This issue of NCDC newsletter has a lead story on the importance of intersectoral coordination in combating zoonotic diseases. More than seventy percent of emerging infections are of zoonotic origin. Through a comprehensive approach involving many scientific disciplines, better health for humans and animals is possible.

The Ministry of Health and Family Welfare co-hosted the “Global Call to Action Summit 2015- ending preventable maternal and child deaths”, with the Health Ministry of Ethiopia on 27-28 August 2015. A brief report along with the Delhi Declaration signed during the summit is covered in this issue of the NCDC newsletter.

The outbreak section focuses on the recent surge of H1N1 cases in in India with a special focus on Maharashtra. An outbreak of dengue serotype 3 in Kanpur UP is also reported. Antimicrobial resistance is increasingly complicating our fight against microbes. To meet this challenge, NCDC has recently initiated the National Antimicrobial Resistance Containment Programme under the 12th five year plan (2012-2017). This is detailed in the NCDC research highlights section. NVBDC monitors dengue trends across India. As the entire country was gripped with dengue, we look at dengue trends across India over past five years. Various other activities of NCDC are highlighted in the NCDC news section including the institute completing 106 glorious years in the service of nation. I hope the readers find this issue of the newsletter informative to read. I look forward to your feedback.
Their important effect on global economy and health is well known, extending from the international movement of animals and importation of diseases to bans on importation of all animal products and restrictions on other international trade practices. Many of zoonotic agents like anthrax, plague, brucella etc. are important biological warfare agents. Over 30 new pathogens of man have been discovered in the last three decades, 75% of these are shared with lower animals and a number of other diseases previously thought to be limited to man have now been found to be zoonoses. Recent outbreaks of Severe Acute Respiratory Syndrome (SARS), avian influenza and Ebola have shown once again the potential of microorganism from animal reservoirs to adapt to human hosts. During the past decade, many previously unknown human diseases have emerged from animal reservoirs, such as Nipah virus, West Nile virus and Hantan virus. More than 300 zoonoses of diverse etiology are now recognized. Among these, particularly important are anthrax, plague, brucellosis, bovine tuberculosis, leptospirosis, salmonellosis, Rickettsial infections, rabies, several common arthropod borne viral infections (arboviral infection like Japanese encephalitis), certain parasitic diseases, especially cysticercosis, hydatid disease, trypanosomiasis and toxoplasmosis. Several factors are known to favour emergence and spread of zoonotic diseases. These include increase in human population, socio-cultural factors, microbiological adaption, ecological changes in environment, globalization of agriculture, food production and trade and tourism.

**Zoonoses Burden India**

India with its 68% population (census 2011) residing in villages with large, domestic, wild and semi-wild animal population faces a huge burden of zoonotic diseases. Classical infectious diseases like rabies and plague, well known for centuries, are zoonoses which have not been eliminated. Some of the zoonoses like plague have re-emerged with three outbreaks in a span of ten years. The zoonotic diseases of major public health importance in India are Japanese encephalitis, leptospirosis, plague, rabies, anthrax, kala azar, Kyasanur forest disease, Rickettsial infections like scrub typhus and parasitic diseases like cysticercosis, hydatid disease, trypanosomiasis and toxoplasmosis (Table-1). Japanese encephalitis and leptospirosis have re-emerged and outbreaks have been reported year after year. Recently, new zoonotic entities Crimean Congo Haemorrhagic fever, Nipah virus infection, avian influenza & H1N1 Influenza have stirred the public health machinery (Figure-1). In addition to existing zoonoses, country faces potential threat of exotic zoonotic infection viz yellow fever, Hanta virus infection, Rift Valley fever, Ebola & Marburg disease. The vector, susceptible host and conducive environment are prevalent in our country.

**Zoonotic Diseases of Public Health Importance**

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<th>Endemic diseases</th>
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Intersectoral Coordination for Prevention and Control of Zoonotic Diseases

Prevention and control of zoonotic diseases require inter-sectoral coordination i.e ‘One Health Approach’ which can be achieved only by collaborative efforts of multiple disciplines like animal health, human health, wildlife, environment and other sectors at local, district, state, national and international level.

Challenges - The major challenges in establishment of inter-sectoral coordination are development and implementation of policies aiming at effective collaboration, communication through administrators/ bureaucrats, identification of technical and financial resources, development of common multi sectoral national plan for prevention and control in humans and animals, integration of surveillance and monitoring activities, sharing of information joint surveillance and response, networking of referral and diagnostic laboratories, joint public health and veterinary services staff trainings and joint IEC activities for community awareness.

Opportunities - Both human and animals sectors have established surveillance and monitoring systems, NCDC/ Indian Veterinary Research Institute joint orientation training programmes are being organized, BSL-2,3,4, laboratory diagnostic facilities exist in both the sectors, ICMR-ICAR task force is undertaking research and disease specific intersectoral co-ordination is being established for outbreak investigation and control (Figure-2).

