Contact tracing in Austria, Georgia, Kosovo*, Kyrgyzstan, and Ukraine during the COVID-19 pandemic: response review and good practices

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Abstract

During the COVID-19 pandemic, effective contact tracing has been recognized as a crucial public health response to mitigate the spread of SARS-CoV-2 and reduce COVID-19-related morbidity and mortality, particularly before widespread population vaccination. The World Health Organization (WHO) recommended the implementation of active surveillance strategies to track and quarantine contacts of confirmed or suspected COVID-19 cases.

This study conducted a compiled analysis of the contact tracing responses of five European countries, between March 2021 and August 2022. The countries were selected to represent a range of geographical areas, and employed a mixed methods approach of in-depth interviews with various stakeholders across different institutional levels to identify commonalities, differences, and good practices in contact tracing. The interviews covered twelve themes, including methods and procedures for COVID-19 contact tracing, information technology, and quality assurance and key performance indicators.

The findings demonstrate that the policy approach, digitalization capabilities, and implementation approach varied in the countries and were dynamic throughout the pandemic. It also revealed that some practices were applicable across all countries, while others were context-specific, catering to each country's unique needs. This study highlighted the need for all countries to institutionalize contact tracing as an essential function of integrated health systems, digitalizing contact tracing practices and processes, and building and retaining contact tracing capacities in the health workforce for better pandemic preparedness.

The study shows that the lessons learned from COVID-19 contact tracing experiences can be applied to future disease outbreaks and pandemics, and can be replicated in other countries.

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Contact Tracing, surveillance, epidemiology, Europe, COVID-19

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Introduction

Contact tracing is the process of identifying, assessing, and managing people who have been exposed to an infectious disease of interest (1). During the COVID-19 pandemic, contact tracing was instigated in many countries globally at the beginning of the COVID-19 pandemic in 2020 to identify and quarantine individuals who had been in contact with a person infected with SARS-CoV-2. Contact tracing and quarantine – along with robust diagnostic testing, case isolation, and treatment – were regarded as key components in the public health response to interrupt chains of transmission of SARS-CoV-2 and reduce COVID-19-associated morbidity and mortality, particularly in the early stages before widespread population vaccination (2). On an individual level, case investigation can identify contacts classified as being at high risk for exposure and/or severe disease, and based on the contact history, the tracing helps inform these contacts about their exposure. At the population level, source investigation can identify settings and events where infection may have occurred, allowing for public health and social measures to be targeted to a specific setting or group and for retrospective contact tracing to identify unknown chains of transmission and thereby reduce further transmission.

To control the spread and limit further infections of COVID-19, since the early phases of the COVID-19 pandemic, WHO recommended countries to establish active surveillance strategies, and released guidance to support the development of effective national contact tracing strategies and the adaptation of these with new emerging Variants of Concern (VOC) throughout the course of the pandemic (3). Although most countries have long-standing experience with contact tracing as part of infectious disease outbreak investigation and response practices, the requirements for contact tracing as part of the COVID-19 response by far exceeded the capability of existing systems and processes. This was mainly due to the sheer number of cases and contacts needing to be identified, contacted and quarantined. Consequently, countries struggled to rapidly train enough contact tracers and establish strategies and

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standard operating procedures as well as systems for managing both the numbers of cases and contacts and the associated data. The rapid spread of the virus required swift action and the pre-symptomatic and/or asymptomatic transmission meant even resource-intensive contact tracing actions were challenging and additional public health and social measures (PHSM) were required to dampen transmission levels (4).

The rapid spread of COVID-19 and the fact that contact tracing had never been recommended nor implemented at a similar scale before, resulted in substantial diversity in national contact tracing policies and procedures (5). Throughout the pandemic, contact tracing strategies and procedures across countries varied depending on factors such as the epidemiological situation, the stage of the vaccine programme, the human and financial resources available for contact tracing and public awareness. These aspects, including using new digital tools for tracing contacts (6), were important factors in the effectiveness of contact tracing operations.

Contact tracing is not a novel public health intervention, having been widely used previously for e.g. tuberculosis (7), meningitis and implemented as part of the response to the Ebola outbreak (8), however not on the scale required for COVID-19.

