News from here and there

India records reduction in maternal mortality rate

India has achieved an extraordinary milestone as its maternal mortality ratio (MMR) has plummeted to 97/100 000 live births from an unacceptably high of 370/100 000 live births within a span of two decades, i.e. between 2000–01 and 2018–20. This was highlighted in the special MMR bulletin issued by the Registrar General of India on 30 November 2022. MMR is defined as the number of women who die from pregnancy-related causes during pregnancy or within 42 days of termination of pregnancy per 100 000 live births. The data are estimated using a regression model that incorporates information on the proportion of maternal deaths among non-HIV/AIDs deaths in women aged 15–49 years, fertility rates, the presence of birth attendants, and the country's gross domestic product (GDP).

Based on the analysis of data from the Sample Registration System (SRS), India has witnessed a progressive decline in its MMR. The MMR was 370/100 000 live births in 2000–01. It decreased to 122/100 000 live births in 2015–17, 103/100 000 live births in 2017–19, and to 97/100 000 live births in 2018–20.

With the latest milestone, we are on track to realize the WHO Sustainable Development Goal (SDG) target 3.1 of reducing global MMR to <70/100 000 live births by 2030. It should be highlighted that India has now achieved the 2017 National Health Policy MMR target of <100/100 000 live births.

State-wise, Kerala leads the table with 19/100 000 live births. It is followed by Maharashtra (33), Telangana (43), Andhra Pradesh (45), Tamil Nadu (54), Jharkhand (56), Gujarat (57) and Karnataka (69). However, states such as Assam (195), Madhya Pradesh (173), Uttar Pradesh (167), Chhattisgarh (137) and Bihar (118) continue to do poorly.

The Government of India has initiated numerous flagship programmes to address the health and well-being of citizens, especially pregnant women. These include the Pradhan Mantri Surakshit Matritva Abhiyan, which facilitates improved quality diagnostic and counselling services and free comprehensive and quality antenatal care; Poshan Abhiyaan for improved nutritional outcomes; Pradhan Mantri Matru Vandana Yojana, which provides direct cash benefits to pregnant women; Surakshit Matritva Anushasan (SUMAN) and Labour Room Quality Improvement Initiative (LaQshya). While SUMAN aims at a guaranteed and dignified provision of free healthcare services to all women and children at public health facilities, the purpose of LaQshya is to improve care during and after childbirth and to decrease mortality and morbidity of both mother and child.

Additionally, maternal and child health (MCH) wings in healthcare centres, birth waiting homes (BWH) in tribal and remote areas of the land, comprehensive abortion care services, and the Anaemia Mukt Bharat Strategy, provide holistic care for vulnerable women and children.

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Algorithm devised for diagnosing and categorizing epilepsy

The electroencephalogram (EEG) is one of the often used tools in the diagnosis of epilepsy. However, prolonged manual visual inspection of EEG is subjective, can become tiring and prone to error. To overcome this, an algorithm for diagnosing and categorizing type of epilepsy has been developed by researchers at the Department of Electronic Systems Engineering, Division of EECS, Center for BioSystems Science and Engineering, Indian Institute of Science (IISc), Bengaluru in collaboration with the Neurophysiology Laboratory, Department of Physiology, All India Institute of Medical Sciences (AIIMS), Rishikesh. A patent has been filed for the work and the algorithm is currently being further tested for its reliability by neuro-physicians at AIIMS Rishikesh.

In a recently published study (Joshi RK, Varun Kumar M, Agrawal M, Rao A, Mohan L, Jayachandra M, *et al*. Spatiotemporal analysis of interictal EEG for automated seizure detection and classification. *Biomedical Signal Processing and Control* 2023:79(1):104086. DOI: https://doi.org/10.1016/j.bspc.2022.104086) the investigators had initially examined EEG data from 88 human subjects obtained at AIIMS, Rishikesh. The subjects had undergone a 45-minute scalp-recorded EEG testing that had included an initial 10-minute testing when the subject was awake (including photic stimulation and hyperventilation), and a subsequent recording during a 35-minute sleep period. The EEG data were classified into sharp signals, spikes, and slow waves and a spatiotemporal analytical algorithm was developed to diagnose and categorize epilepsy type. The algorithm had used the parameter 'cumulative sharp count' (a higher value indicating a greater chance of epilepsy being evident) to detect if the subject had epilepsy or not.

This algorithm was then blindly validated on a new set of EEG data from subjects for whom the classification whether epilepsy was evident, and if so, the type was already known (n=11). The algorithm could classify the EEG data into: normal, focal, generalized and absence, with 93.2% accuracy. Blinded validation (n=11) confirmed the generalizability of the classifier with an accuracy of 90.9%. When asked about the practical applications of this algorithm, Dr Bhuma Vengamma (President, Indian Epilepsy Association [IEA] and Professor (Senior Grade), Department of Neurology, Director-cum-Vice-Chancellor, Sri Venkateswara Institute of Medical Sciences, Tirupati), told this correspondent that this algorithm had the potential to help neurologists make a quick automated screening of the EEG recording, diagnose and categorize the type of epilepsy.

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Vaccines being developed against dengue

Dengue is a vector-borne disease caused by the dengue virus (DENV1–4 serotypes) and is transmitted to humans through the bite of infected mosquitoes, *Aedes aegypti* and *Aedes albopictus*. About half of the world's population is now at risk of dengue;

there is an estimated 100–400 million infections annually. Climate change along with rising temperatures, urbanization, vector suitability and vulnerability of populations are factors that influence the incidence of disease. In the recent past, there has been an increase in *A. aegypti* dengue transmission in India.

As of 2022, there are two commercially available vaccines and they are sold under the brand names of dengvaxia and qdenga.

CYD-TDV (dengvaxia), manufactured by Sanofi-Pasteur, is a live-attenuated tetravalent chimeric vaccine made using recombinant DNA technology by replacing the PrM (pre-membrane) and E (envelope) structural genes of the yellow fever attenuated 17D strain vaccine with those from the four dengue serotypes. CYD-TDV is partially effective in preventing infection but carries a higher risk of severe disease in those who have not been previously infected and acquire infection later. Dengvaxia was approved for use by the European Union in May 2019. It is the first vaccine that can be used in the age group of 9–16 years, for those who have laboratory-confirmed previous dengue infection and who live in endemic areas.

TAK-003/DENVax (qdenga) manufactured by Takeda, is a recombinant chimeric attenuated vaccine with DENV1, DENV3 and DENV4 components on a dengue virus type 2 backbone, which was originally developed at Mahidol University, Bangkok, Thailand. TAK-003 produces sustained antibody responses against all four virus strains, regardless of previous dengue exposure and dosing schedule. TAK-003 is also efficacious in seronegative people. In August 2022, Indonesia approved qdenga for use in patients aged 6–45 years and became the first authority in the world to approve qdenga. It was also approved by the European Union in December 2022.

A few other vaccines are also under trial. TV-003/005 is a tetravalent admixture of monovalent vaccines tested separately for safety and immunogenicity. Panacea Biotec has conducted phase 2 clinical studies in India. Also, TDENV PIV (a tetravalent dengue virus purified inactivated vaccine) is currently undergoing phase 1 trials as part of a collaboration between GlaxoSmithKline and the Walter Reed Army Institute of Research, USA.

The Indian Council of Medical Research has sought the Drugs Controller General of India's approval for phase 3 trials of a vaccine candidate it has developed with drugmakers Serum Institute and Panacea Biotec. A safe vaccine is necessary to fight dengue, for which there is only symptomatic treatment so far.

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