Disease specific intersectoral coordination for outbreak response

Standing Committee on Zoonoses since 2006 under the chairmanship of DGHS with members from various sectors and member secretary, Head of Zoonosis Division, NCDC, Delhi periodically takes stock of various aspects of zoonotic diseases and advises regarding strengthening. India has shown exemplary inter-sectoral coordination in control of some of the zoonotic diseases like avian influenza which has prevented occurrence of human cases, investigation of Crimean Congo Hemorrhagic Fever which probably averted a bigger outbreak, diagnosis of trypanosomiasis etc. But it is time to have a holistic “One Health” strategy for control of Zoonoses, which recognizes the vital interconnectedness of microbes and the environment. Through a comprehensive approach involving many scientific disciplines, one can attain better health for humans and animals and improve our environment.
Government of India initiative

Ministry of Health and Family Welfare, Government of India has approved programme on strengthening of inter-sectoral coordination for prevention and control of zoonotic diseases. The programme is being implemented throughout the country utilizing the existing infrastructure. Zoonosis Division, NCDC as the nodal agency will be strengthened and will co-ordinate and monitor the activities of the programme. It will provide feedback to Standing Committee on Zoonoses which will review the progress and advise on various facets. The mandate of Joint Monitoring Group on Avian Influenza is being expanded to include other zoonotic diseases. Task Force on Zoonoses is being constituted.

Rabies, leptospirosis, plague, anthrax, Crimean Congo Haemorrhagic fever, brucellosis, Nipah virus infection have been identified as priority zoonotic diseases. The programme will be implemented utilizing the existing surveillance system. State surveillance committees and district surveillance committees under IDSP are being strengthened. For effective co-ordination the veterinary officer under IDSP will co-ordinate the activities between the medical, veterinary, wild life and other sectors at the state level. Efforts will be made to integrate the IDSP, National Animal Disease Reporting System and National Animal Disease Referral Expert System for sharing of information among the department of health, department of animal husbandry and Indian Council of Agriculture Research to generate the early warning signals for early response.

For effective laboratory diagnosis, networking and sharing of laboratory facilities among the medical and veterinary sectors is being undertaken. Rapid response teams under IDSP will be strengthened with identified officials from animal husbandry from state with training for joint outbreak investigations and response. For better understanding and co-ordination joint trainings of medical and veterinary professionals will be organized at national, state and district levels. For effective participation of community joint IEC will be carried out to create awareness regarding preventing losses and how to prevent. It is envisaged that the above activities will help in strengthening intersectoral co-ordination in the country for effective prevention and control of zoonotic diseases.

(Contributed by Dr Veena Mittal, NCDC)

Call to Action Summit-2015
“Community Partnership and Accountable Mechanisms are Critical to Health System”

Shri J P Nadda, Hon’ble Union Minister of Health and Family Welfare

Shri J P Nadda, Hon’ble Union Minister for Health and Family Welfare chaired the closing session of the two-day “Global Call to Action Summit 2015- ending preventable maternal and child deaths”, co-hosted by the Ministry of Health and Family Welfare, Government of India and the Health Ministry of Ethiopia, in partnership with Bill and Melinda Gates Foundation, the Tata Trusts, UNICEF, USAID and WHO, here today. The “Delhi
“Declaration” was signed at the end of the summit which saw participation of Health Ministers and heads of country delegations from 22 countries.

On the occasion, the Health Minister said community-partnerships and accountability of mechanisms are critical to health systems strengthening and last mile service delivery; mobilizing community support and optimizing resources to consolidate gains. He urged all leaders from participating countries to “commit to a culture of evidence-based decision-making, strengthen accountability of national health systems and align resources to those with the greatest need.”

He said that our challenges are common but ways of addressing them come from investments in strengthening healthcare and orchestrating health reform. Providing healthcare is not a mechanical function, but an integral part of a universal and transformative sustainable development agenda. So, we need to work together and carve out mechanisms of partnerships that will help us reach the Sustainable Development Goals. Inclusion is the key to progress and provision of equitable services and universalizing access are pathways to change, he added.

The Health Minister said the Ministerial Conclave helped set the leadership agenda in the period of transition from the Millennium Development Goals and endorsement of the Sustainable Development Goals. In a short span of time we were able to issue the Third Global Call to Action Joint Statement which is a path-breaking declaration that reflects country commitments to the health and well-being of women and children and ending preventable deaths, he added. The Health Minister added that India will lead the efforts to demonstrate global progress in maternal and child health by working closely with global partners to make sure that the post 2015 development agenda will advance the cause of ending preventable child and maternal deaths.

He said, Public-Private Partnerships are also emerging as game-changers and we need to take advantage of the support offered by corporate sector and industry to better health systems performance and delivery. He further added that today, geographical boundaries are being breached by technological innovations such as mobile telephony and information and communication technologies. So, we need to use technology for maximum good and to broaden the scope of healthcare.

Speaking at the summit, Shri B P Sharma, Secretary (Health and Family Welfare) said that evidence based decision making and community level accountability are the cornerstones of a functional and impactful public health service delivery system. He emphasized the importance of cross-learnings from the experience of other countries. He also highlighted the existing accountability structures within the National Health Mission.

Mr. Richard Verma, Ambassador of the USA to India was also present at the closing ceremony of the summit. Speaking on the occasion, he stated that we need to continue our collaborative partnership to help reduce maternal and child deaths through causes that can be easily avoided. He added that the USA is ready to align its efforts towards the targets set in the Delhi Declaration.

(Source: Press Information Bureau)
Extracts from the Delhi Declaration

Recognizing the centrality of the health and well-being of women and children in shaping prosperous and sustainable societies, we commit to accelerate efforts to end preventable child and maternal deaths in support of the Every Woman Every Child Global Strategy for Women’s, Children’s, and Adolescents’ Health.

● Survive. We will end preventable maternal, newborn, and child mortality. We will reduce preventable deaths from both infectious and non-communicable diseases. We will strengthen health systems, including delivery of routine services and resilience to cope with unforeseen events.