It is therefore important to document the experience and lessons from contact tracing in the context of COVID-19 in order to further strengthen contact tracing systems and practices as an integral part of health system preparedness (9).To capture the lessons from COVID-19 contact tracing and document good practices and challenges experienced by countries, WHO Regional Office for Europe conducted a series of case studies on COVID-19 contact tracing. This paper summarizes the findings from the case studies, including the diversity in approaches to COVID-19 contact tracing, the commonalities across case study countries and examples of good practice.

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Methods

Study design

The case studies were based on a mixed-methods approach. Several semi-structured interviews were held with key stakeholders from five countries, with a pre-defined set of questions covering a variety of themes relevant to contact tracing, defined by subject matter experts. This included informants from the different administrative levels in the countries and other key stakeholders supporting the COVID-19 contact tracing operations. The study also included a quantitative element to examine the wider data relating to COVID-19 cases within the country, alongside data relating to the contact tracing programme.

Participants

To ensure geographical representation from the WHO European Region, countries were selected from south-eastern Europe, South Caucasus, Western Europe and Central Asia.

National focal points for COVID-19 contact tracing were invited to participate in the study through the WHO country offices (where applicable) and invited further technical staff to be involved in the interviews. These included representatives from ministries of health, leads of the contact tracing operations (both local and national), representatives from the national epidemiological service, contact tracers, and other key stakeholders as relevant.

Data collection

The interviews were semi-structured to allow for flexibility in exploring wider areas of relevance arising during the interviews. The interview guide was divided into 12 key areas (presented in box 1). Interview questions are included in the supplementary materials.

Box 1: Interview themes

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1. Setting
2. Prior experience with contact tracing
3. Methods and procedures for COVID-19 contact tracing
4. Human resources for COVID-19 contact tracing
5. Training
6. Isolation and quarantine
7. Data management and analysis
8. Information technology
9. Communication and ethical aspects
10. Outbreak data
11. Quality assurance and key performance indicators of contact tracing
12. Impact of contact tracing activities

The full list of questions used to gather the qualitative and quantitative data can be found in Annex 1. Interviews were conducted through online platforms (Microsoft Teams and Zoom). Where English was not widely spoken, an interpreter supported the interviews. The interviews were recorded and transcribed afterwards. All participants were asked for their consent to participate and record the interview. The interviews were conducted between March 2021 and August 2022, with Kosovo*, Kyrgyzstan and Austria taking place in 2021 and Georgia and Ukraine in 2022.

The quantitative element of the study included national data on COVID-19 cases, positivity rate of testing, and mortality directly due to COVID-19 in the population throughout the pandemic, the activity of contact tracing teams such as average number of contacts per case and proportion of these who are contacted, quality assurance indicators, and any relevant data on the impact of the contact tracing activities. The quantitative data complemented the qualitative elements of the study by providing the quantitative basis relevant for certain interview questions. Prior to the interviews, a desk review of the available information was conducted, covering the national strategies, policies, guidelines and decrees.

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Data analysis

Data collected from each country was summarized in a detailed country-specific report was generated for each country. These reports were organized according to the 12 key areas and subsequently analysed to identify challenges, solutions, recommendations, and examples of good practice in the five countries. This analysis was conducted through meetings between authors during which each area was discussed, and results agreed. Any disagreements resulted in further discussion until the authors reached a consensus. Key themes were also grouped into detailed recommendations to strengthen and enhance the contact tracing operations in each country. The reports were disseminated to interview participants to check for accuracy.

Results

The findings from all the country reports are consolidated and presented below. Table 1 provides an overview of the contextual country information for the five countries. Table 2 highlights some of the findings from common areas identified from the case studies and how they compare the five countries, followed by highlights of the diversity of approaches taken by the different countries which were responsive to their national situation.

Table 1. Contextual information of the case study countries

	Austria	Georgia	Kosovo*	Kyrgyzstan	Ukraine
Population (10)	8,956,279	3,708,610	1,806,279	6,694,200	43,814,581
Size (KM2) (11,12)	82,520	69,490	10,887	191,800	579,400
GDP per capita (13)	53,267.9	5,042.4	4,986.6	1,276.2	4,835.6

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Income Group (14)	High Income	Upper middle income	Upper middle income	Lower middle income	Lower middle income
WHO Europe Sub-region	Western Europe	South Caucasus	South-eastern Europe	Central Asia	Eastern Europe

Table 2. Overview of the main commonalities related to COVID-19 contact tracing in the five countries

