



ANNUAL REPORT 2021-2022

ICMR-Regional Medical Research Centre, Gorakhpur



Hon'ble Prime minister Shri Narendra Modi ji inaugurated the new building of ICMR-RMRC, Gorakhpur on 7th Dec 2021



वार्षिक प्रतिवेदन

Annual Report
2021-2022

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FROM DIRECTOR'S DESK



I am delighted to present to you the Annual Report of our Institute for the Year 2021-22. The year continued to be challenging but productive. Remarkable moment of the year was the inauguration of our new state-of-the art building by Hon'ble Prime Minister Shri Narendra Modiji on 7th December 2021 in the august presence of Hon'ble Governor of Uttar Pradesh, Smt. Anandiben Patel, Hon'ble Chief Minister, Shri Yogi Adityanath, and Prof (Dr) Balram Bhargava, Secretary, DHR & DG, ICMR. We continued our efforts in the fight against COVID-19 and carried out more than 10 lakh RT-PCR tests for the diagnosis of SARS-CoV2. Besides diagnosis, we also partnered 4 rounds of National COVID-19 serosurveys and studies related to COVID-19 and stigma, vaccine interchangeability study, genome sequencing and impact of COVID-19 on Maternal and Child Health Services. The Institute extended its services for the investigation of JE/AES and other etiologies for acute febrile illness. Dengue and leptospirosis were found to be emerging infections besides the predominance of scrub typhus and JE in most of the cases. We also completed the TB prevalence survey in partnership with NIRT, Chennai and the report for pan India prevalence was submitted to the Govt of India. State Level Viral Diagnostics Laboratory (VRDL) became fully functional and investigations on major outbreaks were initiated. The process for setting up a Model Rural Health Research Unit in Pali CHC, near Gorakhpur has been initiated. Studies on One Health were also initiated under the consortium coordinated by DBT. Institute carried out many Information, Education and Communication related activities and participated in Times of India Destination UP event as well as also in Ujjwal Uttar Pradesh Exhibition held during 24-26th December 2021 and received certificate of appreciation. RMRC, Gorakhpur was also selected as one of the 75 centres for the celebration of '*Vigyan Sarvatre Pujyate*' by Vigyan Prasar and Principal Scientific Adviser (PSA) to Govt of India to celebrate the 75 years of India's Independence in February 2022 during National Science Day. Large number of talks, symposia, exhibitions, live demonstration, Rangoli competition, debate and other activities were carried out. During the year eight projects were completed, twenty one new projects were initiated and a total of twenty two research papers were published in various national and International Journals. 20 students joined the dissertation and 17 completed their work successfully. We are all set to have a new mobile BSL-3 and NGS facility that will take the Institute to a new height. I wish all the Scientists and Staff of RMRC, Gorakhpur a great success in their future endeavors.



(Dr. Rajni Kant)
Director,
ICMR-RMRC, Gorakhpur



1.1 Coronavirus Disease-19 (COVID-19) Studies

1.1.1 Molecular diagnosis of SARS-CoV-2 (nCoV-19) specimens obtained from Uttar Pradesh state health department

Principal Investigator: Dr. R. Kant, K. Zaman

Co-PIs & Investigators: H. Deval, G. R. Dwivedi, A. K. Pandey, R. Singh, B. R. Misra, S. P. Behera, N. Kumar & G. K. Yadav, entire technical & project teams

Starting date: March 2020

Duration: Ongoing

Funding: ICMR, New Delhi

Objectives

- To provide diagnosis for suspected COVID-19 cases obtained from health department of Uttar Pradesh

Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a highly transmissible and pathogenic coronavirus that emerged in late 2019. The first case of COVID-19 in India was reported from Kerala state on January 30th, 2020. Unfortunately, there was no laboratory in Uttar Pradesh to perform COVID-19 testing. The need for the COVID-19 laboratory testing for the first time was realized when two persons of Maharajganj district of eastern Uttar Pradesh region returned to home after foreign travel from China in last week of January 2020. At that time this centre started its preparedness for the laboratory diagnosis of COVID-19

specimens with the continuous support of Uttar Pradesh state health machinery. State health officials and administrative officers of Gorakhpur division visited our centre in second week of March 2020 and requested Director, ICMR-RMRC, Gorakhpur to start COVID-19 diagnosis at this Centre. Initial training to all lab personnel was initiated and the reagents were shipped from National Institute of Virology, Pune, the nodal apex centre of ICMR for SARS-CoV-2 diagnosis. ICMR-NIV, Pune approved laboratory diagnosis facility at RMRC, Gorakhpur on 23 March 2020 after successful run of positive and other controls of this virus through RT-PCR.

Work Done

The laboratory reported the 1st fatality of COVID-19 in Uttar Pradesh in the last week of March. Since then, the laboratory had gradually increased its testing capacity to about 3500 per day and has completed more than 10.1 lakh specimen testing (till 31st March 2022) and reported 16455 positive cases.

The centre got its BSL-II plus facility, that is fully dedicated for COVID-19 laboratory diagnosis in the first week of July. This facility was inaugurated by honourable Chief Minister of Uttar Pradesh Shri Yogi Adityanathji on 6 July 2020. Since then, laboratory is testing more than 2500- 3000 samples every day. All the samples are tested by RT-PCR in this laboratory and reported to state health department within 48 hrs of receipt of samples. The online data entry was also completed on real time basis in both UP State COVID Lab

and ICMR COVID-19 portals. Centre had been upgraded to High throughput COVID-19 laboratory by Department of Health Research (DHR) in May 2021. A group of staffs including scientists, research assistants, Laboratory technicians, and attendants are working tirelessly every day.

Co-PIs & Investigators: M. M. Reddy, S. K. Mishra, P. Yadav, R. Kant,

Starting date: October 2021

Duration: 6 Month (part of COVID-19 diagnostics study)

Funding: ICMR, New Delhi

Objectives

- To study the age distribution in first and second waves of COVID-19

Background

This Centre Initially got the responsibility of COVID-19 testing from all districts of Gorakhpur and Basti Division of Uttar Pradesh, later samples from all three districts of Azamgarh Division were linked to this institute for testing. Within a short period, the lab started testing hundreds of samples every day.

Work Done

Comparison of first and second waves of Coronavirus disease (COVID-19) showed varied differences including the peak and time distribution. Contrary to published reports of comparing two waves in India wherein the younger age group was affected more in the second wave in India; a secondary data analysis of around 0.5 million real-time reverse transcription-polymerase chain reaction tests conducted in COVID-19 diagnostic laboratory in eastern Uttar Pradesh, India showed an increase in positivity rate in older age groups in the second wave. The positivity rate among symptomatic cases was found to be three times higher in second wave compare to the first wave. Higher positivity rates were seen across older age groups, with a shift of 11 years in the mean age of positivity in the second wave compared to the first.

Future Plan

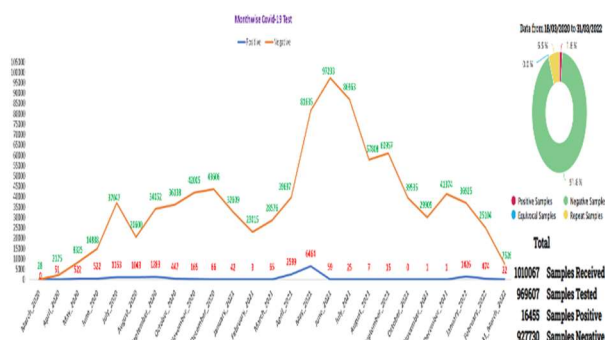


Figure: COVID-19 test and positivity from March 2020 to March 2022



Figure: COVID-19 test related work under progress

1.1.2 Differences in age distribution in first and second waves of COVID-19 in eastern Uttar Pradesh, India

Principal Investigator: Dr. Kamran Zaman

Continuous laboratory diagnosis of COVID-19 specimens will be performed for effective surveillance of this pandemic.

1.1.3 Evaluation of immunogenicity and protective efficacy after vaccine interchangeability in a selected population of Eastern UP

Principal Investigator: G. R. Dwivedi
Coordinator & Investigators: R. Kant, K Zaman, R. Singh,
Starting date: November 2020
Duration: One year
Funding: ICMR, New Delhi

Objectives

- To evaluate the vaccine effectiveness and immunogenicity in selected group
- To study the impact of vaccine interchangeability on immunogenicity
- To study the short/long term immune protection due to the interchangeability.

Background

Recently an incidence of inadvertent vaccine interchangeability occurred in twenty individuals in Audai Kalan village under the CHC Badhni of Siddharthnagar district of eastern Uttar Pradesh, India. Twenty individuals were immunised with Covishield as first dose. Subsequently these 20 individuals were immunised with Covaxin™ as the second dose after a period of 04-06 weeks. United Kingdom conducted multi-centric, participant-masked, randomised heterologous prime-boost COVID-19 vaccination study comparing all four prime-boost permutations of the Oxford-AstraZeneca and Pfizer vaccines both at 28-day and 84-day prime-boost. The interim safety analysis was found an increase in systemic reactogenicity

after the boost dose reported by participants in heterologous vaccine schedules in comparison to homologous vaccine schedules, and this was accompanied by increased paracetamol usage. Researchers all over the world are of the idea that The ability to mix and match vaccines could make vaccination programmes more flexible: it would speed up the process and reduce the impact of any supply-chain disruptions. Animal studies suggest that a strengthened immune response is possible: in a preprint published on bioRxiv on 29 January 2021, researchers reported that a combination of an RNA coronavirus vaccine and the AstraZeneca vaccine roused CD8⁺ T cells in mice better than either vaccine alone. It is proposed to conduct the study to determine the vaccine effectiveness, immunogenicity and reactogenicity, in this heterologous vaccination scenario (Covishield followed by Covaxin). A total of 100 vaccine recipients including 20 volunteers from heterologous vaccinated group, 40 each from homologous vaccinated Covishield and Covaxin group would be included in study.

Future Plan

The outcomes of the study will be implemented for vaccine safety, immunogenicity and protective efficacy when there is interchangeability of the vaccines and its feasibility.

1.1.4 Immune response to precautionary third dose of COVISHIELD/COVAXIN among healthy adult population: an ICMR Cohort study, India

Principal Investigator: Dr R. Kant, K. Zaman
Co-PIs & Investigators: H. Deval, M. M. Reddy & G. R. Dwivedi
Starting date: January 2022
Duration: One Year



Funding: ICMR, New Delhi

Objectives

- Characterise SARS-CoV-2 specific humoral and cellular immune response after homologous / heterologous additional third dose of COVISHIELD/COVAXIN vaccine at different time points

Background

More than 84 million people have received at least one dose and 60 million have received their two doses in India. Studies have documented waning vaccine effectiveness after primary series for infection. However, protection remains high for severe disease and hospitalization. COVID-19 cases have been rising rapidly in countries where Omicron VOC has been reported, indicating its high transmissibility. Studies have reported evasion of the immunity acquired naturally as well as by vaccination by the Omicron VOC. Nearly <1600 cases of Omicron have been reported from India with a potential to cause third wave. India's COVID-19 vaccination programme has proposed to initiate additional third dose for healthcare and frontline workers and individuals aged above 60 years with comorbidities. Limited studies from India have documented dynamics of immune response of additional third dose of COVISHIELD/COVAXIN vaccine using homologous regimen. In this context, we propose to establish a cohort in ICMR institutes receiving additional third dose to characterise the humoral and cellular immune response.

Work Done

Till date 14 participants have been enrolled from our centre and baseline and one-month follow-up blood samples have collected and

shared with NIV Pune for humoral response analysis.

Future Plan

ICMR staff who have received two doses of COVID-19 vaccine will be invited to participate in the study. The current recommendation is to administer homologous schedule for the precautionary dose. Accordingly, the study is designed to establish a cohort of ICMR staff members who will be receive homologous schedule of precautionary dose of COVISHIELD or COVAXIN. However, if the guideline is revised to implement heterologous regimen, we will also establish a cohort of individuals receiving heterologous schedule of precautionary dose.

1.2 Japanese Encephalitis (JE) & Acute encephalitis syndrome (AES) studies

1.2.1 Diagnostic services for suspected Japanese encephalitis (JE) cases from eastern Uttar Pradesh

Principal Investigator: Dr. R. Kant, R. Singh
Co-PIs & Investigator: K. Zaman, N. Kumar, G. R. Dwivedi, H. Deval, K. Shaw, A. Kavthekar, A. Mehta, M. Mittal

Starting date: 2008
Duration: Ongoing
Funding: RMRC, Gorakhpur

Objectives

- To provide a diagnosis for suspected Japanese encephalitis (JE) and AES cases admitted to BRDMC, Gorakhpur

Background

Acute encephalitis syndrome (AES) has been a major cause of case fatality in the Gorkakhpur

division for the last three decades. Recent investigations found *Orientia tsutsugamushi* (OTs) as an etiological agent in about 40-50% of AES cases (ST-AES), While antibodies against Japanese encephalitis virus (JEV) were identified in <10% of AES cases. The agent was detected by immunological assays techniques for JEV, Scrub typhus, Dengue, and leptospira. After the confirmation, the results of the diagnosis are promptly communicated to clinicians or concerned state health officials for immediate start of treatment.

