



Rapid Response Mobile Laboratories (RRMLs): what's in a mobile laboratory?

Unpacking a mobile lab

The Rapid Response Mobile Laboratory (RRML) Network is a core asset of the Global Outbreak Alert and Response Network (GOARN). Mobile laboratories are an essential part of the global health emergency workforce that provides surge capacity aimed at strengthening the preparedness and response of Member States.

RRMLs have been rapidly deployed in a variety of settings such as outbreaks of infectious diseases, during migrant and refugee crises, in the aftermath of natural disasters, and to strengthen national public health systems.

Applying a modular approach, RRML partners bring critical laboratory resources on location and assist in targeted boosting of diagnostic capacities during public health emergencies, especially in hard-to-reach, remote areas.

Mobile labs include diagnostic modules to support national preparedness activities including during mass gatherings, training of local technical personnel, and in field research settings at the intersection with zoonotic diseases.

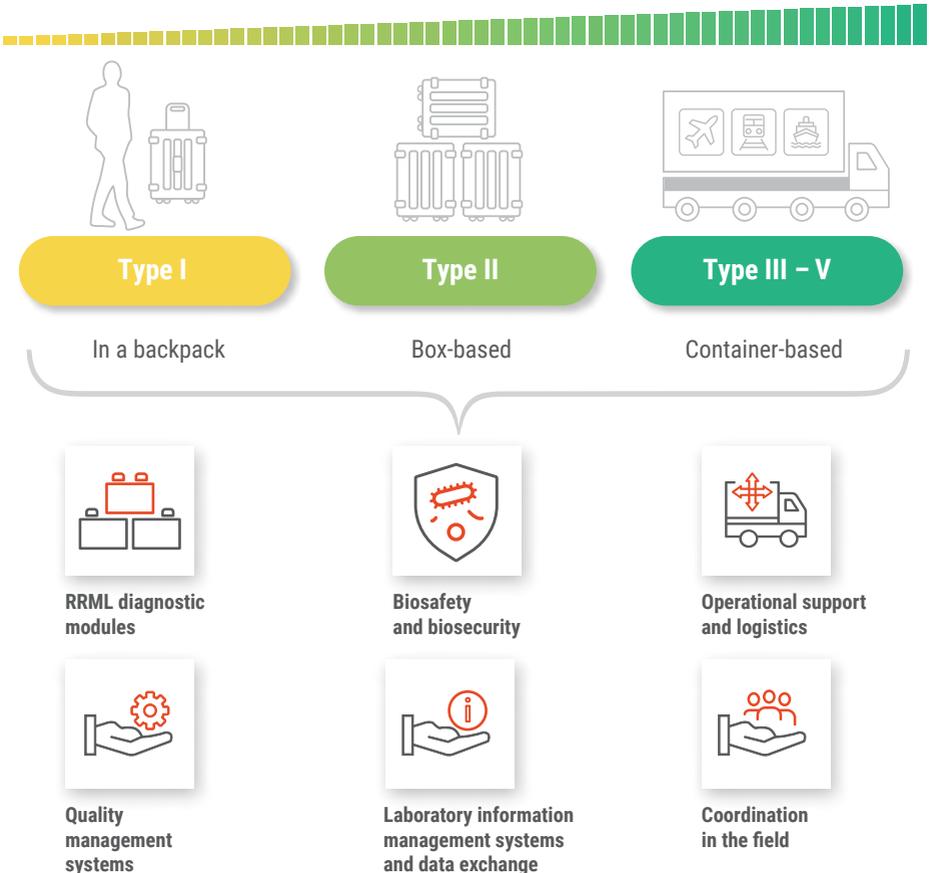


Type I RRML for on-the-spot investigation of environmental samples

RRML classification based on capability and self-sufficiency

WHO *Guidance for rapid response mobile laboratory (RRML) classification*¹ outlines different types of mobile labs to serve communities during emergencies. Each type is clearly defined and features increasing levels of capability and self-sufficiency to support a predictable yet flexible response.

Based on RRML Minimum Standards, each lab type develops and uses specific procedures to cover any additional needs, working with a wide network of partners to minimize reliance on the host country for assistance or additional resources.

