The World Health Organization (WHO) Regional Office for Europe (WHO/Europe) is one of the six regional offices of the WHO. It serves the WHO European Region that comprises 53 member states (MS), covering a vast and varied geographical region from the Atlantic to Pacific oceans. Approximately 900 million people live in diverse economic, political, and social and conditions, in countries that have built different health systems and approaches to health. WHO/Europe has country offices in 30 countries, in 12 countries of the European Union (EU), and in countries of the Southeastern Europe Health Network (SEEHN [1]) and the newly independent states (NIS).

The objective of the WHO as described in its constitution [2] is the attainment by all peoples of the highest possible level of health. The WHO is the directing and coordinating authority on international health work: in emergencies, including outbreaks of infectious disease, the WHO provides appropriate technical assistance if requested to do so by governments. The WHO’s responsibilities in these situations are mandated primarily by the International Health Regulations (IHR, 2005) [3], and this was tested to the utmost during the 2009 pandemic. The response by the WHO to the 2009 pandemic, as well as the preceding preparedness activities, has been scrutinized extensively during the external review of the IHR [4]. The committee concluded that the IHR helped make the world better prepared to cope with public health emergencies, but that the world is ill prepared to respond to a severe influenza pandemic or to any similarly global, sustained and threatening public health emergency. The WHO was considered to have performed well in many ways, but demonstrated shortcomings in responding to a global public health emergency of protracted duration. The committee found no evidence of malfeasance on the part of the WHO, refuting allegations that WHO recommendations regarding the use of pandemic vaccines were influenced by the pharmaceutical industry.

Although the review was comprehensive, the full extent of the activities conducted in the area of pandemic preparedness and response by the WHO regional and country offices, and how these were coordinated with other (UN) organizations, stakeholders, and WHO collaborating centers, is not captured by the report. Against this backdrop, this article reviews the activities of WHO/Europe in this area from 2005 throughout the 2009 pandemic until the present time. It concludes with a forward look based on the lessons learned.

The work of WHO/Europe in the area of influenza

Influenza is a priority disease in the WHO European region. Activities in the area of influenza are led by the Influenza & Other Respiratory Pathogens program (IRP), supported by programs dealing with vaccine-preventable diseases and immunization, alert and response operations, IHR area coordinators, country emergency preparedness, and the division of health systems and public health. The aims of the IRP are to:

- Strengthen surveillance for mild and severe disease caused by influenza across the region and share data to inform global influenza vaccine strain selection
- Use surveillance data to estimate the burden of influenza to prioritize national influenza vaccination and treatment programs
- Support pandemic preparedness activities at the national level and the implementation of core capacities required under the IHR
- Support the response of MS to outbreaks caused by influenza or other respiratory pathogens

Implementation through coordination and collaboration

WHO/Europe conducts its work jointly with its country offices and with WHO headquarters. Activities are conducted at the regional level involving all 53 MS, at the subregional level involving countries of the SEEHN or NIS, or with individual countries. These activities include meetings to present new WHO guidance and discuss their implementation, discuss new developments, and exchange good practices and training. MS participants are either formally nominated by the Ministries of Health (MoH) to represent their country or invited in their own right as experts, depending on the activity. In addition, WHO/Europe develops operational guidance (e.g., for the implementation of influenza surveillance and standards for laboratories), and through weekly bulletins and reports it collects, analyses, and disseminates influenza surveillance data and data related to influenza vaccine policies and uptake that are reported by all 53 the MS. All key documents related to influenza are published in English and Rus-
Table 1: Key activities conducted by WHO/Europe in the area of influenza 2005–2011