Work Done

Routine investigation of clinically suspected cases of Japanese encephalitis virus (JEV) and Acute Encephalitis Syndrome (AES) cases were carried out at ICMR-RMRC, Gorakhpur. A total of 580 cases were admitted during the year 2021. All the AES cases hospitalized from (March to December 2021) were investigated for detection of anti-Japanese encephalitis (JE) virus-specific IgM (anti-JE IgM), anti- *Orientia tsutsugamushi* IgM (anti-OTs IgM), Dengue NS-

1 antigen (DEN NS-1 Ag) and Anti-Lepto IgM by ELISA assays as per the ICMR recommendations. Of the 580 cases, Paired specimen (CSF and serum) was available from 463 patients. Anti-JE IgM positive was documented in 24(5.1%) and 48 (8.4%) of CSF and Serum specimens respectively. While anti-OTs IgM was detected in 62% of both the specimen (CSF and Serum. Furthermore, anti-Dengue NS-1 antigen was found in 0.7% of cases and Anti-Lepto IgM positivity in 2.6% of cases (Table-1). The HSV, CMV, VZV, enterovirus, Chandipura Virus, H. influenzae and S. pneumoniae were also tested in CSF specimen of samples negative for JEV, OTs, Dengue (Table-2).

Table 1: Specimens tested with anti-JE IgM, anti-OTs IgM, Dengue NS-1 Ag ELISA, and Anti-Lepto IgM

(No. of cases) 2021	Specimen Type	Total samples received and tested	Anti-JE IgM Positivity (%)	(%) Anti-OTs IgM Positivity (%)	DEN NS-1 Ag Positivity (%)	Anti-Lepto IgM Positivity (%)
AES (580)	CSF	466	24(5.1%)	289 (62%)	NIL	NIL
	Serum	569	48 (8.4%)	358 (62.9%)	04 (0.7%)	15 (2.6%)

Table 2: CSF Specimens tested for HSV, VZV, CMV, Enterovirus, Chandipura virus, H. influenza and S. pneumoniae

Specimen Type	Total samples	HSV	CMV	VZV	Entero virus	Chandipura Virus	H. influenzae	S. pneumoniae
CSF	106	03(2.8%)	01(0.94%)	01(0.94%)	NIL	NIL	NIL	NIL



1.2.2 Development of diagnostic kit for rapid and early detection of *Orientia tsutsugamushi* based on isothermal recombinase polymerase amplification and lateral flow analysis

Principal Investigator: R. Singh
Co-PIs & Investigators: S. Kulkarni, R. Kumar, K. Zaman, H. Deval
Starting date: February 2020
Duration: Two Years
Funding: ICMR, New Delhi

Objectives

- To develop and validate the nucleic acid based RDT kit to detect *Orientia tsutsugamushi*

Background

Since Scrub typhus (ST) accounts major for AES outbreaks and acute febrile illness, development of a rapid point of care testing (POCT) kit is the need, in order to control the fatality rate. Gilliam and Karp strains are the most prevalent strains in AES and acute febrile illness (AFI) cases reported from various parts of India. Developing a rapid diagnostic kit for detection of these prevalent strains of *O. tsutsugamushi* (OT) will help to diagnose the infection of ST in the early stages, especially in the remote area where the infrastructure and instrumentation facilities are unavailable, allowing for point-of-care use without the need for technical expertise and complex ancillary equipment.

Work Done

The in-house designed primers and probes of the target 56kDa gene for Loop mediated isothermal amplification (LAMP) were designed and synthesized. Further, screening of LAMP primers was performed.

Finally, optimization of LAMP-LFA assay was done for amplification of standard strain (Kato and Karp). Further, the time required for completion of LAMP reaction was optimized at varying time interval from 30 min to 60 min. (Fig. 1). The LAMP reaction to proceed for 50 minutes at 60°C is enough for detection of the target.

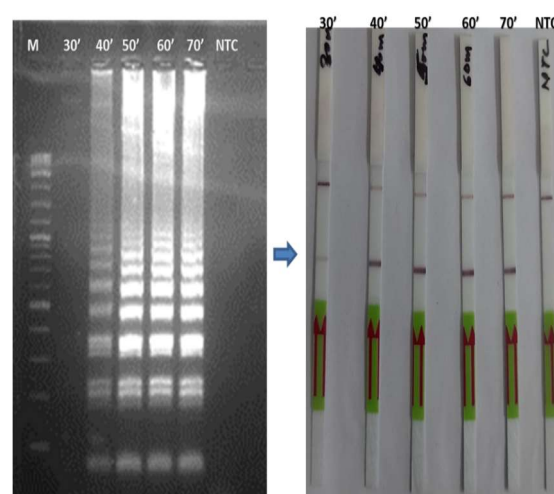


Figure: Optimization of LAMP-LFA assay at varying time interval. The LAMP reaction was carried out at 60°C followed by end-point detection.

1.2.3 Geo-spatial distribution of Acute Encephalitis Syndrome and their associated environmental factors in eastern Uttar Pradesh

Principal Investigator: Dr. K. Zaman
Starting date: July 2021
Duration: One Years
Funding: ICMR, New Delhi

Objectives

- To identify spatio-temporal hotspots of disease (AES, JE and ST) eastern Uttar Pradesh.
- To understand any change in hotspots over the period of time.
- To find out the association of the prevalence of the disease with temperature, humidity and rain fall.

Background

The center has been contributing as apex referral laboratory for AES/JE in eastern Uttar Pradesh since 2008. In these 12 years (2008-2020), the burden of the disease and its distribution has been varied over the period of time. The present study will try to map out year wise hotspots of AES/JE with the help of the AES line list data and will try to explore the changes in hotspot over a period of time.

Following which the data on temperature, humidity & rainfall has been obtained from metrological department Pune to analyse the correlation between the environmental factors and AES/ JE disease burden. For analysing the data QGIS and STATA software are being used.

Work Done

Data on AES/JE from 2008 to 2020 has been analyzed for its trend and pattern. Metrological data has been bought from Metrological department Pune. GPS coordinates of location of AES/JE cases from 2008 to 2019 has been obtained from Google map. Correlation analysis of the metrological data with AES disease burden is under process.

1.2.4 Molecular and serological detection of Rickettsia infection in Acute Encephalitis patients and acute febrile illness patients admitted at BRD medical college, Gorakhpur.

Principal Investigator: Dr. S. P. Behera

Starting date: July 2021

Duration: One Years

Funding: ICMR, New Delhi

Objectives

- To determine the genetic variants of Spotted Fever group (SFG) and typhus group (TG) Prevailing in Gorakhpur region
- To determine the rate of seroprevalence of SFG and TG rickettsiae in AES and AFI cases

Background

Eastern Uttar Pradesh region of India has been witnessing annual seasonal acute encephalitis syndrome (AES) outbreaks with high mortality, and scrub typhus (ST) has been identified as one of the predominant etiologies in more than 50% of cases. Since ST caused by *Oreintia tsutsugamushi* and other Rickettsial diseases (Spotted Fever group & Typhus group) are genetically identical and from the same genus (Rickettsia), therefore this study was planned

to find the association of other Rickettsial infections in the AES and AFI cases admitted at BRD medical college, Gorakhpur.

Work Done

Clinical specimens were collected from AES and AFI cases admitted at BRD medical college. Till date 100 samples were processed for DNA extraction followed by PCR. Of these samples, 10 samples were found positive for Rickettsial DNA targeting the 23s-5s Intergenic spacer



region. Multi locus identification of rickettsial gene targets of these positive samples (gltA, gene D, 17 kDa, ompA, ompB) and serological assay of these received samples are in process. PCR amplification of the 9 positive samples were shown in figure below.

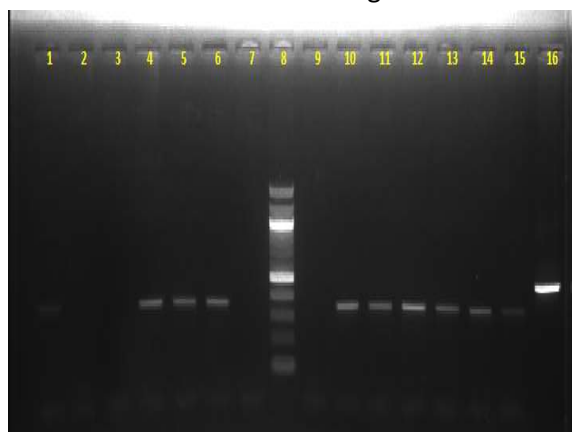


Figure: PCR amplification of the nine positive samples

1.2.5 A study of psycho-neurotic disorders and socio - behavioral changes among AES/JE cases recovered in Gorakhpur.

Principal Investigator: Dr. G. K. Yadav
Co-PIs & Investigators: T. K. Aich, R. Kumar
Starting date: July 2021
Duration: One Years
Funding: ICMR, New Delhi

Objectives

- To examine the level of psycho-neurotic disorders among AES/JE recovered cases in Gorakhpur.
- To understand the socio-behavioral changes among AES/JE recovered cases in Gorakhpur.
- To examine the level of psycho-neurotic disorders & behavioral changes as function of time duration

elapsed after recovering from AES/JE.

Background

Various studies confirmed the occurrence of swelling & bio. changes in brain due to AES/JE. (Gourie Devi et al., 1995; Ishii, 1977), & neuropsychiatric sequelae with cognitive and language impairment (Kaur & Vрати, 2003; Vaughn & Hoke, 1992). And, psycho-neurotic disorders & behavioral asymmetries are associated with brain mechanism & its biological characteristics (Philos, et al 2009). Therefore, it is rational to investigate whether there is functional relation of AES/JE with psycho – neurotic disorders & behavioral changes.

Work Done

All the prior formalities to conduct the study have been done, approval from IHEC has also been done, the project work could not be initiated due to covid-19 pandemic second phases situation. As per the suggestions of previous SAC meeting a professor of Psychiatry and a professor of neuro-biochemistry from BRD Medical College has been taken as a Co-investigator in the project.

1.2.6 A study of cognitive awareness level about Japanese Encephalitis and Behaviour Patterns among people belonging to north east districts of UP

Principal Investigator: Dr. G. K. Yadav
Co-PIs & Investigators: K. Zaman, H. Deval
Starting date: July 2021
Duration: One Years
Funding: ICMR, New Delhi

Objectives

- To understand cognitive awareness level and stigma among people belonging to AES/JE affected area in Gorakhpur division.
- To understand daily life behavior patterns of people belonging to AES/JE affected area in Gorakhpur division.
- To develop intervention strategies for creating awareness & behavioral modification.

Background

North Eastern Uttar Pradesh is endemic for Japanese encephalitis (JE). Some of the north east districts have become a focus of JE in the post monsoon season and the review of scientific literature on JE outbreaks also revealed similar trends in the area. In India, Uttar Pradesh had maximum burden of JE, more than 75% of cases during the recent past (Kumari & Joshi, 2012, NVBDCP annual report, 2012). The Uttar Pradesh state is highly endemic; since the first report of a JE epidemic in 1978, (Bhardwaj et al. 1981; Khare, 1982), extensive and recurrent outbreaks have been reported from the eastern parts of the State.

The entire region of UP is prone to annual flooding due to its topography. Districts near to Gorakhpur in Eastern UP, a region surrounded by embankments and drainage structures, are the most affected by floods as they are traversed by major rivers originating in the Nepali hills. Regular flooding is devastating for the crops, life and property of the farming community, and to a large extent determines their socioeconomic and political lives (Kumari & Joshi, 2012).

JE a vector-borne viral disease, is prevalent in large parts of Asia and the Pacific regions (Soloman, 2006), it is a major public health challenge due to its high epidemic potential, high case–fatality and neuropsychiatric sequelae among survivors. It was first recognized in Japan in 1924 (Mackenzie et al. 2007).

JE is an infection of the brain caused by JE Virus. Symptoms may include headache, fever, confusion, a stiff neck & vomiting. Complications may include seizures, hallucinations, trouble speaking, memory and hearing problems (CDC, 2015). JEV is generally spread by mosquitoes, specifically those of the culex type, pigs and wild birds serve as a reservoir for the virus.

Work Done

All the prior formalities to conduct the study have been done, approval from IHEC has also been done, the project work could not be initiated due to covid-19 pandemic second phases situation.

1.3 Other important studies

1.3.1 Establishment of a Health and Demographic Surveillance System [HDSS], Gorakhpur, Uttar Pradesh

Principal Investigator: Dr. K. Zaman
Co-PIs & Investigators: Dr. A. R. Deoshatwar, Dr. M Murekhar, Dr. N. Gupta
Starting date: 2018
Duration: Four Years
Funding: ICMR, New Delhi

Objectives



- Establish a “Demographic and Epidemiologic Surveillance System” coupled with GIS mapping of the HDSS area in Gorakhpur, Uttar Pradesh.
- Identify patterns and trends of morbidity and mortality in the HDSS population.
- Generate data on risk and protective factors of diseases prevalent in HDSS area.
- Monitor socio-economic status of the HDSS population.
- Monitor nutritional status of HDSS population, especially pediatric groups.
- Identify health priorities and hygiene issues, water and sanitation issues.

