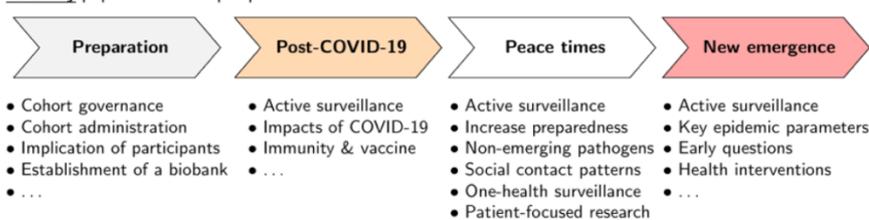


MCID core activity: BEready cohort

Rationale: A cohort study that represents the population of the canton of Bern will collect essential longitudinal data to improve knowledge about existing infectious diseases and preparedness for emerging health threats. The COVID-19 epidemic in 2020-2021 has highlighted that having existing research infrastructure in place allows rapid responses to, and investigation of, emerging health threats. A population-based cohort study will allow ongoing research questions about the COVID-19 epidemic to be answered, from immune responses and levels of exposure to its demographic, social, behavioural and economic determinants. The next pandemic-causing pathogen is not known; it could be respiratory, vector-borne, water-borne, blood-borne or sexually transmitted. Active ongoing contact with our population will provide a platform that can pivot rapidly to launch essential studies when necessary. Experts in pandemic preparedness strongly recommend the establishment of such cohorts¹.

Overall objective: The long-term objective of BEready is to build a common resource for all MCID clusters and will help build synergies between them. BEready plans to enroll approximately 5,000 households, including adults, children and pets, into a population-based cohort. Participants will be characterized both genotypically and phenotypically, with ongoing surveillance for circulating infectious diseases. This research platform will use innovative decentralized data-collection methods, a flexible and novel bioinformatics infrastructure, and a biobank including human and animal (pet) samples. During the different phases of the cohort, driven by the epidemiologic context, a wide range of research activities will be conducted, as shown in Figure 1.

BEready population-based prospective cohort:



During the *preparation phase*, a *pilot study* will be launched to evaluate the acceptability and feasibility of such a research initiative for participants as well as cantonal and national public health authorities.

During the *post-COVID-19 phase*, attention will be focused on the tail of the SARS-CoV-2 pandemic, with population-based surveillance for potential resurgences (including genetic variants), evaluation of the direct and indirect impact of the pandemic on the population's health and living conditions, and monitoring of SARS-CoV-2 immunity and vaccine efficacy. During *peace time*, the focus will be on the surveillance for, and study of, a wide range of infectious diseases, providing a unique opportunity to collect data on transmission patterns of circulating infectious diseases both between individuals and at the human-animal interface (One-health). A key strength of this research platform will be its readiness to give rapid responses to urgent research questions related to the *new emergence* of an infectious disease threat. Importantly, the cohort will provide a structured data-collection platform for nested studies aimed at answering specific research questions related to infectious diseases and pandemic preparedness, including social, economic and policy aspects. Furthermore, a study sample of the general population also provides a healthy control group for many studies that are conducted with people or samples from diseased or otherwise non-representative populations.

Throughout its implementation, BEready will rely on cutting edge epidemiological methods, including deterministic and stochastic transmission models to simulate and evaluate the spread of infectious diseases, genetic sequencing and phylogenetic data, advanced statistical methods for population-based cohort data, privacy-preserving data linkage with other public health datasets and the use of mobile digital technologies. The specific aims and methods of the pilot study, which is to be implemented during the first year of funding, are further developed below.

Innovation: As opposed to already existing research initiatives in Switzerland, the BEready platform will specifically designed towards addressing research questions on emerging infectious diseases threats. It will use

¹ Norton A, Sigfrid L, Aderoba A, et al. Preparing for a pandemic: highlighting themes for research funding and practice-perspectives from the Global Research Collaboration for Infectious Disease Preparedness (GloPID-R). BMC Medicine 2020;18:273.

innovative research methods and tools for data collection, specimen collection, and data analysis, including online and video participation, self-sampling, “wearables” to collect data about mobility and social contacts.