| Timeline       | Event(s)                                                                 | Activity                          | Countries                                                                 | Objective(s)/Outcome(s)                                                                                                                                 |
|----------------|---------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2005–2007      | Outbreaks of H5N1 in wild birds and poultry across multiple countries      | Outbreak response missions        | Azerbaijan, Cyprus, UNMIK, Romania, Turkey                                 | Support countries’ efforts to investigate and control the outbreaks                                                                                     |
|                | and human cases in two countries                                         | Risk assessment missions          | Armenia, Azerbaijan, Georgia, Serbia, the Former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine | Assess the risk for outbreaks of H5N1 in birds and humans                                                                                             |
| 2006–2008      | The continued threat of outbreaks of H5N1 in the European region          | Training in rapid response        | Armenia, Azerbaijan, Bulgaria, Kazakhstan, Kyrgyzstan, Russian Federation, Uzbekistan | Provide training (in theory and practice) and establish multidisciplinary rapid response teams at national and local level to manage future outbreaks |
|                |                                                                          | Desk-top exercise                 | Country exercises: Albania, Armenia, Azerbaijan, Republic of Moldova, and Tajikistan | Identify strengths and weaknesses in avian influenza contingency plans related to coordination and communication at national and inter-country level |
| 2005–2007      | The possibility of a pandemic gained prominence on the global agenda       | Three regional workshops on pandemic preparedness | All 53 MS                                                                 | Accelerate MS’ efforts to develop national pandemic plans [reinforced by entry into force of the IHR (2005) in June 2007]                           |
|                | for health security, due to outbreaks of H5N1 in wild birds and poultry   |                                   | Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Denmark, Finland, Kazakhstan, Montenegro, Republic of Moldova, Romania, Serbia, Switzerland, the Former Yugoslav Republic of Macedonia, The Netherlands, Turkey, Turkmenistan | Provide advice on the content of pandemic plans and determine status of preparedness in the region                                                 |
|                | across multiple countries of the European region and human cases in two    | Missions to assess pandemic preparedness in countries | 50 MS                                                                     | Provide advice on the content and implementation of pandemic plans                                                                                      |
|                | countries                                                                   |                                   | Armenia, Azerbaijan, Bosnia and Herzegovina, Tajikistan, Turkmenistan     |                                                                                                                                                         |
| 2006–2008      | Missions to support the development of national pandemic plans            |                                   | Armenia, Azerbaijan, Bosnia and Herzegovina, Tajikistan, Turkmenistan     | Provide advice on the content and implementation of pandemic plans                                                                                      |
| 2008–present   | Recognition of the need to increase capacity for routine influenza         | WHO/Europe influenza surveillance platform (EuroFlu) established and three annual meetings held | 50 MS                                                                     | Number of MS in the region reporting influenza surveillance data to WHO/Europe nearly doubled, allowing for better monitoring of the pandemic and seasonal influenza |
|                | surveillance in the region                                                |                                   | NA                                                                        |                                                                                                                                                         |
| 11 June 2009   | Declaration by WHO of the first pandemic in more than 40 years,           | NA                                | NA                                                                        | Accelerated finalization of preparedness plans by some countries; MS, WHO, and other international organizations mount a global response              |
|                | caused by a new strain of influenza H1N1                                  |                                   |                                                                           |                                                                                                                                                         |
| August–December 2009 | Evaluation of the early response to the pandemic                          | Sub-regional workshops            | Countries of southeast Europe (SEE) and newly independent states (NIS)    | Support countries’ ongoing response to the pandemic, facilitate sharing of experiences                                                                 |
| April–June 2010 | All countries of the WHO European region have experienced epidemics       | Missions to seven countries       | Armenia, Bosnia and Herzegovina, Denmark, Germany, Portugal, Switzerland, Uzbekistan | WHO/Europe evaluation conducted to determine the usefulness of pandemic preparedness activities in response to the pandemic and to develop recommendations for pandemic plan revisions |
| 2011           | localized outbreaks continue (pandemic declared to be over in August 2010) | Four sub-regional workshops       | 45 MS                                                                     | Obtain an overview of major changes being made to countries’ pandemic plans and agree on options for future inter-country collaboration |

*United Nations Interim Administration Mission in Kosovo*  
Joint activities with ECDC and/or the European Commission  
*MS* member states
WHO/Europe coordinates its activities and conducts joint work with the European Commission (EC) and the European Centre for Disease Prevention and Control (ECDC) in EU countries and countries of the European Economic Area (EEA). Regular coordination meetings ensure that best use is made of scarce resources and that duplication is avoided. In this respect, influenza surveillance data provided by EU/EEA MS to ECDC through the Tessy platform are automatically transferred to the regional platform EuroFlu [6] and subsequently to the global WHO platforms FluNet and FluID [7].