Background

The establishment of HDSS will be done in two phases. The first phase (12 months) will include the recruitment and orientation training of core-team and field staff at other well established HDSS's in India. The core team, after analysing their observations of other HDSS's, will decide on the data management system that will be appropriate for meeting the objectives of Gorakhpur HDSS. The system will be chosen with a futuristic view so that studies to be performed are easily linked with /

1. Training of HDSS staffs for Follow-up round

Three-day training for all staff of the HDSS (follow-up round) project was conducted from 1st to 3rd February 2021. The topics related to the follow-up events like Birth, Death (verbal autopsy), Child Immunization, Child Nutrition, Migration, Eligible Women, and Pregnancy etc. The training was given by two external experts

incorporated on the same platform. Collaboration with Gorakhpur district administration including SDM, CMO Gorakhpur and Anganwadi project officers/ BDOs [Block Development Officers], and Gram Pradhans will be done for permission and approval of study at village levels. Following that the study area will be identified and marked into clusters. Data of household and individual level information will be initiated taking into account the demographic, socio-economic details and additional survey round will include information about events like birth, death, migration, and etc. In the second phase, after the baseline survey round where all households and members of the HDSS are registered, all subsequent rounds will be concerned with updating events in this population.

Work Done

1. Baseline data

HDSS fieldwork for first-round (baseline) data collection was resumed from 16th November 2020 onwards and completed the first round of data collection on 27th January 2021. After successful completion of baseline data of 28 villages, data was cleaned, missing and errors were removed from the raw data.

Dr Ram Shankar Rath, Asst. Prof. AIIMS Gorakhpur and Dr Prem Shankar MBBS, MD Community Medicine. Hands-on training on data collection for follow-up events forms on a tablet in the field was given. After training from an external expert, 9 days of indoor training and demonstration of tablet base data collection was done under the supervision of HDSS project scientist Dr Rajaram (Demographer), Miss. Priyanka (Data



Manager) & Mr Kaushik Kumar (Social Scientist) with the guidance of HDSS project PI Dr Kamran Zaman.

2. Follow-up round of Health and Demographic data collection:

Data collection: The team initiated the follow up data collection on 16th February 2021. Seven teams, each with one supervisor and 3 field assistants are form and data collection was started in 7 villages. A committee consisting of Gram Pradhan, ASHA, ANM and other key holders was approached before starting data collection.

Till 9th April 2021, data collection has been completed in 3 village and details of the

households and members covered are described in the table below. After 9th April 2021, project activities were held up and the entire staffs were engaged in the COVID-19 diagnostic work to support the COVID-19 lab team to cater a sample load of 3000-4000 samples per day till 25th July 2021. We have re-started our follow-up round data collection from 26th July 2021.

GPS data collection: GPS coordinates of landmarks is completed in all villages.

Nutritional Assessment: We have started the data collection of nutritional status of HDSS population in nine villages from 7th February 2022. We have covered 7000 populations till 31st March 2022.

Table 1: The brief breakup of the baseline data

Sr. No.	Information	
1	Total no. of HH Completed	120307
2	Total no. of HH Members Covered	20965
4	Total no. of New HH added	750
5	Total no. of Villages completed	28

Table 2: The brief breakup of the follow up data

Cumulative Status of Follow-up round		
Sr. No.	Information	
1	No of HH Completed	18831
2	No of HH Members Covered	108266
3	No. of Villages completed	28





Figure 1: Snapshots of training on Follow-up round

1.3.2 Establishment of a Consortium for One Health to address Zoonotic and Transboundary Diseases in India, including the Northeast Region. (Multi-Institutional DBT Project)

Principal Investigator: Dr. R. Kant
Co-PIs & Investigators: K. Zaman, R. Singh
Starting date: August 2021
Duration: Three Years
Funding: DBT, New Delhi

Objectives

- To establish a network of laboratories at centralized and field levels
- To estimate prevalence and burden of selected diseases through serological or other surveillance methods
- To detect pathogens by serological (antigen) or molecular tests where disease symptoms clearly

manifest, mainly in clinical cases and when required in animals

- To model the data for disease forecasting and assess risk
- To generate tools and reagents

Work Done

The SOP, clinical Case definition and case Performa have been prepared and are under finalization with discussion with other medical team members. Collection of samples: Serum/CSF specimen from approximate 50 cases has already been collected and stored.

As soon as kits will be available the test will be performed.

1.3.3 Surveillance of scrub typhus infection by serological and molecular testing by DHR- virus diagnostic laboratories across the country

Site PI's & Investigators: K. Zaman

Starting date: August 2021
Duration: One Year
Funding: DHR, New Delhi

Objectives

Surveillance of scrub typhus infection among cases of Acute Encephalitis Syndrome (AES) and Fever Rash Syndrome (FRS)

Background

Scrub typhus is one of the most commonly reported rickettsial infections from the Indian subcontinent. It has become an emerging public health problem because of rapid urbanization of rural and forested areas¹. It is caused by *Orientia tsutsugamushi* (OT), an obligate intracellular gram-negative bacterium, transmitted by larval trombiculid mites (chiggers). Severity of this disease may vary from asymptomatic to fatal and depends on the strain of the infecting organism, the genetic background and physical condition of the patient². Scrub typhus presents as either a non-specific febrile illness with constitutional symptoms such as fever, rash, myalgias and headache or with organ dysfunctions involving organs such as kidney (acute renal failure), liver (hepatitis), lungs (acute respiratory distress syndrome), central nervous system (meningitis), or with circulatory collapse with haemorrhagic features³. Scrub typhus is one of the differential diagnoses (in addition to leptospirosis, malaria or dengue fever) in patients with haemorrhagic fever especially if associated with jaundice and/or renal failure⁴. In the recent past scrub typhus has also been found to be associated with acute encephalitis syndrome^{5,6}. It can also result in severe multi-organ failure with a case fatality rate up to 70% without appropriate treatment.

Scrub typhus and other rickettsial infections are grossly under-diagnosed in India because of their non-specific clinical presentation, low index of suspicion among clinicians, limited awareness about the disease and lack of diagnostic facilities⁶. The mainstay of diagnosis of scrub typhus is by detection of anti- *Orientia tsutsugamushi* IgM antibodies by ELISA. But, the cut off for calculating the results of IgM testing varies with the geographical location and has to be calculated for each geographical location. No such cut off has been calculated for India till date. Therefore, the present study is planned to find carry out the surveillance of scrub typhus among cases of AES and fever rash syndrome in India and to calculate the national cut off for IgM ELISA.

Work Done

1. Serology panel for EQUAS was tested and reported to be concordant.
2. Molecular RT PCR panel for EQUAS was tested and reported to be concordant.

1.3.4 Gap in Spatial distribution of disease density and health facilities in rural Gorakhpur

Principal Investigator: Dr. K. Zaman
Starting date: July 2021
Duration: One Year
Funding: ICMR, New Delhi

Objectives

- To map the most prevailing diseases and available healthcare facilities in rural Gorakhpur.
- To understand the health seeking behaviour of people after the occurrence of the disease.



- To estimate out of pocket healthcare expenditure and distressing health financing.

Background

Health Demographic Surveillance System (HDSS) site which includes 28 villages is the study area for this study. In this study, GPS mapping of diseases and health facilities is being done, by doing so we can able to identify the mismatched distribution of diseases and health facilities. Data on health seeking behaviour and healthcare utilization has been borrowed from HDSS baseline survey. Household survey is going on for 1000 household in 5 villages of HDSS site which includes questionnaire based on, household monthly consumption expenditure, health expenditure cost and source of finance and few basic demographic and social background characteristics. Data collected in this survey will be used to examine the out-of-pocket expenditure, catastrophic health expenditure and distress health financing.

Work Done

GPS coordinates of households with diseased persons has been collected during HDSS survey. GPS coordinates of health facilities in 13 villages has been done. Data on 1400 households has been collected and analysis is under process.

1.3.5. Hospital-based surveillance of respiratory pathogens in children below 5 years in Gorakhpur region

Principal Investigator: Dr. H. Deval

Co-PIs & Investigators: R. Kant, V. Potdar, A. Mehta, G. R. Dwivedi, R. Singh, S. P. Behera, K. Zaman, M. Mittal

Starting date: October 2021
Duration: Three Years
Funding: ICMR, New Delhi

Objectives

- Profiling of respiratory pathogens in patients and determine their seasonality pattern
- To understand the trend of pathogens at different age groups and clinical profile.
- To develop a diagnostic algorithm

Background

Acute respiratory infections (ARI) are classified as upper respiratory tract infections (URIs) or lower respiratory tract infections (LRIs) which is a Leading cause of morbidity, hospitalization and mortality among children under 5 years (U5s) worldwide, particularly in developing countries. 13 million children of <5 years dies worldwide due to acute respiratory illness who have average three to six episodes of ARIs annually regardless of where they live or what their economic situation is (WHO). AMR profile of pathogens also varies according to geographical regions.

Work Done

Clinical details and samples (Throat swab) collection process has been initiated from February 2022. A total of 75 samples from ARI and SARI cases has been collected from the Paediatric ward of the BRD Medical College, Gorakhpur for the investigation of viral and bacterial panels by PCR. In the viral panel Human Meta Pneumo Virus (HMPV) was detected in a total of 12 samples. The molecular



characterization of HMPV, seasonality pattern and clinical association with other viruses is in progress.

1.3.6. Development of Isothermal amplification and CRISPR/Cas based rapid detection test of *Orientia tsutsugamushi*

Principal Investigator: Dr. R. Singh
Starting date: July 2021
Duration: One Year
Funding: ICMR, New Delhi

Objectives

To develop and validate the CRISPR/Cas based nucleic acid detection RDT kit to detect *Orientia tsutsugamushi*

Background

The POCT developed so far to detect Scrub typhus (ST) lacks the required sensitivity and specificity for on-field diagnosis. In recent years, CRISPR–Cas (clustered regularly interspaced short palindromic repeats–CRISPR-associated) based technologies display their potential for providing very sensitive almost as sensitive as real time- polymerase chain reaction (RT-PCR) and highly specific POCT for pathogen and disease detection. The CRISPR/Cas12a based diagnostic system relying on endonuclease, displaying collateral cleavage activity, integrated with loop mediate or recombinase based isothermal amplification. Therefore, this study was carried out to develop Isothermal amplification and CRISPR/Cas12a based POCT to detect the prevalent strains (Gilliam, Karp, Kato, and Kostival) of OT in India targeting TSA 56Kda gene.

Work Done

All the designed primer for RPA showed to amplify the target length amplicon. Although

the desired product was obtained through RPA and showed a good intense color development at T line, but also developed background/primer noise signal in no template control (NTC) strip (Figure 1). Further, to resolve this and increase the sensitivity of the diagnostic, CRISPR/Cas12a associated crRNA were designed for complete removal of primer artifacts and ordered for synthesis by Integrated DNA technologies.

1.3.7. Assessment of lymphatic filariasis transmission after post mass drug administration in Gorakhpur district

Principal Investigator: Dr. B. R. Misra
Starting date: December 2020
Duration: One and half Year
Funding: ICMR, New Delhi

Objectives

- To evaluate microfilaria transmission cycle in rural and urban areas of Gorakhpur

Background

Filariasis is a neglected tropical disease caused by the infection of filarial worm *Wuchereria bancrofti* and transmitted by mosquito vector. Mass Drug Administration (MDA) is most effective strategy to check microfilaria transmission. Xenomonitoring of microfilaria infection in vector has play important role in validation of MDA program and to determine level of infection in mosquito vectors.

Work Done

Collection of mosquito specimens have been done from various selected sites. The SOPs for detection of microfilaria in mosquito specimens have prepared and under finalization. Collection of mosquito specimens from the remaining rural and urban sites of



Gorakhpur will be completed and screening of female *Cx. quinquefasciatus* mosquitoes will be performed after finalization of SOP.

1.3.8. Vector bionomics relevant in transmission dynamics of Kala-azar and insecticide susceptibility status in Uttar Pradesh

Principal Investigator: Dr B R Misra
Starting date: September 2021
Duration: One and half Year
Funding: ICMR, New Delhi

Objectives

To determine the distribution of *Phlebotomus argentipes*, vector in Kala-Azar affected areas of Gorakhpur division

Background

Kala-azar is in elimination mode. Most of the blocks have achieved the target of elimination i.e. <1 case p/10,000 population, even the transmission is continuing at micro level (Village) in the target achieved blocks and yet to achieve. Kala-azar is a disease of poorest among poor community. Sandfly vector habitat is primarily indoor, which requires wall to rest in dark places with moisture and lay eggs in the loose soil. It prefers mud wall or brick with mud, but the house of poor people are mostly thatched made of bamboo stick and straw, where sun light passes. In this situation sandflies rest in outdoor nearby habitat having dark and moist places in the bushes, old tree buttresses, ruined houses, stacks of old bricks etc.

