

A sample approach to the estimation of the critical parameters of the SARS-CoV-2 epidemics: an operational design

Master Class by Piero Demetrio Falorsi and Vincenzo Nardelli

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Abstract

Given the urgent informational needs connected with the pandemic diffusion of the Covid-19 infection, in this paper we propose a sample design to build up a continuous-time surveillance system. With respect to other observational strategies, the proposal has three important elements of strength and originality: (i) it not only aims at providing a snapshot of the phenomenon in a single moment of time, but it is designed to be a continuous survey, repeated in several waves through time, taking into account different target variables in different stages of the development of the epidemic; (ii) the statistical optimality properties of the proposed estimators are formally derived and tested with a Monte Carlo experiment and (iii) it is rapidly operational as it is required by the emergency connected with the diffusion of the virus. The sample design is thought having in mind, in particular, the SAR-CoV-2 diffusion in Italy during the Spring of 2020. However, it is very general, and we are confident that it could be easily extended to other geographical areas and to possible future epidemic outbreaks. Formal proofs and a Monte Carlo exercise highlight the estimator is unbiased with a higher efficiency with respect to the simple random sampling scheme.

Trainers

Piero Falorsi, was Former Director of Methodology at Istat and International Consultant. Since his retirement, he continues to be active in statistics: he acts as a consultant, gives courses and conferences on subject related to survey methodology.

Vincenzo Nardelli is a PhD Student in Statistics at the University of Milan-Bicocca. His work focuses on spatial statistics models in particular with the use of unstructured big data and web data. During the pandemic, he is involved in Covstat, an italian project to make the interpretation of data on covid-19 accessible to all. His passion for research led him to participate in international research projects presented in various conferences. He founded the Data Network Association for promoting the data literacy.

Bibliography

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