WHO/Europe works closely with the Center for Disease Control and Prevention, USA (CDC), and with two WHO collaborating centers (WHOCC) in the United Kingdom, one for reference and research on influenza (WHOCCRRI) and one for pandemic influenza and research (WHOCCPR). WHO/Europe works with MS experts and has established a regional network of national focal points for influenza surveillance, which includes the same experts as the European Influenza Surveillance Network for EU/EEA countries (EISN [8]).

Work with countries is conducted in collaboration with the MoH based on a biennial cooperative agreement (BCA) that covers policy and technical support, including knowledge transfer, assessments, and evaluations. Country offices play a crucial role in the implementation of the BCA through liaison with the MoH as well as other organizations that are supporting programs in the area of health. Depending on the country needs, country offices have national and sometimes international staff. Country work in the area of influenza focuses on countries of the NIS and SEEHN.

As part of the WHO secretariat, WHO/Europe participated in the intergovernmental meeting that led to the establishment of the Pandemic Influenza Preparedness Framework for the sharing of influenza viruses and access to vaccines and other benefits ("PIF Framework"), bringing together MS, industry, other key stakeholders, and WHO [9].

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countries to perform a joint risk assessment. WHO conducts missions to verify in a timely manner events of potential international concern and are obliged to notify public health events according to the type of outbreak, in infection control and clinical management, epidemiology, laboratory, human and animal public health, communications, social mobilization, and logistics. Their mode of operation is reflected in the mission team leader having an important role, exercising health diplomacy when liaising with the MoH to explain the work being done and when requesting certain actions from the ministry. One potentially sensitive area is the sharing of viruses with the WHOCC: obtaining agreement for their shipment requires knowledge of national regulations and procedures. Clinical specimens and viruses from the outbreaks of avian influenza H5N1 in humans in Turkey and Azerbaijan were shared with the WHOCCRI, facilitating in-depth analyses that informed further risk assessment of the outbreaks and its implications for public health.

A description of the outbreak in Turkey as well as practical lessons that national and international public health agencies
Tab. 2 Progress made in influenza surveillance in the 53 countries in the WHO European region between 2008 and 2011

| Activity                                           | MS 2008 (n) | MS 2011 (n) |
|---------------------------------------------------|-------------|-------------|
| Has sentinel outpatient influenza surveillance    | 36          | 45          |
| Has sentinel hospital (SARI) surveillance          | 0           | 12          |
| Regularly report epidemiological and virological data to WHO | 29          | 45          |
| National Influenza Center is recognized by WHO    | 38          | 40          |
| Shared influenza viruses with WHO                  | 19          | 28          |
| Participates in WHO laboratory proficiency testing program | 39          | 44          |

*Three out of 53 MS do not have influenza surveillance systems in place

Influenza surveillance network

Another major focus of the work is influenza surveillance. The WHO has a long and successful history of working with networks [17, 18]. Currently, surveillance networks in the European region exist in the areas of polio, measles and rubella, HIV, TB, and influenza. In 2008, in cooperation with ECDC, WHO/Europe established the WHO European Region Influenza Surveillance Network by expanding the existing network for the 29 EU/EEA MS, the EISN [8], to include all 53 MS. The regional network now includes national focal points for epidemiological and virological influenza surveillance, nominated by the MoH, from the 50 MS that have routine seasonal influenza surveillance systems [6]. WHO-recognized National Influenza Centers (NIC) in 40 countries are also part of the Global Influenza Surveillance and Response System, GISRS (formerly known as GISP [19]). NIC in EU/EEA MS participate in the Community Network of Reference Laboratories for Human Influenza in Europe (CNRL) [20]. Through the national focal points, MS provide weekly data to the EuroFlu platform from which the bulletin is published in English and Russian. As described above, EU/EEA MS provide data through the ECDC platform, Tessy, to avoid duplication of data provision.

The first EuroFlu bulletin was published in February 2009, which was extremely timely occurring as it did only weeks before the start of the 2009 pandemic. It resulted in almost a doubling of the number of countries reporting data to the WHO throughout the pandemic and increased the geographic coverage dramatically (shown in Fig. 1 and Tab. 2). The number of visits to the EuroFlu website was greater than 1 million in April 2009, and over 2 million at the peak of the winter pandemic influenza activity in Europe in November 2009. A survey performed among EuroFlu bulletin users indicated a high level of satisfaction [21]. Taken together, the above confirms the importance of the regional influenza surveillance network and positions the EuroFlu bulletin as a key WHO/Europe publication that reaches a wide audience. EuroFlu data are also used to develop season overviews and situation analyses [5].

