



EUROPE

# Eliminating measles and rubella and preventing congenital rubella infection

WHO European Region strategic plan 2005–2010



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## Executive summary

Strengthening national immunization systems is an important goal in the WHO European Region. Immunization programmes delivering quality vaccines in a safe manner, with age-appropriate vaccination coverage rates  $\geq 95\%$ , high-quality programme-monitoring capacity and laboratory-based disease surveillance, will enhance the cost-effectiveness of using existing vaccines.

The WHO Regional Office for Europe developed and implemented a strategic plan for measles and congenital rubella infection in the WHO European Region in 2002. This plan targeted the elimination of measles and the prevention of congenital rubella infection for the year 2010. Measles elimination has already been achieved in some Member States through routine immunization programmes, which maintain high measles-vaccine coverage using a two-dose schedule.

Considerable progress was made between 2002 and 2004: all 52 Member States now have routine two-dose measles immunization schedules and 26 (50%) have achieved a measles incidence of  $<1$  per million population, one indicator of measles elimination. Forty-eight (92%) are now using rubella vaccine; 47 use measles vaccine combined with rubella vaccine.

As a result of consultations in 2004 with Member States and technical advisory groups, rubella elimination was also proposed for 2010. Given that rubella is a less contagious illness compared with measles and most Member States have elected to use combined measles-rubella vaccines, rubella elimination is feasible within a framework of measles elimination. This was approved at the fifty-fifth session of the WHO Regional Committee for Europe, as part of the resolution on strengthening national immunization systems through the elimination of measles and rubella and the prevention of congenital rubella infection.

The new strategic plan for eliminating measles and rubella and preventing congenital rubella infection in the WHO European Region highlights the progress made since 2002 and identifies key strategies and actions required in the areas of national policy development, surveillance, vaccine quality and safety, communication and advocacy, and the development of a certification process. WHO will develop supporting documents as needed to help Member States in the implementation of these strategies.

# 1. Introduction

Immunization, a highly cost-effective and life-saving intervention used to control and potentially eliminate vaccine-preventable diseases, improves the population's health. Effective immunization programmes have been an integral part of public health services in the WHO European Region for decades, resulting in the global eradication of smallpox in the 1970s and enabling polio-free certification of the Region in 2002. In the 1990s, the resurgence of diphtheria in many countries of the former USSR reaffirmed the need for maintaining strong routine immunization programmes and ensuring high population immunity to control these diseases.

The 2005 World Health Assembly resolution WHA58.15 urged Member States to adopt the *Global Immunization Vision and Strategy* as a framework for strengthening national immunization programmes between 2006 and 2015, with the goals of achieving greater coverage and equity in access to immunizations; improving access to existing and future vaccines; and extending the benefits of vaccination linked with other health interventions to age groups beyond infancy (1).

Measles is a highly contagious illness, which was responsible for over 30 million cases and 530 000 deaths in the world in 2003 (2). Despite the availability of measles vaccine for more than 40 years, over 29 000 measles cases were reported for 2004 in the WHO European Region (Annex 1). WHO has estimated that 4850 measles deaths may have occurred in the Region in 2003 (2). Efforts to reduce the measles disease burden have led to measles elimination initiatives. Four WHO regions, including the European Region, have targeted measles elimination as a priority; the Pan American Health Organization declared the WHO Region of the Americas free from endemic measles transmission in 2002. Nevertheless, that Region continues to experience importations of measles from other parts of the world: 37% of measles cases imported into the United States during the period 1993 to 2001 and 21% of all Canadian measles cases during the period 1999 to 2001 were linked to the European Region (3,4). Similarly, almost 50% of measles cases imported into countries of the European Union (EU) are from other EU countries (5), highlighting the need for a coordinated strategy within the European Region.

Rubella, a milder, less contagious viral illness, is of high public health importance owing to teratogenic effects that can result from congenital rubella infection (CRI), leading to miscarriage, fetal death or birth of an infant with congenital rubella syndrome (CRS). It has been estimated that over 100 000 cases of CRS occur in developing countries each year (6). CRI can be prevented by ensuring women of childbearing age are protected both through vaccination and by preventing their exposure to indigenously circulating rubella virus. A single dose of rubella vaccine, which confers immunity in 95% or more of recipients at 12 months of age or older, should be sufficient. Both the Region of the Americas and the European Region seek to eliminate rubella.

Offering all children the opportunity to receive two doses of measles-containing vaccine (MCV) and all children and women of childbearing age the opportunity to receive at least one dose of rubella-containing vaccine will be adequate to permit Member States to reach the 2010 targets for these diseases. Given that most Member States have already incorporated

a combined measles-rubella (MR) vaccine into the vaccination schedule (7) and that rubella is less contagious than measles, rubella elimination is feasible within the framework of a measles elimination strategy. Use of combined MR vaccines is the most efficient way to deliver these antigens in routine childhood immunization programmes; but the decision to use MR or measles-mumps-rubella (MMR) vaccine should be based on the health priorities of individual Member States.