The outdoor establishment of sandfly is also due to insecticidal pressure and it comes back to indoor habitat with reduction in the pressure after some time in some extent. This will be conducted by collecting sandflies from

both habitats using CDClight traps overnight and aspiration in the morning for resting sandflies.

Seasonal density of sandflies in outdoor and indoor habitats will be compared. It will follow the comparison of host preference, rate of natural infection and susceptibility status from different insecticides. After knowing the vector bionomics, the effective control measure can only be implemented.

Work Done

Preliminary data of Kala azar and post kala azar dermal leishmaniasis (PKDL) was collected from the three bordered districts (i.e., Kushinagar, Deoria and Maharajganj) of Gorakhpur division from January 2017 to 15th September 2021. Maximum number of cases was documented from Kushinagar district followed by Deoria and Maharajganj districts. A total of 7 administrative block and 62 villages of Kushinagar was affected by this disease as per 2017 to 2021 record. In Deoria district 8 blocks and 48 villages were affected however, 2 blocks and 2 villages of Maharajganj were affected by this disease. In Kushinagar district Tarya sujan area was the most affected site of Kushinagar district. Vector bionomics study will be performed from most affected village of Kushinagar and Deoria district.

1.3.9 Human Brucellosis and Leptospirosis in patients with Acute Febrile Illness in Eastern Uttar Pradesh.

Principal Investigator: Dr N Kumar
Starting date: January 2021
Duration: One Year
Funding: ICMR, New Delhi

Objectives

To study about human Brucellosis and Leptospirosis in patients with acute febrile illness.

Background

Brucellosis and Leptospirosis, are common zoonosis, occurs in diverse epidemiological settings and affects vulnerable populations, such as rural subsistence farmers and urban slum dwellers. These are increasingly recognized as an important cause of undifferentiated fever and are under-diagnosed, likely because of misleading clinical picture. Both the disease are underreported in

antigen (J. Mitra & Co. PVT.LTD) and RDT assay for anti-S. Typhi/paratyphi IgM/IgG RDT(CTK) and Malaria RDT assay (P.f/Pan Ag SD Biosensor).

Work Done

During the rainy season (July to October 2021) total 120 AFI cases has been enrolled. The

Eastern Uttar Pradesh despite its endemicity and increased exposure to live stock among the population. Acute Febrile Illness (AFI), cases admitted to the various wards of medicine at Baba Raghav Das Medical College, Gorakhpur, during rainy season, and fulfilling the criteria of clinical suspicion of brucellosis and/or leptospirosis has been included. Serum samples from the patients has been screened by IgM-ELISA according to the manufacturer's instructions. The detection of anti-leptospira IgM (Panbio® Leptospira), anti-Brucella IgM by Euroimmun (Lubeck, Germany), anti- Orientia tsutsugamushi IgM (Inbios), Dengue NS-1

aetiology based on standard diagnostic tests are given in Fig. 1. The percentage of Scrub typhus was highest (60%) followed by S. typhi/paratyphi (17.5%). The Leptospira has been detected in 10 cases and 4 AFI cases was reactive with Dengue NS-1 ELISA. The molecular identification is in process.



2.1 Family and community perceptions and practices related to stillbirth and under-five child death and feasibility of conducting minimally invasive tissue sampling in Gorakhpur District

Principal Investigator: Dr. M. Das

Co-PIs & Investigators: Dr K. Zaman, Dr V. Aditya, Dr A. Mehta, Dr. D. K. Srivastava

Starting date: July 2021

Completion date: December 2021

Funding: (Extramural) ICMR

Objectives as approved

- To describe cultural, social, and religious norms, rituals and practices involving the stillbirth and under-five child death.
- To describe the current documentation and tracking of pregnancy, delivery and childhood illnesses and identify the determinants of effective surveillance to identify the stillbirth's deaths and under-five child deaths
- To explore the perception and willingness for MITS among the stakeholders (mothers, fathers and community members) along with the facilitators and barriers related to consent for MITS
- To explore the perception and practices of healthcare providers and facilitators regarding stillbirth and under-five child death, its reporting and acceptability for MITS by the families
- To document the flow of events and communication between healthcare provider and family around the stillbirth and under-five child death at the facility to identify the facilitators

and barriers for possible MITS at the facilities.

Background

RMRC Gorakhpur team assisted the INCLEN team under supervision of Dr. Kamran Zaman Sci. E & their team [Kaushik Kumar Social Sci., Rameez Khan (Tech II) & Shashi Gupta (Tech II)]. Team provided the support in the fieldwork while taking qualitative data which include telephonic interview, in-depth interviews & focus group discussion

Results and conclusion

A total of 76 interviews (parents of deceased children, neonates or stillbirths, n=36; community members, n=4, community health functionaries, n=8, and religious leaders, n=7), healthcare providers, n=21), and 8 FGDs (n=72) were conducted. The parents were positive and expressed willingness to accept MITS. The key determinants for acceptance of MITS were: (1) understanding and willingness to know the cause of death or stillbirth, (2) experience of the healthcare received and trust, (3) the religious and sociocultural norms. Parents and community favoured for MITS over CDA when needed, especially where in cases with past stillbirths and child deaths. The experience of treatment, attitude and communication from healthcare providers emerged as important for consent. The father/husbands were the key decision makers, in consultation with the elders and family members. The community health functionaries perceived MITS to be useful and their involvement would be helpful for conducting the MITS for the community-based deaths and some stillbirths (for the pregnancies they accompany to the hospital). The community leaders were also supportive of the MITS and felt that their involvement



would be essential for obtaining consent for deaths outside hospital. No religious leader was against the procedure, as both, the respect for the deceased and need for medical care were satisfied.

Almost all professional and support staffs were positive about the MITS and its advantage for Cause of Death identification including co-existing and underlying illnesses. All of them perceived that MITS would be acceptable for parents due to the non-disfigurement and preferred by those who had unexplained child deaths or stillbirths in past. According to them, the key factors for MITS acceptance were appropriate communication, trust building, involvement of senior doctors, and engagement of the counsellor prior to deaths and training of the personnel.

Largely, MITS appeared to be acceptable for identifying the causes of child deaths and stillbirths, if the parents and family are counselled appropriately considering the sociocultural and religious aspects. They perceived the quality of care, attitude and communication by the healthcare providers as critical factors for acceptance of MITS. MITS was also acceptable for the doctors, nurses and support staffs and critical for better identification of the causes of death and stillbirths. For successful implementation of MITS, need for appropriate skill building of the health care providers, counselling system and some systemic organization at the hospital would be necessary. For including the deaths occurring outside hospitals, community demand generation and involvement of the community health functionaries and community leaders shall be critical.

2.2 To understand the clinical spectrum and course of disease caused by Omicron VOC (Multi-centric study)

Principal Investigator: Dr R. Kant, Dr A. Ali

Co-PIs & Investigators: , Dr K. Zaman Dr H. Deval, Dr Mahendra M, Dr. G. R. Dwivedi, Dr. A. Singh

Starting date: January 2022

Completion date: January 2022

Funding: (Intramural) ICMR

Objectives as approved

- To estimate the proportion of patients infected with SARS-CoV-2 Omicron VOC amongst the ones admitted with COVID-19.
- To study the clinical spectrum of disease among patients hospitalised with SARS-CoV-2 Omicron VOC.

Background

COVID-19 cases have been rising rapidly in countries where Omicron VOC has been reported, indicating its high transmissibility. Nearly <1600 cases of Omicron have been reported from India with a potential to cause third wave. The high transmissibility of Omicron VOC has led to a surge of COVID-19 cases. The clinical course of patients hospitalised with Omicron VOC still needs to be clearly understood. To understand the clinical spectrum and course of disease caused by Omicron VOC, all patients enrolled in selected sites of NCRC, will be tested using TATA MD-CHECK Omisure kits. TATA MD-CHECK Omisure is a diagnostic RT-PCR qualitative assay for detection of SARS-CoV-2 and can be used to identify the Omicron variant of concern (VOC).

Results and conclusion

A total of 34 cases were enrolled from COVID-19 Hospital of BRD Medical College,



Gorakhpur. The clinical details of the enrolled cases were submitted in NCRC registry portal and samples were shipped to NIV Pune for sequencing and analysis.

2.3 Molecular surveillance and assessment of genomic diversity of SARS CoV-2 in Eastern Uttar Pradesh.

Principal Investigator: Dr H. Deval

Co-PIs & Investigators: Dr R. Kant, Dr P Yadav
Dr A. S. Aich, Dr D. Nyayanit, Dr K Zaman,
Dr S. P. Behera, Dr P. Shankar, Dr R. Singh,
Dr G. R. Dwivedi and
Dr A. K. Pandey

Starting date: April 2020

Completion date: July 2021

Funding: (Intramural) ICMR

Objective Approved as

- To study the genomic diversity and evolution among the SARS-CoV-2 strains in Eastern Uttar Pradesh.
- To study the clinical presentations and basic epidemiological features of SARS CoV-2 infection in Eastern Uttar Pradesh.
- To study the vaccine breakthrough Infections with SARS-CoV-2 Variants.

Background

Severe acute respiratory syndrome Coronavirus-2 (SARS-CoV-2) has caused a global pandemic of coronavirus disease 2019 (COVID-19) and remains a serious emerging public health concern. Robust molecular surveillance help to unearth changes occurring over the time into new variants, during the first and second waves of the COVID-19 pandemic. Uttar Pradesh is the most populous country subdivision in the world and is the 6th highest COVID-19 affected state with a 1.33% death

rate in India. The present study was conducted to carry out the molecular surveillance of the SARS-CoV-2 strains and explore clinical-epidemiological association and disease outcomes in the first and second waves of SARS-CoV-2 transmission in E-UP.

Results and conclusion

A total of 147 samples were transported to the ICMR-NIV, for Whole genome sequencing (WGS). Of the 147 cases subjected to complete genome sequencing, 97-100% coverage was obtained for 87 cases. Of these 87 samples, 49 were from the first wave while the rest 38 sequences obtained were from the samples recovered during the second wave. The observed average (Ct) value for these cases was 22.4. In the first wave majority of the cases showed similarity with SARS-CoV-2 GR clade (40.8%), followed by unclassified clade O (24.4%). The other samples comprised 22.4% of GH, 10.2% of G, and the least samples showed similarity with S clade (2.04%). Whereas during the second wave only G clade (100%) was found, no other clade was detected. Further, according to the pangolin lineage the samples from the second wave of the pandemic, all VOCs responsible for case fatalities were detected with a majority of delta variant (B.1.617.2) (71.1%), followed by the Delta plus (AY.1) in 21.1%, and Kappa variant (B.1.617.1) in 7.9%.

The evolutionary analysis revealed the circulation of GR, O, GH, G and S clade during the first wave of pandemic whereas only G clade variants were detected as the predominant strain during the second wave of infection.

2.4 National Survey for State Wise Prevalence of Microbiologically Confirmed Pulmonary Tuberculosis in India



Principal Investigator: Dr. G. R. Dwivedi
Co-PIs & Investigators: Dr. K. Zaman, Dr. A. K. Pandey
Starting date: Dec 2019
Completion date: August 2021
Funding: (Extramural) ICMR

Objective Approved as

- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥ 15 years in age in India at national level.
- To estimate the point prevalence of microbiologically confirmed pulmonary TB among persons ≥ 15 years in age for 20 individual states / state groups.

Background

WHO estimates that India has achieved Millennium Development Goals (MDGs) related to TB, these are based on estimates of guestimates, rather than direct measurements like prevalence survey? Noticeably, TB nationwide survey was never repeated after 1956. And this makes all the more important to conduct a nationwide TB prevalence survey, if we really want to closely monitor the progress towards TB control with the aim to 'End TB' as per Sustainable Development Goals (SDGs). While, it is important to know the disease burden at national level; considering the diversity and variation of burden of disease across the country, it is equally important to know state level prevalence of TB. In this context we propose to conduct a nationwide TB prevalence survey with state wise estimates. This will also form the baseline for monitoring progress against the SDGs related to TB.

This survey is being started across all over India (20 state/state groups) conducted by NIRT Chennai. TB nationwide survey was never

repeated after 1956. It is important to know the disease burden at national level, considering the diversity and variation of burden of diseases across the country.

Results and conclusion

The Team completed survey of 25000 populations to find out the point prevalence. X-ray was conducted of about 14000 persons, about 1400 CBNAAT done and reported 48 persons as TB positive (41 Rifampicin sensitive, four rifampicin resistance and three intermediate). Also explored health seeking behaviour, sources of treatment and risk factors for TB diseases.

