

## COVID-19 : the importance of peripheral actors

Based on the pasteurian values they all share, the Pasteur Network members are still engaged with many countries and their population worldwide. In this issue, we present some examples of the COVID-19 activities implemented within the projects Ecomore 2, REPAIR, AFROSCREEN et « Monitoring of SARS-CoV-2 in wastewater».



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## SPOTLIGHT



## The role of social sciences in the response to an epidemic: the example of the COVID-19 pandemic

**A lesser known but equally crucial dimension in managing and responding to an epidemic is social sciences in health, which can shed light on populations' understanding, perception and acceptance of the risks associated with diseases. The COVID-19 pandemic is no exception. As the disease spread across the planet, clear differences in perception by populations were observed in different countries, creating fertile ground for investigation for researchers specializing in social sciences applied to health.**

**S**ocial sciences are a series of academic disciplines (anthropology, sociology, communication, economics, etc.) whose common thread is the study of human societies and social interactions between individuals, groups and their environments.

During the Ebola epidemic in 2015, healthcare procedures and safe burial management went against certain cultural and religious practices, creating very high levels of mistrust among populations regarding healthcare interventions and those responsible for them. Social sciences in health became an essential factor in the successful management of the Ebola epidemic: research into the

perception and degree of acceptability of certain treatments and practices by a given population was used as a basis for dialog with the aim of organizing the most appropriate response to specific needs and contexts.

### THE IMPORTANCE OF GIVING POPULATION GROUPS A SAY IN THEIR PERCEPTIONS OF THE COVID-19 EPIDEMIC

For the past twenty years, researchers in social sciences have been looking into issues related to epidemic preparedness and response (especially perceptions: of disease, testing, social distancing measures and vaccination, the impact of misinformation or rumors, etc.) and providing support to health authorities in developing responses to potential disease outbreaks. Initial research focused on social issues related to people with HIV: perception, stigmatization, adherence to treatment, etc.

Studies in the area of social sciences in health are mainly carried out nationwide, but it can be worthwhile expanding their scope to a larger scale. The aim of the REPAIR program (International Pasteurian Research Program in Response to Coronavirus in Africa) conducted since

2020 in 10 African institutes in the Pasteur Network is to improve understanding of SARS-CoV-2 circulation on the African continent. The social sciences part of the project particularly focuses on testing and the way in which it is understood and experienced by three categories of people in four countries: healthcare professionals, individuals who have been tested and the general population.

The REPAIR project applies the same research protocol to four members of the Pasteur Network (Côte d'Ivoire, Madagascar, Niger and Tunisia) with different environments and political, epidemiological and cultural contexts, with the aim of performing a comparative socio-anthropological study.

«It is crucial to have a common framework within which to draft guidelines for health authorities, but we have given ourselves a degree of flexibility to take account of national particularities » explains Dr. Chiarella Mattern, Head of the Health and Social Sciences group within the Epidemiology and Clinical Research Unit at the Institut Pasteur de Madagascar in charge of the social sciences component of the REPAIR project.

*Social sciences have been looking into issues related to epidemic preparedness & response and providing support to health authorities in developing responses to potential disease outbreaks.*

The aim of the study is to collect qualitative data through in-depth interviews with those affected by the issues at hand.

Each institute (CERMES Niger, Institut Pasteur de Côte d'Ivoire, Institut Pasteur de Madagascar and Institut Pasteur de Tunis) interviewed three groups of people: healthcare workers, people who had been tested, and the general population. Healthcare workers shared their experience of COVID-19, healthcare practices, difficulties encountered in tackling the disease, vaccination and the impact of the epidemic on their daily lives. People who had been tested spoke about their understanding and perception of testing. The interviews with the general population will provide data on knowledge about COVID-19, the application and practice of screening, and experiences of the preventive measures introduced by the different governments.

The Institut Pasteur de Madagascar, the Institut Pasteur de Côte d'Ivoire and the Institut Pasteur de Tunis have now finished gathering data and are in the data entry phase. CERMES Niger is slightly further ahead and is drafting an initial report.

These data can only be fully understood

when seen within the respective national contexts of the epidemic. Each of the four institutes has therefore agreed to produce a timeline of major events (border closures, dates of lockdowns, etc.), compiled using press reviews and an analysis of speeches by health authorities. All the results will be published in summer 2022.

