and continues till the wee hours.

The mass nesting is expected to continue for at least five to six more days. By the time it would end, the number of

marine visitors to the Nasi - 1 and Nasi - 2 islands of the Gahirmatha beach would go up manifold, they said.

Last year about 6.04 lakh turtles crawled their way to the Gahirmatha beach for mass nesting, they said.

Forest officials are of the view that with the climatic condition being conducive and beach topography ideal, the turn out of these marine creatures would rise manifold in coming days.

As Nasi-1 and Nasi-2 Islands are located in close proximity to the Defence Research Development Organisations defence installation at Wheelers Island, no outsider is permitted to witness the mass nesting.

About 50 forest personnel have been deployed at the beach to keep vigil and ensure safe and undisturbed mass nesting of the turtles, said officials.

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### **INDIA, FRANCE AGREE TO STEP UP COOPERATION IN SPACE TECH**

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India and France today decided to step up cooperation in space technology and use it in the maritime domain.

The two sides also decided to expedite work on the Jaitapur nuclear power plant during talks between Prime Minister Narendra Modi and French President Emmanuel Macron.

Indian Space Research Organisation (ISRO) and Central National D’Etudes Spatiales (CNES) inked an agreement for end-to-end solution for detection, identification and monitoring of vessels in the regions of interest.

India and France share a robust relationship in the area of space which is five-decades-old.

In the field of atomic energy, the two countries signed an agreement to expedite the work on Jaitapur nuclear power plant.

The “Industrial Way Forward Agreement” was signed between EDF, France, and Nuclear Power Corporation of India Limited (NPCIL).

The EDF will be constructing six atomic reactors in Jaitapur with a capacity of 1,650 MW each. The plant which will come up in coastal Maharashtra will be the largest nuclear park in the country.

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### **INCREASE FUNDS TO ICMR FOR ROBUST RESEARCH: PAR PANEL**

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A parliamentary panel has sought increased fund allocation to the Indian Council of Medical Research (ICMR) as it fears that a funds crunch will adversely affect the research activities and development of new drugs, vaccines and diagnostics in the country.

The panel, in its 106th report on Demands for Grants 2018-19 for the department of health, extended its support to

the department's demand for additional funds to the tune of Rs 350 crore. The department had cited less allocation of funds to the ICMR against its projected allocation.

The committee emphasised that the ICMR being the only custodian of health research activities needed to be promoted and encouraged so that tangible outcomes are witnessed for various health care challenges.

"The committee would like to urge upon the Ministry of

Finance to increase the budgetary allocation to the Department of Health Research so that the latter is able to ensure continuity in critical health research," the report said.

ICMR is an apex organisation to formulate, conduct, coordinate and promote biomedical research. It is one of the oldest medical research bodies in the world funded by the Ministry of Health.

The council's research priorities coincide with the national health programmes such as control and management of communicable diseases, fertility control, maternal and child health and control of nutritional disorders.

The parliamentary panel also recommended the health department to formulate a comprehensive action plan while projecting its funds requirement before the Ministry of Finance and observed that constraints of funds should not come in the way of the medical research.

The committee said that the Department of Health Research has not been effective in persuading the Ministry of Finance for seeking required funds and therefore, the additional funds are received at the flag end of the financial year.

It recommended that the health department be more proactive in holding pre-budget discussions and forwarding the proposals for supplementary grant in order to ensure that the funds are released well in advance.

The panel also flagged under-utilisation of funds with respect to certain schemes like development of tools to prevent outbreak of epidemics (33.20 per cent), Human Resource Development for Health Research (53.15 per cent), Indian Council of Medical Research (ICMR) (69.68 per cent) among others.

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### **ENV MIN OKAYS PLAN TO TACKLE AIR POLLUTION IN DEL-NCR**

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The government today said a Comprehensive Action Plan (CAP) for management of air pollution "specifically" for Delhi-NCR has been finalised by the Environment Ministry.

The plan has a number of measures including actions to reduce vehicular emissions and control dust from constructions.

Environment Minister Harsh Vardhan in a written reply in the Rajya Sabha said the finalised action points to mitigate air

pollution have been notified by the Central Pollution Control Board (CPCB) for strict implementation by agencies concerned.

"A CAP for management of air pollution in Delhi and NCR has been finalised by the Environment Ministry in consultation with various stakeholders.

"The finalised action points have been notified by the CPCB vide directions dated January 25, 2018, and March 6, 2018, under sections 3 and 5 of the Environmental (Protection) Act, 1986 for strict implementation by concerned agencies" he said.

The plan has identified time lines for agencies to take action under various categories like air quality monitoring, action to reduce vehicular emissions, strategies to reduce number of vehicles on road and non-motorised transport (NMT) network among others.

For authorities, it has time lines for them to take action in the parking policy to reduce congestion and pollution; and on traffic management, power plants and industries, generator sets, open and domestic 'chulha' burning and open eateries.

It also looks at implementing control measures for road and construction dust.

The CAP is "specific" for Delhi and NCR, and there is no plan for its implementation across the country, the minister said.

He said the CPCB is regularly undertaking various studies for source apportionment, health impact, air pollution inventory and monitoring among others.

There is no specific study with three months reporting time-line being undertaken by the CPCB, he said.

The government has formulated a separate National Clean Air Programme (NCAP) as a long-term and time-bound national level strategy to tackle increasing air pollution in the country in a comprehensive manner, he said.

"The overall objective of the NCAP is comprehensive management plan for prevention, control and abatement of air pollution besides augmenting and evolving effective ambient air quality monitoring network across the country," the minister said.

The NCAP has a specific component on formulation of action plans for 100 non-attainment cities that have air-quality worse than the National Ambient Air Quality Standards.

To meet air quality standards, the CAP includes measures such as setting up of 20 more realtime monitoring stations, NCR-wide air quality monitoring expansion, undertake satellite-based monitoring and enforcing agriculture waste burning.

Under it, the government has also planned research studies on issues such as air pollution inventory, source apportionment, health impact and enforcing Graded Response Action Plan.

Action related to reduction of vehicular emissions include introduction of battery-operated vehicles in targeted segments of two and three wheelers and inter-state freight transport plan among others.