	Austria	Georgia	Kosovo*	Kyrgyzstan	Ukraine
Risk Communication and Community Engagement strategy	No	Yes	Yes	No	No
Risk communication implemented	Yes	Yes	Yes	Yes	Yes
Community Engagement Implemented	Yes	Yes	Yes	Yes	Yes
If yes, with whom?	▪ Local community leaders	▪ community leaders, ▪ Medical Students ▪ NGOs (Red Cross) ▪ Heads of different entities such as kindergartens, schools, and various businesses	▪ NGOs ▪ international organisations (UKAID, Swiss Agency for Development and Cooperation) ▪ Medical Students	▪ village councils ▪ mayoral offices ▪ rural health committees ▪ NGOs (Red Cross)	▪ medical students ▪ religious leaders ▪ Heads of different entities such as kindergartens, schools, and various businesses.
Public Hotline	Yes	Yes	Yes	Yes	Yes
Digital tools for contact tracing used	Yes	Yes	Yes	Yes	Yes
If yes, which one	▪ Epidemiological Reporting	▪ Excel	▪ Excel (initially) ▪ Go.Data	▪ Excel ▪ Stop COVID	• Excel (initially) • EIDSS

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	System (EMS)				• Go.Data • Diy Vdoma
Data Management and Analysis (paper/digital)	Digital	Digital	Digital	Digital	Digital
Key Performance Indicators (KPIs)	No	No	No	No	Yes
Organization (Centralized/de centralized)	Decentralized, governed by national documents	Centralized	Centralized	Centralized	Decentralized, governed by legislation

Summary of overall findings

From the interviews and data provided, it was clear that country-specific strategies needed to be developed to address their specific needs to optimize the contact tracing process. However, many overlapping challenges and needs exist between countries which led to some common policies and actions, as shown in Table 3.

Table 3. Summary of good practices and challenges identified across countries.

Focus Area	Good Practices	Challenges
Prior experience with contact tracing	▪ Institutionalization of contact tracing for all notifiable diseases where relevant. ▪ Sustainable mechanism and protocols	▪ Lack of an integrated system for contact tracing for any pandemic.
Methods and procedures for COVID-19 contact tracing	▪ Prioritisation of cases during periods with high caseloads ▪ National zoning/classification of regions to inform resources and efforts allocation	▪ The dynamic nature of COVID-19 with several peaks of transmission. ▪ High caseload during peaks of transmission ▪ Changes in policy and prevention measures
Human resources for COVID-19 contact tracing	▪ Staff and expertise retention	▪ Small contact tracing teams overwhelmed by workload during the high caseload periods.

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	▪ Recruitment of volunteers to expand the contact tracing team capacity	▪ The need to conduct contact tracing and train new individuals in parallel
Training	▪ Periodic training and sharing experiences ▪ Tailoring WHO training materials to national context	▪ Not all aspects of contact tracing were included in training events, such as RCCE.
Isolation and quarantine	▪ Flexibility of the guidance communicate this information promptly. ▪ Involvement of local authorities and other governmental sectors	▪ Public non-compliance ▪ Guidance changing often with little communication or unclear messaging
Data management and analysis	▪ Use of dedicated digital contact tracing tools (Go.Data) ▪ Periodic analysis and reporting	▪ Lack of interoperability with existing digital infrastructure ▪ Transformation to new systems during pandemic period
Information technology	▪ Use of Digital Proximity tools ▪ Use of digital contact tracing applications	▪ Resources for digital tools ▪ Data security ▪ Users' consent and concerns for sharing personal data and location
Communication and ethical aspects	▪ Communication campaigns with the public utilising the various communication channels ▪ Meaningful engagement s in the development of communications strategies and in activity implementation. ▪ Implementation of behavioural insights and Knowledge, Attitudes and Practices surveys ▪ Issuing guidance in multiple languages	▪ Confidentiality and data protection ▪ Lack of trust in the governmental entities/authorities ▪ Language barriers ▪ Difficulty reaching marginalized or vulnerable communities, particularly in remote communities
Quality assurance and key performance indicators of contact tracing	▪ KPIs endorsed in official government decisions and decrees	▪ Lack of KPI frameworks and lack of a clear monitoring strategy

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Country Highlights

The findings highlighted below are examples of some country-specific activities that can be considered good practices in their national context. They may be replicated by other countries where feasible or compatible with their epidemiological situation and capacity.