BEready pilot

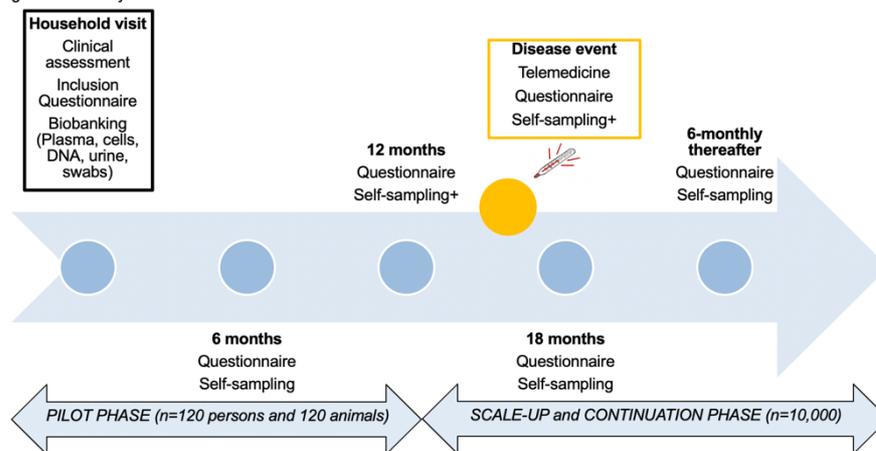
We will collect essential information about the acceptability of such a research initiative by the general population, as well as feasibility. Although data collected during this phase of the project will not allow analyses with the statistical power to address epidemiological associations of interest, the pilot phase of BEready will provide invaluable information for the implementation of the fully sized cohort. Researchers from ISPM have obtained preliminary data about the feasibility of implementing a cohort study in Bern. First, an online survey of a random sample of the Swiss population with >5,000 respondents in 2020, found positive attitudes towards providing health data and biological samples for personalized health research². Second, in 2020, they conducted a pilot study data for the 'Swiss health study', a population-based cohort study for chronic disease research supported by the Federal Office of Public Health. They successfully enrolled 400 participants for baseline physical and questionnaire assessments.

Specific objectives: During the first 12 months of the project, we aim:

1. To evaluate the acceptability of a prospective population-based household cohort study by conducting an online survey;
2. To assess the feasibility of implementing a decentralized cohort with self-administered questionnaires, self-sampling and telemedicine consultations;
3. To collect samples (blood, nasal swabs) and data, including social contact surveys, to address research questions included in projects from other clusters.

Methods: We will conduct an online cross-sectional survey of a random sample of the population of Bern. We will sample 10,000 individuals (expecting a response rate of 35%, as in ref 2), and ask questions about the attitudes and willingness of themselves and their household members to take part in research about infectious diseases and pandemic preparedness. From the respondents, we will select 100 volunteer households at random

Figure 2: BEready cohort structure and data collection



for inclusion into the pilot study. Figure 2 shows the planned data collection schedule. Besides the initial household visit and yearly routine contact, we plan to collect data during disease events, when participants experience symptoms potentially related to an infection. During such events, a telemedicine consultation will be proposed and biological samples, including nasal

swabs for detection of respiratory viruses will be collected from all members of the household.

Interaction with clusters and specific projects: We expect BEready to be an open platform, which will provide a broad spectrum of data to characterize the study population and can be easily adapted to collect additional data for specific research projects. An example of the potential contribution of the BEready pilot to MCID-funded projects is the analysis of nasal swabs by multiplex PCR, combined with social contact surveys, to describe patterns of transmission of common respiratory viruses within the households.

² Brall C, Berlin C, Zwahlen M, et al. Public willingness to participate in personalized health research and biobanking: A large-scale Swiss survey. PLOS ONE 2021;16: e0249141.