WHO/Europe, in coordination with ECDC, supports the surveillance network through the organization of joint annual influenza surveillance meetings [22], the development of the “WHO Regional Office for Europe guidance for sentinel influenza surveillance in humans” [23], and the provision of methodologies for calculating thresholds for influenza activity (currently implemented for 18 MS on EuroFlu [24]), for analyzing risk factors for severe disease associated with influenza, and for estimating the burden of disease. For estimates of mortality associated with influenza, WHO/Europe works with the European Mortality Monitoring Project (EuroMOMO [25]). WHO/Europe also conducts missions to assist countries with the development of national guidelines for the implementation of sentinel influenza surveillance.

The influenza laboratory network currently includes WHO-recognized NIC in 40 WHO/Europe MS and another ten countries have designated national influenza laboratories. In close collaboration with the WHOCCRRI and the CNRL, WHO/Europe supports these laboratories, especially those that seek to attain WHO recognition, through the provision of guidance and assessment tools [26], training in biosafety and influenza laboratory techniques, and the shipment of infectious substances, logistics support with the shipment of viruses, and provision of proficiency testing programs. This has resulted in improved capacities to perform virus isolation, share viruses with the WHO, and detect novel influenza viruses as part of pandemic early warning.

Taken together, these activities have resulted in tangible improvements to surveillance in the region since 2008. The number of countries with sentinel surveillance systems in the region, including sentinel hospital surveillance for severe acute respiratory infections (SARI), has increased considerably, as has reporting the data to EuroFlu (Tab. 2). This, together with the improved capacities of the laboratories, has significantly increased the region’s capacity for: (a) monitoring influenza types/subtypes and antigenic/genetic characteristics of locally circulating influenza viruses, thereby increasing the representativeness of viruses provided for the annual vaccine strain selection process, (b) understanding and determining the timing and spread of influenza viruses, (c) identifying changes in circulating viruses, and (d) responding to potential pandemic viruses.
## Pandemic preparedness and response

Since 2005, WHO/Europe together with the EC and ECDC has assisted MS with the development and implementation of their national pandemic plans (Tab. 1). As described above, activities related to avian and seasonal influenza also contributed to pandemic preparedness and the ability of countries to respond to the 2009 pandemic. Between 2005 and 2007, three regional meetings for all 53 MS were held to present the 2005 WHO global pandemic plan and checklist and to facilitate the exchange of experience and good practice among countries. A number of subregional workshops were also conducted, among EU/EEA MS, countries of the SEEHN, and NIS countries, the last one taking place just before the pandemic in February 2009. Missions to assess jointly with the countries the status of implementation of their pandemic plans using a standardized tool were also undertaken, in 40 out of the 53 WHO European MS by 2009 [27]. Status reports were published by ECDC for EU/EEA countries in 2007 and by WHO/Europe for SEE countries in 2008. Some countries also published their individual reports. WHO/Europe also provided input to the actual development of the pandemic plan in several countries. Lastly, European indicators for pandemic preparedness were developed [28] and are currently being revised with input from MS to incorporate lessons learned.

All in all, by the time the pandemic was declared by the WHO in June 2009, all 53 MS in the WHO European region had developed a national pandemic plan and were relatively well prepared compared with other regions. However, country assessments and other activities identified a number of gaps, chiefly that national plans were not operational—they described what had to be done but few activities had been (fully) implemented, at national or local level. Examples include strategies for vaccine and antiviral delivery, surge capacity in the healthcare services, routine surveillance for severe disease associated with influenza, and business continuity in essential services.

### The response to the 2009 (H1N1) pandemic

The world has recently experienced the first influenza pandemic of the twenty-first century lasting 14 months between June 2009 and August 2010. Although the 2009 pandemic was less severe than the three pandemics of the twentieth century, it caused a wide spectrum of illness [30] and in the USA caused severe disease and death more frequently in the under-60s, compared with seasonal influenza, in persons with underlying conditions, pregnant women, but also healthy individuals [29]. Regarding the community effect of the 2009 influenza pandemic, analysis of EuroFlu data showed it arrived earlier than previous seasons and caused a significantly higher number of outpatient consultations in children [31].