2.5 Impact of COVID-19 on Maternal and Child health services in India.

Principal Investigator: Dr G. R. Dwivedi
Co-PIs & Investigators: Dr R. Singh, Dr K Zaman, Dr B. R. Misra, Dr A. K. Pandey and Dr H. Deval
Starting date: November 2020
Completion date: April 2021
Funding: (Extramural) ICMR

Objective Approved as

- Assess trends of antenatal care visits, maternal and paediatric admissions, institutional deliveries, emergency obstetric care, abortion care, newborn care and postnatal care at the health care facility level during COVID-19 epidemic.
- Assess trends of childhood immunization during the COVID-19 outbreak.
- Assess and understand the health seeking behaviour of women with respect to MCH services during the COVID-19 epidemic.
- Assess the challenges and response strategies of the health system



delivering MCH services during the COVID-19 epidemic.

Background

The National health Policy of India emphasises on universal health coverage with specific targets for reduction of both maternal and infant mortality in India by the year 2025. The impact of COVID-19 on the maternal and child health services is yet to be ascertained in India, however experience from even developed countries have shown disruption of essential health services especially health services for the pregnant mothers and new-born. The study aims to assess the impact of the ongoing COVID-19 epidemic on the Maternal and Child health service in India. Although outreach services for MCH care have been restricted, Government of India has taken measures to ensure that beneficiaries visit peripheral facilities on particular date as informed to them telephonically or through ASHAs. It would be important to assess the likely impact of these measures on the demand and uptake of MCH services amidst the fear and panic induced by COVID-19 and further guide policymakers to address the gaps.

Results and conclusion

Rapid assessment surveys (RAS) were carried out to gather information on antenatal care visits, maternal and paediatric admissions, institutional deliveries and new-born care at the health care facility level, childhood immunization, health seeking behaviour among beneficiaries of MCH services and challenges and response mechanisms of the health care workers delivering MCH services during COVID-19 epidemic (Figure 1). Considering the travel restrictions and inaccessibility due to COVID-19, telephonic interviews of both the health care workers as well as the beneficiaries were done for the

immediate assessment of MCH services. Among the three districts of North Zone (Kushi Nagar, Raibareilly and Sant Kabir Nagar) six district level health officials and 7 block/Village level health official/workers has been interviewed telephonically in each district. Further, Contacts details of 245 beneficiaries were collected. Finally, among these 90 were interviewed telephonically with refusal rate 6.66%. The above data has been entered in CS Pro. Finally, these data were sent to ICMR-NIMS for further analysis.

2.6 A qualitative study on psycho-social issues and challenges of individuals diagnosed with Covid-19 in eastern Uttar Pradesh

Principal Investigator: Dr G. K. Yadav

Co-PIs & Investigators: Dr K. Zaman, Dr P. Shankar

Starting date: November 2020

Completion date: April 2021

Funding: (Extramural) ICMR

Objectives

- To understand the psycho-social issues faced by Covid-19 positive cases (non-migrants) before and after the discharging from hospital.
- To understand the psycho-social issues faced by Covid-19 positive migrant cases before and after the discharging from hospital.
- To develop the intervention strategies and suggestions to the concerned authority to deal with and overcome the psycho-social issues and challenges of Covid-19 positive cases.

Background

Those who have been diagnosed with Covid-19 positive have to go through the different stages of quarantine and isolation during



treatment in hospital i.e. stage of quarantine before treatment (01 – 04 days), isolation in the hospital during treatment (approx. 15 days), quarantine after treatment (approx. 15-30 days). During all these stages they experienced and faced different type of psychological and social problems and challenges, feeling of stigma and despised from society. In such situation this is highly needed to understand the psychosocial problems, social discrimination and challenges in the individuals diagnosed with Covid-19. So that appropriate interventional and remedial steps can be further taken to overcome psycho-social issues and feeling of discriminations among the individuals diagnosed positive with Covid-19 in pandemic situations.

Results and conclusion

58% non-migrants reported the experience of social stigma; however 86% migrants reported the experience of social stigma. They mentioned that people do not look at COVID-19 individuals with good eyes. 23% from all migrant and non-migrant people preferred to be alone. Most of the people who prefer solitude attributed this to corona and/or to be careful about protection or behavior of other people. 52.5% people reported more experience of being embarrassed due to corona.

Due to COVID-19 infection people reported inducement of irritation (6%), fear (12%), change of attitude towards society and other people and learnt lesson with the infection (24%). Recovered patients reported the development of OCD symptoms (9%), depressive symptoms (21%) and anxiety (59% migrants) and (35% non-migrants) due to COVID-19. Migrant people (75%) faced a lot of

psycho social and survival challenges during journey, quarantine, isolation and feeling loneliness and far away from family members. However non migrants (14%) showed experience of challenges they faced.

34% individuals reported different psychological discomforts and challenged like fear, been emotionally imbalanced, feeling of uncertainty of life, panic and mentally tensed restlessness and hopelessness during the quarantine period. However, during isolation period in the hospital when they got confirmed positive of COVID-19 they 23% individuals experienced bitter experiences, not able to survive, prison-like experience and experience of being untouchable by people's behavior.

2.7 Factors Related to Covid-19 Stigma: A Mixed Method Study

Principal Investigator: Dr G. K. Yadav

Co-PIs & Investigators: Dr A. K. Pandey, Dr K. Zaman, Dr R. Singh, Dr B. R. Misra, Dr S. P. Behera, Dr N. Kumar

Starting date: November 2020

Completion date: June 2021

Funding: (Extramural) ICMR

Objective Approved as

- To study the community's understanding of the cause, spread and prevention related to COVID-19
- To understand the perception of self and others at risk among the communities
- To identify the measures taken by the communities to protect themselves from the COVID-19
- To explore the perceptions and experience of COVID-19 stigma in the communities



- To understand the experiences of COVID -19 infected individuals (after discharge)
- To elucidate the measures to mitigate the COVID-19 stigma

Background

Covid-19 pandemic resulted in social stigma and discrimination towards individuals perceived to be infected or more vulnerable. Lesser-known facts on SARS COV-2, myths and misinformation circulated continuously over print, electronic and social media along with public's misunderstanding of health messages harboured an environment of fear and stigma. This was further fuelled by infection control techniques and restrictive practices such as quarantine, isolation, contact tracing mechanisms, lockdowns employed to prevent spread of the infection. However, there is dearth of literature on to assess stigma related COVID-19 due to its new emergence. There is a need for an understanding factor associated with stigma and suggest strategies to mitigate stigma problems associated with the newly emerging disease. This study provides insight into the stigma associated with the COVID-19 and the potential strategies for mitigation of such stigmatization.

Results and conclusion

It was found that the majority of respondents reported of television being the major source of information about COVID-19 infection and also referred to TV being the most reliable source of information on COVID-19. More than three fifths of respondents (66.4%) reported virus as the cause for COVID-19. Majority of the respondents reported touching infected person as the most likely mode of transmission and were aware of the major symptoms of COVID-19 infection. Three fourth of the respondents were aware of major three

preventive measures (wearing face mask, sanitizing hand and maintaining appropriate physical distance). While 65 percent of the COVID-19 recovered were aware that individual infected with COVID-19 could be asymptomatic, only 56.3% of respondents from community had knowledge about that. Majority of COVID recovered as well as respondents from the community perceived that their family members and also, they (in the case of community members) were not at risk of getting infected as they were adhering to COVID-19 appropriate preventive measures. Findings from the qualitative data showed manifestations of stigma associated with COVID-19 in the form of enacted, secondary, internalized and perceived stigma. Experiences of stigma subjected to the social inequalities of individuals were also reported, which underscores the existence of intersectionality in COVID-19 stigma. The stigmatized behaviour of people was reported to be mainly due to the fear of perceived risk of COVID-19 infection and poor understanding about the disease. Issues around containment strategies implemented by the government/local bodies for prevention of the COVID-19 infection were also reported to prompt. Unfavourable media coverage on COVID-19, at the initial phase was also reported to be associated with stigma. Consequences of stigma included, effects on overall well-being of individuals, denial of essential services including medicines, loss of job and income, delay in testing, disclosure concerns anticipating stigma and accessing health care services. Intersectionality of stigma is observed from the in-depth interview highlighting the need to address stigma that is more prevalent in certain groups.



2.8 Population-based serosurvey to estimate prevalence of SARS-CoV-2 antibodies in India: Fourth survey, June - July 2021

Principal Investigator: Dr G. R. Dwivedi
Co-PIs & Investigators: Dr R. Singh, Dr K. Zaman, Dr H. Deval, Dr A. K. Pandey
Starting date: June 2021
Completion date: July 2021
Funding: (Intramural) ICMR

Objectives approved as

- Estimate the prevalence of SARS-CoV-2 antibodies among (a) children aged 6-17 y and (b) adults in the general population, at the national level
- Estimate the prevalence of SARS-CoV-2 antibodies among healthcare workers at the national level

Background

India is witnessing a second wave of SARS-CoV-2 infections from February 2021, spread across majority of states of India. As of May 29, 2021, India had reported around 25 million cases and more than 3,00,000 deaths. ICMR conducted

frontline workers. In Phase 2 individuals above 60 years old and above 45 years old with specified comorbidities eligible for vaccination from March 1, 2021 followed by Phase 3 for all above 45 years of age from April 1, 2021. And finally Phase 4 for all above 18 years of age began on May 1, 2021.

In this context, it is proposed to conduct fourth round of serosurveillance to determine the prevalence of SARS-CoV-2 antibodies in the community and health care workers as per change in epidemiology and public health response to the epidemic in the country.

Results and conclusion

In conclusion, our serosurvey findings indicate that nearly two of the three individuals aged ≥ 6

the third population-based serosurvey among individuals aged 10 years and above and health care workers between Dec 18, 2020 and Jan 6, 2021 in the same 700 villages or wards from 70 districts in 21 states selected for the first and second serosurveys. In the third serosurvey, prevalence was estimated based on the presence of both IgG antibodies against SARS-CoV-2 S1 protein of the receptor binding domain (S1- RBD) and nucleocapsid (N) protein of SARS-CoV-2 while in second serosurvey prevalence was based on IgG antibodies nucleocapsid (N) protein of SARS-CoV-2. The weighted and assay characteristic adjusted seroprevalence among general population was 24.1 (95%CI: 23.0% to 25.3%) India started COVID-19 vaccination with BBV152 vaccine (Covaxin; Bharat Biotech) and ChAdOx1 nCoV-19 vaccine (COVID-19 Vaccine AstraZeneca) since January 16, 2021 under Emergency Use Authorization for the health care workers. The vaccination strategy was expanded for frontline workers in February 1, 2021 for

years from the general population and 85% HCWs had antibodies against SARSCoV- 2 by June 2020 in India. As one third of the population is still seronegative, it is necessary to accelerate the coverage of COVID-19 vaccination among adults. COVID-19 cases in India have been declining since May 2021. However, continued surveillance for COVID-19 cases is necessary to detect upsurge of COVID-19 cases early. The ongoing genomic surveillance for SARS-CoV-2 also needs to be strengthened to inform about the emergence of newer variants including their ability to circumvent immunity conferred by the natural infection as well as vaccination. Finally, high seroprevalence observed in the general



population should not be a reason for complacency. It is essential to continue adherence to non-pharmaceutical

interventions, such as avoiding gatherings, ensuring social distancing, and using face masks in public places.



3.1 Post-doctoral HRD activities

3.1.1 Development of CRISPR/Cas based isothermal detection platform for rapid and accurate diagnosis of Dengue and Chikungunya

Principal Investigator: Dr Pooja Bhardwaj
Study: DHR Young Scientist
Status: Ongoing
Mentor: Dr R. Singh

Objectives

- To develop a POCT with the CRISPR/Cas12a based detection system directed towards the NS1 and E1 gene of DENV and CHIKV respectively.
- To validate the sensitivity and specificity of the developed kit with clinical samples.

Background

Dengue virus (DENV) and Chikungunya virus (CHIKV) are arboviruses that share the same Aedes mosquito vector and thus overlap in their endemic areas. Most parts of India are hyper-endemic for DENV and CHIKV. These 2 viruses also cause similar clinical presentations, especially in the initial stages of infection. Thus, simultaneous diagnosis of DENV and CHIKV is need of time to diagnose dual infection and prevent complications by starting supportive treatment well in time. Developing a rapid diagnostic kit for DENV and CHIKV will help to diagnose the infection at the early stages especially in the remote area where infrastructure and instrumentation facilities are unavailable, allowing for point-of-care use without the need for technical expertise and complex ancillary equipment.

Result and conclusion

The Non-structural (NS1) and Envelope (E) gene for DENV and CHIKV respectively has been identified for the development of kit based on isothermal amplification assisted with CRISPR/Cas12 based detection. The in-house primers for cprM and NS1 genes of dengue was designed, and PCR assay was optimized using these primes using all four serotypes of DENV (Fi1-2). Further, the complete ORF of NS1 gene amplified from Dengue serotype 2 & 4 were successfully cloned in pGEMT vector and the insert was further confirmed via sequencing.