## 2. Status in the WHO European Region

### Background for the disease control initiative

The health for all policy framework for the WHO European Region (HEALTH21), approved by the WHO Regional Committee for Europe in 1998, identified targets for nine vaccine-preventable diseases, including measles elimination by 2007 and an incidence of CRS of <1 case per 100 000 live births by 2010 (8). Owing to widespread use of combined MR vaccine in the European Region, the strategic plan for measles and congenital rubella infection in the WHO European Region (9) targeted both interruption of indigenous transmission of measles (measles elimination) and prevention of congenital rubella infection (<1 case of CRS per 100 000 live births) by 2010. In 2004, the WHO European Region's National Immunization Programme Managers and the WHO European Technical Advisory Group of Experts on Immunization (ETAGE) reviewed the plan's objectives, and recommended inclusion of rubella elimination into the strategy. This was approved at the fifty-fifth session of the WHO Regional Committee for Europe as part of the resolution on strengthening national immunization systems through the elimination of measles and rubella and the prevention of congenital rubella infection (Annex 2).

### Economics of measles and rubella elimination and CRI prevention

The Expanded Programme on Immunization (EPI) has been shown repeatedly to be one of the most cost-effective health programmes. EPI is estimated to prevent up to three million deaths and to save 750 000 children from disability each year (10). Yet an estimated 1.4 million children under five years of age died from diseases preventable by widely used vaccines in 2002. This therefore supports the need for ongoing efforts to strengthen existing immunization programmes.

Economic evaluations of the use of measles and rubella vaccines demonstrate either cost-effectiveness and/or cost-savings. A study from western Europe demonstrated optimal cost-effectiveness and cost-benefit for a two-dose measles vaccine schedule at 95% coverage levels (Iversen PB, unpublished observations, 2005). This assessment did not, however, include the potential added benefits of general strengthening of routine childhood immunization programmes and surveillance capacity, including well functioning laboratory networks.

An analysis of costs associated with the Italian measles outbreak in 2002–2003 in regions with low vaccine coverage estimated the direct costs to have been between €9.9 million and €12.4 million and total costs of €14.8 million. This was sufficient to have vaccinated 2.7 birth cohorts of children nationwide with two doses of MMR at 95% coverage rates (11).

Data from a comprehensive review of 17 global studies, including seven from the WHO European Region, established rubella vaccine to be a cost-effective and cost-saving intervention (12); this analysis included studies from Denmark, Finland and Norway that reported benefit–cost ratios >1 for preventing CRS using rubella or combined MMR vaccine (13–15).



## Progress since 2002

### Surveillance systems for measles, rubella and CRS

Member States use different methods to collect measles and rubella data, including aggregate (reporting in broad age-groups), case-based (individual case investigation) and sentinel physician reporting. In 2004, 44 countries reported aggregated monthly data and five reported case-based data on a monthly basis. Thirty-one countries reported measles directly to WHO, and 18 countries reported only through EUVAC.net, the measles surveillance network supported by the EU. In addition, all Member States reported annual information on measles, rubella and CRS for 2004 using the WHO/United Nations Children's Fund (UNICEF) annual reporting form, which was distributed early in 2005.

Surveillance guidelines for measles and congenital rubella infection were published in 2003 (16), and the monitoring of the completeness and timeliness of monthly reporting to WHO for measles was established in 2004. At the regional level, completeness of reporting is defined as  $\geq 80\%$  of monthly reports being received by WHO; timeliness is defined as  $\geq 80\%$  of monthly reports being received by WHO before the 25th of the following month. In 2004, 71% of Member States met the criterion for completeness and 10% met the criterion for timeliness.

The European Region measles and rubella laboratory network was initiated in 2002. At present, 47 (90%) Member States have a national measles/rubella laboratory, which is linked to one of three WHO European Region reference laboratories appointed in 2003 or to the global specialized laboratory located in the European Region. The network has implemented standardized diagnostic methods and reagents and a quality assessment programme, including proficiency testing and monthly online reporting of laboratory performance indicators; completeness of reporting from national laboratories was 70% in 2004.

The results of a technical consultation on measles, rubella and congenital rubella syndrome surveillance, held in April 2005 (5), are being used to revise the existing surveillance guidelines.

### Vaccination programmes

All 52 Member States now have national two-dose measles vaccine schedules, an increase from 49 (96%) of 51 countries in 2001. Rubella-containing vaccine use among Member States has also increased from 38 (75%) of 51 countries in 2001 to 48 (92%) of 52 countries in 2005; 47 Member States use at least one dose of a combined MR vaccine in their childhood immunization programmes (Fig. 1 and Annex 3). Overall, about 70% of Member States had national immunization plans in 2004, 60% had measles plans, but less than 50% had rubella plans and/or plans for CRI.

First-dose MCV (MCV1) coverage in the European Region for 2004 ranged from 73% to 99%, with a population weighted mean of 92% (Fig. 2 and Annex 3). Regionally, MCV1 coverage reached a high of 92.2% in 2001. A regional average coverage for the second dose of MCV (MCV2) for 2004 was 86%; but, this is not a true reflection of coverage because 14 (27%) countries did not report this indicator (Fig. 3 and Annex 3).