### THE FIRST NETWORK FOR SOCIAL SCIENCES IN HEALTH IN THE PASTEUR NETWORK

Just two institutes in the Pasteur Network have a structured team in social sciences applied to health: the Institut Pasteur in Paris and the Institut Pasteur de Madagascar. Over the past ten years, several research projects in health humanities have been developed within the Pasteur Network, touching on a wide variety of topics: maternal and infant health, infectious diseases, etc.

The REPAIR project, which has a dedicated social sciences component, has provided an opportunity to formalize this working framework. It is crucial that all health humanities researchers, most of whom are isolated in their countries, can get to know their counterparts in the

Pasteur Network and develop a network of expertise.

Initially, the aim is to identify key people, to determine individual needs (training, networking, etc.) and to share experiences (research topics, funding bodies, partners, methodologies used). On this basis, the idea is then to form a structured network of researchers in social sciences applied to health within the Pasteur Network, so as to boost opportunities to develop research by fostering a stimulating environment for scientific dialog on shared research questions.

«In recent years, the outbreaks of Ebola, plague in Madagascar in 2017, and COVID-19 have highlighted the importance of our discipline in terms of preparedness and response to the social dimensions of epidemics, especially the need to analyze the factors governing the success or failure of public health interventions and to analyze rumors and the demand for care. Given the impact that individual health-related behaviors can have on the success of public health interventions, it is crucial to incorporate anthropological research into work on epidemic preparedness and response, and in health research in general,» concludes Dr. Mattern. •



## Zoom on the Health & Social Sciences team at Institut Pasteur de Madagascar

Dr Chiarella Mattern

Head of Health & Social Sciences team, Epidemiology and clinical research Unit  
Institut Pasteur de Madagascar

The Health & Social Sciences team based within the Epidemiology and Clinical Research Unit of the Institut Pasteur of Madagascar presents the only national expertise in terms of anthropological health research in Madagascar. Since its development in 2012, 16 research projects have been conducted in the field of maternal and child health, infectious diseases and epidemic preparedness and response.

The mission of the team, which consists of 27 people, is to contribute to the improvement of the health and

well-being of populations through research in the field of health socio-anthropology. The research carried out by the team focuses on themes of interest to the populations and in an integrative and multidisciplinary approach.

Strong interaction through collaborative or training activities with Malagasy and Indian Ocean region institutions is one of the team's priorities. The knowledge transfer approach is adopted by a majority of the projects, to ensure the impact of the research conducted by the team.



## COVERAGE



## Monitoring and early warning: Pasteur Center in Cameroon plays an active role in the response to the COVID-19

**As a first-line laboratory in the event of a health emergency, the Pasteur Center in Cameroon was naturally designated as a COVID-19 reference laboratory by the Cameroon health authorities in 2020. How did the Pasteur Center in Cameroon organize its response to this emerging novel virus at national level throughout the epidemic, and how is it monitoring the virus today?**

**A**t the beginning of the COVID-19 pandemic, the Pasteur Center in Cameroon was mandated by the Cameroon Ministry of Public Health to establish and decentralize molecular diagnostics (RT-PCR) for SARS-CoV-2.

With emergency funding from the French Development Agency (AFD), the Pasteur Center in Cameroon was able to mobilize and train up additional staff and also to acquire equipment, reagents and consumables to deal with the high numbers of samples. At regional level, the Institut Pasteur de Dakar, in its mission as a COVID-19 reference laboratory for the World Health Organization (WHO), worked with the Pasteur Center in Cameroon to train staff, perform quality control and sequence the first cases, which was crucial at the start of the outbreak to help them prepare and respond to the pandemic.

### SCALING UP VIROLOGICAL SURVEILLANCE TO SHED LIGHT ON THE IMPACT OF THE NOVEL VIRUS

Decentralization to peripheral laboratories was essential to gain a more detailed understanding of the epidemic. A total of 17 laboratories located in 9 of the country's

10 regions were identified and provided with training and equipment to perform molecular diagnostics for COVID-19. To this end, a questionnaire was sent out in advance to the potential laboratories. On-site visits were then conducted to verify the biosafety level and the availability of molecular biology equipment. Experts from the Pasteur Center in Cameroon subsequently organized on-site cascade training in molecular diagnostics for COVID-19.

To monitor how the virus was circulating in these nine regions, the laboratories in the network also had to be provided with IT equipment and an internet connection. Using data-sharing software developed by the Pasteur Center in Cameroon, the 17 laboratories were able to share their data centrally in real time throughout the epidemic.

«In Cameroon, the situation regarding the COVID-19 epidemic is identical to that in the other countries in Sub-Saharan Africa: the number of confirmed cases of SARS-CoV-2 infection is low, but this is probably an under-estimation,» explains Prof. Richard Njoum, Head of the Virology Department.