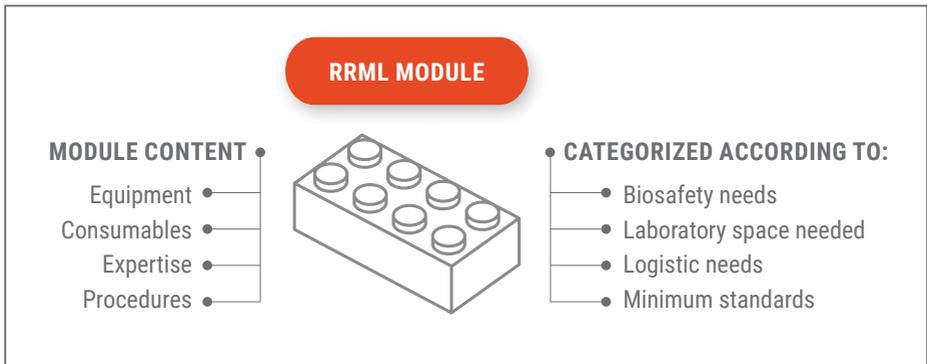


¹ Guidance for rapid response mobile laboratory (RRML) classification. Copenhagen: WHO Regional Office for Europe; 2021. (<https://apps.who.int/iris/handle/10665/339845>, accessed 3 September 2022). License: CC BY-NC-SA 3.0 IGO

Modular content for a tailored response

RRMLs are comprised of individual diagnostic modules, consisting of sets of equipment, procedures, consumables and expertise, tailored to accomplish the goals of the mission.

This approach allows for a customized, high-quality and needs-based response in the field, while facilitating scalable and adaptable deployments. For host countries, this means RRMLs are rapidly deployed and made to measure, keeping in mind the local context.



Equipment and consumables :

- Standardized
- Calibrated
- High quality
- Validated as per RRML minimum standards

Expertise and procedures:

- Expertise in diagnostic procedures and evaluation
- Staff trained in procedures and deployments as per RRML minimum standards

RRMLs adopt the One Health approach

Clinical



Clinical diagnostic

Blood count, urine testing



Bacterial

Bacteria growth, polymerase chain reaction (PCR), microscopy

Research



Environmental research

PCR, sequencing



Surveillance zoonotic pathogen

PCR, sequencing

Public health



Pathogen diagnostic

PCR, antigen detection rapid diagnostic test (Ag-RDTs)



Genome analysis

Sequencing



Seroprevalence

enzyme-linked immunoassay, Ag-RDT



Hazard identification

Chemical, biological, radiological, nuclear





Biosafety and biosecurity

RRMLs apply a risk assessment approach to mitigate biosafety and biosecurity risk according to minimum standards. Based on the WHO Laboratory biosafety manual¹ RRML teams conduct a comprehensive bio-risk assessment during the intermission phase of the RRML life cycle and develop standard operating procedures (SOPs) and emergency plans, and train staff.

For each deployment, RRML teams conduct additional risk assessments specific for the deployment context during the Mission specification phase to identify necessary containment equipment and the need to adapt existing SOPs.



Trained experts

- Biosecurity
- Decontamination
- Sample transport



Guided procedures

- Overarching risk assessment
- Biosecurity risk assessment
- Pathogen risk assessment
- Local risk assessment