A field guide for supplemental immunization activities for measles and rubella was published by the WHO Regional Office in 2004 to aid in the planning, implementation and

evaluation phases of these activities (17). At least nine national supplementary immunization activities have been conducted in the European Region since 2001, targeting measles- and/or rubella-susceptible persons in Albania, Cyprus, Italy, Kazakhstan, Serbia and Montenegro (Kosovo), Kyrgyzstan, the Republic of Moldova, Tajikistan and Turkey (18).

### **Disease epidemiology**

The reported incidence of measles in 2004 by Member State is presented in Fig. 4 and in Annex 1. A measles incidence of <1 per million population has been identified as an indicator of measles elimination (19). The number of Member States achieving this incidence increased from 14 (27%) in 2001 to 26 (50%) in 2004 (Fig. 5). At least 25 Member States have had measles outbreaks since January 2002, including large outbreaks in Armenia, Azerbaijan, France, Georgia, Germany, Ireland, Italy, Kazakhstan, the Republic of Moldova, Romania, the Russian Federation, Spain, Switzerland, Tajikistan, Ukraine and Uzbekistan.

The reported incidence of rubella in 2004 by Member State is presented in Fig. 6 and in Annex 1. In 2004, seven (13%) Member States did not report national data on rubella cases, and 15 (29%) did not report information on CRS; 14 (27%) Member States reported a rubella incidence of <1 per million population and 17 cases of CRS were reported. Since 2000, 123 CRS cases have been reported to WHO from 17 (33%) Member States; but 45 (37%) were reported from Romania, 28 (23%) from the Russian Federation and 17 (14%) from France. As these countries represent only a small proportion of Member States known to have freely circulating rubella virus and many countries that have reported zero or few cases have not evaluated the completeness of reporting, it can be assumed that marked under-reporting of CRS occurs.

A summary of mumps control in the European Region is presented in Annex 4, since 50 (96%) of Member States are currently using mumps vaccine, 47 as MMR vaccine.

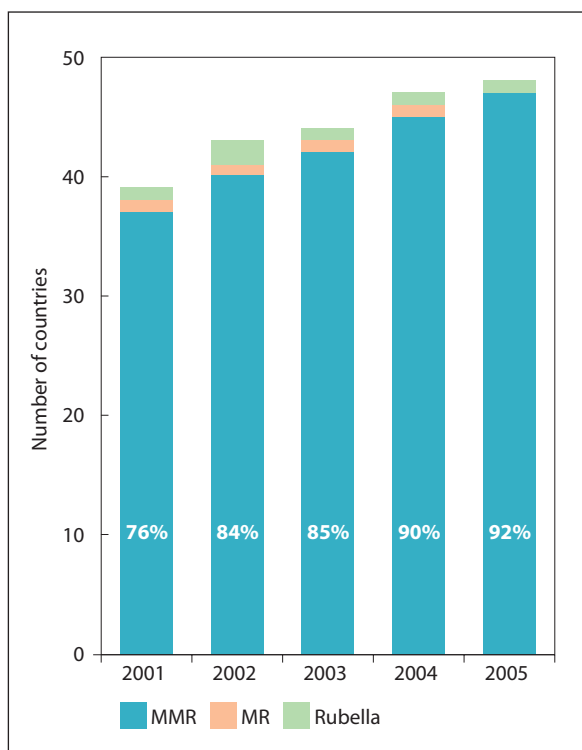
### **Analysis by measles vaccine coverage and measles incidence**

Member States have been grouped based on their MCV1 coverage and measles incidence for the four years, 2001–2004, using the parameters of MCV1 coverage (<95% or ≥95%) and measles incidence (<1 per million population or ≥1 per million population). Four groups of countries are thus created (Fig. 7). Since 2001, the number of countries in the group with a measles incidence of <1 per million and a MCV1 coverage of ≥95% has increased from 8 to 18, demonstrating that in many Member States the decrease in measles incidence has also been accompanied by an improvement in measles vaccine coverage.

The total number of cases of measles, rubella and CRS reported during 2004 for each of the four groups is shown in Table 1. While the incidence of measles and rubella varied by group, it is difficult to draw specific conclusions about rubella given that five countries from the group with the highest measles incidence and lowest MCV1 coverage, representing 60% of the group's population, did not report information on rubella cases. Since four of these five countries use MMR vaccines, it is unlikely their level of rubella control is better than for measles. While 50% of countries with the highest incidence and lowest MCV1 coverage experienced negative publicity regarding immunization, the proportion of countries with communication plans was similar among all four groups, ranging from 50% to 67%.