Austria

In Austria, the government made an effort to align the COVID-19 response and policies with those of the neighbouring countries and be as evidence-based as possible. Although there were no key performance indicators for contact tracing to provide a structured analysis of performance on local or national level, a feedback mechanism was implemented through a weekly telephone call with the nine federal states to update regularly. The epidemic law (15) in Austria allows the health authorities to isolate or quarantine those diagnosed with, or suspected to have, a notifiable disease. This existed before COVID-19 and applies to all notifiable diseases, with violations of this law being a criminal offence. A major learning point mentioned was the need to use straightforward language with the public to increase understanding and compliance with COVID-19 public health and social measures. The Ministry of Health was very active and responsive to issue communications with any update of the contact tracing guidance.

Georgia

In Georgia, contact tracing activities are managed centrally by the National Center for Disease Control (NCDC) in Tbilisi, along with the public health department in the Ministry of Internally Displaced Persons from the Occupied Territories, Labor, Health and Social Affairs (MoILHSA). Contact tracing has been conducted in Georgia since the 1960s and focuses on numerous infectious diseases such as tuberculosis. One of Georgia's strengths is their ability to retain staff, with many staff in the public health department

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having more than 20 years of contact tracing experience which proved to be an advantage when COVID-19 contact tracing was implemented.

The government issued recommendations for journalists and other media outlets specifically about COVID-19 to strengthen their public health messaging to the population (16). Additionally, WHO, UNICEF, and the MoILHSA conducted a behavioural insights study addressing COVID-19 related knowledge, attitudes, and practices among the public during the first, second and third waves of the pandemic (17). The behavioural insights report showed that respondents largely trust the national and local health authorities. The interviewees acknowledged the difficulties of working with diverse communities in the country, e.g. contact tracers encountered language barriers in rural areas where minority groups do not speak Georgian, yet most contact tracers only speak Georgian. To overcome such barriers, health authorities published COVID-19 awareness materials and messages such as the self-isolation instructions, in various languages on the government website (18).

Kosovo*

Traditionally, contact tracing has been a part of case investigation and management in infectious disease outbreaks in Kosovo*. Yet, there have been no dedicated resources for contact tracing, and no central system for cases and contact data collection and management. Contact tracing during the COVID-19 pandemic was affected by limited capacity, both human resources and testing, and consequently prioritisation of high-risk and household contacts was required. Regarding the digital infrastructure of the health system, there was no interoperability between the laboratory system and the local case reporting or management systems. Thus, test results required manual input when available from the laboratory. A combination of Excel and Google Sheets was used to collect and manage data on cases and contacts at local level, then collated centrally. In October 2020, with high-level support, the Go.Data outbreak investigation tool was implemented, a software tool that collects data on cases and contacts

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and tracks disease transmission in real time, thus facilitating the contact tracing process. Confidentiality was a major concern for the public and it was preserved by ensuring that contacts were never informed who the related case was. In addition, employees in the National Institute of Public Health (NIPH) and regional public health centres signed a declaration of confidentiality at the start of their employment and were required to comply with privacy and data security rules.

A communication strategy for COVID-19, targeting local communities, was developed by the Department for Health Education and Health Promotion with support from NGOs and international organisations. The strategy aimed to improve access to information on COVID-19 on different social platforms and to raise awareness of the disease and preventative measures, particularly in schools. One example is the 'Together For COVID' campaign, developed with UKAID, in cooperation with the Ministry of Health, NIPH, and the Association of Municipalities.

Kyrgyzstan

In Kyrgyzstan, trained specialists have conducted contact tracing for tuberculosis since 2017. All methods and procedures for contact tracing in the country are defined by the national legislation, decrees, and standard operating procedures issued by the Ministry of Health and Social Development. Accordingly, the processes are consistent throughout all regions and districts. At the start of the COVID-19 pandemic, supported by the government, programmers developed a proximity tracing app, "Stop COVID", which functioned until July 2020. It was initially used for travellers entering Kyrgyzstan to ensure they adhered to quarantine measures. The general public also installed the app for the same purpose, but those interviewed believed that the app was not widely used due to privacy concerns. As a consequence of the limited use, it was discontinued a few months into the pandemic. All contacts were required to physically sign a consent form to agree to quarantine and to accept visits from mobile contact tracing teams. Mobile and technological solutions for this were sought but nothing was

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implemented to alleviate this additional requirement to travel to visit contacts from the contact tracing teams.