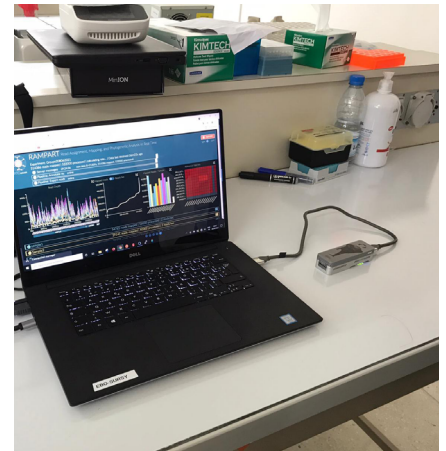
To gain a better idea of the impact of the

pandemic and monitor the development of SARS-CoV-2 on the African continent, the Pasteur Center in Cameroon is taking part in the collaborative research program REPAIR, launched with all the African member institutes in the Pasteur Network.

### DEVELOPING A BETTER UNDERSTANDING OF SARS-COV-2 CIRCULATION

The research carried out in connection with the REPAIR program (International Pasteurian Research Program in Response to Coronavirus in Africa) touches on a variety of fields, including the development and evaluation of diagnostic tests, molecular epidemiology studies of the virus and mathematical modeling of its spread.

«At the Pasteur Center in Cameroon, we developed a colorimetric LAMP assay that is easy to use in the field. The assay is currently under evaluation in Cameroon and in the other REPAIR project partner countries,» says Prof. Richard Njoum. «By developing an extensive network for COVID-19 molecular diagnostics, through decentralization and the development of easy-to-use rapid diagnostic tests, we were able to focus on monitoring variants that arrived in the country.»



## SEQUENCING, A KEY TOOL FOR MONITORING VARIANTS

Sequencing is currently an essential technique for studying the spread of SARS-CoV-2 over time and space and pinpointing the emergence of potentially dangerous variants. But this technique requires additional equipment and also staff with training in biotechnology, which excludes many laboratories. When variants began to emerge in 2021, the Pasteur Center in Cameroon enjoyed the support of the Institut Pasteur de Dakar, which sequenced all the samples sent. But the time lag between sending samples and receiving results prevented the center from being sufficiently responsive as the epidemic was developing. The Institut Pasteur in Paris equipped the virology laboratory with a MinION sequencer which could be used to analyze the viral genome.

«This enabled us to introduce genomic monitoring in January 2021, which led to the sequencing of 116 whole genomes and approximately 800 partial sequences of SARS-CoV-2. The results we obtained confirmed the circulation of the Alpha, Beta and Delta variants and very recently the Omicron variant in the country,» reports Prof. Richard Njouom.

The MinION is very easy to use but cannot sequence large numbers of genomes. That was where AFROSCREEN came in, a project that aims to strengthen the SARS-CoV-2 genome sequencing capabilities of 25 laboratories in 13

Sub-Saharan African countries. AFROSCREEN will involve new equipment including an Illumina sequencer, training, and epidemiology and public health studies.

«We hope that the AFROSCREEN network will enable us to ramp up our sequencing effort. The other advantage of being part of such a large network, with laboratories in 13 African countries, is the opportunity to share knowledge and data,» explains Prof. Njouom. «The Pasteur Center in Cameroon has deposited approximately 200 SARS-CoV-2 nucleotide sequences circulating in Cameroon in the GISAID open-access database, making it possible for the entire international scientific community to monitor and gain a better insight into how the virus is circulating in the region.»

## MONITORING SARS-COV-2 IN WASTEWATER

Diagnostics and sequencing based on human populations provides an imperfect picture of the real dynamics of COVID-19 infection, which is why modeling is so important to obtain predictions and anticipate new waves. But this modeling capability is still lacking in many developing countries.

Alternative epidemiological approaches therefore need to be developed. Searching for SARS-CoV-2 and its variants in wastewater could generate additional reliable data and provide a warning signal ahead of an actual wave of infection.

To this end, the Pasteur Center in Cameroon, which already monitors the polio virus in wastewater, is involved in the new project «Monitoring SARS-CoV-2 in wastewater,» funded by the AFD. The project, coordinated by the Institut Pasteur in Paris in partnership with the Obépine network, will be launched in developing countries in the first half of 2022.

The project will begin with a design and preparation phase, with scientific outreach and exchanges between experts and institutions in the countries (to date, 11 countries have expressed an interest in taking part). A second operational rollout phase for wastewater monitoring will then be implemented in a smaller number of countries that satisfy the conditions identified in phase 1.