Use of MCV1 coverage and measles incidence can be a management tool, providing a current and more objective assessment of a country's measles control programme compared with the three stages of measles control (I–III) used in the *Strategic plan for measles and congenital rubella infection in the European Region of WHO* (9). To meet the 2010 targets for measles, Member States with MCV1 coverage <95% and incidence  $\geq 1$  per million need to improve routine measles vaccine coverage and immunize susceptible populations, while those with MCV1 coverage  $\geq 95\%$  and incidence  $\geq 1$  per million need to maintain

**Fig. 1. Number and percentage of Member States using rubella vaccines by vaccine type, 2001–2005**



their coverage levels, while also addressing measles-susceptible populations. Member States with a measles incidence <1 per million but MCV1 coverage <95% need to develop strategies to improve routine measles vaccine coverage and avoid the accumulation of susceptible people, while countries with MCV1 coverage  $\geq 95\%$  and a measles incidence <1 per million need to maintain their achievements. All countries need to ensure their ability to document cases resulting from indigenous (endemic) measles transmission or an importation.

A similar analysis can be made of rubella vaccine coverage and rubella incidence. Since most Member States now use combined MR vaccine, current rubella vaccine coverage is linked with mea-

sles vaccine coverage; but the epidemiology of rubella is different from measles in many countries, owing to the recent introduction of rubella vaccine.

The analysis of measles and/or rubella incidence by vaccine coverage is limited by the quality of data received from a Member State. While the cyclical pattern of measles and rubella epidemics has to be considered when analysing incidence for only one year, the existence of this cyclical pattern needs to be better characterized among those countries below the threshold incidence of <1 case per million. Information provided by countries claiming to have achieved measles and rubella elimination will need to be validated through a certification process.

### **Immunization quality and safety**

Immunization quality and safety were recognized as a high priority in the *Strategic plan for measles and congenital rubella infection in the European Region of WHO* (9), and major achievements have occurred in this area. In 2004, 49 (94%) of 52 Member States secured vaccines of assured quality; 20 (69%) of 29 priority countries had action plans for injection