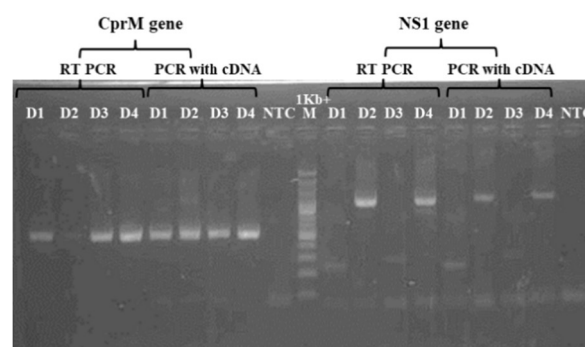


Figure : CprM gene (511 bp) and NS1 gene (1048 bp) amplification with in-house designed primers using standard DENV serotypes via RT-PCR and cDNA. Where, M = 1 Kbp+ marker

3.1.2 To study the pattern of long term disability and poor prognostic factors for disability among children with Acute Encephalitis Syndrome (AES)

Principal Investigator: Ms Neha Srivastava
Study: DHR Young Scientist
Status: Ongoing
Mentor: Dr R. Kant

Objectives

- To examine the pattern of long term neurological impairments in patients with acute encephalitis syndrome

(AES) in order to assess their rehabilitation needs.

- To determine the relationship between demographic factors, clinical variables, radiological and neurological outcomes which will generate a predictive model for disability among AES patients.

Background

Acute encephalitis syndrome (AES) is a serious public health problem in India caused by wide range of viral and bacterial etiologies which mostly affects children and young adults. About 20-80% (varies largely between various studies) of AES patients suffer physical and mental disability after recovery and of public health importance. The burden of disability among AES survivors has been a largely neglected area of study while majority of studies was done to assess outcome of Japanese encephalitis which accounts for 10-15% of total AES cases and outcome due to other major etiologies i.e. 80-90% cases are still unknown. The main objective of this study is to examine the pattern of neurological impairments across different etiological subgroups of AES patients and to determine the major predictors at admission leading to this disability. This burden estimation will be helpful in guiding the rehabilitation needs of patients who have suffered from encephalitis. Risk factors for disease outcome will identify patients at high risk in each etiological subgroup and allow optimization of preventive measures that already exist and development of new interventions to reduce the risk of the outcome

Result and conclusion

Block-wise screening of pediatric AES patients (age ≤ 16 years) among three etiological

subgroups (Japanese Encephalitis, Scrub Typhus and other etiology) was done. Patient Information sheets, consent forms and questionnaire were developed. Purchase of necessary items was done. Formal Consent of Additional Director Health Gorakhpur Division and CMOs of Gorakhpur, Deoria, Kushinagar and Maharjganj were taken to conduct the study in their region and for their support. Follow up and assessment of patients from Chargaawa block started. Till 23 March 2022, a total of 15 patients (4 JE-AES, 6 ST-AES and 5 unknown-AES) were assessed for disability among which 3 (2 JE-AES; 1 unknown-AES i.e. 20%) patients were found severely disabled. Future Plan: Total 100 JE positive AES patients, 400 Scrub Typhus Positive AES patients and 200 AES patients of unknown or other known etiology will be assessed for disability. Severely disabled patients in each etiological subgroup will be systematically analyzed by MRI. Main focus will be on the site of damage rather than its nature, and it will be determined whether 'damage' is present or absent at each anatomical location of brain. Clinical, Biochemical, Laboratory parameters and radiological findings will be compared in each etiological subgroup of AES for predictors of poor outcome in each group.

Disabled AES patients found at follow up



Research team from ICMR-RMRC Gorakhpur & Health personnel from Chargaawa Block



3.2 Post Graduate HRD Activity

3.2.1 Etiological investigation of the bacterial and viral causes of acute respiratory infection in 1-5 years children

Student's Name: Dr Shyam Kumar Gupta
Study: M.D Dissertation
Status: Completed
Guide: Dr H. Deval

Objectives

- To estimate prevalence of micro-organisms causing ARIs among 2 months to 60 months old children coming to a tertiary health care facility

Background

Acute respiratory infections (ARIs) is major public health problem worldwide, and is a leading cause of morbidity and mortality in paediatric age group. Global burden of ARIs are over 1400 cases per 100000, or 1 case per 71 children per year; however, in developing nation 2500 cases per 100000 children. The ARIs result in an estimated 1.9 to 2.2 million deaths per year, of which 70 % occur in developing countries which accounts for 30 per cent of total childhood deaths. It is estimated that there were over 120 million episodes of pneumonia among children younger than five years during 2010–11; of which over 10% were severe episodes. Pneumonia is the single largest infectious cause of death in children worldwide. Pneumonia killed 7,40,180 under 5 children in 2019, accounting for 22% of all deaths in children aged 1 to 5 and 14% of all deaths of children under five years.

Result and Conclusion

The study demonstrates for the simultaneous detection of viral and bacterial aetiologies of acute respiratory infections (ARIs) in children,

the age group 2-60 months in tertiary care hospital setting in pediatrics department of BRD medical college Gorakhpur. A total of 300 ARI children of 2 to 60 months' age and acute respiratory were screened and finally 167 of ARI children were recruited in study after meeting the eligibility criteria from Sep 2020 to Sep 2021. In this study 67.1% of ARI children are male, while rest of 32.9% are female. The mean age of children is 14.83 months and 65.3% of children between 2-12 months.

The most frequently detected virus RV (7.2%), followed by HMPV, PIV-4, and SARS CoV-2 with detection rate 4.8%, 2.4% and 0.6% respectively from all ARI cases. Total number of isolated viruses from URTI are 41.6% (5 out of 12 cases) and from 14.8%. (LRTI are 20 out of 135 cases). There were significant difference i.e. larger proportion of LRTI negative for respiratory viruses. The most common viruses isolated from URTI are RV (16.7%), HMPV (16.7%) and PIN 4 (8.3%). The most common viruses isolated from LRTI are RV (6.5%), HMPV (3.9%), PIN4(3.9%) and SARS CoV-2 (0.6%). RV, HMPV and PIV-4 are the most prevalent viruses isolated from all the cases. Both URTI and LRTI are most commonly (58.3% and 65.8%) found age group 2 to 12 months followed by age group 13 to 36 months and 37 to 60 months. Rhinovirus are most prevalent virus in age group 2 to 12 months (4.6%) and 13 to 36 months (14%) and 13 to 36 months (6.7%) and HMPV are the second most common virus detected in all age group. PIV4 virus are detected 2.8% in age group 2 to 12 months and 2.3% in age group 13 to 36 months. The least common virus in all age group were SARS CoV-2.

3.2.2 Understanding the key mechanism of multidrug resistance in clinical isolate and



isoquinoline derivatives as drug resistance reversal agent

Student's Name: Phool Kumari Pandey
Study: M.Sc Dissertation
Status: Completed
Guide: Dr G R Dwivedi

Objectives

- Sensitivity/ resistance profiling of *Klebsiella pneumoniae* against clinically used antibiotics.
- To explore the mechanisms of antibiotic resistance in *Klebsiella pneumoniae*.
- To evaluate in plant compounds as antibacterial/ modulators.

Background

Infectious diseases are major killer in developing and under developed countries. Antibiotic was introduced in 1930s as important step towards the control of infectious diseases. The negligent/ inappropriate use of antibiotics made this medical miracle as useless weapon. Now most of the bacteria acquired resistance to present conventional classes of antibiotics. These antibiotics have limited core structure for bacterial enzymes (Dwivedi et al., 2016). This is need of the hour to discover novel antibiotics with unique core structures and unique mode

helpful to reduce the dose of antibiotics as well as the cost. On the other hand, this study may also be helpful to delay in drug resistance

of actions. The plant molecules/compounds CSD-104 are unique to bacteria and less cytotoxic, compared to the antibiotics. Lack of availability of novel antibiotics /modulators in market, demands the effort to identify potential antibiotics. In the current scenario of superbugs and lack of novel antibiotics have generated a crucial need to develop an effective therapy (Dwivedi et al., 2018). The present investigation was taken as to explore the plant-based compounds as novel antibiotics/modulators. Attempts have also been made to explore the possibility of putting into reuse of some of the old antibiotics through combination therapy.

Result and conclusion

In the era of drug resistance, novel compounds discovery is crucial unique compounds/are desired to have unique core structure and novel mode of action. In this regard plant compounds/molecules promises as unique entity. The finding of this study will be useful, especially for putting into reuse of old antibiotics which have become non-functional due to the acquired resistance. This is for the first time, these isoquinoline derivatives are being reported as antibacterial agent against clinical isolate of RMRC-KN-1. This study will be

development leading to increased self-life of antibiotics.



HRD ACTIVITIES

3

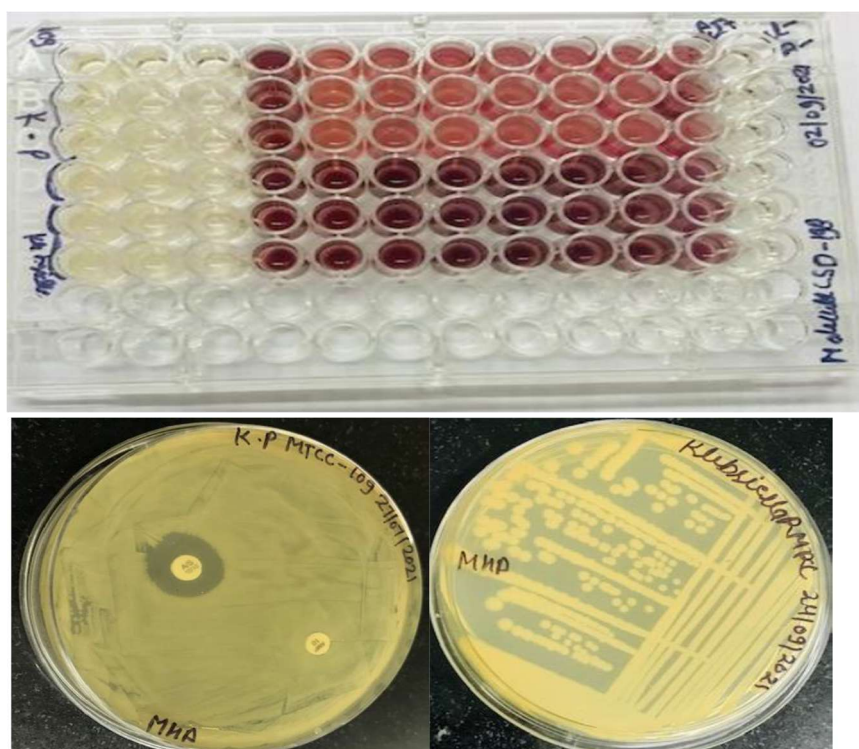


Figure: Sensitivity/resistance profiling of *Klebsiella pneumoniae* against clinically used antibiotics



4.1 Training, Workshops, Conferences & Meetings conducted

- A four days training/orientation program was organised on “Procedures and major issues on the conduction of social behavioral researches and preparation of data collection tools in psycho-social aspects in public health researches.” from 12th January to 15th January 2021. This training was given by Dr. Girijesh Kumar Yadav (Technical Officer – A, Psychology) to Keylong Field Station staff at RMRC, Gorakhpur.
- Two days Health and Demographic Surveillance System: staff training was carried out from 1 to 2 February 2021 at RMRC, Gorakhpur.
- RMRC staff Covid-19 vaccination was initiated on 5 February 2021
- Building Committee Meeting was held on 3rd March 2021 for the review of building construction and finalization of time for handing over of building. Director, ICMR-RMRC, Gorakhpur, engineers of CPWD, engineers of ICMR, members of building Committee and scientists of RMRC present during the meeting.
- International Women’s Day was celebrated by RMRC on 8th March 2021. On this occasion a talk was delivered by Dr Pragya Yadav, Scientist E, National Institute of Virology, Pune on challenges of COVID-19, isolation of SARS-CoV-2 virus and its vaccine development strategies.
- A Stake holders’/ Expert Group meeting was held in Hybrid mode

(Virtual and in person) at Deputy Commissioner Office, Keylong (HP) on 14th July 2021, under the chairmanship of Dr. J.P Narain, Global Health international Advisor, Former Director, Communicable Diseases, WHO Regional Office for South-East Asia & Advisor, ICMR-RMRC Keylong Field Station. Dr Rajni Kant, Director & Scientist ‘G’, ICMR-RMRC, GKP present during the meeting and discussed the ongoing activities of Keylong Field Station and its future road map along with the Deputy Commissioner (DC) of Keylong, Chief Medical Officer (CMO) of Regional Medical Hospital, Keylong, RPGMC Tanda, AIIMS Bilaspur, ICMR-NIRTH Jabalpur as well as ICMR-RMRC, Keylong Field Station teams.