● Thrive. We will end all forms of malnutrition, and seek to address the nutritional needs of adolescent girls, pregnant and lactating women, and children. We will prioritize universal access to sexual and reproductive healthcare services including for family planning.

● Transform. We will seek to create an enabling environment that fosters gender equality and the participation of all stakeholders and ensure through appropriate laws, policies and entitlements the realization of the rights of every mother, newborn, child, and adolescent. We commit to advancing equitable access to services and prioritizing the needs of those in marginalized, underserved, and poorer segments of the population. We will seek to strengthen cross-sectoral collaboration to promote universal access to safe drinking water, sanitation and hygiene, and education, in order to ensure that everyone is given the opportunity to reach his/her full potential.

NCDC News

NCDC celebrates Institute Day

On 30th July, 2015 National Centre for Disease Control completed 106 years of existence. Officers, staff and students marked this historic occasion with a technical session on the theme of one health. The Director General of Health Services, Dr Jagdish Prasad inaugurated the programme. Other eminent guests were Dr BD Athani, special Director General of Health Services and Sh Rajiv Kale, Registrar from GGSIP University. In his inaugural address, the DGHS congratulated the officers and staff of NCDC on their hard work in taking the institute forwarded and urged them to explore and expand work into newer public health challenges such as emerging and re-emerging infections and non-communicable disease. “NCDC plays a pivotal role in disease control and prevention for the country”, remarked Dr B D Athani in his address. The Director NCDC highlighted the key achievements of NCDC in the past year including creation of a division of climate change, centre for environmental health and centre for non-communicable diseases and initiation of opening of new NCDC branches in Telangana, Rajasthan and Maharashtra. He also informed that 363
outbreaks in 2015 were reported and responded to by NCDC in 2015. National guidelines on rabies and leptospirosis, the NCDC newsletter as well as the annual NCDC report were released on the occasion by the dignitaries. During the technical session, Dr Veena Mittal HoD Zoonosis Division stated “with over 70% of emerging and re-emerging infections being of zoonotic origin, we cannot afford to overlook this problem and establishing a coordination mechanism between the human health and the animal health side is the foremost step”. Deliberations were held by experts from WHO SEARO, ICMR, Veterinary department, agricultural department and NCDC in creating coordination mechanisms to take forward the agenda of one health. A lively cultural programme were also part of the celebrations.

(Contributed by Dr Tanzin Dikid NCDC)

Capacity Building on Anthrax for Medical Officers, Veterinary Officers and Lab Technicians Jharkhand

Training of Medical Officers, Veterinary Officers and Lab Technicians on Anthrax was organized at Ranchi, Jharkhand on 26th - 27th August 2015 by State Surveillance Unit Jharkhand in coordination with Central Surveillance Unit IDSP and Zoonosis Division, NCDC, Delhi. Participants were District Surveillance Officers, Block level Medical Officers, Lab Technicians of District and CHC Hospital Labs and Block veterinary Officers of Districts Simdega, Gumla, West Singhbhum and Khunti.

Dr Ramesh Prasad, SSO Jharkhand in his inaugural address stated that this training was unique as the participants from animal husbandry and health department of district level were being trained at a common platform. Technical sessions on disease epidemiology of human and animal anthrax, lab diagnosis including sample collection, storage and transportation, outbreak investigation and importance of inter-sectoral coordination in disease control were taken. This training will help in early detection of anthrax outbreaks and better coordinated response from both human health and animal husbandry department at District level.

(Contributed by Drs Jyoti, Mala Chhabra, Veena Mittal, Pradeep Khasnobis IDSP & NCDC)

Laboratory Quality Management System implementation in IDSP State Referral Laboratories of Assam and Punjab

Under the Integrated Disease Surveillance Programme (IDSP) the strategy for laboratory strengthening for surveillance of epidemic prone diseases is strengthening of district hospital laboratories for diagnosis of epidemic prone diseases and establishment of state referral lab network for investigation of outbreaks. One of the key objectives of the laboratory strengthening under IDSP is generation of quality laboratory confirmed surveillance data for epidemic prone diseases. In the context of improving its laboratory capacity for providing quality services for diagnosis of common epidemic prone diseases as well as supporting the International Health Regulations 2005 (IHR) implementation in the country, the IDSP carried out a standardized assessment of IDSP district public health laboratories in 13 states during November – December 2013. Some of the key gaps identified for strengthening are: Biosafety, quality management system (QMS), Data management, Equipment
maintenance, Workflow and organization, technical skills of laboratory staff.

As part of the action plan for improving the gaps identified during the assessments, the first activity carried out was a capacity building workshop on Lab QMS for IDSP state microbiologists from 17-20 November 2014.

Since Lab QMS covers most of the gaps identified during assessments, as a next step, IDSP plans to implement Lab QMS in a phased manner beginning with two states namely Assam and Punjab. The LQMS implementation is being taken up in state referral labs (medical colleges) to begin with, followed by its implementation in district labs by identified mentors from state referral labs. This activity is being carried out with Technical support from CDC/IQLS. The sensitization workshop for state referral lab participants of the 2 states was conducted on 26-27 August 2015 at NCDC Delhi. This workshop was inaugurated by Dr Dharamshaktu, Additional DGHS, MoHFW and was attended by heads of departments and quality managers from state referral labs and IDSP state microbiologists from the state of Assam and Punjab.

