

# EFFECTIVE CONTACT TRACING AND THE ROLE OF APPS: LESSONS FROM EUROPE

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**Summary:** Contact tracing is an essential tool to support the transition back to normal life during the COVID-19 pandemic. This article explores how 31 countries operate contact tracing, using data extracted from the COVID-19 Health Systems Response Monitor (HSRM). Two main approaches emerge: centralised (led by one national agency) and decentralised (at regional/district level). In most cases, trained staff conduct phone interviews, and many countries have moved to strengthen the capacity of tracing teams. Further, contact tracing apps are being developed and implemented, although some difficulties related to privacy concerns have arisen, necessitating more transparency on how data are collected.

**Keywords:** Contact Tracing, Digital Apps, Public Health Capacity, COVID-19

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## Introduction

Contact tracing remains an essential tool for societies to transition back to as near-normal life as possible during the COVID-19 pandemic. The World Health Organization (WHO) has highlighted the importance of testing, contact tracing and isolation in order to stem the spread of COVID-19 and has defined contact tracing as “the process of identifying, assessing and managing people who have been exposed to a disease to prevent onward transmission”.<sup>1</sup> According to the WHO, critical elements of contact tracing include: community engagement and public support; careful planning and consideration of local contexts, communities, and cultures; a workforce of trained contact tracers and supervisors;

logistics support to contact tracing teams; and a system to collate, compile, and analyse data in real-time.<sup>2</sup>

In this article, we present a review of how 31 countries in the WHO European Region structure their contact tracing operations, based on evidence available in the COVID-19 Health Systems Response Monitor (HSRM). We also assess the features of different apps introduced in the region to support contact tracing, and conclude with some lessons and recommendations for the future.

## Who performs contact tracing?

In the majority of countries, trained staff, which may include doctors, nurses, pharmacists, newly qualified doctors

and veterans but also public health professionals and/or volunteers, conduct phone interviews to identify everyone who has been in contact with infected or suspected cases. Although contact tracing has been around for decades, the increased demand due to COVID-19 has led to an immediate and substantial need for trained workers (who do not necessarily need a background in public health). Contact tracing could also be supported by the use of apps (see below). In our analysis, we identified two main approaches by which countries structure their contact tracing operations: centralised and decentralised (see Figure 1).

### Countries using a centralised approach for contact tracing have one agency to lead operations

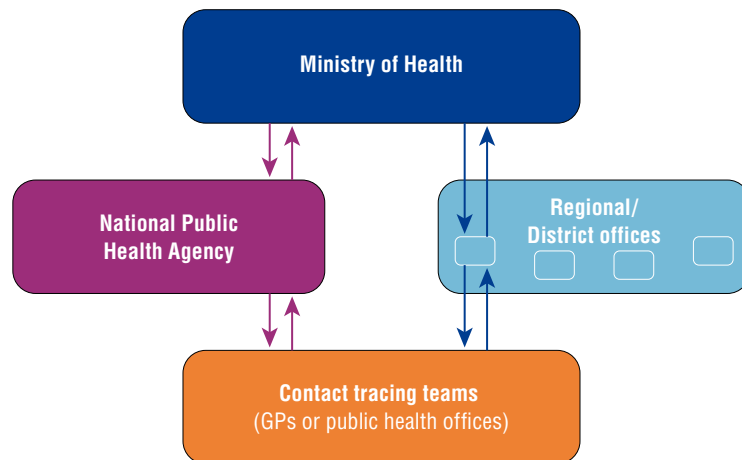
A range of countries implement centralised contact tracing at the national level (e.g. Belarus, Cyprus, Israel, Kyrgyzstan, Latvia, Lithuania, Luxemburg, Malta, Poland, Portugal, Republic of Moldova, Russian Federation). Often, the Ministry of Health or a subordinate agency leads these operations. For example, in Portugal, contact tracing is coordinated by the Directorate-General of Health; in Poland, the National Sanitary Inspection is in charge.