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Similarly, action plan for reduction in vehicular emissions also include ensuring on schedule implementation of BS VI fuel and emission standards, expansion of CNG programme across NCR, installation of vapour recovery systems in fuel refuelling outlets to reduce benzen emissions in NCR and others.

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### **'HIGH' AMOUNTS OF HEAVY METALS IN GROUND WATER IN DELHI'S KRISHNA VIHAR: RESEARCH**

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The government today said a new research has found the presence of high concentration of heavy metals, including copper and lead, in ground water samples taken from the e-waste dumping site in Krishna Vihar here.

In January, researchers at Jamia Milia Islamia published a paper titled 'Assessment of Contamination of Soil and Ground Water due to E-waste Handling'. It indicated presence of heavy metals, Minister of State for Environment Mahesh Sharma said in a written reply in the Rajya Sabha.

"(The report has) indicated presence of higher concentration (against the prescribed drinking water standards) of heavy metals like copper, lead, cadmium, nickel and chromium in the underground water samples collected from the e-waste dumping site situated in an industrial area at Krishna Vihar in Delhi," he said.

The minister said according to Central Ground Water Board (CGWB), heavy metal (lead) contamination in samples has been detected in North, West and South-West districts along Najafgarh drain.

He said that cadmium contamination has been detected in South-West; North-West, South, East and New Delhi districts (chromium contamination); and East and North-East districts (arsenic contamination).

In view of high pollution potential and human health implications of heavy metal contamination, the government has taken various preventive measures for restricting their entry into the natural ecosystem, especially in ground water, Sharma said.

The measures include guidelines published by Central Pollution Control Board (CPCB) for implementation of the E-Waste (Management) Rules, 2016, in respect to collection centers, channelisation, storage, transportation, environmentally sound dismantling, recycling and refurbishment of e-waste as well as responsibilities of e-waste producers in this regard.

It also includes ground water quality monitoring and awareness creation across the country, including Delhi, generation of ground water quality data through scientific studies, mapping

of vulnerable areas of groundwater depletion and pollution, directives for sealing of bore wells which are contaminated among a host of other measures.

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### **ICMR, HEALTH MINISTRY TO CREATE OWN NATIONAL LISTS OF ESSENTIAL DIAGNOSTIC TESTS, TOOLS**

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The Indian Council of Medical Research (ICMR), the research body of the health ministry, along with several partners, including the WHO India and the McGill University, today convened the first national consultation on an Essential Diagnostics List (EDL) to create their own national lists of essential diagnostic tests and tools.

Four decades after publishing the first Essential Medicines List (EML), the WHO is developing an EDL to provide evidence-based guidance to countries to create their own national lists of essential diagnostic tests and tools to facilitate access to treatment, particularly in low-resource countries.

"The National EML in India has been helpful in capping prices of a variety of products, and has increased access to important medicines. The same model could be used for diagnostics. Without diagnostics, good medicines can be wasted, misused or simply not used," an ICMR statement said.

Speaking at the consultation, Dr Vinod Paul of NITI Aayog, encouraged the participants to think of EDL within the context of India's push to offer comprehensive primary care while Dr Soumya Swaminathan, DDG, WHO, assured that the WHO would offer the ICMR and the Indian ministry all the support required to succeed in this initiative.

Participants at the consultation pointed out several potential benefits to an EDL, including improving patient care, helping detect outbreaks, increasing affordability of tests, reducing out-of-pocket expenses for tests, reducing antibiotic abuse as part of AMR response and improving regulation and quality of diagnostic test among others.

Participants proposed several approaches to EDL development, including identification of tests that are necessary to maximise the impact of the National EML, to address the disease burden and meet the most important diagnostic needs of care providers and patients at each level of the health system.

The proposed list would also need to factor in the issues of accuracy, affordability, cost-effectiveness, human resources, regulatory challenges and harmonisation with the available national guidelines.

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## BLINK AND MISS! ROBOT SOLVES RUBIK'S CUBE IN 0.38 SECONDS

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Scientists have created a robot that has possibly set a new world record by solving the Rubik's cube in 0.38 seconds.

The current Guinness World Record for a Rubik's cube solved by a robot is 0.637 seconds.

The robot was built by Ben Katz, a student at Massachusetts Institute of Technology (MIT) and software developer Jared Di Carlo, who posted the video of the robot in action.

"The machine can definitely go faster, but the tuning process is really time consuming since debugging needs to be done with the high speed camera, and mistakes often break the cube or blow up the transistor," Katz wrote in the blog post.

"We noticed that all of the fast Rubik's Cube solvers were using stepper motors and thought that we could do better if we used better motors," Di Carlo wrote in a separate blog post.

The 0.38 seconds starts from the moment the keypress is registered on the computer, to when the last face is flipped, Katz said in his blog.

It includes image capture and computation time, as well as actually moving the cube. The motion time is about 335 millisecond, and the remaining time is that of image acquisition and computation.

The robot had difficulty identifying the difference between the red and orange sides of the cube, so the researchers blackened the orange squares with a marker pen.

"For the time being, Jared and I have both lost interest in playing the tuning game, but we might come back to it eventually and shave off another 100 ms or so," Katz said.

As of now, the record has not been independently verified by Guinness, so the title for the fastest robot to solve a Rubik's Cube remains with 'Sub1 Reloaded' built by Albert Beer of Germany.

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## NASA PROBE SET TO UNCOVER MYSTERIES OF RARE 'RELIC GALAXY'

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NASA's Hubble Space Telescope is set on an Indiana Jones-type quest to uncover a rare ancient "relic galaxy" hidden in our cosmic backyard that has remained unchanged for the past 10 billion years.

The wayward stellar island may provide valuable insights into the origin and evolution of galaxies billions of years ago.

The galaxy, NGC 1277, started its life with a bang long ago, ferociously churning out stars 1,000 times faster than seen in the Milky Way today.

However, it abruptly went quiescent as the baby boomer stars aged and grew ever redder.

Though Hubble has seen such "red and dead" galaxies in the early universe, one has never been conclusively found nearby.

Where the early galaxies are so distant, they are just red dots in Hubble deep-sky images. NGC 1277 offers a unique opportunity to see one up close and personal.

"We can explore such original galaxies in full detail and probe the conditions of the early universe," said Ignacio Trujillo, at the University of La Laguna in Spain.