(Contributed by Dr Lata Kapoor, IDSP)

**Capacity Building Workshop on International Health Regulations (2005) held at Chennai**

Health security is a global issue. As a WHO signatory, 196 countries including India have agreed to work together to prevent and respond to public health crises through an agreement called the International Health Regulations (IHR) 2005 for which WHO plays the coordinating role.

In view of this, a capacity building workshop on IHR (2005) was held at Health & Family Welfare Training Centre, Chennai from 2-4 September 2015. The objectives of the training were to carry forward the IHR agenda and to build up the capacity of State Surveillance Officers (SSOs) under IDSP and to sensitize Senior Regional Directors (RDs) of Regional Offices for Health & Family Welfare.

The inaugural session of the workshop on 2 September, 2015 was graced by Dr N S Dharmshaktu, Addl DGHS and Dr K Kolandaswamy Director of Public Health & Preventive Medicine, Tamilnadu. Seventy one participants including State Surveillance Officers, Senior Regional Directors, Airport and Port Health Officers from Chennai and health officials from Tamilnadu State headquarter attended the three day training workshop. The training comprised of overview lectures and discussions on IHR (2005) highlights & requirements; risk communication plan & role play; role of states & districts in disease surveillance in context to IHR; emerging & re-emerging zoonotic diseases; vector borne diseases, respiratory diseases of international concern with specific focus on meningococcal diseases, ebola, MERS CoV, Influenza A H1N1 and public health emergencies (experience of strategic
Management Division, NCDC. Other important topics covered were global health security; FSSAI provisions, coordination and linkages with SSOs & Points of Entry (PoE); surveillance mechanism for vaccine preventable diseases, linkages with IDSP for managing disasters; radio nuclear emergencies- management & linkages with IDSP and chemical disasters/ irritants. Public health emergency of international concern decision instrument along with group activity exercise for 6 case scenarios was conducted for the participants. Action plan for states & districts as well as expectations from states as regards IHR Preparedness was discussed.

(Contributed by Drs Suhaas Dhandore, Pradeep Khasnobis IDSP, Prabha Arora NCDC)

India EIS second cohort completes its two year training

The second cohort of India Epidemic Intelligence Service officers finished their two year training successfully. Seven officers received their certificates from Dr B D Athani, Special Director General of Health Services, Govt. of India. Of them, four were sponsored by central/ state govt. and three were self sponsored. Congratulating these seven officers on their graduation, Dr B D Athani said “we would be keenly watching your service and contribution to India’s public health as you step out of NCDC after sharpening your skill sets in field epidemiology through this prestigious training”.

Director NCDC while congratulating these officers urged them to be “champions of public health in their field of work and uphold the repute of this training programme”. Director CDC India, Dr Kayla Laserson reiterated the importance of Indo-US continued cooperation in the area of health, India EIS training being one of the excellent working example of this cooperation. Talking about their experience during the two year training, one of the EIS officers said, “this training taught me the science and the art of a perfect outbreak investigation”. Another EIS officer recalled how grueling, at the same time enriching the training experience was for him. A seminar on Influenza with speakers from Influenza Foundation of India including Dr A K Prasad, Chairman Influenza Foundation of India was also held on the occasion.

(Contributed by Drs Girish Makhija, Tanzin Dikid, NCDC)
H.E., Shri Richard Verma, United States Ambassador to India and Dr Tom Frieden, Director, CDC Atlanta visited NCDC, Delhi on 11th August 2015. Additional Director General, Dr N S Dharamshaktu and Director NCDC, Dr S Venkatesh welcomed the guests to NCDC and spoke about the close partnership between India and USA. H.E., Sh Richard Verma in his address spoke about the illustrious past of NCDC and the stellar role it continues to plays in prevention and control of diseases in India.

Dr Tom Frieden spoke about evolution of EIS programme in CDC, its importance and relevance for disease control today in India. The guests interacted with the faculty of NCDC and were briefed about various technical activities and field investigations led by NCDC including the acute encephalitis syndrome outbreak investigation in Muzzafarpur Bihar, inter-sectoral coordination for one health approach, antimicrobial resistance policy framework. They also took a tour of the NCDC complex including a visit to the entomology museum and an exhibition of key projects currently underway in various centres and divisions of NCDC. They also interacted with the India EIS officers and MPH-FE scholars who briefed them about their experiences working in field conditions and applying epidemiological approaches for public health problems. Two EIS Officers presented a shellfish outbreak investigated by them in Cuddalore, Tamilnadu.

(Contributed by Dr Arti Bahl, NCDC)
EIS officers trained in entomological skills

A training workshop for EIS officers was organized by Centre for Medical Entomology & Vector Management from 12-14 August 2015. Seventeen India Epidemic Intelligence Service (EIS) officers of 2nd and 3rd Cohort participated in this training course. For successful culmination of the training, different experts in the field of medical entomology were invited in addition to faculties from other divisions of NCDC and NVBDCP, to deliver lectures on various specialized topics. Basic aspects of surveillance & monitoring of entomological data in relation to vectors of dengue, Japanese encephalitis, chikungunya, Crimean Congo Haemorrhagic fever, plague, scrub typhus etc. were covered. All participants visited Jharoda dairy in North Delhi district to conduct assessment of vector borne disease situation focusing on entomological aspect under supervision of Dr. Roop Kumari, Joint Director. Field training was provided to them on various aspects of entomological/ epidemiological data collection, recording of data, methods of surveillance of Aedes mosquitoes (vectors of dengue & chikungunya), culex (vectors of Japanese encephalitis), tick, mites etc. Collected samples were processed and identified in NCDC. The method of flea collection from rats was also demonstrated in the lab. The field report was presented on the last day during the concluding session.