“transparency regarding how the information is gathered and for what purpose”

### Decentralised contact tracing puts the responsibility on regions or districts

A number of countries use a more decentralised approach by implementing contact tracing at regional/district level (e.g. Albania, Belgium, Bosnia and Herzegovina, Bulgaria, Estonia, Finland, Germany, Italy, the Netherlands, North Macedonia, Norway, Slovenia,

**Figure 1:** The main approach to contact tracing



- **Centralised approach:** mandate comes from the Ministry of Health (MoH) and contact tracing is organised by National Public Health agencies, which then collect information from contact tracers to feed back to the MoH
- **Decentralised approach:** mandate comes from the MoH to regional/district offices which then collect information from contact tracers to feed back to the MoH

Source: Authors' compilation

Romania, Serbia, Slovenia, Spain). For example, in Romania, dedicated staff in the 42 district public health authorities are in charge of calling all the contacts of those infected with COVID-19 (e.g. from home, work and other activities) and asking specific questions (e.g. date of the most recent contact, duration of their interaction, etc.) to investigate which ones are close contacts, in order to establish isolation measures or offer testing, if they have symptoms. In Spain, contact tracers at the regional level track down people who were closer than two meters to either suspected or confirmed cases for more than 15 minutes in the two days before the onset of symptoms or a positive test. In England, NHS Test and Trace operates as a partnership between the national level, where contact tracers interview cases and identify contacts for non-complex cases, and the local level, where contact tracers from local Public Health England Health Protection Teams deal with more complex cases (e.g. in schools, workplaces, prisons or care homes).<sup>2</sup> Contact tracing strategies, however, differ across England, Scotland, Wales and Northern Ireland.

### For some countries using a decentralised approach, general practitioners are part of contact tracing

In some countries, general practitioners (GPs) play a key role in contact tracing. For example, in Serbia, the physician attending a possible or probable COVID-19 case is responsible for recording the patient's close contacts after the onset of symptoms of COVID-19, and then sending it to the epidemiologist of the territory's public health institute. Afterwards, the epidemiologist contacts all the people on the list and requests that they self-isolate for 14 days.

In Norway, GPs in the municipalities are responsible for tracing contacts for all patients with confirmed COVID-19, in cooperation with the Norwegian Institute of Public Health.

### Many countries are making more funding and employment opportunities available for contact tracing teams

Most countries have invested in additional human resources in public health to strengthen their tracing teams. This

is the case in Romania, where several measures have been taken to increase the availability of human resources, not only to increase the number of health professionals dealing with COVID-19 outbreaks (including hospital staff and public health workers tackling contact tracing), but also to retain existing health workers. In Serbia, the Minister of Health stated that 4,500 health workers were employed during the state of emergency period, including 1,800 doctors, with newly employed staff being trained on basic aspects of coping with the COVID-19 outbreak, including using contact tracing tools. In England, 18,000 contact tracers were initially recruited and started work at the end of May. Of these, 3000 had a medical or public health background and were responsible for initial interviews with cases and identifying contacts. These contact tracers were supported by 15,000 individuals, most with no experience in health care, who followed-up to provide advice to named individuals.<sup>2</sup> In Germany, the Health Ministry provided public health offices at the local level with €50 million to digitise and speed-up tracing operations as well as hire additional tracers (see Box 1).

### Contact tracing apps are being developed and used to help contain the spread of the virus

Several countries have identified apps as a supportive measure to telephone contact tracing with the potential to trace contacts of infected persons that they may not know personally but have been in close proximity to (e.g. Austria, Belgium, Bulgaria, Denmark, Finland, France, Georgia, Germany, Iceland, Ireland, Russian Federation, Spain, Ukraine, and the UK). The specific technical details and capabilities of the apps can vary substantially, which affects how individuals use them and what data are collected. This article specifically focuses on apps designed for contact tracing, while apps used for self-diagnosis, monitoring active cases and communications are outside of this review.

Contact tracing apps employed in the surveyed countries can either rely on Bluetooth or geolocation services. Contact tracing apps based on Bluetooth detect

#### Box 1: Germany: the main features of a successful contact tracing strategy

Run primarily at the local level, contact tracing is organised by 375 public health offices across the country that have been monitoring cases, tracing outbreaks and providing counselling. Contact tracing teams in the country have been built using existing resources and officials from the public health offices. Medical students, armed forces members and civil servants were all brought in to help, and primarily work through daily phone and house calls. The federal and state governments agreed on 25 March that public health offices must have at least one contact tracing team of five people per 20,000 inhabitants.<sup>3</sup> The Robert Koch Institute (RKI) recruited and trained “containment scouts” to help build these teams. A survey of the public health offices made public on 14 May found that 67% did not reach their targets until mid-May, so 105 mobile contact tracing teams were also created as an RKI program financed by the Ministry of Health.<sup>4</sup>

