

## Innovation Report

# COVID-19 pandemic: opportunities and challenges for microbiologists in Nepal

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**Abstract:** Coronavirus disease-19 (COVID-19) has affected global population with high morbidity and mortality in short period of time. After the report of first case of COVID-19 in 23 January 2020, it took almost two months for the report of other cases and since then cases are rising rapidly. The ongoing outbreak presents many public health management challenges due to limited understanding of risk factors for infection and transmission, pathogenesis and effective preventive measures, as well as limited options of laboratory diagnosis. Government of Nepal, Ministry of Health and Population has requested Tribhuvan University, Central Department of Microbiology to provide technical support to COVID-19 case diagnosis. Accordingly, till the date the department has technically supported to establish four diagnostic laboratories and trained laboratory personnel for detecting SARS-CoV-2 using Real Time PCR. In order to aware authorities, scientific community and general people, the faculties of the department disseminated updated knowledge on current pandemic through series of media interviews. However, due to lack of recognition as health worker for Microbiology graduates of the department, they could not participate in the routine diagnosis of patient in the laboratory. If granted the license, they can utilize their full potential for infectious disease control to support health sector. Therefore, it is essential to use microbiologist from Tribhuvan University for strengthening the laboratory capacity at Provincial, Municipal and National level to mitigate the present crisis of COVID -19 from Nepal.

**Keywords:** control, diagnosis, infectious disease, license, Microbiologists

### 1. Introduction and Objectives

Central Department of Microbiology, one of the first centres of excellence, conducting advanced level Microbiology education in the country was established in 1990 under Institute of Science and Technology (IOST) at Tribhuvan University, Kirtipur, Kathmandu. Since its inception, the department is offering Master's and Ph.D. degree courses in Microbiology. Since its establishment, department has produced more than 600 Masters graduate and more than 7 doctoral level graduates with almost 30 graduates completing masters and a doctoral graduate every year. The department is enriched with highly qualified, skillful and competitive faculty members having specializations in various arenas of microbiology including medical, public health, biotechnology, environmental, food and agriculture microbiology. The department from its beginning has

been conducting research on numerous fields of microbiology, for example quality of foods and food products, water and wastewater, agriculture and phyto-pathogens, medical and health microbiology particularly in vector borne diseases, vaccines, and many more. The department has extended its activities to laboratory capacity assessment and strengthening, conducting trainings in quality assurance systems, conducting training on malaria microscopy, assessment of antimicrobial use and resistance status in the country, malaria research in collaboration with the different agencies of the Government, UN agencies and world class universities. The department has made significant contribution in updating research knowledge and application with high number of article publications - almost 30 per year in national and international journals.

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The current pandemic Coronavirus disease-19 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus - 2 (SARS CoV-2) has created unprecedented situation affecting global population with high morbidity and mortality in short period of time. The outbreak has challenged public health management in many ways. There is limited understanding of viral pathogenesis, risk factors for infection and transmission, natural history of disease and effective preventive measures and containment interventions. Since the disease is new, there are limited options for laboratory diagnosis. As an important microbiology academia, Central Department of Microbiology has resources and expertise in Virology. The department objects to support the country and society in this pandemic condition with every possible technical support. Herein we summarize the departmental activities supporting the national interest to control the pandemic disease COVID-19.

## **2. Activities of Central Department of Microbiology, Tribhuvan University for Combating COVID-19**

The faculty members of the Central Department of Microbiology, Tribhuvan University participated in national and provincial efforts to control COVID-19 in different capacities. A team of faculties and microbiologists from the department were involved in collection of blood samples from the people in quarantine from Kailali and Kanchanpur districts. The team provided technical support to set up COVID-19 diagnostic real time PCR laboratories in four diagnostic centers/hospitals namely- Karnali Province Surkhet, province 5 Bhairahawa, TU Teaching Hospital and province 2 Janakpur. Recently, the “Interim Guideline for COVID-19 Testing in Nepal” has proudly recognized M.Sc. medical microbiology graduates as a human resource for conducting real time PCR test for SARS-CoV-2 diagnosis. We are expecting significant contributions by the graduates in days ahead.

The COVID-19 is newly emerged disease with limited textbook knowledge. This created a lot of havocs and misinformation regarding the etiology, transmission, prognosis, diagnosis and containment. Central Department of Microbiology and its faculties became credible source of scientific information on COVID-19. Most of televisions, newspapers and electronic media consulted faculties of Central Department of Microbiology, Tribhuvan University and microbiologists to aware people on coronavirus (SARS-CoV-2).

### **2.1. Collection of blood samples to investigate coronavirus infection in Kailali and Kanchanpur districts**

With the request from Nepal Health Research Council (NHRC) and National Public Health Laboratory (NPHL) on 9 April, 2020 to provide microbiologists for blood sample collection and testing, team of 4 microbiologists visited Kailali and Kanchanpur and collected blood samples to validate RDT kit for detection of SARS-CoV-2 infection.



**Figure 1.** Microbiologists in personal protective equipment (PPE) to collect samples for COVID-19 detection

### **2.2 Team of Central Department of Microbiology, Tribhuvan University to set up COVID-19 Diagnostic Laboratory**

A team of Central Department of Microbiology comprised of two faculties and two microbiologists from visited Surkhet in request of Provincial Government, Karnali Province to Tribhuvan University to set up COVID-19 diagnosis real time PCR laboratory. The team supported the provincial hospital to set up laboratory with biosafety, trained 9 laboratory technologists/technicians on RNA extraction from swab samples, reagent preparation, performing real time PCR and interpreting the test results.

Similarly, Province 5 government requested the department to support in setting SARS-CoV-2 diagnosis laboratory. PhD students from Central Department of Microbiology, Tribhuvan University set the laboratory and trained lab technologists and technicians for diagnosing SARS-CoV-2 using real time PCR and safety precautions.

A team of faculties and microbiologists from Central Department of Microbiology supported to set up real time PCR laboratory in TU Teaching Hospital to diagnose SARS-CoV-2 infection.



**Figure 2.** SARS-CoV-2 diagnostic lab. set up in Surkhet

A team of microbiologists also supported in setting up real time PCR laboratory in province-2 Janakpur.

### **3. Challenges Encountered and Lessons Learned**

The main challenges include the lack of appropriate research infrastructure and proper recognition of the potential health laboratory service human resources. There is no Bio-Safety Level-3 and plus laboratories in the country to pursue the research for drugs and vaccines for such virulent and contagious virus including SARS-CoV-2. The department is missing tremendous research opportunity and

possible contribution in current and future pandemics. Despite the knowledge, skill and the degree, medical microbiology graduates of the department have not been yet formally defined as the professional health worker by the Government of Nepal. There is no license from respective council to microbiologists to work as a health worker for diagnosing infectious diseases. Our graduate Microbiologists have sufficient knowledge, skills and capacities, and can contribute to infectious diseases diagnosis including use of molecular tools and techniques in the country if opportunities provided to them.

### **4. Future Works and Way Forward**

Microbiology graduates from Institute of Science and Technology, Tribhuvan University should be recognized by the government and opportunities should be provided to work them in the country in the diagnosis and control of infectious diseases. Considering the need of continuous research on highly contagious emerging microbial infections, sufficient funds should be allocated to establish sophisticated microbiology laboratories in particular a Virology laboratory at the department.

**Author Contributions:** All three authors contribute to write the manuscript.

**Conflicts of Interest:** None

#### **Declarations:**

**i. Ethical approval and consent to participate.** Please write which category does your research falls.

Not applicable.

**ii. Availability of data and materials.**

Data sharing not applicable as article does not include generation and analysis of data.

**iii. Funding**

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