- Honourable **Prof. Balram Bhargava**, D.G. ICMR and Secretary DHR visited ICMR-RMRC, Gorakhpur on 6th December 2021 inspected laboratories, newly constructed building and interacted with scientists of RMRC, Gorakhpur.
- New building of ICMR-RMRC, Gorakhpur was inaugurated by the honourable **Shri Narendra Modi ji**, Prime minister of India in the presence of **Yogi Adityanath ji**, Chief minister of Uttar Pradesh on 7th December 2021. Prof. Balram Bhargava, D.G. ICMR and Secretary DHR, Dr Samiran Panda, ADG ICMR, Dr Rajni Kant, Director, ICMR-RMRC, GKP, Directors of various ICMR institutes, other dignitaries and staff of ICMR-RMRC, GKP were present during this ceremony.
- One day Symposium on New dimensions in health research with



focus on emerging & re-emerging infections and pandemic preparedness was organised by ICMR-RMRC, GKP on 8th December 2021 in its new building. Inaugural session was initiated by Dr Rajni Kant, Director ICMR-RMRC, GKP by his welcome note. Keynote address was delivered by Dr Sanjay Mehendale, Director Research, PD Hinduja Hospital and Medical Research Centre, Pune. First session of this symposium was dedicated to lesson learnt from covid-19 pandemic and epidemic preparedness. Second session was on one health -upcoming area of research while third session was dedicated to impact of climate change on vector borne disease and last session was dedicated to JE/AES: Research Experiences and Future needs. Valedictory and conclusion remarks were given by Dr J. P. Narain, Senior Advisor, ICMR Hq, New Delhi.

- Mega Science Week under the 'Azadi Ka Amrit Mahotsav' was celebrated by ICMR-RMRC, Gorakhpur from 22nd Feb 2022 to 28th Feb 2022 to exhibit the achievements of last 75 years and the vision for the next 25 years in the field of Indian science. RMRC, Gorakhpur organized many activities on all the 7 days of the event which included exhibition with 75 posters on Renowned Indian Scientists. ICMR-RMRC, Gorakhpur involved in live demonstration of mosquito vectors and its immature stages along with microscopy of malaria parasite and larvivorous fishes for creating awareness. Students of the BRD Medical College displayed specimens

for creating awareness, while students of the MMM University of Technology displayed innovations like drones and soil testing techniques and preparation of biofuel. Students of DDU Gorakhpur university displayed techniques for the preparation of biofertilizers from household waste material. There were lectures by the eminent Scientists every-day as per the theme decided for that day and many other events like quiz contest, skit contest, poetry coemption, drawing competition, Rangoli competition were also organized. Many young start up came to participate and showed their innovation. Approximately 5000 students of more than 30 schools of Gorakhpur region participated in this event.

4.2 Training, Workshops, Conferences & Meetings attended

- Dr Rajni Kant, Director and Scientist 'G' delivered an invited talk on "Systematic slaying of encephalitis" in the 'Times of India destination Uttar Pradesh Conclave' at Gorakhpur on 29th December 2021
- Dr Rajni Kant delivered an invited lecture on "Mahatma Gandhi aur Jan Swasthya" at CSIR-CSMCRI, Bhavnagar on 10th January 2022.
- Dr Rajni Kant delivered a talk as a Speaker in the Vigyan Sarvatra Pujyate event on 'Changing health scenario in post independent India-sharing insights, views and experiences' at ICMR-RMRC, Gorakhpur



- Dr Kamran Zaman contributed as Judges for Policy Case Competition on Adult Immunization held in the 'National Social Summit 2021', the annual Social Festival of IIT Roorkee, on the theme: 'Envisioning Better Healthcare Evolution' in March 2021.
- Dr Kamran Zaman attended "Publishing Webinar- Tips from the Editors" at Indian Council of Medical Research held on Tuesday 30 March, 2021.
- Dr Kamran Zaman contributed as resource person (Chairperson-Technical Session) In International Conference Cum Researcher's Summit-2021 organised by IEC School of Pharmacy, IEC University, Baddi, Himachal Pradesh.
- Dr Kamran Zaman attended webinar on Awareness on Good Clinical Practice Professional Certification Scheme (GCPPCS) organised by THSTI, Faridabad, India
- Dr. Kamran Zaman delivered a talk as a Speaker in the 9th Annual National Conference of Consortium against Rabies - CARCON 2021 held online from 28th to 29th January 2022 at AIIMS Gorakhpur.
- Dr Kamran Zaman, Dr Niraj Kumar and Mr Ajay Nayak were nominated for the Training Programme on "Workshop on Gender Budgeting" scheduled during Wed 02 Feb, 2022 to Fri 04 Feb, 2022 by ISTM, New Delhi
- Dr Brij Ranjan Misra, Dr S. P. Behera, Dr Shalendra Mishra and RMRC, Gorakhpur staff participated in Aavishkaar Exhibition "UJJWAL UTTAR PRADESH GORAKHPUR 2021" organized at Annexy Bhawan, New Circuit house, Gorakhpur from 24-26th December 2021 under supervision of Dr Kamran Zaman.
- Dr Hirawati Deval was panelist for two days international webinar on "Role of microbiology and biotechnology in the times of Covid-19 pandemic" on 19th May 2021 organized by School of Life Sciences, Dr BR Ambedkar University, Agra.
- Dr Hirawati Deval attended webinar on "Role of sequencing in SARS-CoV-2 discovery, diagnostics and disease surveillance" on 21st Jan 2021, organized by FIND, India.
- Dr Hirawati Deval was key note speaker in webinar on "Climate change and its impact on human health" organized by re-imaging society India on 13th Feb 2021.
- Dr Hirawati Deval delivered an invited lecture on "Research Ethics" in 7 days workshop on Research Methodology & innovations in life sciences for the MSc students at DDGU in July 2021.
- Dr Hirawati Deval participated in symposium on "New Dimensions in Health Research with focus on Emerging & Re-emerging infection and Pandemic Preparedness" at ICMR-RMRC, Gorakhpur on 8th Dec 2021.
- Dr Gaurav Raj Dwivedi attended Low-Density Infection Detection Workshop at NIMR, Delhi from 27 to 30 September 2021.
- Dr Gaurav Raj Dwivedi attended Online VRDLN Workshop on 3rd March 2022.
- Dr Niraj Kumar attended online training on "Good Governance and



Transparency through RTI Act 2005” from 9th to 10th September, 2021 organised by the National Productivity Council, New Delhi, Ministry of Commerce and Industry, Govt. of India.

- Dr Niraj Kumar attended “Public Procurement through GeM Portal” from 5th to 6th August, 2021 organised by the National Productivity Council, New Delhi, Ministry of Commerce and Industry, Govt. of India.
- DR Niraj Kumar and Dr S. P.Behera attended “Workshop and hands-on training on leptospirosis diagnosis, characterization of isolates and tracking of animal vectors” Organised by ICMR-RMRC Portblair, Andaman and Nikobar Islands, India. 4th – 8th October 2021.
- Dr Gaurav Raj Dwivedi participated in training program for VRDLs (2022/03) held on 27th to 30th March 2022
- Dr Mahendra M attended Online Webinar on "Balancing Scope, Scale and Data Quality: Learnings from NFHS" conducted by NDQF on 11 February 2022.
- Dr Kamran Zaman and Dr Mahendra M attended the Online "Basic training workshop series: Introduction to priority setting and HTA" conducted by DHR-HTA India on 16 February 2021.
- Dr Kamran Zaman and Dr Mahendra M attended Online workshop on "Statistical Methods in Clinical Trials" conducted by ICMR-NIMS, New Delhi from 07-08 March 2022.
- Dr Mahendra M attended the Online webinar on "Spreadsheet Data Management: Simple, Convenient yet Powerful" conducted by ICMR-NIOH Ahmedabad on 09 March 2022



4.1 Research Publications

1. Murhekar MV, Bhatnagar T, Thangaraj JWV, Saravanakumar V, Kumar MS, Selvaraju S, Rade K, Kumar CPG, Sabarinathan R, Turuk A et al: SARS-CoV-2 seroprevalence among the general population and healthcare workers in India, December 2020-January 2021. *International journal of infectious diseases: IJID* 2021, 108:145-155.
2. Niraj Kumar, Kamran Zaman, Brij Ranjan Misra, Rajni Kant (2021) Interpretation of pooled sample testing of COVID-19 for efficient use of resources, 0.4103/ijmr.IJMR_4465_20.
3. Zaman K, Shankar P, Yadav PD, Nyayanit DA, Behera SP, Bhardwaj P, Shete A, Majumdar T, Yadav R, Patil S et al: Molecular epidemiology of a familial cluster of SARS-CoV-2 infection during lockdown period in Sant Kabir Nagar, Uttar Pradesh, India. *Epidemiology and Infection* 2021, 149: e200.
4. Pandey AK, Mohanty A, Hada V, Rath RS, Kumar S, Kishore S, Kant R: Comparison of the Rapid Antigen Testing Method with RT-qPCR for the Diagnosis of COVID-19. *Cureus* 2021, 13(8): e17405.
5. Murhekar MV, Bhatnagar T, Thangaraj JWV, Saravanakumar V, Santhosh Kumar M, Selvaraju S, Rade K, Kumar CPG, Sabarinathan R, Asthana S, Balachandar R, Bangar SD, Bansal AK, Bhat J, Chakraborty D, Chopra V, Das D, Devi KR, Dwivedi GR, Jain A, Khan SMS, Kumar MS, Laxmaiah A, Madhukar M, Mahapatra A, Ramesh T, Rangaraju C, Turuk J, Yadav S, Bhargava B; ICMR serosurveillance group. Seroprevalence of IgG antibodies against SARS-CoV-2 among the general population and healthcare workers in India, June-July 2021: A population-based cross-sectional study. *PLoS Med.* 2021 Dec 10;18(12):e1003877. doi: 10.1371/journal.pmed.1003877. Epub ahead of print. PMID: 34890407. *Impact factor: 11.06.*
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9. Pandey P, Sahoo R, Singh K, Pati S, Mathew J, Pandey AC, Kant R, Han I, Choi EH, Dwivedi GR*, Yadav DK. Drug Resistance Reversal Potential of Nanoparticles/Nanocomposites via Antibiotic's Potentiation in Multi Drug Resistant *P. aeruginosa*. *Nanomaterials* (Basel). 2021 Dec 30;12(1):117. doi: 10.3390/nano12010117. PMID: 35010068; PMCID: PMC8746836.
10. Deval H, Nyayanit DA, Mishra SK, Yadav PD, Zaman K, Shankar P, Misra BR, Behera SP, Kumar N, Kumar A et al: Genome

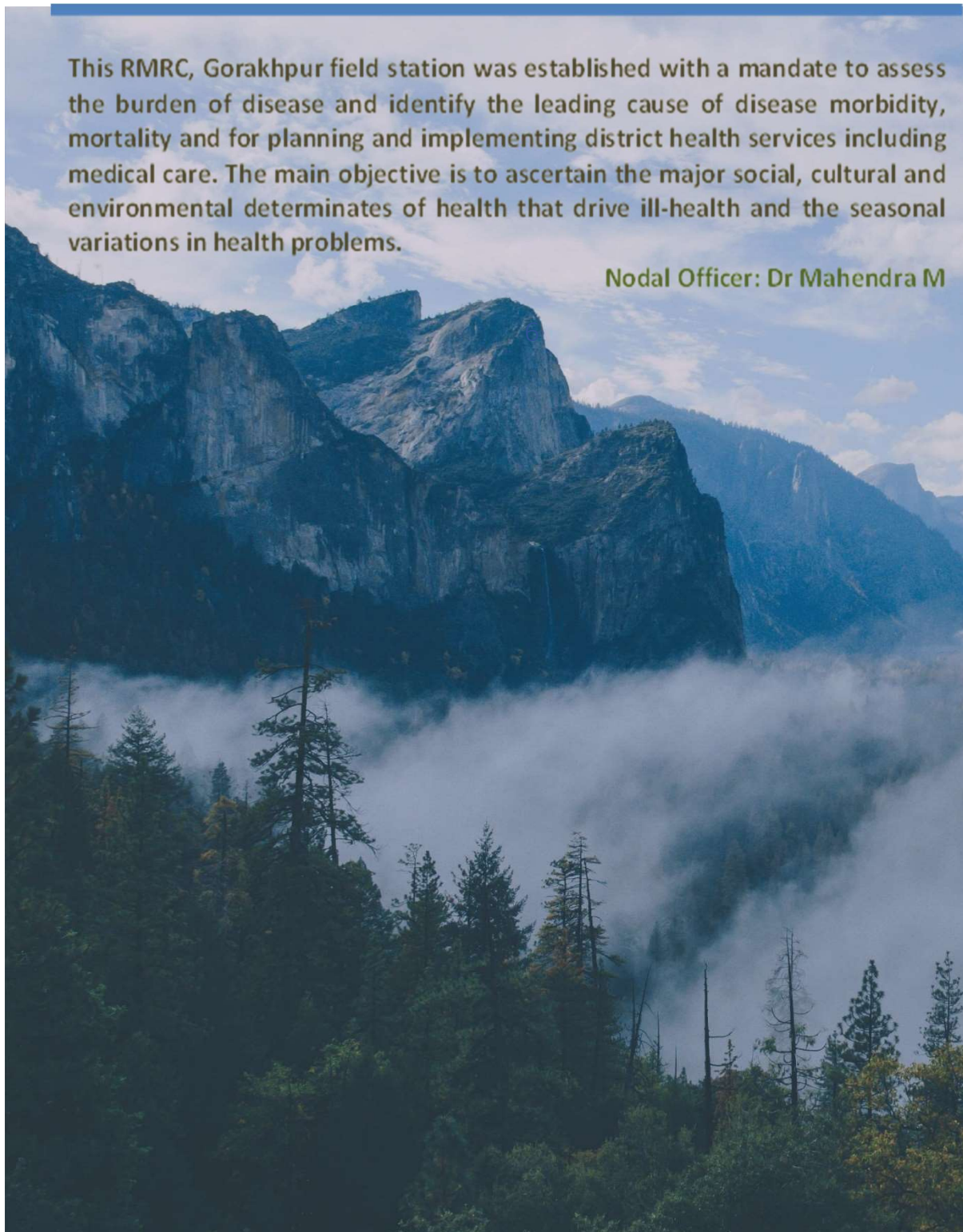
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This RMRC, Gorakhpur field station was established with a mandate to assess the burden of disease and identify the leading cause of disease morbidity, mortality and for planning and implementing district health services including medical care. The main objective is to ascertain the major social, cultural and environmental determinates of health that drive ill-health and the seasonal variations in health problems.