(Contributed by Dr. Roop Kumari and Dr RS Sharma, NCDC)

News from around

Breakthrough Therapy for Hepatitis C Virus Infection in India

Hepatitis C virus infection is a major public health problem especially in developing countries like India. Globally, an estimated 130–170 million persons (2%–3% of the world’s population) are living with HCV infection and about 15 million people are living with HCV infection in India.

The treatment of chronic hepatitis C started with interferon α monotherapy in the 1990s and progressed on to a combination of once weekly injection of pegylated interferon (PegIFN) - α and daily oral ribavirin for 24 or 48 weeks. Until 2011 this combination was the only approved treatment available for chronic Hepatitis C. With this regimen, patients infected with HCV genotype 1 had SVR rates of approximately 40%- 50%; patients infected with HCV genotypes 2, 3, 5, and 6 had higher SVR rates of up to about 80% and
intermediate SVR rates were achieved in those with HCV genotype 4. Three newer more potent, directly acting antiretroviral drugs (Sofosobuvir, Semiprevir and Daclatasvir) have been approved by the US FDA and the European Union in 2014. Out of these Sofosobuvir has been approved for use by the Drug Controller General of India (DCGI) in January 2015. These approvals include treatment for all genotypes of HCV and for co-infection with HIV. Both the branded and generic versions are available in India at substantially reduced prices, generics being 99% cheaper than prices in US market. India being a leader in production and supply of generic medicines globally, generic sofosobuvir is freely available in India, making it affordable for Indian patients.

(Contributed by Microbiology Division, NCDC)

Recent Publications of interest

National Rabies Control Programme is being implemented across the country under 12th Five year plan. The programme consists of human health component for prevention and control of human deaths due to rabies and animal component for control of rabies in dogs. The human health component is being implemented throughout the country. An expert group meeting was held on 8 July, 2015 at NCDC, Delhi to develop National Guidelines on Rabies Prophylaxis. The guidelines were released by Prof. Jagdish Prasad, Director General of Health Services during Institute Day Celebration and are also available on NCDC website (www.ncdc.gov.in).

Programme for prevention and control of leptospirosis is being implemented in endemic states of Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Gujarat, Kerala and Andaman & Nicobar Islands. An expert group meeting was held on 9 July, 2015 to develop National Guidelines on Diagnosis, Case Management, Prevention and Control of Leptospirosis. The guidelines were released by Prof. Jagdish Prasad, Director General of Health Services during Institute Day Celebration and are also available on NCDC website (www.ncdc.gov.in).

A report on the successful elimination of yaws, a neglected tropical disease, leading the way towards global action to eradicate this disease is published in the WHO SEARO Newsletter, September 2015. The report highlights the hard work of state medical doctors in the endemic area and sustained efforts of more than two generations of epidemiologists working in NCDC and erstwhile NICD leading to elimination in 2004. India has applied to WHO in 2015 for certification of yaws eradication. Details on this publication are available on WHO SEARO website (www.who.searo.int) and NCDC website (www.ncdc.gov.in)
National Antimicrobial Resistance Containment Programme

Drug-resistant bacteria, or superbugs, present a serious and worsening threat to public health worldwide. The World Health Organization has also classified antimicrobial resistance (AMR) as a "serious threat" to every region of the world which "has the potential to affect anyone, of any age, in any country". New antibiotics are needed to keep pace as drug resistance continues to grow rapidly and pose a major threat to the public health.

The first antibiotic Penicillin was discovered by Alexander Fleming in 1928 and more than 100 compounds have been found since, but no new class has been found since 1987. The lack of new drugs coupled with misuse and over-prescribing has led to bacteria becoming increasingly resistant to modern medicines.

The National antimicrobial resistance containment programme has been launched under 12th five year plan (2012-2017) and NCDC is a focal point for coordinating the surveillance for antimicrobial resistance in common bacterial pathogens. In the first phase, ten network laboratories across the country have been enrolled and have been supplied with necessary reagents for carrying out the activities. Recently, the data on antimicrobial resistance has started flowing in from these laboratories which is being analyzed at the center to understand the trends of AMR in different geographical regions. Key results from one of the network laboratories from Delhi has been presented here. A total of 505 blood cultures of patients from a tertiary care hospital in New Delhi received during January-April 2015 were positive, from which 517 pathogenic isolates were recovered.
Gram positive cocci represents the bulk of pathogens causing blood stream infections (67%) followed by gram-negative bacteria (23%). Among gram positives, most common blood stream isolates were Staphylococcus species (62%), including coagulase negative Staphylococcus (31%) and S. aureus (31%) followed by enterococcus species (8.1%). Among gram-negative bacteria, Acinetobacter was predominant (8%) followed by Klebsiella species (7%), E. coli (5%), Enterobacter (3%), Salmonella Typhi (3%), Pseudomonas (3%) (Figure 1). Resistance rates to most of the antimicrobials were high. About sixty five percent of S. aureus strains were methicillin resistant (MRSA, as depicted by cefoxitin resistance) and more than 50% isolates were resistant to all the first line drugs (Figure 2). Similarly, among enterococci, multi-drug resistance was more than 60% and vancomycin resistance (VRE) as observed in ~36% isolates (Figure 2 & 3).