Containment equipment

- Certified containment
- Safe and robust



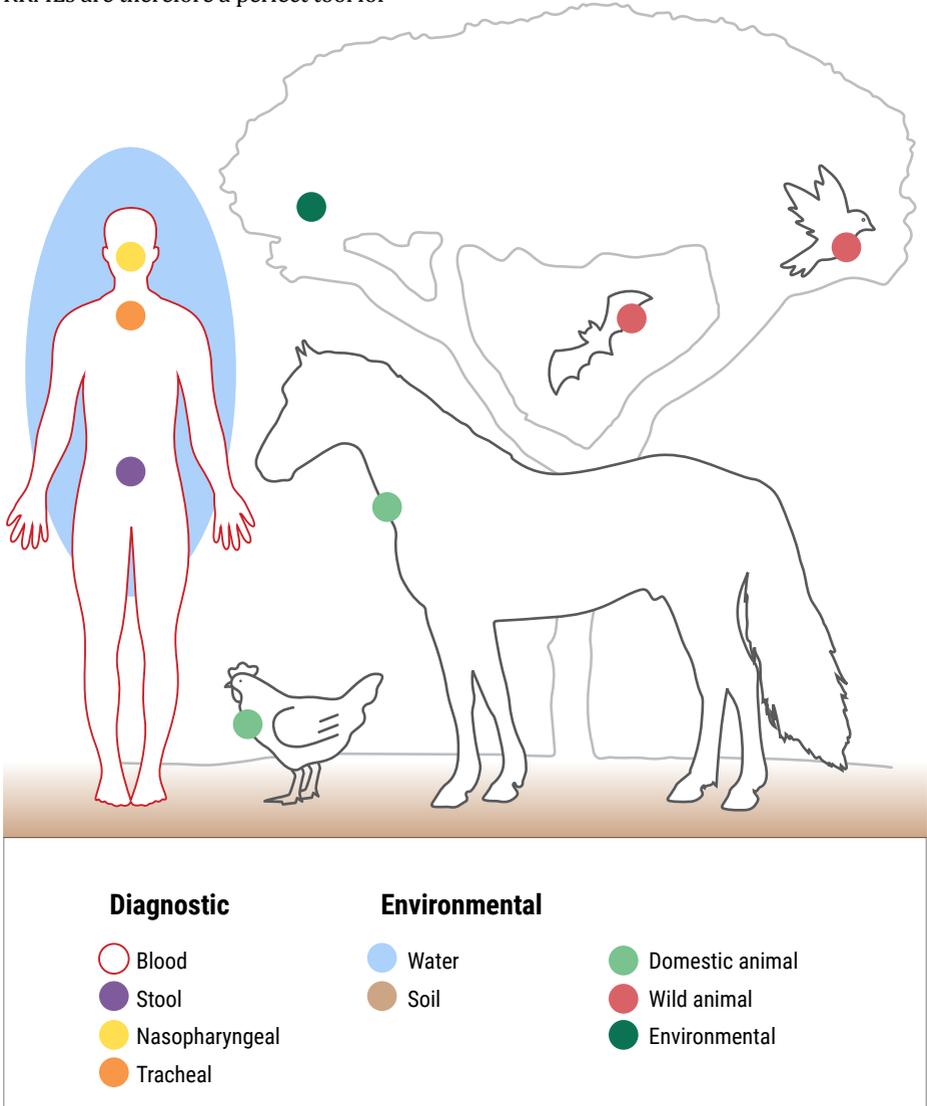
¹ Laboratory biosafety manual, fourth edition. Geneva: World Health Organization; 2020 (<https://www.who.int/publications/i/item/9789240011311>).

Sample analysis

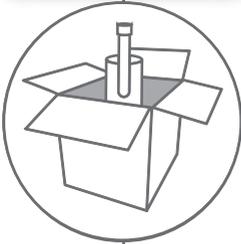
RRMLs can analyse a variety of samples from different sources including human, animal and environmental samples.

RRMLs are therefore a perfect tool for

applying the One Health approach and to support active surveillance in remote areas.

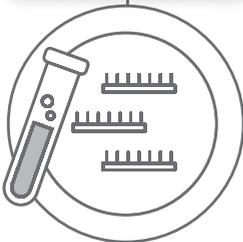


Delivery



- Samples are received according to international transport standards;
- All received samples are documented and assigned with unique identifiers to protect confidentiality;
- RRML staff are trained in international sample shipment.

Processing



- Modularized diagnostic methods follow standardized procedures
- Each module meets the requirements of RRML Minimum Standards.

Reporting



- Results are documented as per established protocols, ensuring confidentiality requirements;
- Standardized procedures allow fast, efficient communication with medical personnel and health authorities.



Laboratory information management system (LIMS)

Using LIMS with standardized functions, RRMLs provide targeted documentation, and sharing and delivery of diagnostic results. RRML procedures support patient treatment and contact tracing with high confidentiality and sharing of results using a needs-based approach.

By documenting and recording an agreed minimum data set, RRMLs ensure a high degree of interoperability between teams and partners in the field.



Benefits of LIMS



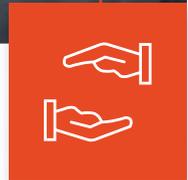
Sample flow tracking



Equipment documentation



Secured communication procedures



Defined responsibilities

Quality management system

Quality management procedures implemented at every stage of the RRML life cycle allow the provision of required diagnostic support at a consistently high quality to affected communities.

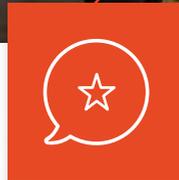
Detailed and precise SOPs, validated diagnostic tests and regular performance evaluation build the basis for high quality support in emergency situations and in remote areas.