During the course of the pandemic, several behavioural insight surveys were conducted through which attitudes to contact tracing were measured. In the fourth survey (March 2021), most respondents (86.3%) indicated that they were willing to share the names of their contacts for tracing. This was positively correlated with trust in the medical sector and health literacy in the country, which was also included in the surveys. The pandemic response in Kyrgyzstan was generally very agile and adaptive, e.g. the contact tracing workforce was flexible enough to expand if the epidemiological situation required so, due to e.g. inclusion of surge personnel from outside the health sector when needed, in particular in urban areas where the demand was higher due to population density.

Ukraine

In Ukraine, COVID-19 contact tracing was implemented by the Oblast (i.e. regional) centres for disease control and governed by legislation. The country implemented a zoning approach to divide the country according to the epidemiological situation (green, yellow, orange, and red)(19). The protection of personal data was a priority, with a Law on Personal Data Protection to make the public more comfortable to share information about themselves and their contacts. The Electronic Integrated Disease Surveillance System (EIDSS) is the national system that records information on cases and contacts. During the pandemic and given EIDSS's limitations for contacts follow up, the Go.Data system was deployed to take advantage of its optimized and tailored features for contact tracing. However, both systems were not interoperable, thus requiring duplicative data entry of contacts in both systems. Following the start of the war in Ukraine in February 2022, the number of registered new cases of COVID-19 has greatly declined as a result of e.g. closure of schools and kindergartens, the absence of any mass gatherings, extended curfew time and the significant decline in the testing capacity. Efforts to

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trace contacts were greatly reduced due to the evacuation and displacement of the Ukrainian citizens, with many living in shelter and highly dense settings, facilitating the chains of transmission, Despite these circumstances hindering the sharing of the necessary information, the contact tracing teams maintained contact with family doctors to follow up on the situation and continue the vaccination efforts.

Discussion

This study has shown that within the five countries selected, there were many lessons from their COVID-19 contact tracing processes which will be useful for future disease outbreaks, epidemics and pandemics. Some were common for all countries, whereas others were restricted to countries with specific national needs and contexts. These are summarised in the discussion points below.

Good practices in contact tracing

A major lesson identified from COVID-19 is that community engagement is critical for successful implementation and adherence to recommended response measures (20). This includes contact tracing, where community engagement played an essential role in the tracing and following up of contacts. The countries interviewed all included community leaders to increase public awareness and to build trust between the public and the local health authorities which is considered fundamental for adherence to quarantine and other recommendations. Other studies further support this (20).

Additionally, as documented in other countries, local media and communication channels were utilised in all five countries to disseminate awareness messages (21). For example, in Georgia, recommendations for the media were developed by the national health authorities on how to communicate COVID-19 related messages, to avoid any unnecessary and inconsistent media communications that can cause panic (16). Given the necessity of effective risk communication and community engagement, a clear

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strategy is needed, allowing for a two-way dialogue with the communities and ensuring that the communities are meaningfully engaged through their representative, leaders, or NGOs in the development and implementation of the risk communication strategy. Moreover, including risk communication and community engagement in any training of contact tracers is considered essential.

Diversity in approaches

Digital contact tracing as a supplement to manual/traditional contact tracing, has proven to be a cornerstone in the contact tracing processes in many countries (22–24), whether data management systems such as Go.Data, or Digital proximity tools, such as ”Diy Vodoma” in Ukraine. Nevertheless, ethical concerns on the use of digital tools for contact tracing has been reported by several countries (22,24). The WHO has issued a guidance on the ethical considerations to guide the use of digital proximity tracking technologies for COVID-19 contact tracing (25), suggesting ethical principles for the use of such technologies. This is highly relevant for countries and/or regions that lack a personal data protection regulation similar to the Law on Personal Data Protection in Ukraine and the European General Data Protection Regulation (GDPR). Furthermore, when introducing any new tool, the current digital health infrastructure must be considered, and the interoperability of the new tool with the existing system is vital to avoid duplication and achieve its goal of alleviating the burden of manual processing of data. Subsequently, this data should be used to inform policy and strengthen the health policies through better informed, evidence-based policymaking. To achieve this, a data analysis and reporting framework should be developed to harmonize the data flow from local and national levels to policymakers, while maintaining the highest levels of personal data protection and security.

Of the five case study countries, only Ukraine had key performance indicators for contact tracing. In Ukraine, the indicators were adopted in the national contact tracing decree. They included targets for

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the proportion of confirmed COVID-19 cases investigated within the first 24 hours after positive test result, the proportion of contacts interviewed within the first 48 hours since identification, and the proportion of contacts followed-up on the seventh and 14th day following exposure. This is an example of how countries can develop a comprehensive multi-level and multi-year KPI framework with a robust monitoring and evaluation plan to better structure and optimize contact tracing.