The researchers learned that the relic galaxy has twice as many stars as our Milky Way, but physically it is as small as one quarter the size of our galaxy.

Essentially, NGC 1277 is in a state of "arrested development."

Perhaps like all galaxies it started out as a compact object but failed to accrete more material to grow in size to form a magnificent pinwheel-shaped galaxy.

About one in 1,000 massive galaxies is expected to be a relic galaxy, like NGC 1277, researchers said.

Massive galaxies tend to have both metal-poor (blue) and metal-rich (red) globular clusters.

The red clusters are believed to form as the galaxy forms, while the blue clusters are later brought in as smaller satellites are swallowed by the central galaxy.

However, NGC 1277 is almost entirely lacking in blue globular clusters.

"I've been studying globular clusters in galaxies for a long time, and this is the first time I've ever seen this," said Michael Beasley, from University of La Laguna.

The red clusters are the strongest evidence that the galaxy went out of the star-making business long ago. However, the lack of blue clusters suggests that NGC 1277 never grew further by gobbling up surrounding galaxies.

By contrast, our Milky Way contains about 180 blue and red globular clusters. This is due partly to the fact that our Milky Way continues cannibalising galaxies that swing too close by in our Local Group of a few dozen small galaxies.

It is a markedly different environment for NGC 1277. The galaxy lives near the centre of the Perseus cluster of over 1,000 galaxies, located 240 million light-years away.

However, NGC 1277 is moving so fast through the cluster, at two million miles per hour, that it cannot merge with other galaxies to collect stars or pull in gas to fuel star formation. In addition, near the galaxy cluster centre, intergalactic gas is so hot it cannot cool to condense and form stars.

The upcoming NASA James Webb Space Telescope - scheduled for launch in 2019 - will allow astronomers to measure the motions of the globular clusters in NGC 1277.

This will provide the first opportunity to measure how much dark matter the primordial galaxy contains.

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### **'TOBACCO INDUSTRY PROFITS USD 9K FROM EVERY SMOKER'S DEATH'**

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The world's biggest tobacco companies make a profit equivalent to USD 9,730 for the death of each smoker, claims a report which found that the industry is increasingly profiting from vulnerable populations of countries in Africa, Asia, and the Middle East.

The Tobacco Atlas report, by American Cancer Society (ACS) and US-based non-profit Vital Strategies, details the scale of the tobacco epidemic around the globe.

It shows where progress has been made in tobacco control, and describes the latest products and tactics being deployed by the tobacco industry to grow its profits and delay or derail tobacco control efforts.

In 2016 alone, tobacco use caused over 7.1 million deaths worldwide. Most of these deaths were attributable to cigarette smoking, while 884,000 were related to secondhand smoke.

The increase in tobacco-related disease and death has been outpaced by the increase in industry profits.

The combined profits of the world's biggest tobacco companies exceeded USD 62.27 billion in 2015, the last year on record for all the major companies.

This is equivalent to USD 9,730 for the death of each smoker, an increase of 39 per cent since the last Atlas was published, when the figure stood at USD 7,000.

"Every death from tobacco is preventable, and every government has the power reduce the human and economic toll of the tobacco epidemic," said Jeffrey Drope, author of The Atlas.

"It starts by resisting the influence of the industry and implementing proven tobacco control policies. The Atlas shows that progress is possible in every region of the world," said Drope, Vice President, Economic and Health Policy Research at the American Cancer Society.

"African countries in particular are at a critical point - both because they are targets of the industry but also because many have opportunity to strengthen policies and act before smoking is at epidemic levels," he said.

"Tobacco causes harm at every stage of its life cycle, from cultivation to disposal," said Neil Schluger, Vital Strategies' Senior Advisor for Science.

"At a conservative estimate, there are more than 7 million tobacco-related deaths and global economic costs of two trillion dollars (PPP) each year, not including costs such as those caused by second-hand smoke and the environmental and health damages of tobacco farming," said Schluger.

Tobacco use and exposure to secondhand smoke costs the global economy more than two trillion dollars every year -

equivalent to almost two per cent of the world's total economic output.

More than 1.1 billion people are current smokers, while 360 million people use smokeless tobacco.

Low and middle income countries represent over 80 per cent of tobacco users and tobacco-related deaths, placing an increased share of tobacco-related costs on those who can least afford it.

The report shows that the tobacco industry deliberately targets countries that lack tobacco control laws and exploits governments, farmers and vulnerable populations across Africa.

In Sub-Saharan Africa alone, consumption increased by 52 per cent between 1980 and 2016.

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### **JUPITER'S GREAT RED SPOT GROWS TALLER AS IT SHRINKS: NASA**

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Jupiter's Great Red Spot - which has been mysterious shrinking for a century and a half - seems to have been growing taller, NASA scientists say.

The spot is one of the most defining features of the gas giant. It was once big enough to swallow three Earths with room to spare.

Nobody is sure how long the storm will continue to contract or whether it will disappear altogether.

However, the new study suggests that it has not all been downhill. The storm seems to have increased in area at least once along the way, and it is growing taller as it gets smaller.

"Storms are dynamic, and that is what we see with the Great Red Spot. It is constantly changing in size and shape, and its winds shift, as well," said Amy Simon, an expert in planetary atmospheres at NASA's Goddard Space Flight Centre in the US.

Keen observers have long been able to measure the size and drift of the Great Red Spot by fitting their telescopes with an eyepiece scored with crosshairs.

A continuous record of at least one observation of this kind per year dates back to 1878.

Researchers drew on this rich archive of historical observations and combined them with data from NASA spacecraft, starting with the two Voyager missions in 1979.

In particular, they relied on a series of annual observations of Jupiter that team members have been conducting with NASA's Hubble Space Telescope as part of the Outer Planets Atmospheres Legacy (OPAL) project.

The team traced the evolution of the Great Red Spot, analysing its size, shape, colour and drift rate.

They also looked at the storm's internal wind speeds, when that information was available from spacecraft.

The findings, published in the *Astronomical Journal*, indicates that the Great Red Spot recently started to drift westward

faster than before.

The storm always stays at the same latitude, held there by jet streams to the north and south, but it circles the globe in the opposite direction relative to the planet's eastward rotation.