On 17 April 2009, the United States government alerted the WHO about two children living in adjacent counties in southern California infected with a new influenza H1N1 virus of swine origin that had not been previously detected in pigs or humans. In Mexico, unusual levels of influenza-like illness had been detected in mid-March 2009, and by mid-April atypical cases and clusters of severe pneumonia occurring mainly among previously healthy young adults in different areas of Mexico were observed. On 23 April, samples from Mexico were found to contain genetically identical viruses to the influenza H1N1 viruses from California and this information was immediately reported by the MoH to the WHO [32]. On 25 April, nearly 2 years after the IHR came into force, the 2009 (H1N1) pandemic was the first event to be declared a public health emergency of international concern (PHEIC) by the Director-Gen-

### Tab. 3 Timeline of the spread of the 2009 (H1N1) pandemic, declaration of phases by the WHO, and recommendations

| Date          | Situation                                                                 | Phase declared by WHO | Main recommendations to countries provided by WHO                                                                 |
|---------------|---------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------|
| 25 April 2009 | Relatively few cases of a new subtype of influenza A(H1N1) not previously known to infect humans reported in one WHO region | PHEIC/phase 3          | Intensify surveillance for unusual outbreaks of influenza-like illness and severe pneumonia                      |
| 27 April 2009 | Confirmed outbreaks in Canada, Mexico, and the USA                        | Pandemic alert phase raised from 3 to 4 | Containment not feasible; focus on mitigation measures; no border closer nor restriction to international travel |
| 29 April 2009 | Sustained human-to-human transmission in at least two countries in one region | Pandemic alert phase raised from 4 to 5 | Immediately activate pandemic preparedness plans; effective and essential measures are heightened surveillance, early detection and treatment of cases, infection control in all health facilities; ramp up capacities for preparedness and response |
| 11 June 2009  | ~30,000 confirmed cases reported in 74 countries and further spread considered inevitable. Pandemic expected to be of moderate severity | Pandemic alert phase raised from 5 to 6 | Pandemics spread rapidly across the globe, countries not yet affected should be vigilant for the first cases. Countries with widespread transmission should focus on the clinical management of patients, with limited testing and investigation of patients to save resources. Pending the availability of vaccines, nonpharmaceutical interventions can confer some protection. WHO continues to recommend no restrictions on travel and no border closures |
| 13 July 2010  | Pandemic                                                                   | Phase 6                | Evaluation and revision of plans based on lessons learned; vigilance for return of the pandemic virus in subsequent influenza seasons |
| 10 August 2010| Most countries have experienced epidemics, localized outbreaks may continue | Pandemic declared over-post-pandemic period |                                                                                                               |
eral of WHO, after consultation with an Emergency Committee and in accordance with IHR provisions. These events signaled the emergence of the 2009 pandemic. WHO continued to alert countries to the situation by the declaration of phases describing the global spread of the virus [33]. Phase 6 is the pandemic phase, declared when it is considered inevitable that the new virus has the potential to cause epidemics in every country. Summarized in Table 3 is a timeline showing the declaration by the WHO of the phases and the main recommendations provided by the WHO (a full timeline of events has been published by the WHO [34]). Recommendations were based on the spread of the virus but also on severity and impact from information received from early-affected countries.

The WHO mounted a full-blown response to the pandemic, which has been described in detail in the external review of the IHR [4]. WHO/Europe, along with the other five regional offices and country offices, played a crucial role in this response. The response mounted by WHO/Europe was essentially a continuation of the activities being conducted since 2005, but with additional manpower and increased working hours. By 25 April 2009, WHO/Europe had activated its emergency steering committee and established a Pandemic Response Team (PRT). Up until July 2009, the PRT consisted of about 25 technical staff available 24/7 on a rotational basis and held daily meetings. During the remainder of the pandemic, the PRT core team consisted of about 15 technical staff, with additional staff as needed. The responsibilities of the PRT were as follows:

- Coordinate activities with WHO headquarters, country offices, and key partners such as the EC and ECDC (mainly through the early warning and response system for EU MS, EWRS)
- Collect, analyze, and present information obtained through IHR channels, EuroFlu, public national bulletins, and other sources, and assess the situation together with WHO headquarters; disseminate information on the severity and impact of the pandemic in the region through the WHO/Europe website and the influenza surveillance network
- Publish the weekly EuroFlu bulletin throughout the pandemic, also in the summer months of 2009 and 2010, in English and Russian
- Provide information and guidance to MS and to country offices
- Provide input to global efforts to mobilize resources for low-resource countries in the region

The PRT also provided operational support to MS in the following areas:

- 100 diagnostic kits (received from CDC, Atlanta, USA) to detect the new virus were shipped to 36 countries
- Facilitated the sharing of viruses through the WHO Shipment Fund Project by 30 MS with the WHOCCRRI; this is more than in a normal season
- Facilitated in 2009 the shipment of about 550,000 courses of oseltamivir, which were donated to the WHO, to 19 countries in the region
- Conducted workshops for all 53 MS to assist with the development of pandemic vaccine deployment plans. Provided a risk communication package to support the deployment of pandemic vaccines
- Held inter-country meetings to review the response to the pandemic and provide further guidance
- Held two annual influenza surveillance meetings in the autumn of 2009 and 2010

WHO/Europe also supported countries that requested assistance to assess the situation during the pandemic. In early November 2009, WHO/Europe mobilized an outbreak response mission to support investigations of the MoH of Ukraine into reports of increased numbers of cases of pneumonia and severe respiratory illness in the western part of the country [35]. Experts from WHO, ECDC, and GOARN partners in the areas of clinical management, epidemiology, laboratory diagnostics, logistics, and crisis communication worked with national public health and healthcare services to establish whether the outbreak was due to the pandemic (H1N1) virus, to gain a better understanding of vulnerability to and risk factors for illness, and identify best-practice scenarios for treatment. A number of viruses from severe and fatal cases were further analyzed by the WHOCCRRI and it was established that there had been no changes to the virus strain that would alter its pathogenicity or antigenicity, the latter indicating that the pandemic vaccine should be effective. The mission team focused on providing recommendations for clinical management, infection control, surveillance, and communication for immediate implementation. The team also conducted an assessment of healthcare settings with regard to the availability and needs related to medical devices and equipment that was used to guide donations from EU countries mobilized through the Monitoring and Information Centre for Humanitarian Aid and Civil Response of the European Commission [36].

**Evaluating the response and lessons learned from the 2009 pandemic**

The ability to respond to a complex health emergency such as an influenza pandemic requires a continuous process of pandemic preparedness planning, exercising plans, and incorporating lessons learned into plans. For the first time in history, countries implemented a pandemic response that drew on pandemic plans and activities undertaken in the few preceding years, and for the first time in history a pandemic vaccine was available during the first wave of the pandemic. By January 2010, most countries in the WHO European region had experienced an epidemic caused by the new virus and countries and international organizations alike started to evaluate their response to the pandemic and to take the necessary steps in the transition to seasonal influenza. In light of a main conclusion of the IHR review, that “the world is ill-prepared to respond to a severe influenza pandemic or to any similarly global, sustained and threatening public-health emergency,” these are critical steps.

In the WHO European region, from evaluations performed by individual countries at the EU and regional level, the
The following key lessons learned were identified:

- The process of pandemic planning with broad stakeholder involvement and the pandemic plans themselves were useful. However, national pandemic plans had been insufficiently implemented at the subnational and local level.
- Global phases describing the spread of the pandemic virus were not useful as triggers for response measures at the national level and local level.
- A rapid assessment of severity and impact was hampered by a lack of standardized protocols and indicators, by a lack of routine surveillance for severe disease associated with influenza, and by tenuous links between public health authorities and health service providers.
- The deployment of, and risk communication activities related to, pandemic vaccine were considered extremely difficult, with generally low uptake in risk groups, some countries having a surplus of vaccine and others receiving vaccine only after the epidemic, particularly those countries that received donations through the WHO.
- Front-line responders—family physicians and hospital healthcare workers—had been insufficiently included in the pandemic planning process and were hard to reach during the pandemic.