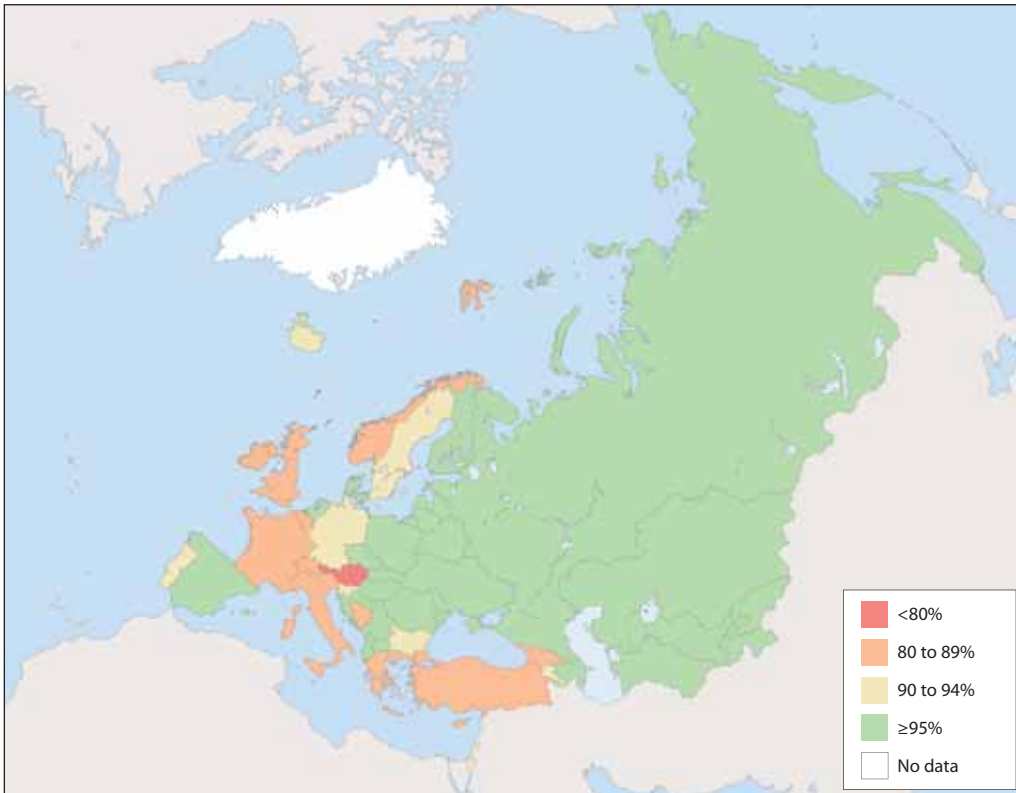


Fig. 2. MCV1 coverage by Member State, 2004

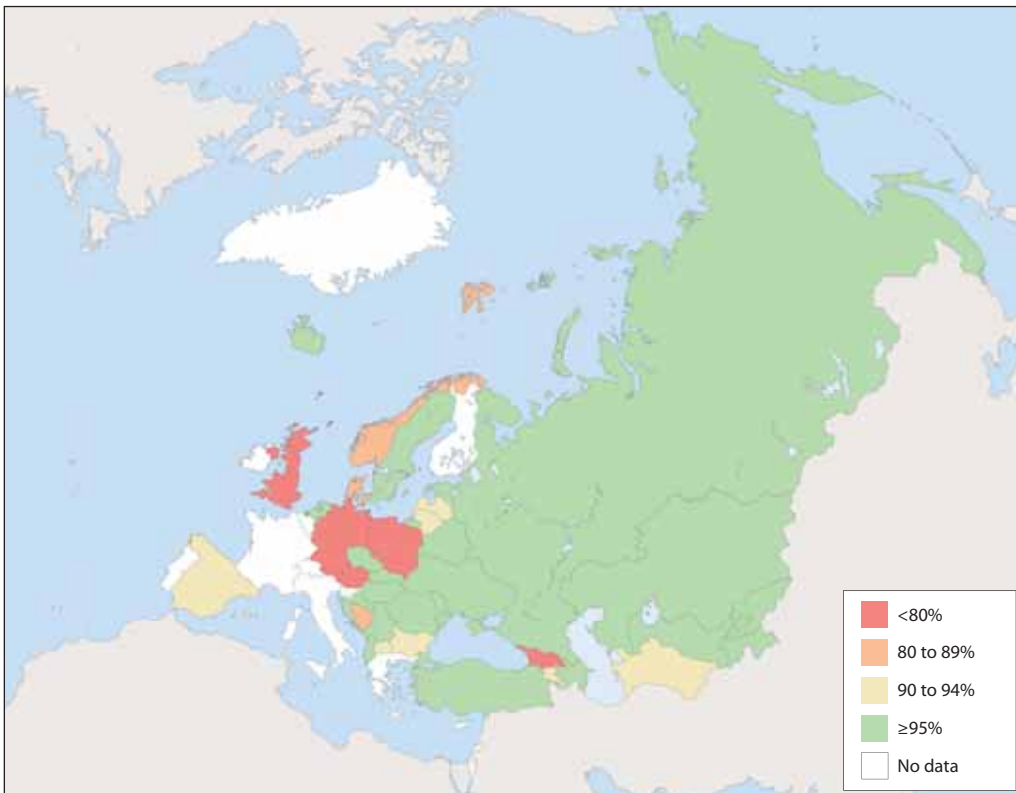


Fig. 3. MCV2 coverage by Member State, 2004