Historically, it has been assumed that this drift is more or less constant, but in recent observations, the team found the spot is zooming along much faster.

The study confirms that the storm has been decreasing in length overall since 1878 and is big enough to accommodate just over one Earth at this point.

However, the historical record indicates the area of the spot grew temporarily in the 1920s.

"There is evidence in the archived observations that the Great Red Spot has grown and shrunk over time," said Reta Beebe, an professor at New Mexico State University in the US.

"However, the storm is quite small now, and it is been a long time since it last grew," said Beebe.

Since the storm has been contracting, researchers expected to find the already-powerful internal winds becoming even stronger, like an ice skater who spins faster as she pulls in her arms.

Instead of spinning faster, the storm appears to be forced to stretch up. The change in height is small relative to the area that the storm covers, but it is still noticeable, researchers said.

In some ways, the mystery of the Great Red Spot only seems to deepen as the iconic storm contracts.

Researchers do not know whether the spot will shrink a bit more and then stabilise, or break apart completely.

"If the trends we see in the Great Red Spot continue, the next five to 10 years could be very interesting from a dynamical point of view," said Rick Cosentino from Goddard.

"We could see rapid changes in the storm's physical appearance and behaviour, and maybe the red spot will end up being not so great after all," said Cosentino.

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### NASA INVITES CITIZEN SCIENTISTS TO OBSERVE CLOUDS

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NASA has announced a global cloud observation challenge - inviting citizen scientists to observe and track clouds using their smartphones.

From March 15 through April 15, citizen scientists of all ages can make up to 10 cloud observations per day using the GLOBE Observer app.

Challenge participants with the most observations will be congratulated by a NASA scientist in a video posted on the GLOBE Program's website and on social media.

"The GLOBE Program is offering this challenge to show people how important it is to NASA to have citizen scientist observations; observations from the ground up," said Marile

Colon Robles, lead for the GLOBE Clouds team at NASA's Langley Research Center in the US.

"We're going from winter to spring, so the types of storms will change, which will also change the types of clouds," said Robbles.

Researchers use, and value, this citizen science cloud data because it helps to validate data from Earth-observing instruments.

Scientists at Langley work with a suite of six instruments known as the Clouds and the Earth's Radiant Energy System (CERES).

Even though CERES' instruments use advanced technology, it is not always easy for researchers to positively identify all types of clouds in their images.

For example, it can be difficult to differentiate thin, wispy cirrus clouds from snow since both are cold and bright; even more so when cirrus clouds are above a surface with patchy snow or snow cover.

One solution to this problem is to look at satellite images from a particular area and compare them to data submitted by citizen scientists on the ground.

"Looking at what an observer recorded as clouds and looking at their surface observations really helps us better understand the images that were matched from the satellite," said Robles.

Citizen science observations are especially needed now because scientists are starting to verify data from a new CERES instrument.

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### COMMON SMART DEVICES CAN BE EASILY HACKED: STUDY

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Off-the-shelf smart devices such as baby monitors and home security cameras, can be easily hacked by criminals, say scientists who found disturbing vulnerabilities of devices and networks used in smart homes and Internet of Things (IoT).

The researchers disassembled and reverse engineered many common devices and quickly uncovered serious security issues.

"It is truly frightening how easily a criminal, voyeur or paedophile can take over these devices," said Yossi Oren, senior lecturer at Ben-Gurion University of the Negev (BGU) in Israel.

"Using these devices in our lab, we were able to play loud music through a baby monitor, turn off a thermostat and turn on a camera remotely, much to the concern of our researchers who themselves use these products," said Oren.

"It only took 30 minutes to find passwords for most of the devices and some of them were found only through a Google search of the brand," said Omer Shwartz, PhD student and member of Oren's lab.

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“Once hackers can access an IoT device, like a camera, they can create an entire network of these camera models controlled remotely,” said Shwartz.

The researchers discovered several ways hackers can take advantage of poorly secured devices. They discovered that similar products under different brands share the same common default passwords.

Consumers and businesses rarely change device passwords when purchased so they could be operating infected with malicious code for years.

They were also able to log-on to entire Wi-Fi networks simply by retrieving the password stored in a device to gain network access.

Oren urged manufacturers to stop using easy, hard-coded passwords, to disable remote access capabilities, and to make it harder to get information from shared ports, like an audio jack which was proven vulnerable in studies.

“It seems getting IoT products to market at an attractive price is often more important than securing them properly,” he said.

“The increase in IoT technology popularity holds many benefits, but this surge of new, innovative and cheap devices reveals complex security and privacy challenges,” said Yael Mathov, who also participated in the research.

“We hope our findings will hold manufacturers more accountable and help alert both manufacturers and consumers to the dangers inherent in the widespread use of unsecured IoT devices,” he said.

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### **EATING ALMONDS, WALNUTS MAY HELP FIGHT COLON CANCER: STUDY**

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People with colon cancer who regularly eat almonds, walnuts, hazelnuts and cashews are at significantly lower risk of cancer recurrence and mortality than those who do not, a study claims.

Researchers at Yale University Cancer Center in the US followed 826 participants in a clinical trial for a median of 6.5 years after they were treated with surgery and chemotherapy.

Those who regularly consumed at least two, one-ounce servings of nuts each week demonstrated a 42 per cent improvement in disease-free survival and a 57 per cent improvement in overall survival.

“Further analysis of this cohort revealed that disease-free survival increased by 46 per cent among the subgroup of nut consumers who ate tree nuts rather than peanuts,” said Charles S Fuchs, director of Yale Cancer Center.

Tree nuts include almonds, walnuts, hazelnuts, cashews, and pecans, among others. In contrast, peanuts are actually in the legumes family of foods.

“These findings are in keeping with several other

observational studies that indicate that a slew of healthy behaviours, including increased physical activity, keeping a healthy weight, and lower intake of sugar and sweetened beverages, improve colon cancer outcomes,” said Temidayo Fadelu, a postdoctoral fellow at Dana-Farber Cancer Institute.

“The results highlight the importance of emphasising dietary and life-style factors in colon cancer survivorship,” said Fadelu, lead author of the study published in the Journal of Clinical Oncology.

