

# Time to evaluate COVID-19 contact tracing apps

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**Digital contact tracing is a public health intervention. Real-time monitoring and evaluation of effectiveness of app-based contact tracing is key for improvement and public trust.**

SARS-CoV-2 is likely to become endemic in many parts of the world, and there is still no certainty about how quickly vaccination will become available and how long its protection will last. For the foreseeable future, most countries will rely on a combination of different measures including vaccination, social distancing, mask wearing and contact tracing.

Digital contact tracing using smartphone apps were established as a new public health intervention in many countries in 2020. Most of these apps are now at a stage where they need to be evaluated as public health tools. We present five key epidemiological and public health requirements for COVID-19 contact tracing apps and their evaluation.

**1. Integration with local health policy.** App notifications should be consistent with local health policies. The app should be integrated with access to testing, medical care and advice on isolation, and work in conjunction with conventional contact tracing where available [Kucharski 2020]. Apps should be interoperable across countries, as envisaged by the European Commission's eHealth Network.

**2. High user uptake and adherence.** Contact-tracing apps can reduce transmission at low levels of uptake, including for those without smartphones [Abueg 2020]. However, high numbers of users increase effectiveness [Cencetti 2020, Moreno Lopez 2020]. An effective communication strategy explaining the apps' role and addressing privacy concerns is essential to increase adoption [Montagni 2020]. Design, implementation and deployment should make the

app accessible to harder-to-reach communities. Adherence to quarantine should be encouraged and supported.

**3. Quarantine infectious individuals as accurately as possible.** The purpose of contact tracing is to quarantine as many potentially infectious individuals as possible, but minimise the time spent in quarantine by non-infected individuals. To achieve optimal performance, apps' algorithms must be tunable, to adjust to the epidemic as it evolves [Wilson 2020].

**4. Rapid notification.** The time between onset of symptoms in an index case and the quarantine of their contacts is of key importance in COVID-19 contact tracing [Ferretti 2020, Kretzschmar 2020]. Where a design feature introduces a delay it needs to be outweighed by gains in e.g. specificity, uptake, or adherence. If the delays exceed the period in which most contacts transmit the disease, the app will fail to reduce transmission.

**5. Ability to evaluate effectiveness transparently.** The public must be provided with evidence that notifications are based on the best available data. The tracing algorithm should therefore be transparent, auditable, under oversight, and subject to review. Aggregated data (not linked to individuals) are essential for evaluating and improving the performance of the app. Data on local uptake at a sufficiently coarse-grained spatial resolution are equally key. As apps in Europe do not geolocate individuals, this additional information can be provided by the user or through surveys. Real-time monitoring should be performed whenever possible.

A proof of principle evaluation is available for the Swiss app [Salathé 2020]. More detailed analysis on the epidemiological effectiveness of contact tracing apps is required. For example, index cases seeking healthcare could be asked if they routinely use the app; if so, interviews with contacts identified by traditional tracing would allow to assess the secondary attack rate among notified individuals. Surveys, epidemiological analyses [Kendall 2020] and experimental studies like the RadarCOVID pilot in Spain can offer further evaluation.

Digital contact tracing is a sustainable measure that can reduce levels of COVID-19 transmission. A rigorous assessment of its effectiveness allows weighing public health benefits against unwanted effects for individuals and society. Stringent evaluation is needed to develop contact tracing apps into an accepted and ethical tool for future outbreaks of other infectious diseases.

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