Among the common gram-negative pathogens, 87.5 percent of E. coli and 100 percent of Klebsiella pneumoniae were ESBL producers. In comparison to E. coli, Klebsiella pneumoniae strains demonstrated higher percentage) of resistance to both first line and second line drugs. More than >70 percent Klebsiella isolates were resistant to third generation cephalosporins, aminoglycosides, fluoroquinolones and carbapenems. In addition, resistance to last resort of drug such as colistin has also emerged (Figure 4 & 5). This report highlights an alarming situation with regard to antimicrobial resistance and is a matter of serious concern for public health. With further data flowing in from other network laboratories, the trends of AMR in various regions of country can be understood.

(Contributed by Drs Sarika Jain & Sunil Gupta, NCDC)
Dengue outbreak in Bauhara Village of Kanpur district, Uttar Pradesh, August 2015.

On 13th August 2015 an outbreak of dengue fever characterized by high grade fever, severe headache, pain in abdomen, nausea, vomiting and generalized weakness was reported from Bauhara village of Ghatampur block in Kanpur district. This village has a population of approximately 5000 with 600 households. Initially it was reported as mysterious fever by the media.

Team from NCDC consisting four members investigated the outbreak. The overall situation in Bauhara village revealed that from 13th August 2015 there was increase in fever cases from affected village. Subsequently district health authorities visited the affected village and deputed Medical officer incharge and his team from CHC, Bheetargaon for screening of fever cases. Symptomatic treatment was given. Those who required additional care were referred to the Ursula Horsman Memorial (UHM) Hospital, Ganesh Shankar Vidyarthi Memorial Medical College (GSVMC) and Trauma Care hospital, Kanpur.

A total 225 patients with complaint of fever were reported from 14th August to 20th August. Most affected age group was 16-35 years (35%) followed by 36-50 years (24.9%). Male and female were equally affected. In addition to high grade fever patients also had symptoms like severe headache, nausea, vomiting and pain in abdomen.

Team from NCDC visited the houses in the affected village and conducted entomological investigation which revealed that Aedes aegypti larvae was predominantly present and the main breeding sources were the domestic and peri domestic containers, metal containers, earthen pots and discarded containers.

The house index (HI) was 50%, container index (CI) 32.22% and breteau index (BI) 83.33% which was higher than the threshold values.

Out of 47 serum samples sent from patients admitted in LLR hospital, UHM hospital & Trauma Care hospital Kanpur to microbiology laboratory, GSVMC and hospital, Kanpur, 38 serum samples were positive for the IgM Dengue antibody (Mac ELISA) by 24th August 2015. 225 blood slides collected from affected village and examined at CHC Bheetargaon were negative for Malaria parasite.

**Microbiological survey and testing at NCDC:** NCDC team also collected total 12 serum samples & slides for MP from suspected cases in Bauhara village and those who were admitted in Ursala Horsman Memorial Hospital, Kanpur from 19.8.2015 to 21.8.2015. Except one case, all were residents of Bauhara village. 3 patients were females. Ages ranged from 15 to 73 years. The samples were collected in serum separation tubes using aseptic precautions. Blood was allowed to clot, samples were packed appropriately and transported to Delhi maintaining cold chain and were submitted to Zoonosis Division, NCDC for testing.
The samples were divided into two groups -
- Group 1 - Cases of fever less than 5 days duration
- Group 2 - Cases of fever more than 5 days duration.

NS1 antigen detection tests for dengue and PCR for dengue virus was done on the Group 1 samples and IgM ELISA was done on the Group 2 samples. All 7 samples of group 1 were positive for dengue virus by PCR technique (100% positivity) while 5 were positive for NS1 antigen test. All samples positive by NS1Ag were positive by PCR. One of the samples of group 2 was positive for IgM antibodies. All samples were negative for PS for MP. All three samples collected directly from Bauhara village were positive for dengue virus by PCR technique. Out of 11 cases, 8 were found to be positive for dengue by NS1Ag/PCR/IgM ELISA giving a positivity rate of 72.7%. Further molecular studies carried out at NCDC revealed the serotype of the virus in all cases to be DEN-3 serotype.

Larvae and pupae of Aedes were collected and kept for emergence. Emerged adults were identified and pooled in 3 tubes, which were forwarded to VAD laboratory, CME & VM for virus detection (report is awaited). Based on the clinical, entomological and microbiological findings it has been concluded that mysterious fever outbreak was due to the dengue virus. Based on the investigation findings the team recommended for intensification of efforts to reduce actual or potential larval habitats in and around houses and IEC regarding the use of personal protective measures against mosquito bite.

**Some Health messages given to the community for Dengue prevention:**

- Wear protective clothing (full sleeves shirts & full pants during day time).
- Cover water containers in the house to prevent fresh egg laying.
- Have infants sleep under bed nets during the day.
- Use commercially available repellents during the day time.
- Use tight-fitting screens/wire mesh on doors and windows.
- Water in bird baths and plant pots or drip trays should be changed at least twice each week.
- Pet’s water bowls need to be emptied daily.

*(Contributed by Drs Amol Annasaheb Patil- EIS Officer, Ganesh Lokhande- IDSP, Simrita Singh, Dr, L.J.Kanhekar, Veena Mittal- NCDC)*
Recent Surge of Influenza A H1N1 cases and deaths in India and report of death audit in Maharashtra

The influenza virus is notable for its unique ability to cause recurrent epidemics and global pandemics. Genetic re-assortments in the influenza virus cause fast and unpredictable antigenic changes in important immune targets leading to recurrent epidemics of febrile respiratory disease every 1 to 3 years. In 2009, pandemic Influenza A (H1N1) was the most commonly circulating strain of influenza virus globally with more than 214 countries reporting laboratory confirmed cases and over 18,449 deaths reported to WHO as on 1st August 2010.