Many previous studies have reported that nuts, among other health benefits, may help to reduce insulin resistance, a condition in which the body has difficulty processing the insulin hormone.

Insulin resistance leads to unhealthy levels of sugar in the blood and is often a predecessor to type 2 diabetes and related illnesses.

Earlier research among patients with colon cancer has revealed worse outcomes among those with lifestyle factors that heighten insulin resistance, such as obesity, lack of exercise, and a diet with high levels of carbohydrates that quickly raise levels of blood sugar.

“These studies support the hypothesis that behaviors that make you less insulin resistant, including eating nuts, seem to improve outcomes in colon cancer,” Fuchs said.

“However, we do not know yet what exactly about nuts is beneficial,” he said.

Nuts also might play a positive role by satisfying hunger with less intake of carbohydrates or other foods associated with poor outcomes, Fuchs noted.

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### **VARICOSE VEINS MAY INCREASE RISK OF BLOOD CLOTS: STUDY**

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Varicose veins may increase the risk of developing potentially dangerous blood clots, according to a study.

Varicose veins are veins that have become enlarged and twisted, most commonly appearing in the legs and feet.

Not much is known about varicose veins and the risk of other vascular diseases including a type of blood clot known as a deep venous thrombosis (DVT), pulmonary embolism (PE) and peripheral artery disease (PAD).

Researchers from China Medical University analysed 212,984 patients with varicose veins and 212,984 without varicose veins from claims data in Taiwan’s National Health Insurance programme.

Patients were enrolled from 2001 to 2013 and followed up through 2014.

The study, published in the journal JAMA, found that varicose veins were associated with increased risk of DVT.

More research is needed to understand whether that association is causal or if it reflects a common set of risk factors,

the researchers said.

Findings about potential associations between varicose veins and risk of PE and PAD were less clear because of possible confounding factors, according to Pei-Chun Chen, from China Medical University.

Since claims data does not include information for patients who do not seek medical care, the results may reflect only the risk among patients with more severe varicose veins requiring medical treatment, researchers said.

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## **'PLAYING FOOTBALL LINKED TO INCREASED CARDIOVASCULAR RISK'**

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Football players show structural changes in the heart and face an elevated risk of heart rhythm disorders later in life, according to a study.

In one study presented at the American College of Cardiology's annual session in the US, former professional National Football League (NFL) players were found to be more than five times as likely to have a heart rhythm disorder, such as atrial fibrillation (AFib), compared with the general public.

Previous studies have shown similarly increased rates of AFib among endurance athletes such as long-distance runners, said researchers, including those from Cleveland Clinic in the US.

This is the first study to find an association for athletes in a strength-based sport, they said.

In a separate study, freshman collegiate football players showed significant structural changes to the heart, including enlargement of the aortic root after just one season of play.

The increased size of the aortic root is a new finding and one for which the clinical significance remains unclear.

"We know that sporting activity increases longevity and has multiple benefits for the cardiovascular system, but our findings seem to suggest that perhaps when you get to the extreme ends that we see in these elite athletes, there may be a negative impact on the heart," said Dermot Phelan from Cleveland Clinic.

"Players should not assume that leading a healthy lifestyle in terms of regular exercise means that they're immune from developing cardiac problems and, in fact, they may be at higher risk for things like atrial fibrillation," said Phelan.

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## **HOLDING HANDS CAN SYNC BRAINWAVES, EASE PAIN: STUDY**

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Reach for the hand of a loved one in pain and not only will your breathing and heart rate synchronise with theirs, your brain wave patterns will couple up too, according to a study.

The research also found that the more empathy a comforting partner feels for a partner in pain, the more their brainwaves fall into sync. And the more those brain waves sync,

the more the pain goes away.

"We have developed a lot of ways to communicate in the modern world and we have fewer physical interactions," said Pavel Goldstein from University of Colorado at Boulder in the US.

"This paper illustrates the power and importance of human touch," Goldstein said.

The study, published in the journal PNAS, is the first to look at brain wave synchronization in the context of pain, and offers new insight into the role brain-to-brain coupling may play in touch-induced analgesia, or healing touch.

Researchers recruited 22 heterosexual couples, age 23 to 32 who had been together for at least one year and put them through several two-minute scenarios as electroencephalography (EEG) caps measured their brainwave activity.

The scenarios included sitting together not touching; sitting together holding hands; and sitting in separate rooms. Then they repeated the scenarios as the woman was subjected to mild heat pain on her arm.

Merely being in each other's presence, with or without touch, was associated with some brain wave synchronicity in the alpha mu band, a wavelength associated with focused attention.

If they held hands while she was in pain, the coupling increased the most.

The researchers also found that when she was in pain and he couldn't touch her, the coupling of their brain waves diminished.

"It appears that pain totally interrupts this interpersonal synchronization between couples and touch brings it back," said Goldstein.

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## **VITAMIN D REDUCES EARLY MORTALITY: STUDY**

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A normal intake of vitamin D can reduce the risk of early death substantially in people with cardiovascular disease, a study has found.

The research concludes that people who have suffered from cardiovascular disease, and have a normal intake of vitamin D, reduce their risk of mortality as a consequence of the disease by 30 per cent.

"We discovered that the right amount of vitamin D reduces the risk of death substantially. However, too much or too little increase the risk," said Jutta Dierkes from the University of Bergen in Norway.

Researchers followed as many as 4,000 patients with cardiovascular diseases from year 2000, for a period of 12 years.

The average age of the participants was 62 years old at the start of the research.

The study, published in The Journal of Clinical Endocrinology & Metabolism, showed that it is favourable to

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have blood values around 42 to 100 nanomoles per litre (nmol/l). If you have higher or lower values, you are at greater risk of dying from cardiovascular disease.

According to Dierkes, it is difficult to give general a recommendation of how much vitamin D supplementation one should take.

“The optimal amount of vitamin D-supplement varies from one person to another. It depends where you live, and what kind of diet you have,” Dierkes said.

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### **REGULAR WALKING MAY PROTECT AGAINST HEART FAILURE: STUDY**

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Walking for at least 40 minutes several times per week at an average to fast pace is associated with a near 25 per cent drop in the risk of heart failure among post-menopausal women, according to a study.

The benefit appears to be consistent regardless of a woman’s body weight or whether she engages in other forms of exercise besides walking.