The RKI launched the “Corona-Warn-App” on 16 June. Using decentralised and anonymous software, the app exchanges temporary encrypted IDs with other app users via Bluetooth. It notifies them if they have been in the vicinity of an infected person for a period of at least 15 minutes within the last 14 days.<sup>5</sup> By mid-September the app had been downloaded 18 million times.<sup>6</sup> Furthermore, as Schengen internal borders slowly re-open and commuters and tourists return, the RKI has made the app available for international download.

if a user has been at least 15 minutes and within 2 meters with another person that is using the app. If a person on that history list self-reports to have tested positive for COVID-19, those logged contacts would be notified and can take measures to self-isolate (see Box 2). Contact tracing apps which monitor the movement of COVID-19 patients based on geolocation can take the form of monitoring bracelets (Russian Federation), or they could be mobile apps downloaded to phones. However, apps using geolocation raise privacy concerns as they use location data from telecommunications providers.

Most apps developed so far can be downloaded voluntarily, and how much they allow users to opt-in on different features (e.g. geolocation, data sharing) varies. For example, Denmark has developed an app, which tracks citizens who voluntarily decide to use the app. If a citizen using the app is diagnosed with COVID-19, all citizens who have downloaded the app who have been close to the person will be informed that they may have been exposed to COVID-19, but the identity of the patient will not be revealed to them (see Box 2).

On 31 May, Italy launched the Immuni app on Apple and Android. Citizens are able to

voluntarily install it on their phones. At the end of June, the app had about 4 million downloads.<sup>12</sup> In Ireland, a COVID-19 Tracker App was launched on 7 July 2020. The app utilises a decentralised model, with information exchanged between close contacts using anonymous codes. To demonstrate the openness and transparency of the technology behind the app, the Data Privacy Impact Assessment and source code was published prior to launch. Within 36 hours, the voluntary app had one million downloads (approximately 20% of Ireland’s population).

### Governments grapple with the difficult balance between effectively tracing contacts and ensuring data privacy

Several countries explicitly mention that privacy concerns, data storage, governance considerations, and partnerships with private industry players impact the speed of adoption of these apps (Belgium, France, the Netherlands, Spain), as governments weigh these implications. For example, while Norway launched an app on 16 April, concerns about privacy issues, including from the Norwegian Data Protection Agency, due to the use of GPS-tracking, as well as a fall in the number of active users, led to it being

## Box 2: The Smittelstop app in Denmark

The single Danish contact tracing app – ‘Smittelstop’ (‘Contagionstop’) – was developed as a public-private innovation initiative, involving the Ministry of Health, the Danish Patient Safety Authority, the Danish Health Authority, the Agency for Digitization, the Statens Serum Institut and a private company, Netcompany.<sup>9</sup> On 15 May, a large majority in the Danish Parliament agreed to develop the app, and it was implemented in 18 June.<sup>9</sup>

Using the app is voluntary, and it may be downloaded for free. The app relies on Bluetooth technology and Google’s and Apple’s technology for decentralised tracing of contacts (Exposure Notification, ENF). The app logs every device for everyone who has downloaded the app and whose Bluetooth connection has been nearby. This data is stored on the mobile device; it is not reported to other databases.<sup>9</sup>

A person who wants to self-report that they are COVID-19-positive must log-in on the app by way of ‘NemID’, a Danish common secure login on the Internet,<sup>10</sup> whereupon the diagnosis is validated in the National Patient Registry. If the person is registered with a diagnosis of COVID-19, the patient will be asked whether he/she has symptoms of COVID-19, when the symptoms started, and whether the patient wants to share the information.<sup>9</sup>