During current year, India experienced increase in Influenza cases especially Influenza A H1N1. A total 40,770 cases and 2702 deaths of laboratory confirmed Influenza A H1N1 was reported (data till 4th Oct 2015).

The rising trend of the cases was observed from the 2nd week of 2015, which continued to peak till 8th week of 2015 and started to decline during week 18. A total of 35,767 cases & 2218 deaths were reported during the spurt from 2nd week to 18th week. Maximum cases were reported during the month of February (Fig. 1). The States most affected during the initial spurt (week 2- week 18) were Rajasthan, Gujarat, Maharashtra, Delhi, Karnataka, Telangana & Madhya Pradesh.

The cases started increasing again since July 2015 following a decline after the spurt in the months of Feb – May 2015. The States of Maharashtra and Kerala were affected initially with increasing trend of cases & deaths from July. Other states like Gujarat, Karnataka, Telangana, Madhya Pradesh & Goa have shown a rising trend during the second spurt (29th week to 39 week) i.e. since August and September 2015 (Fig. 1).

Concerned about the situation the Directorate General of Health Services, Govt. of India deployed a central teams with the objective to carry out epidemiological investigation to suggest recommendations for containment in coming season. This report is based on the key findings of the central team visiting Maharashtra in August to conduct a record based study of patients admitted in various healthcare institutions to identify risk factors.

In Maharashtra, data was collected from the records available at State Surveillance Unit, IDSP, Pune, National Institute of Virology, Pune, along with three tertiary care hospitals in Mumbai and Pune and one diagnostic laboratory centre (Private Laboratory) in Mumbai. Data was collected from both government and private sector establishments Data was collected for the recent 50 deaths which includes deaths between periods of 30.7.2015 to
23.9.2015. The team also held discussions with the microbiologist as well as physicians and programme officers during the visits.

Figure 2 shows the number of cases increasing again since July 2015 following a decline after the spurt in the months of Feb – May 2015 seen across India. Majority of the districts have reported deaths. It was also observed that Nasik, Kolhapur, Satara, Sangli were the newer districts reporting deaths as compared to the last spurt of H1N1 in Maharashtra.

The case fatality rate for the current increase in cases is lower than that witnessed during preceding months of April, May & June. This shows increasing testing due to awareness during spurt increased the denominator of positive cases during seasonal spurt.

Table 1: Month wise Case Fatality Rate

<table>
<thead>
<tr>
<th>Month</th>
<th>Cases</th>
<th>Deaths</th>
<th>CFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>68</td>
<td>21</td>
<td>30.9</td>
</tr>
<tr>
<td>February</td>
<td>1667</td>
<td>122</td>
<td>7.3</td>
</tr>
<tr>
<td>March</td>
<td>2890</td>
<td>273</td>
<td>9.5</td>
</tr>
<tr>
<td>April</td>
<td>531</td>
<td>88</td>
<td>16.6</td>
</tr>
<tr>
<td>May</td>
<td>106</td>
<td>24</td>
<td>22.6</td>
</tr>
<tr>
<td>June</td>
<td>45</td>
<td>15</td>
<td>33.3</td>
</tr>
<tr>
<td>July</td>
<td>257</td>
<td>15</td>
<td>5.8</td>
</tr>
<tr>
<td>August*</td>
<td>751</td>
<td>47</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>6315</td>
<td>605</td>
<td>9.6</td>
</tr>
</tbody>
</table>

*Provisional

Maximum deaths were reported from private hospitals (57%) as compared to government hospitals (43%).

Table 2 shows positivity rates from the various laboratories records. The positivity from the SRL diagnostic laboratories is nearly 48 % which is higher than the other laboratories.

The team reviewed the death records of recent 50 deaths to identify possible epidemiological risk factors for mortality.

Age wise distribution of the cases shows maximum proportion of deaths in the age group of 15-50 yrs age group followed by 30% and 18% among the 50-65yrs & >65yrs age groups respectively. More young adults were affected compared to older age individuals.

Fifty six percent of deaths were in males as compared to 44% in females. Sixty four percent of deaths were from urban areas. Symptomatically, fever & cough (60%) was most common presentation followed by the fever, cough & breathlessness together i.e. (54%) cases.

Maximum deaths were from Mumbai, 15 (30 %), followed by Pune, 7(14%) and Thane, 14 (14%). Fifty nine percent deaths were associated with co-morbidities (n=49). Diabetes (36%) was the most common co-morbidity observed followed by coronary heart disease (18%), respiratory diseases (16%), neurological diseases (8%) and obesity (8%) (Figure 3). Out of 50
deaths, 2 (4%) were pregnant women of which one was 36 weeks pregnant while for other period of gestation was not mentioned. Four (8%) deaths were associated with co infection which includes dengue, malaria, tuberculosis and leptospirosis each.