Fig. 4. National and subnational (Russian Federation) measles incidence, 2004

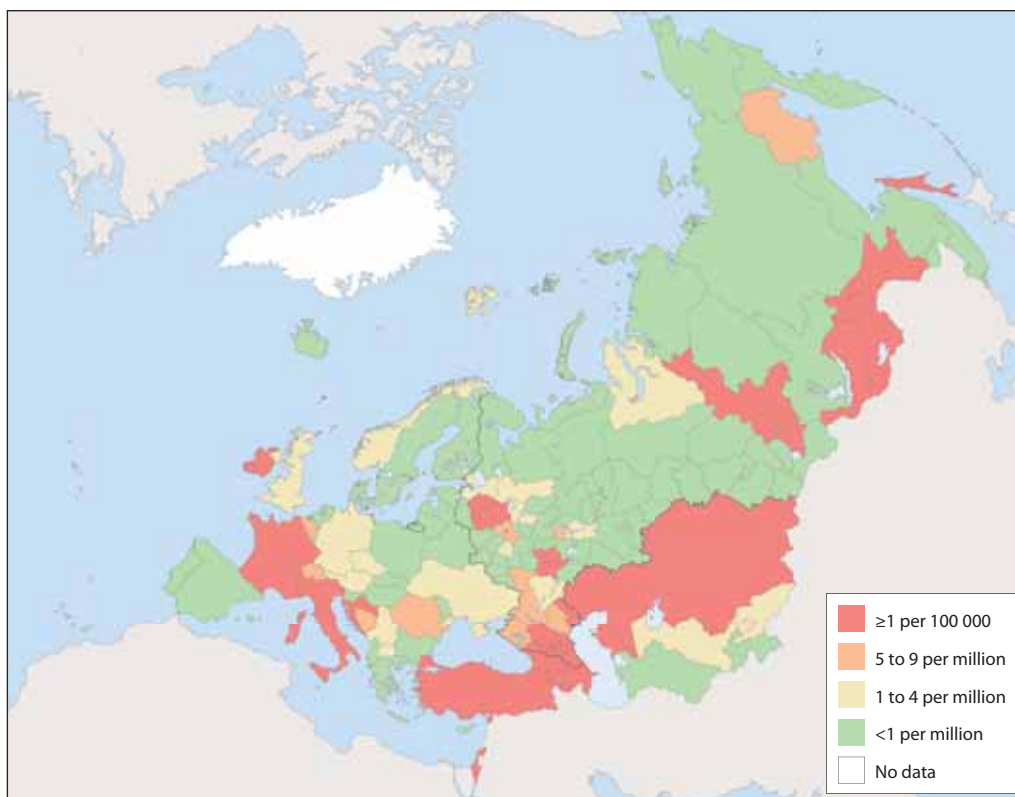
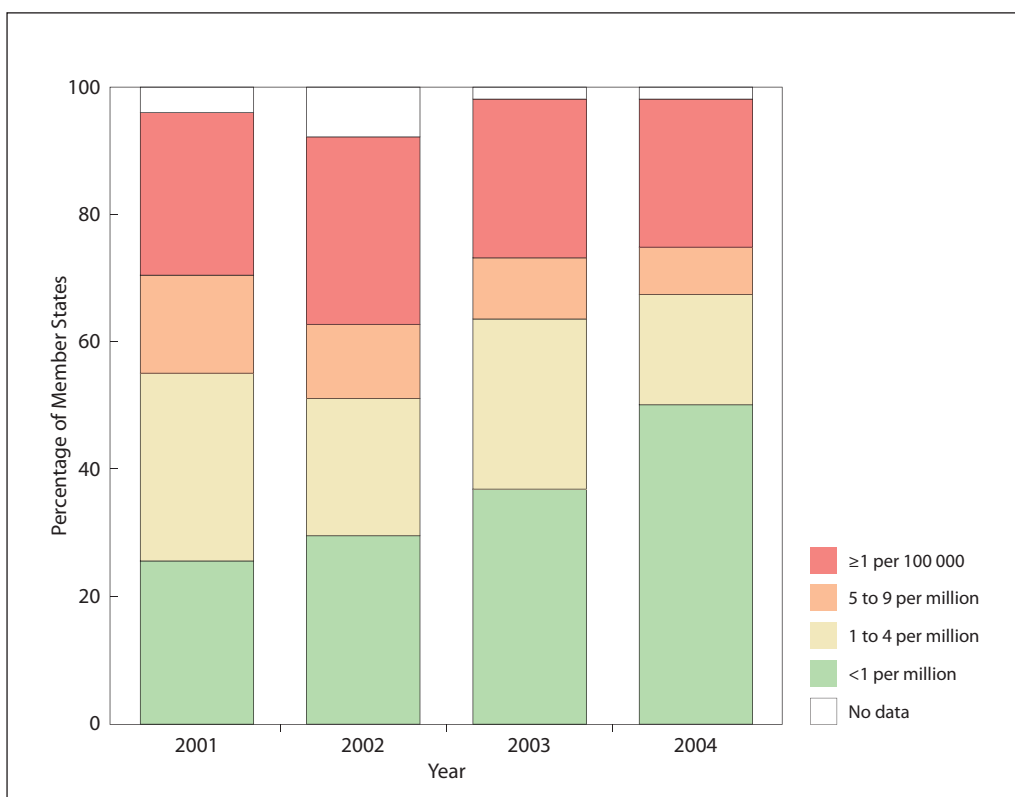