«Monitoring SARS-CoV-2 in wastewater will enable us to model virus circulation. Since we have fallen behind in vaccinating the population, it is vital for us to be able to alert the health authorities in advance of an outbreak so that they can impose more effective temporary preventive measures,» concludes Prof. Richard Njouom. ●

### Obépine Network

The [Obépine network](#) is a French epidemiological observatory launched as part of a comprehensive plan to tackle COVID-19. It promotes the use of wastewater as a quantitative indicator of the different phases of an epidemic caused by a bacterium or virus.



## SPOTLIGHT

# The importance of a decentralized diagnostic system: another example of successful implementation in Viet Nam

**Viet Nam is one of the countries that could set an example in terms of epidemic management. Social measures, decentralization of diagnosis, sequencing, vaccination, all the cogs of a response to the epidemic have been successfully put in place, even if Viet Nam today has many confirmed cases.**



Viet Nam has experienced a specific COVID-19 epidemic than other parts of the world. Indeed, the country was spared all year 2020 thanks to lockdown and strict social measures. The first wave of outbreak with the delta variant started in June 2021, when the sequencing of the virus was known, and vaccines began to be

available. As soon as the first case appeared in the Ho Chi Minh region, the epidemic spread at an exponential rate reaching in January 2022 nearly 2 million confirmed cases. With all the same mandate to fight COVID-19 pandemic, the country's three national reference laboratories (one per region), namely the National Institute of Hygiene and Epidemiology, the Institut Pasteur de Nha Trang and the Institut Pasteur d'Ho Chi Minh have therefore seen the increasing number of tests flow in very little of time.

"When the tests came in droves, we were analyzing an average of 5,000 samples per day, we had no time to devote ourselves to other activities such as epidemiological studies or sequencing for example. Therefore, it was quickly decided, with the national health authorities, to train peripheral public laboratories as well as those of public and private hospitals in the regions," explains Tran Thi Mai Hung, Deputy head of Planning and International Cooperation Department of the National Institute of Hygiene and Epidemiology.

## DECENTRALIZE SARS-COV-2 DIAGNOSTIC CAPABILITIES TO PERIPHERAL LABORATORIES

Thanks to the COVID-19 emergency funding set up by Agence française de développement (AFD) as part of the Ecomore II project, the National Institute of Hygiene and Epidemiology (NIHE) has therefore developed face-to-face training on the SARS-CoV-2 diagnosis, as well as sample collection and transport.

"We decided to provide a training-of-trainers, that means that we trained managers who in turn trained their teams in their laboratories. To ensure the quality of the analyses, we then

carried out quality controls in each of the laboratories. Laboratories that have passed their quality control have been awarded a certification allowing them to analyze the samples," explains Dr Tong Thi Ha, deputy director of the NIHE training and science management center.

In total, 204 laboratories were trained across the country in one year by the three national reference laboratories. Nearly 300 people have been trained by NIHE only in the North region and the hinterland alone. In comparison, at the same period Lao PDR had 3 laboratories trained in COVID-19 diagnosis and the Philippines had 157 laboratories. Viet Nam has therefore succeeded in quickly setting up a very fine network of laboratories capable of reporting epidemiological data from diagnosis

## SEQUENCING AND VACCINATION: NEW CHALLENGES ADDRESSED BY NATIONAL REFERENCE LABORATORIES

The decentralization of tests to peripheral laboratories has enabled the three national reference laboratories to carry out other activities such as sequencing, vaccination and conducting epidemiological studies on SARS-CoV-2.

The National Institute of Hygiene and Epidemiology, the Institut Pasteur de Nha Trang and the Institut Pasteur d'Ho Chi Minh are all equipped with sequencers, necessary high-tech equipment to monitor variants. Therefore, they respectively document the circulation of variants in their region, allowing their national authorities to have a global picture on the whole territory. In January 2022, the Institut Pasteur de Nha Trang detected the first Omicron case in the territory, which has represented, in February 2022, 15% of the circulation of SARS-CoV-2 in Viet Nam.

Arrived late on the territory, the vaccination was started in the fall of 2021 and is still in progress. "Thanks, in particular to the Covax program of Gavi, the Vaccine Alliance and the help of France, we have been able to start large-scale vaccination campaigns in recent months. Currently, 70%\* of the population is vaccinated and we are currently conducting benefit-risk studies to vaccinate children aged 5-11 years. concludes Tran Thi Mai Hung. ●