About 6.5 million adults have heart failure, a condition in which the heart becomes too weak to pump enough blood to meet the body’s needs, researchers said.

The risk of heart failure rises with age; women 75-84 years of age are three times as likely to have heart failure compared with women 65-74 years old, they said.

“We already know that physical activity lowers the risk of heart failure, but there may be a misconception that simply walking isn’t enough,” said Somwail Rasla from Saint Vincent Hospital in the US.

“Our analysis shows walking is not only an accessible form of exercise but almost equal to all different types of exercise that have been studied before in terms of lowering heart failure risk,” Rasla said.

“Essentially, we can reach a comparable energetic expenditure through walking that we gain from other types of physical activity,” Rasla said.

The study, which analysed walking behaviour and health outcomes among 89,000 women over a more than 10-year period, is the first to examine, in detail, the benefits of walking by parsing the effects of walking frequency, duration and speed.

It is also the first to specifically focus on the risk of heart failure among women over age 50.

The study will be presented at the American College of Cardiology’s 67th Annual Scientific Session on March 12.

The research is based on an analysis of data about women’s habits and health outcomes from 1991-2005.

Participants were between 50 and 79 years of age at enrollment. The researchers extracted data for women who, at baseline, were able to walk at least one block and did not have

heart failure, coronary artery disease or cancer.

The findings suggest walking frequency, duration and speed each contribute about equally to this overall benefit.

Women who walked at least twice a week had a 20 to 25 percent lower risk of heart failure than those who walked less frequently.

Those who walked for 40 minutes or more at a time had a 21 to 25 percent lower risk than those taking shorter walks.

Women walking at an average or fast pace showed a 26 and 38 percent lower risk of heart failure, respectively, compared with women who walked at a casual pace.

“We actually looked at women with four different categories of body mass index (BMI) and found the same inverse relationship between walking behaviour and the risk of heart failure,” Rasla said.

“The results show that even obese and overweight women can still benefit from walking to decrease their risk of heart failure,” Rasla added.

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### **BEHAVIOUR IN HIGH SCHOOL PREDICTS OCCUPATIONAL SUCCESS LATER IN LIFE: STUDY**

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Being a responsible student, maintaining an interest in school and having good writing skills will not only help a teenager get good grades in high school but could also be predictors of occupational success decades later, according to a study.

Researchers at the University of Tübingen in Germany analysed data of 346,660 high school students in 1960, along with follow-up data from 81,912 of those students 11 years later and 1,952 of them 50 years later.

The initial high school phase measured a variety of student behaviours and attitudes as well as personality traits, cognitive abilities, parental socioeconomic status and demographic factors.

The follow-up surveys measured overall educational attainment, income and occupational prestige.

Being a responsible student, showing an interest in school and having fewer problems with reading and writing were all significantly associated with greater educational attainment and finding a more prestigious job both 11 years and 50 years after high school.

These factors were also all associated with higher income at the 50-year mark, according to the study published in the *Journal of Personality and Social Psychology*.

“Student characteristics and behaviours were rewarded in high school and led to higher educational attainment, which in turn was related to greater occupational prestige and income later in life,” said Marion Spengler from the University of Tübingen.

“This study highlights the possibility that certain

behaviors at crucial periods could have long-term consequences for a person's life," Spengler said.

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### CO-SLEEPING WITH BABIES FOR LONG MAY MAKE MOTHERS DEPRESSED: STUDY

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Mothers who co-sleep with their infants beyond six months are more likely to feel depressed, a US study has found.

After analysing moms' sleeping patterns, the researchers found that mothers who were still co-sleeping - sharing either a room or bed - with their infants after six months were more likely to feel depressed.

They were worried about their babies' sleep and thought their decisions were being criticized, the researchers said.

The researchers said that while most American families begin co-sleeping when their babies are first born, most of those families transition the babies to their own room by the time he or she is six months old.

"In other parts of the world, co-sleeping is considered normal, while in the US, it tends to be frowned upon," said Douglas Teti from Pennsylvania State University in the US.

"Co-sleeping, as long as its done safely, is fine as long as both parents are on board with it. If it's working for everyone, and everyone is okay with it, then co-sleeping is a perfectly acceptable option," Teti said.

The researcher said concerns about sudden infant death syndrome (SIDS) or the desire for babies to learn how to fall asleep on their own may be why many parents in the US prefer their babies to be sleep alone.

"We found that about 73 per cent of families co-slept at the one-month point. That dropped to about 50 per cent by three months, and by six months, it was down to about 25 per cent," Teti said.

"Most babies that were in co-sleeping arrangements in the beginning were moved out into solitary sleep by six months," Teti added.

The study, published in the journal *Infant and Child Development*, also found that moms who were still co-sleeping with their babies past six months were more likely to be more depressed, worry about their baby's sleep and feel more criticized than moms who were no longer co-sleeping.

On average, mothers that were still co-sleeping after six months reported feeling about 76 per cent more depressed than mothers who had moved their baby into a separate room.

They also reportedly felt about 16 per cent more criticized or judged for their sleep habits.

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### YOUNG MALES AT RISK OF DEVELOPING SEVERE MENTAL DISORDERS: STUDY

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Young males are more likely to experience first-episode psychosis, defined as the first manifestation of one or more severe mental disorders including schizophrenia, bipolar affective disorder, compared to women in the same age group, a study has found.

Ethnic minorities and people living in socioeconomically disadvantaged area are also at risk of developing severe mental disorders, according to researchers at University of Sao Paulo Medical School in Brazil.

In European countries, these disorders have been found to be more frequent in large cities than smaller towns or rural areas and also to be relatively frequent among ethnic minorities.

The researchers conducted an investigation in 17 urban and rural areas in six participating countries - England, France, Italy, the Netherlands, Spain and Brazil - between 2010 and 2015.

The study, published in the journal *JAMA Psychiatry*, also showed that the incidence of first-episode psychosis was higher among men aged 18 to 24 than among women in the same age group.

The researchers noted that the incidence of first-episode psychosis among young adult males is higher than among young adult females according to previous research, which also shows that as men approach 35, it tends to converge with the incidence among women.

In women aged 45-54, it is slightly higher than among men in the same age group.