Fig. 5. Percentage of Member States in each measles incidence group, 2001 to 2004



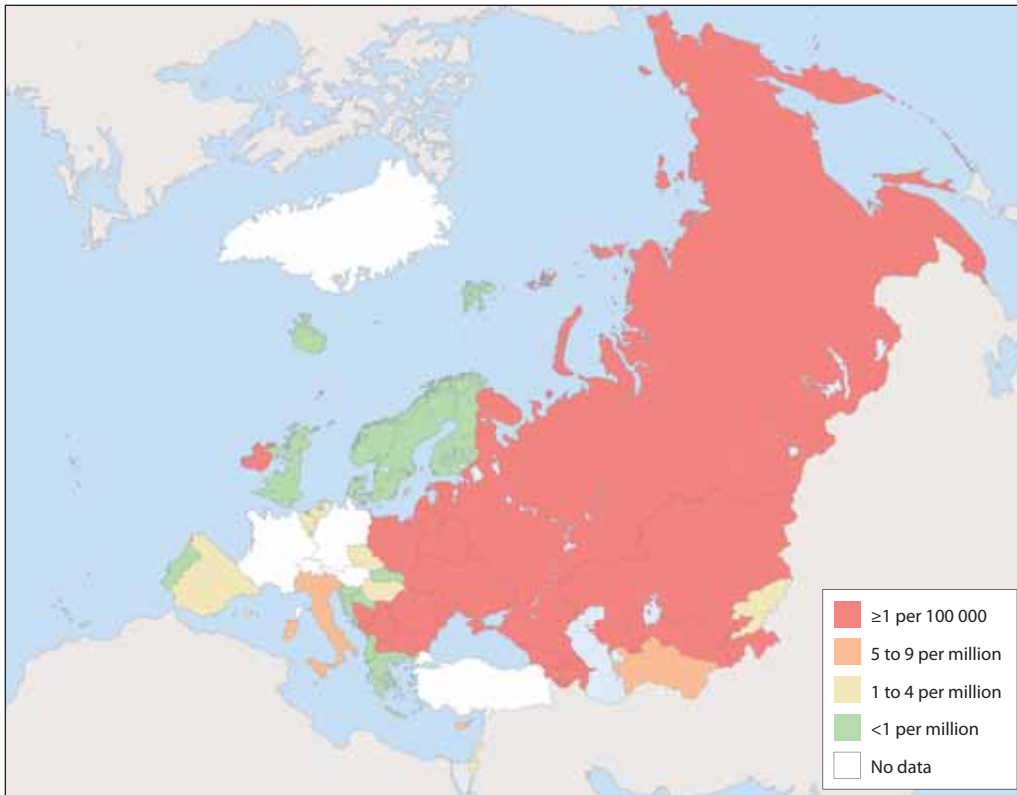


Fig. 6. National rubella incidence, 2004

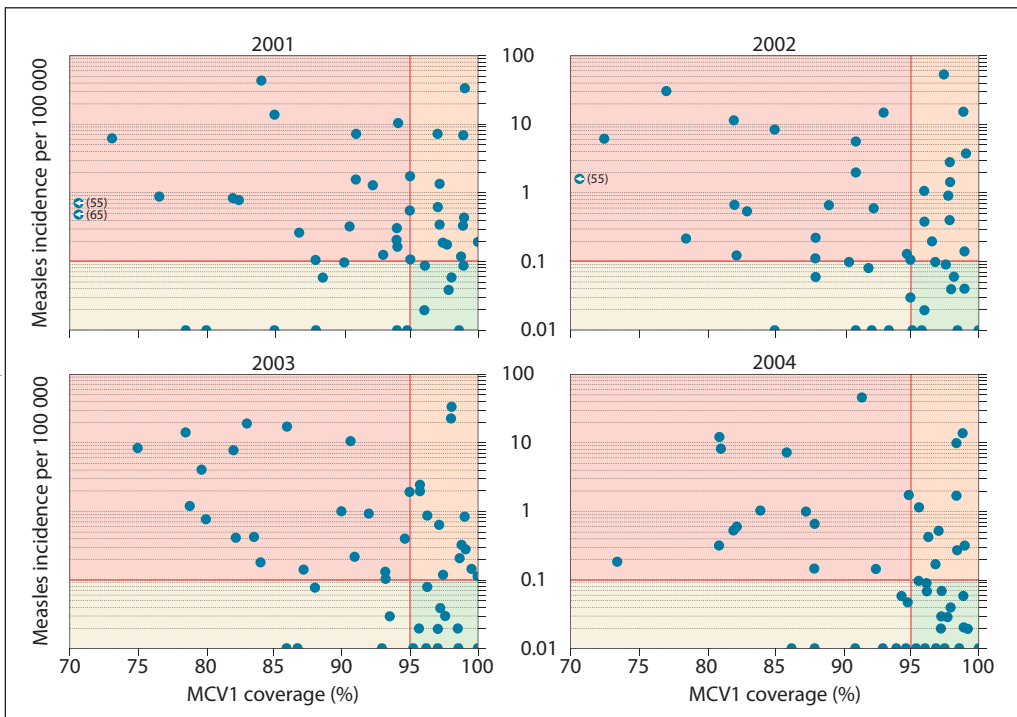


Fig. 7. Measles incidence and MCV1 coverage among Member States, 2001–2004

Note: Group 1 (red) includes countries with a measles incidence of  $\geq 1$  per million and a MCV1 coverage of  $< 95\%$ ; group 2 (orange) includes countries with a measles incidence of  $\geq 1$  per million and a MCV1 coverage of  $\geq 95\%$ ; group 3 (yellow) includes countries with a measles incidence of  $< 1$  per million and a MCV1 coverage of  $< 95\%$ ; and group 4 (green) includes countries with a measles incidence of  $< 1$  per million and a MCV1 coverage of  $\geq 95\%$ . Measles incidence is shown on a common logarithmic scale.



Table 1. The number of measles, rubella and CRS cases by measles group, 2004

Measles group	Number of countries	Population	Number of measles cases	Measles incidence per 100 000 population	Number of rubella cases <sup>a</sup>	Number of CRS cases
1	14	377 032 581	23 402	6.2	6 054	4
2	11	296 432 836	6 020	2.0	247 047	10
3	8	40 681 958	11	0.03	491	0
4	18	161 666 239	70	0.04	10 462	3
Total	51	875 813 614	29 503	3.4	264 054	17

<sup>a</sup> WHO did not receive national rubella surveillance data for 2004 from five countries in group 1 and from one country in group 4.

Source: Data obtained from Member States on the WHO/UNICEF annual reporting form, 2005 and available for all Member States except Monaco.

safety and sharps disposal, and 37 (71%) of 52 Member States reported adverse events following immunization, compared with 18 (62%) and 24 (46%) respectively in 2001.

### Immunization information

The Vaccine Safety Net is a network of immunization web sites approved by WHO as having good information practices. The Network enables easy access to information on the benefits and risks of immunization for health care providers and parents. It was created to fulfil the need for high-quality information on immunization. Currently, 14 web sites in the European Region represent seven languages (20).

A further effort to improve immunization awareness involves the initiation of an annual, regionwide European Immunization Week. Through this initiative, Member States will identify and address barriers preventing high immunization coverage through targeted activities to improve knowledge and attitudes about the benefits and risks of immunization.

### 3. Strengthening national immunization systems

Strengthening national immunization systems is an important goal in the WHO European Region. Immunization programmes delivering quality vaccines in a safe manner, with age-appropriate vaccination coverage rates  $\geq 95\%$  and with high-quality disease surveillance and immunization programme-monitoring capacity, will enhance the cost-effectiveness of using existing vaccines. Strong immunization systems are also able to make effective use of evidence to support the introduction of new vaccines where appropriate. This strengthening can involve building on existing infrastructure and enhancing programme management capacity.