<table>
<thead>
<tr>
<th>Name of Laboratory</th>
<th>Period</th>
<th>Sample tested</th>
<th>Sample positive</th>
<th>Percentage of positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institute of Virology, Pune</td>
<td>Since Jan 2015 to till 24.08.2015</td>
<td>3237</td>
<td>986</td>
<td>30.5%</td>
</tr>
<tr>
<td>Ruby Hall Clinic, Pune</td>
<td>Since 16th March 2015</td>
<td>111</td>
<td>25</td>
<td>22.5%</td>
</tr>
<tr>
<td>Kasturba Hospital molecular diagnostic reference lab</td>
<td>Since Jan 2015</td>
<td>637</td>
<td>178</td>
<td>27.9%</td>
</tr>
<tr>
<td>SRL Diagnostic Mumbai</td>
<td>August 2015</td>
<td>2806</td>
<td>1368</td>
<td>48.8%</td>
</tr>
<tr>
<td>Mumbai (From all labs)</td>
<td>Since Jan 2015</td>
<td>14964</td>
<td>3108</td>
<td>20.8%</td>
</tr>
</tbody>
</table>

Association of co-morbidity and age wise distribution shows that as age increases the association with the co morbidity increases (Table 3). Nearly 80 % of death among the age group more than 50 yrs had an associated co-morbidity. It was also observed that nearly 65 % of deaths among the age group 15-50 years had no association with co-morbidity. Co-morbidity appears to increase the risk of mortality among the influenza A H1N1 cases. Death amongst young adults (without co morbidity) could be due to delayed presentation to the hospital, transportation delayed or inadequate facility at the treating hospital.

Fig. 3: Distribution of cases according to co-morbidity among H1N1 deaths, Maharashtra

Fifty seven percent of fatal cases had reported to the health facility between 3-7 days of onset of symptoms while 10 (21.3%) had reported to the health facility after 7 days of onset of symptoms. Only 5 (10.8%) had started treatment within 48 hrs of onset of symptoms. 21 (42%) & 9 (18%) of deaths occurred within 48 hrs & after 7 days of hospitalization respectively (Figure 3).

Based on the above findings the team recommended that all patient with diabetes/ co morbid conditions to be referred to tertiary care centre or specialist as early as possible. Strict categorization for sample testing specially at private labs needs to be followed as well as revisiting the private accredited labs for quality testing. Early reporting to health facility could be improved by increasing awareness among the community as well as health care worker.
H1N1 hospitals treating such a patient be well equipped (ventilator management) and train physician in critical care to initiate early and appropriate treatment. Initiation of Oseltamivir as earliest after onset of symptoms so as to decrease the severity of the cases especially high risk groups as well as halting the transmission in the community.

Our study reinforces the need to identify and target high-risk groups for interventions, such as information on immunization, early medical advice and use of antiviral medications, as cost of testing is much higher than cost of vaccination if calculated for each individual as the positivity reported by Private labs is very high. Further analytical studies need to be carried out for understanding the profile of all respiratory viruses causing influenza like illness and severe acute respiratory infections as well as risk factors between survival and deaths due to influenza A H1N1.

(Contributed by: Drs Prabha Arora, Amol Patil -NCDC, Neeraj Gupta- Safdarjung Hospital as part of field investigation team; Drs Ranjeet Prasad, Pradeep Khasnobis as part of H1N1 data analysis team at CSU, IDSP)
Trend of Dengue disease in India

Dengue is the fastest spreading outbreak prone arbo-viral disease and has become one of the major public health concerns in India. The risk of dengue has shown an increase in recent years due to unplanned and uncontrolled urbanization and concurrent population growth thereby increasing the breeding potential of the vector species (Aedes aegypti and Ae. albopictus). Out of 36 states/UTs, 35 (excluding Lakshadweep) are reporting dengue cases. After 1996 outbreak with a total number of 18517 cases and 545 deaths, upsurge of cases was recorded from 2010 onwards. In 2015 (till October), a total no. of 69493 cases have been reported which are comparatively higher than the cases reported in corresponding period of 2014. Maximum numbers of cases were reported from Delhi followed by Punjab, Haryana, Karnataka, Gujarat, Kerala, Tamil Nadu, Maharashtra, West Bengal, Rajasthan and Andhra Pradesh. Total 47 deaths due to dengue reported till October during 2015. Out of which maximum deaths were reported from Delhi (32), Kerala (22), Maharashtra (19), Punjab (10). The Case Fatality Rate (CFR - deaths per 100 cases) due to dengue was 3.3% in 1996. Thereafter, though it declined but consistently remained above 1.0% till 2007. After the National Guidelines on clinical management of DF/DHF/DSS were developed and circulated in 2007, the CFR started declining and has been maintained at <1%. In 2015, despite upsurge of cases, the Case Fatality Ratio is 0.2%. Dengue virus has four sero-types i.e. DENV (1, 2, 3 & 4). All these four serotypes have been isolated in India from various States. In 2015, though DEN 2 has been isolated in Delhi and Punjab, clinical complications are observed to be comparatively less than documented for DENV2. Age-wise distribution of cases in 2015 indicates maximum cases are amongst age group of 6-15 yrs and 16 to 45 yrs.

The transmission of Dengue is perennial in southern and western states In Northern states transmission is seasonal with upsurge from June/July onwards, reaches its peak by September/October and decline from November. The upsurge of dengue cases in many states was predicted in 2015 because of forecasted rain pattern, circulation of different serotypes of dengue virus and various other factors like water storage practices, use and disposal of plastic material etc. Expansion of diagnosis network over the years with provision of diagnostic kits might be attributed to increased numbers of cases. Besides, involvement of Aedes albopictus to transmission potential might possibly is an important contribution for increased numbers of cases.

(Contributed by Drs Kalpana Baruah, PK Sen & AC Dhariwal, NVBDCP)