Nodal Officer: Dr Mahendra M



6.1 Ongoing Study

6.1.1 Post vaccination seroprevalence of Hepatitis B virus infection among tribal population of Lahaul and Spiti district of Himachal Pradesh

Principal Investigator: Dr. Tanuja Mishra
Co-PIs & Investigators: H. Deval
Starting date: July 2021
Duration: Two Years
Funding: ICMR, New Delhi

Objectives

- Seroprevalence of Hepatitis B viral antigen in tribal population of Lahaul and Spiti.
- Blood group susceptibility in hepatitis B viral infection.

Background

Hepatitis B viral infection is a serious global healthcare problem. It is a potentially life-threatening liver infection caused by the Hepatitis B virus (HBV). It is often transmitted via body fluids like blood, semen, and vaginal secretions. It ranks among the top 10 causes of death, being responsible for around 1 million deaths every year. Despite the availability of a highly efficient vaccine and potent antiviral agents, HBV infection still remains a significant clinical problem, particularly in those high endemicity areas where vaccination of large populations has not been possible due to economic reasons. India is considered as an intermediate endemic country with 4-7% HBV prevalence indicating that there are about 40 million HBV carriers in the country. HBV prevalence in India is as high as 60% in the Jarawa tribe of the Andaman and Nicobar islands. The Lahaul and Spiti is a tribal dominant district of Himachal Pradesh (H.P.) India. Previous studies by ICMR-NIRTH and ICMC Shimla

reported high prevalence of Hepatitis B virus in Spiti valley. Therefore, this study was proposed with following objectives.

Work Done

Blood samples were collected from 800 subjects from different villages of Lahaul and Spiti. ELISA test done and Blood grouping also done by the ICMR-RMRC Field station team.

Future Plan

Collection of remaining blood sample from the field, then processing in the laboratory and final data analysis.

6.2 Completed Study

6.2.1 Study on Reproductive Tract Infection among women in Lahaul & Spiti, Himachal Pradesh

Principal Investigator: Ms Bimla Devi
Co-PIs & Investigators: Dr Kalyan Brat Saha,
Dr Jyothi Bhatt,
Dr. Suyesh Srivastava
Starting date: July 2019
Completion date: April 2021
Funding: (Intramural) ICMR,

Objectives

- To understand the gravity and prevalence of the reproductive tract infection (RTI) and poor hygiene among the reproductive aged women residing in inaccessible, difficult high altitude areas in Lahaul and Spiti region of Himachal Pradesh.

Background

Reproductive tract infections are a major health problem in the developing countries as well as in India. India is one of the populous country with diverse population reporting one among four women in the reproductive age group has any one type of reproductive tract infection (RTI) with an annual incidence of RTI as approximately 5%. The tribal population is more vulnerable to such infections because of



their educational backwardness, belief system, cultural practices, poverty, place of residence in difficult terrains, geoclimatic conditions and scarcity of health facilities. District Lahaul & Spiti (L&S) in Himachal Pradesh provides an ideal situation for exploring the RTI. The district is located in high-altitude areas of Himachal Pradesh where 85% of the population is tribe. Due to heavy and frequent snowfall in the area the roads get close down for almost six months every year. Scarcity of water for domestic purpose particularly during winter when temperature falls below freezing point may also set off poor personal hygienic practices and this in turn may enhance RTI.

Result and Conclusion

Women of reproductive aged group 15-49 years were screened through reported symptoms followed by laboratory investigations of their vaginal swabs. Preliminary investigation revealed that around 49% of the women reported one or the other symptoms of RTI during two-three months preceding the survey. Most of the symptoms as reported were related to discharge. Knowledge on suspected symptoms of RTI was assessed by probing suspected symptoms and it was found that only 32% women were able to mention one or the other symptoms of RTI. Regarding routes of transmission of RTI, a higher proportion of women believed that RTI is transmissible (69%), among them 68% attributed to sexual intercourse followed by sharing of clothes (37%), using common toilets (34%) and sharing of needles (11%).

6.2.2 Knowledge attitude and practices based screening of Non- Communicable Diseases (NCDs) in Rural Villages of District of Gorakhpur in Uttar Pradesh

Principal Investigator: Ms Bimla Devi
Co-PIs & Investigators: H Deval, G Yadav

Starting date: July 2021
Completion date: October 2021
Funding: (Intramural) ICMR,

Objectives

- To assess the knowledge and health seeking behaviour on Non-Communicable Diseases (NCDs) among the rural community
- To assess the risk factors associated with NCDs
- To develop intervention strategies to overcome the burden of NCDs in the study sites

Background

Non-communicable diseases are the serious public health concern in worldwide particularly in India. According to the WHO non-communicable diseases (NCDs) represent the major challenge to global development in 21st century. NCDs are the leading cause of death in the South-East Asia Region. Each year, an estimated 7.9 million lives are lost due to NCDs, accounting for 55% of all deaths in the Region. India is experiencing a rapid health transition with a rising burden of NCDs. Cardiovascular diseases are the most frequent cause of NCDs deaths followed by chronic respiratory diseases, cancers, and diabetes in India. NCDs control activities get defeated in rural areas due to locations of the villages in difficult terrains and forest areas, lack of awareness and mass illiteracy, misconception on the disease transmission, non availability of health workers or they are not properly equipped coupled with strong uprising problem. This makes NCDs control in the area a challenging affair.

Result and Conclusion

A total 540 rural community members from Health Demographic Surveillance Site (HDSS) villages spread across 28 villages in Gorakhpur



district was covered. It has been found that the awareness related to non-communicable diseases among rural areas was low and people were suffering from NCDs problems such as diabetes/sugar, BP, cancers and cardiovascular diseases.

6.2.3 Understanding the perspective and coping strategy for recently emerged COVID-19: An exploratory study in tribal population of Himachal Pradesh and Madhya Pradesh

Principal Investigator: Dr Kalyan Brat Saha

Co-PIs & Investigators: Ms B Devi

Starting date: April 2021

Completion date: October 2021

Funding: (Extramural) ICMR,

Objectives

- To understand the challenges faced by frontline workers in understanding COVID-19 related control activities in remote tribal areas.
- To study the operational issues faced in collection, transportation & laboratory testing of samples related to COVID 19 and the challenges faced by frontline workers in undertaking COVID -19 related control activities in remote tribal areas.
- To study the level of awareness and the preventive guidelines, perception, misconception, stigma, discrimination in different section of the population including the recovered patients on the recent corona virus outbreak

Background

COVID-19 pandemic has wreaked havoc and is creating confusion, panic and anxiety among

people all over the world. This fear is further fuelled due to infection control techniques and restrictive practices. The unpredictable future of this epidemic has been exacerbated by myths and misinformation, often driven by erroneous news reports and the public's misunderstanding of health messages. During this stressful time for the people and communities, fear and anxiety about a disease can lead to social stigma toward people, places, or things. The study results will help in designing mitigation strategy to manage the COVID-19 cases better.

Result and Conclusion

Covid- 19 pandemic has wreaked havoc and is creating confusion, panic and anxiety among people all over the world. No such systematic information is available from the tribal areas. The study involves both qualitative and quantitative technique for data collection. There is a paucity of trained service providers including health infrastructure in the four tribal areas. Overall, the awareness of COVID- 19 in lahual and spiti was better. About 76 % of the respondents were reported to have awareness of the place of diagnosis and treatment for Covid. Overall, 47% reported viewing of television, followed by involving in music, dance and other cultural activities (44%) during lockdown period. To cope up with economic crisis they mainly used their personal savings. Further there was existed misconception related to ideology of transmission of the infection in all the tribal regions considered in the study.



6.3 Publications

1. Sharma RK, Shukla MK, Minhas N, Barde PV. Seroprevalence and risk factors of hepatitis B virus infection in tribal population of Himalayan district Lahaul and Spiti, India. *Pathogen & Global Health*. 2019;113(6):263-7.
2. Minhas N, Shukla M, Sharma DD, Subramaniam RS. Sickle cell anaemia and G6PD deficiency in Lahaul&Spiti district of Himachal Pradesh. *Indian J Med Res* 2019 (accepted)
3. Saha, Kalyan & Sharma, Ravendra & Parihar, Bandhu & Devi, Bimla & Verma, Arvind & Shrivastava, Suyesh. (2021). Reproductive tract infection among the women of high-altitude areas of Lahaul and Spiti District of Himachal Pradesh, India. *International Journal of Community Medicine and Public Health*. 8. 1904.
4. Singh, S., Saxena, S.S., Saxena, N (2022). Indigenous populations, ethnomedicine and sustainability: The Indian perspective. *People and Nature: Insights for Social, Ecological and Technological sustainability*. Elsevier.

6.4 Events and activities

Republic Day 2022



IEC- activities-against-COVID-19



ICMR RMRC FS Keylong staff participated in Fit India Freedom Run 2.0 with full enthusiasm.



ICMR Field Station Keylong participated in Reuters coverage of Komic village in Spiti valley for being the highest village with a hundred percent Covid vaccination



Blood sample collection work for Hepatitis-B and Anemia in Spiti block



Celebration of ICMR-RMRC Gkp 3rd Foundation Day at Field Station Keylong.



World Indigenous People Day Celebration

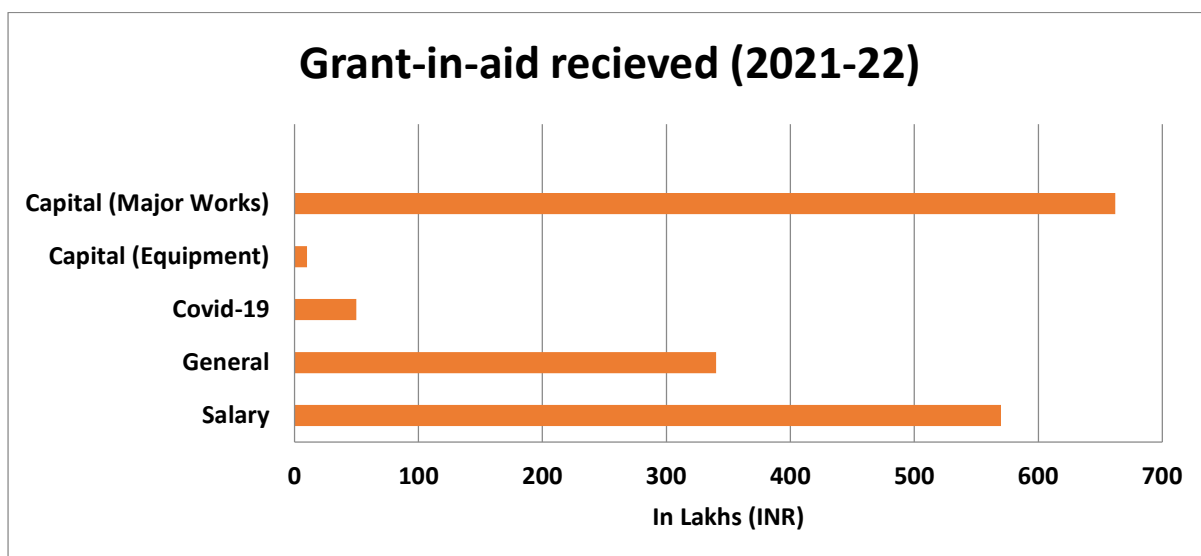


Handing and Taking over of administrative control at field Station Keylong



Expert Group Meeting to discuss the ongoing activities of Keylong field station and its future road map on 14th, July 2021 at Deputy Commissioner's office Keylong.





Grant-in -aid received by ICMR-RMRC, Gorakhpur during financial year 2021-2022



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Special Invitee

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Former Joint Director,
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- Dr. R. S. Sharma**
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NVBDCP, Govt. of India



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9

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