SOPs



Internal and external quality assessment



Quality management system experts



Validated diagnostic tests

Operational support and logistics (OSL)

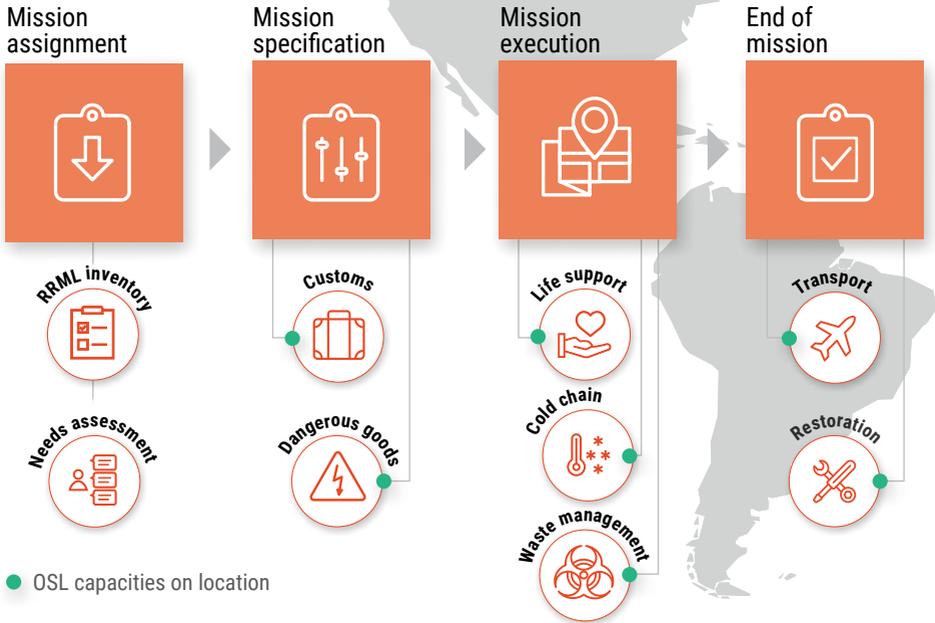
RRMLs are designed to provide targeted support to host communities during emergencies around the world. To ensure fast deployment across the globe, mobile labs work with OSL experts facilitating

the coordinated transport and resupply of equipment and rotation of staff to ensure consistent and uninterrupted support to communities.