Common approaches

Although there were differences between the five countries studied, Table 3 showed that common challenges and barriers led to similar approaches. This overlap was also observed during a European COVID-19 contact tracing meeting organized by the WHO European Region and European Centre for Disease Prevention and Control in March 2022. Many examples of good practices and challenges outlined in Table 3 are broadly similar to the findings from this meeting (26). This can be expected, with a recent systemic review on contact tracing finding that there were common facilitators and barriers between all contact tracing activities for the different infectious diseases covered (27). They identified the main enablers, namely collective responsibility, personal benefits, efficient and reliable systems, and the coproduction of contact tracing systems in partnership with the community. Barriers identified were privacy concerns, technical difficulties, lack of perceived personal benefits, logistical challenges, fear of stigmatization, and mistrust. This aligns with our findings and supports the generalisability of such practices for other infectious diseases. Broadly, we also identified that resource needs for comprehensive and protracted contact tracing operations was a major obstacle for countries, particularly during rapid surges in case numbers. In the countries included in the case study, students, young people and other groups were included as additional capacity to support contact tracing teams during increased demand for contact tracing services. Similar approaches have been applied by other countries and jurisdictions, e.g. Pennsylvania, USA (28).

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Strengths and Limitations

This study documents approaches, good practices and challenges related to COVID-19 contact tracing in five countries in the WHO European Region, aiming to allow the generalisability of the findings to inform contact tracing activities in other areas. The protocol, methodology and interview guide were adopted from the WHO's template for qualitative and quantitative assessment of contact tracing systems for COVID-19, piloted in Switzerland. A standardised interview questions was used for all country studies to maintain the fidelity and consistency in the process. The interview structure was comprehensive and addressed all WHO recommended intersectionalities with contact tracing activities, yet the semi-structured interview style was agile enough to be tailored to the specific country context and interviewees expertise. Finally, several interviewees were included from each country, acknowledging the diverse implementation of national guidelines and the initiatives that were actioned by personnel in different, regions, cities, offices and personnel.

As this study was conducted during the pandemic, our case studies were limited to only the countries where it was feasible to implement the study and release their staff for the interviews. Due to the different structured and hierarchies in the ministries of health, it was not possible to identify people in the exact same or similar roles in each of the five countries. Thus, some case studies might be richer in certain aspects than others. Furthermore, as this was a semi-structured interview, the follow-up questions varied depending on the interest and expertise of the interviewees. Additionally, in some interviews, an interpreter was needed, which may not have provided the exact translations. Finally, it should also be noted that the time and logistical challenges during the pandemic were exacerbated by the political situation in Ukraine, which may have also affected the interviews.

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Conclusion

Learning from the COVID-19 pandemic is critical to ensure better preparedness for future pandemics, further strengthen outbreak investigation and response practices in countries, and inform future national and global guidance. This paper shares good practices that can be replicated in other countries and reiterates the requirement to evaluate the preparedness of national health systems to ensure that systems are in a state of readiness and are resilient for future outbreaks or health emergencies such as pandemics. This study highlights the need to institutionalize contact tracing as an important function of integrated health systems, building and retaining contact tracing capacities in the health workforce and ethical digitalizing of the contact tracing practices for better pandemic preparedness. Stemming from WHO's policy recommendation (29), leveraging the current response to enhance the health system and its preparedness for future pandemics is a must. Additionally, investing in the essential public health functions including contact tracing should be prioritised, and integrated into the health system. Finally, national stakeholders should efficiently plan COVID-19 response de-escalation strategies, ensuring that institutional memory, experience and systems related to processes such as contact tracing are maintained and thus prepared to respond to any future outbreak or pandemic.

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Conflicts of interest

No conflict of interest declared.

Key points

- There is a great opportunity to evaluate national health systems' preparedness to effectively tackle future outbreaks and health emergencies, capitalizing on our learnings from COVID-19.
- Contact tracing needs to be institutionalized as an essential function of integrated health systems.
- Building and retaining contact tracing capacities in the health workforce is required to ensure countries can respond effectively to future pandemics.
- There is widespread need for investment in the ethical digitalization of the contact tracing practices for better pandemic preparedness.

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