If so, devices which have been closer than one meter to the device, for more than 15 minutes within the latest 14 days are notified. Neither the patient, nor the citizens, receive information about each other’s identity.<sup>9</sup> By 8 July, the app had been downloaded 745,000 times (12.8% of the population, assuming each user was unique), and 112 persons had registered themselves as infected with COVID-19 using the app.<sup>11</sup>

discontinued on 15 June; all data collected were deleted. In Spain there is an order that regulates the use of anonymised and aggregated data provided by mobile operators in order to analyse the population movements prior and during the lockdown, with a view to identify hotspots and improve the management and coordination of health care resources. The app will be fully available for those autonomous communities that so wish by September 15th, although some regions could have a first functional version by mid-August, if needed. The use of the app as well as communicating a possible contagion would be voluntary. The technology for the app in Belgium has to be open source, use only anonymised data, and rely on Bluetooth technology as opposed to geolocation technologies. Moreover, Belgium has specified that if different regions use different applications, they should be compatible with each other and with the federal eHealth platform. The German app was developed by SAP and Deutsche Telekom and privacy concerns

were largely assuaged by including input from cybersecurity experts at German research institutes.

### Some lessons and recommendations for the future

Contact tracing has been identified as a key element to control the spread of COVID-19. In our analysis we have found that some countries had contact tracing strategies in place, but dedicated resources were initially insufficient at the onset of the health crisis. As the COVID-19 crisis developed, countries invested additional resources into contact tracing, such as hiring new personnel and/or developing apps that could help support the re-opening of the economy. However, even if countries have the appropriate resources to perform contact tracing, ensuring the system can identify possible cases quickly, as well as having adequate supervision and management of contact tracers in place are key elements for the success of contact tracing.

We have also found that most countries tend to implement a decentralised approach for contact tracing through regional/district public health services. This approach facilitates closeness to the population and its needs, but may result in uneven contact tracing across the country if there is a geographical imbalance in public health capacity. Additional coordination at national level may avoid an unequal implementation of contact tracing within countries, and promote the fluid coordination between the testing and tracing systems.

This is particularly relevant for the use of apps. We found that some countries have developed different contact tracing apps to broaden their ability to undertake early detection of potential new COVID-19 infections. However, there is heterogeneity in the characteristics of these apps: some apps are voluntary (e.g. Denmark) while others are compulsory (e.g. Russian Federation); some countries have introduced legislation to allow access to private data (e.g. Spain) while others only use anonymised data (e.g. Belgium). Independently of their characteristics, there should be transparency regarding how the information is gathered and for what purpose, with data privacy prioritised.

“limited uptake by citizens means that apps should not be the only solution”

Further, while some think that the use of apps can help make the contact tracing operation faster and more effective and engage citizens in the process, a limited uptake by citizens mean that apps should not be the only solution. In fact, few countries get above 1 in 5 residents to download the contact tracing app.

To conclude, we understand that the success of a solid contact tracing strategy is very much intertwined with other strategies. These include the reinforcement of early detection of infection in primary care (by PCR or any other equivalent test), closer coordination with the epidemiological surveillance services, and compliance with isolation measures. Further analysis across these may reveal relevant lessons for future health crises.

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## Achieving Person-Centred Health Systems: Evidence, Strategies and Challenges

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The idea of person-centred health systems is widely advocated in political and policy declarations to better address health system challenges. A person-centred approach is advocated on political, ethical and instrumental grounds and believed to benefit service users, health professionals and the health system more broadly. However, there is continuing debate about the strategies that are available and effective to promote and implement 'person-centred' approaches.

This new study brings together the world's leading experts in the field to present the evidence base and analyse current challenges and issues. It examines 'person-centredness' from the different roles people take in health systems, as individual service users, care managers, taxpayers or active citizens. The evidence presented will not only provide invaluable policy advice to practitioners and policy makers working on the

design and implementation of person-centred health systems but will also be an excellent resource for academics and graduate students researching health systems in Europe.

*Contents:* Forewords; Acknowledgements; The person at the centre of health systems: an introduction; Person-centredness: exploring its evolution and meaning in the health system context; Person-centred health

systems: strategies, drivers and impacts; Achieving person-centred health systems: levers and strategies; Community participation in health system development; Patient and public involvement in research; Listening to people: measuring views, experiences and perceptions; Choosing providers; Choosing payers: can insurance competition strengthen person-centred care?; The service user as manager of care: the role of direct payments and personal budgets; Choosing treatments and the role of shared decision-making; The person at the centre? The role of self-management and self-management support; Patients' rights: from recognition to implementation; Index.