RRML modules



Expertise required for deployment

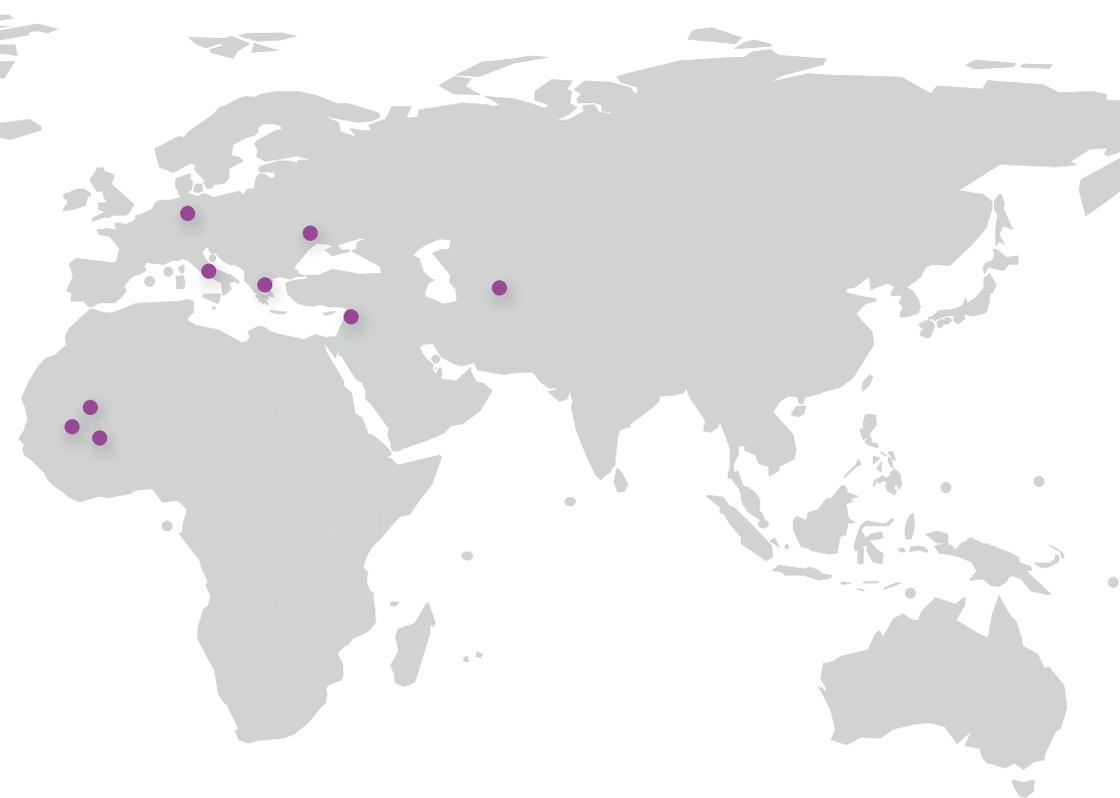


Deployments

Between 2014 and 2022 RRMLs have been deployed to support the response to health emergencies and humanitarian crises in Eurasian and African countries.

RRML have therefore provided diagnostic support in hard-to-reach areas during the 2013–2016 Ebola outbreak and covered peak demands over the course of the COVID-19 pandemic.

In addition, RRMLs have supported Member States experiencing humanitarian crises in the Middle East and eastern Europe, and in pandemic preparedness in Central Asia by providing on the spot training to increase national capacities.

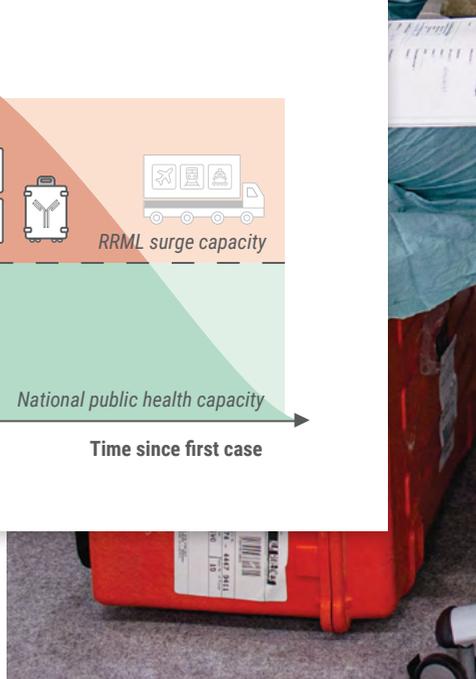
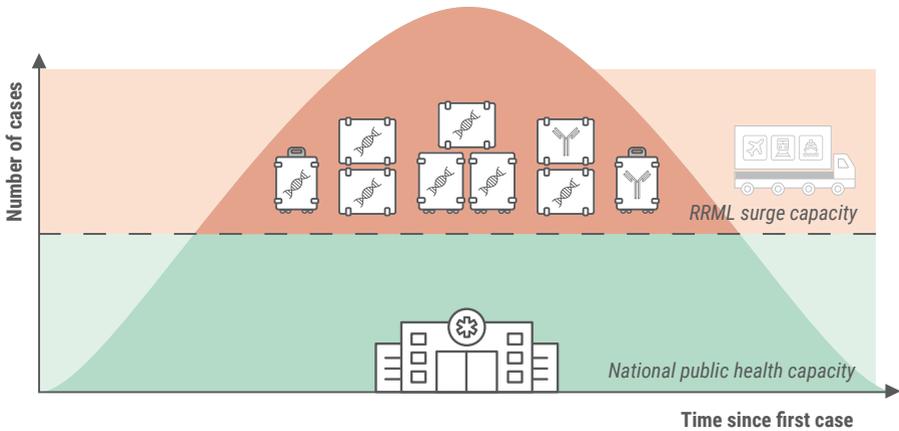


● Deployments 2014–2022

RRML scalability and flexibility

The modular approach adopted by RRMLs allows for a scaled-up response depending on need. Mobile labs are also flexible to adapt to changing emergency contexts, using different modules to support the health emergency workforce if need exceed capacity.

Based on this scalable and flexible application, it is recommended that RRMLs are established at national level as part of public health laboratory systems. Being integrated into the national preparedness and response systems RRMLs will strengthen national, subregional and international public health capacities.





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RRML: What's in a mobile
laboratory? (YouTube)



Guidance on RRML
Classification

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