"We don't know exactly why there are these differences in incidence between sexes and age groups, but they may be linked to the process of cerebral maturation: the brain matures between the ages of 20 and 25, and during this period, men seem to be more vulnerable to mental disorders than women," said Paulo Rossi Menezes from University of Sao Paulo Medical School.

The researchers also found that the incidence of first-episode psychosis is high among ethnic minorities and in areas with less owner-occupied housing.

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## ANTIBIOTIC MISUSE MAY IMPACT CANCER TREATMENT EFFICACY: STUDY

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Overuse and misuse of antibiotics may leave you drug resistant, vulnerable to infection and can also hamper cancer treatment, a study has found.

Any negative impact of antibiotics on cancer treatment appears to go back to the gut and to whether the microbiota is needed to help activate the T cells driving treatment response, according to researchers.

“It likely depends on what types of therapy physicians are giving to patients and how often they also are giving them antibiotics,” said Gang Zhou from the Augusta University in the US.

Infections are typically the biggest complication of chemotherapy, and antibiotics are commonly prescribed to prevent and treat them, according to the study published in the journal *Oncotarget*.

“We give a lot of medications to prevent infections,” said Locke Bryan from the Augusta University.

“White blood cell counts can go so low that you have no defense against bacteria, and that overwhelming infection can be lethal,” said Bryan.

In this high-stakes arena, where chemotherapy is increasingly packaged with newer immunotherapies, the researchers found more evidence that antibiotics’ impact on the microbiota can mean that T cells, key players of the immune response, are less effective and some therapies might be too.

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## TEACHERS CAN TREAT CHILDREN’S MENTAL HEALTH PROBLEMS: STUDY

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Scientists have found that school-based services delivered by teachers can help reduce mental health problems in elementary-aged children.

“Given the limited accessibility of traditional mental health services for children school-based mental health services are a tremendous vehicle for overcoming barriers to mental health care and meaningfully expanding the reach of supports and services for so many children in need,” said Amanda Sanchez from Florida International University in the US.

“Treating children in schools can powerfully overcome issues of cost, transportation, and stigma that typically restrict broad utilization of mental health services” said Sanchez.

The findings, published in the *Journal of the American Academy of Child & Adolescent Psychiatry*, are based on a meta-analysis of 43 controlled trials that collectively had almost 50,000 elementary-aged children participate in school-based mental health services.

The researchers examined the overall effectiveness of school-based mental health services, as well as the relative effectiveness of various school-based intervention models that differed according to treatment target, format, and intensity.

In addition to supporting the overall effectiveness of school-based mental health care, follow-up analyses revealed that school-based services targeting child behaviour problems were particularly effective, relative to services targeting child attention problems, mood and anxiety problems.

Moreover, treatments that were implemented multiple times per week were more than twice as effective as treatments that were only implemented on a weekly (or less) basis.

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## IMMUNE-SUPPRESSION MUST WHILE PLANNING FOR SMALLPOX OUTBREAK

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Unprecedented levels of immunosuppression in countries like Australia and the US must be considered in planning for the real risk of smallpox re-emerging in the world, a study warns.

“Smallpox was eradicated in 1980 but in 2017, Canadian scientists created a smallpox-like virus in a lab using just mail order DNA,” said Raina MacIntyre from University of New South Wales in Australia.

“Now in 2018, these same scientists published a step by step method to create a pox virus in a lab, making the threat of smallpox re-emergence even greater,” said MacIntyre.

In the nearly 40 years since smallpox was eradicated, much has changed in society.

Advances in medicine mean that many more people today live with a weakened immune system - such as people with HIV, people being treated for cancer and autoimmune conditions.

The study, published in the journal *Emerging Infectious Diseases*, showed that children and young people aged 0-19 years will have the highest risk of infection in a smallpox epidemic. However, the risk of severe disease and death is in people aged more than 45 years.

Almost one in five people in cities like Sydney and New York have a weakened immune system, which would make the impact of an attack with smallpox much more severe, according to the study.

“The rates of immunosuppression were even higher for the age group 60-65 years, because of natural decline of the immune system with age,” MacIntyre said.

“We have an ageing population, and this must be considered when planning for a bioterrorism attack, and vaccination strategies during an outbreak,” MacIntyre added.

She has led a study that used a mathematical model to identify the impact of smallpox re-emerging in cities like Sydney and New York.

The research identified that the highest rates of smallpox infection in these cities would be in people aged under 20 years, but the highest death rates would be among people aged 45 and over.

The study also is a tale of two cities with very different vaccination policies. Smallpox vaccine was routine in New York, but not used widely in Sydney.

MacIntyre said almost 22 per cent of the current New York population is vaccinated for smallpox, compared with only 10 per cent of the current Sydney population - and these were mostly migrants who were vaccinated in their country of origin.

The research therefore looked at whether past vaccination in older people gave much protection.

Despite widespread past vaccination in New York, the modelled impact of smallpox in this city was more serious than in Sydney due to its larger number of immunosuppressed people.

“Immunosuppression would likely drive the impact of smallpox more than past vaccination, especially with so many people today living with HIV, or receiving cancer therapy or other medical treatments that suppress the immune system,” said Tony Kelleher from University of New South Wales.

“Vaccine immunity wanes over time, and recent vaccination is needed for protection. The good news is, people who have been vaccinated in the past would have a faster response to re-vaccination in the event of an outbreak,” MacIntyre said.

“The bad news is, both cities show the highest smallpox infection rates for unvaccinated young people, aged 5-20 years,” she said.

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### **CHILDREN WITH LOW BIRTH WEIGHT AT HIGHER RISK OF HEART DISEASE: STUDY**

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Children with a birth weight under 2.5 kilogrammes stand at risk of becoming underweight and can experience cognitive difficulties as well as diabetes and cardiovascular disease later in life, a study has found.

However, early iron supplementation seems to provide some protection, researchers said.

The study consisted of 285 children who were born with a marginally low birth weight, 2–2.5 kilogrammes, and a control group of 95 children born with a normal birth weight.

Data on weight, height, body composition, blood pressure, and blood tests for blood sugar, insulin and blood lipids were collected.

In addition, the children’s IQ, and various other abilities were tested. Among the children born with low birth weight, a clear majority only have a marginally low weight, but they are rarely prioritized in studies.