The evaluation performed by WHO/Europe together with the WHOCCPIR in seven countries focused on the degree to which pandemic preparedness plans and associated activities proved useful during the 2009 pandemic. The goal was to provide recommendations for pandemic plan revisions and to identify areas of planning that require further strengthening. Using a systematic approach, more than 200 individuals representing national, regional, and local responders in seven MS were interviewed. In addition to the lessons learned summarized above, the evaluation revealed six major themes essential for effective pandemic preparedness: communication; coordination; capacity; adaptability/flexibility; leadership; and mutual support. With respect to the theme of support, the WHO pandemic planning guidance and the guidelines produced during the pandemic were considered extremely important. With respect to capacity, preparedness activities including training, inter-country exchange of expertise and experience, assessments and strengthening in specific fields such as surveillance and risk communication had a positive impact on the ability of MS to respond to the pandemic [10, 37].

**Conclusions and next steps**

Based on the experience of the past 7 years and feedback from MS, it can be concluded that the activities conducted by WHO/Europe in the area of influenza and pandemic preparedness have been useful and have filled a number of gaps. The level of pandemic preparedness and the capacity for influenza surveillance in the region, both epidemiological and virological along with early warning, has increased. These capacities will benefit public health in a broader context, as influenza surveillance can detect other respiratory infections; the capacities built as part of pandemic preparedness will support preparedness for other infectious diseases as well as the implementation of IHR core capacities.

WHO/Europe was well positioned to guide and assist its country offices in the implementation of activities, and has coordinated activities with WHO headquarters as well as regional and global partners. This is commensurate with the goals of the WHO Reform [38] regarding health security, whereby the WHO will provide surveillance, alert–verification–assessment support, and event management mechanisms, along with direct operational support on the ground when needed, as well as assist countries to build their institutional capacities. However, a number of gaps were also identified, and to address these in times of shrinking resources, in 2011 the IRP program performed a situation analysis and developed a 5-year strategy. Based on this strategy, WHO/Europe will continue to assist MS efforts to strengthen surveillance for severe disease due to influenza and it will focus more on assisting countries to determine the burden of disease and risk factors for severe disease so as to inform seasonal influenza vaccination programs. Therefore, in collaboration with the VENICE project and ECDC [39], in 2011 the first regional survey of seasonal influenza vaccine policies and uptake in the 53 MS was conducted. Currently, only one country in the region meets the 2005 WHO target of 75% vaccine uptake in the elderly, and few countries have programs to vaccinate other-risk groups, such as persons with underlying conditions and pregnant women, or systems in place to monitor uptake (unpublished data). WHO/Europe will continue to conduct regular surveys to target assistance to countries in this area. WHO/Europe will continue to assist national influenza laboratories in the ten countries that currently are not recognized by WHO to obtain WHO recognition, to measure the impact of seasonal influenza in the region, as was done for the pandemic [31], and to respond to requests for assistance in periods of unusual influenza activity. In 2011, during the first post-pandemic season that was dominated by the pandemic (H1N1) virus and which caused strains on critical care services in a number of countries, WHO/Europe together with the EC and ECDC organized regional teleconferences for clinicians from the first-affected countries to share their experience in the management of severe cases with clinicians from countries that had not yet been affected [40].

WHO/Europe will continue to support MS efforts to revise their pandemic plans, through inter-country workshops jointly with ECDC similar to those organized in 2011 [41], through sharing of good practice, and through assistance to individual countries. This work will be integrated with efforts to enhance general preparedness for public health emergencies as well as the implementation of IHR core capacities. WHO/Europe together with MS experts and ECDC is currently revising the European pandemic indicators [27] that will form a new European guidance for pandemic preparedness. WHO/Europe, as WHO secretariat, will support the implementation of the PIP Framework [9].
Influenza, whether seasonal, avian, or pandemic, will continue to feature on the public health agenda, and to take us by surprise: the 2009 pandemic was first detected not in Southeast Asia, the epicenter of the H5N1 outbreak, but in the Americas. It was milder than previous pandemics but yet was difficult to manage for many countries. WHO/Europe will therefore continue to work in this area, based on the needs of countries as well as the requirements for global surveillance and response.

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