“The results were surprising. That low birth weight children who received early iron supplementation had a lower

blood pressure in school age has never been shown before,” said Josefine Starnberg from Umea University in Sweden.

“We may have identified a way to partially protect against cardiovascular diseases, even if more research is needed,” said Starnberg.

The study showed that children born with only a little too low birth weight have more cognitive difficulties, such as lower verbal IQ and poorer attention and coordination abilities in comparison to children born with normal birth weight.

“The below average test results may lead to more school difficulties and behavioural problems to a larger extent than for children born with normal birth weight,” Starnberg said.

“It’s important that we are aware of this, both in the health care system as well as in the educational system, in order to early capture those who may need additional support,” Starnberg said.

Children born as marginally underweight have an increased risk of still being underweight at the age of seven, the researchers said.

Early signs of a disrupted insulin and blood sugar balance were also found, a well-known sign for increased risk of later developing diabetes and cardiovascular diseases.

Infants who received iron supplementation in early childhood had lower blood pressure, which is a previously unknown relationship.

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### **LETTING KIDS TO TASTE ALCOHOL MAY UP DRINKING RELATED RISKS**

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Parents, take note! Allowing your children to occasionally sip and taste alcohol may increase their risk for drinking related problems in late adolescence, a study has found.

The findings contradict the common belief that letting kids sip and taste alcoholic drinks is harmless, and might even help to promote responsible drinking later in life.

Sipping alcohol with adult supervision in childhood, so often viewed as innocuous, can be harmful when kids get older and age into peak periods of heavy drinking.

“Early sipping and tasting is predicting increased drinking behaviour in young adulthood,” said Craig Collier, a professor at University at Buffalo in the US.

“Sipping and tasting alcohol in childhood with adult permission is associated with more frequent drinking and an additional drink per drinking episode,” Collier said.

“It’s not only how often they’re drinking and how much they’re drinking in late adolescence, but the negative consequences related to drinking increase as well, like being hungover, getting into trouble, arguing and fighting,” he said.

Roughly a third of all children before the age of 12 will taste alcohol with their parent’s permission.

Though common in practice, that sipping and tasting still happens infrequently, perhaps four or five times a year.

“If I say a kid sips or tastes an alcohol drink a couple of times a year, few people would bat an eyelash,” said Colder.

“But the data strongly suggest that such infrequent tasting in early childhood is not a benign behaviour,” he said.

The findings, published in the journal *Addictive Behaviors*, support educational interventions already developed by other researchers to reduce sipping and tasting among children.

Early sipping represents what is often a child’s first direct experience with drinking, yet little research has examined the long-term impact of this behaviour, in part because most studies do not measure early sipping and tasting alcohol with parental permission.

“Alcohol use without parental permission is typically initiated around age 13 or 14,” said Colder.

“The early sipping measured in this study was prior to age 13, before most kids initiate alcohol use without parental permission,” he said.

Researchers annually interviewed two demographically representative community samples, each consisting of approximately 380 families, for seven years.

The data clearly show that these were average kids who were not growing up in problem families, yet these kids who engaged in early sipping and tasting were embedded in a social context that supports drinking.

Colder said there is no evidence that the sipping and tasting that occurred within the two samples was in any way related to deficient parenting and or poor family functioning. It was limited to what he calls alcohol-specific socialization.

“These are not alcoholic families, but families that have more laissez-faire attitudes about underage drinking. The kids are also interacting with peers that have pro-drinking attitudes. We know that,” he said.

“When we statistically control for these contexts, this early sipping and tasting behaviour is still predictive of these long-term outcomes,” he added.

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### **BRISK WALKING MAY CUT HEART FAILURE RISK IN WOMEN**

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Brisk walking for at least 40 minutes several times every week may significantly reduce the risk of heart failure among older women, a study has found.

The benefit appears to be consistent regardless of a woman’s body weight or whether she engages in other forms of exercise besides walking, researchers said. About 6.5 million adults have heart failure, a condition in which the heart becomes too weak to pump enough blood to meet the body’s needs.

The risk of heart failure rises with age; women 75-84 years of age are three times as likely to have heart failure compared

with women 65-74 years old.

“We already know that physical activity lowers the risk of heart failure, but there may be a misconception that simply walking isn’t enough,” said Somwail Rasla, who conducted the study while at Brown University in the US.

“Our analysis shows walking is not only an accessible form of exercise but almost equal to all different types of exercise that have been studied before in terms of lowering heart failure risk,” said Rasla.

“Essentially, we can reach a comparable energetic expenditure through walking that we gain from other types of physical activity,” he said.

Since walking can be done any time and does not require special equipment, the results put meaningful physical activity within reach for older women who may be hesitant to join a gym or begin a new workout routine.

The study, which analysed walking behaviour and health outcomes among 89,000 women over a more than 10-year period, is the first to examine, in detail, the benefits of walking by parsing the effects of walking frequency, duration and speed.

It is also the first to specifically focus on the risk of heart failure among women over age 50.

Researcher extracted data for women who, at baseline, were able to walk at least one block and did not have heart failure, coronary artery disease or cancer. Based on information from participant questionnaires, the women’s walking behaviour was categorised according to frequency, duration and speed.

Researchers also assessed the women’s overall energy expenditure from walking by combining all three of these variables into a calculation known as Metabolic Equivalent of Task (MET).

Those in the highest tertile for MET per week were 25 per cent less likely to develop heart failure compared with those in the lowest tertile.

The findings suggest walking frequency, duration and speed each contribute about equally to this overall benefit.

Women who walked at least twice a week had a 20 to 25 per cent lower risk of heart failure than those who walked less frequently.

Those who walked for 40 minutes or more at a time had a 21 to 25 percent lower risk than those taking shorter walks.

Women walking at an average or fast pace showed a 26 and 38 per cent lower risk of heart failure, respectively, compared with women who walked at a casual pace.

Researchers said the results were consistent across different age categories, ethnicities and baseline body weight in post-menopausal women, suggesting the findings can be generalised to apply to most women above 50 years old.

“We actually looked at women with four different categories of body mass index (BMI) and found the same inverse relationship between walking behaviour and the risk of heart failure,” Rasla said.