Measles and rubella elimination and CRI prevention provide an excellent opportunity to strengthen routine immunization systems. Key components of the immunization infrastructure can be enhanced by improving safe and effective immunization practices; developing immunization tracking systems to reduce drop-out rates; reducing missed opportunities and inappropriate contraindications; training health staff; and developing information, education and communication materials to be used by the public and health care providers. In addition to increasing vaccine coverage, supplementary immunization activities provide an opportunity to strengthen core components of the routine immunization infrastructure (17). Preparation for supplementary immunization activities requires at least eight months and should focus on micro-planning; vaccine management; injection safety, including proper disposal of injection materials and the reporting and management of adverse events following immunization; training; and social mobilization.

#### Measles, rubella and CRI objectives

The revised objectives for 2010 are:

- to eliminate endemic measles;
- to eliminate endemic rubella; and
- to prevent CRI (<1 case of CRS per 100 000 live births).

#### Key strategies

To achieve these objectives, the key strategies have been revised to take into account the rubella elimination target.

- 1. Achieve and sustain very high coverage ( $\geq 95\%$ ) with two doses of measles and at least one dose of rubella vaccine through high-quality routine immunization services.** Strategies need to be developed to improve vaccine coverage to  $\geq 95\%$ , especially among “hard-to-reach” populations (21), which include cultural or ethnic minority groups, nomadic groups, populations experiencing civil unrest/political instability, populations geographically isolated and populations refusing vaccination owing to religious or philosophical beliefs.



- 2. Provide a second opportunity for measles immunization through supplementary immunization activities to populations susceptible to measles.** Supplementary immunization activities need to be considered to reach people that have inadequate levels of immunity for interrupting endemic transmission of measles and are likely to be exposed to measles virus should it be introduced into the community. Such people include those attending schools or universities, those in the military and those working in health care settings. Susceptible groups of people can be defined by evaluating existing epidemiological data on measles cases, by assessing historical vaccine coverage data or in some circumstances, by using serosurveys.
- 3. Provide rubella vaccination opportunities, including supplementary immunization activities, to all rubella-susceptible children, adolescents and women of childbearing age.** Children and women of childbearing age may be susceptible to rubella owing to lack of exposure to rubella virus or because they did not receive rubella vaccine; a small proportion of women (<10%) may not have responded to one dose of the vaccine or may have lost protective antibody levels. Some countries have used rubella vaccines for many years in childhood programmes but without sustained coverage at high levels, resulting in a larger proportion of unvaccinated girls becoming women of childbearing age without immunity to rubella than would have occurred before rubella vaccine was used. During a rubella outbreak, these women are at risk for infection during pregnancy, increasing the number of children with CRS compared with countries where rubella vaccine has never been used (22). Appropriate immunization strategies need to be considered to reach these susceptible populations, both to interrupt endemic transmission and to ensure women of childbearing age are protected should rubella virus be introduced into their community.
- 4. Strengthen surveillance systems by rigorous case investigation and laboratory confirmation of suspected cases.** Surveillance activities for measles, rubella and CRS need to be of sufficient quality to detect sporadic cases and provide adequate information on both the epidemiology and the virus genotype, so cases can be classified as being the result of endemic transmission or importation. This information needs to be collected, analysed and communicated effectively, in a timely manner, to enable appropriate public health action. Surveillance systems for adverse events following immunization also need to be capable of detecting, monitoring and responding to suspected cases in a timely manner. Regular training and the availability of adequate information systems are critical components of this key strategy.
- 5. Improve the availability of high-quality, valued information for health professionals and the public on the benefits and risks associated with immunization against measles and rubella.** The knowledge and perceptions of health professionals and the public about measles and rubella, including the benefits and risks associated with preventing these diseases, remain extremely important for public health officials seeking to increase and maintain the very high levels of immunization coverage required to meet the objectives of measles and rubella elimination. A growing number of people in all Member States get their health-related information from news media and the

Internet. While many Member States may provide some information for the public on immunization, more “Attention should be given to how the material is perceived and used by those with the right and desire to know – the parents of children about to be immunized or those who believe their child has been adversely affected.” (23).

WHO will develop supporting documents as needed to help Member States in the implementation of these strategies.

## 4. Key areas for action

The key areas for action include both regional and national activities, and are based on resolution EUR/RC55/R7 of the WHO Regional Committee for Europe (Annex 2).

### National policy development

#### National immunization plans for routine childhood immunization

All Member States are strongly encouraged to have approved national immunization plans containing clearly defined objectives, immunization strategies and activities, resource requirements and where appropriate, financial sustainability plans. National immunization plans should identify mechanisms for strengthening immunization programme management activities, including the ongoing evaluation of performance, and appropriate strategies to improve the collection, analysis and use of data on subnational programme activities, including the identification of under-performing areas.

#### Measles/rubella/CRI plans

Disease-specific plans are essential for Member States with endemic measles and/or rubella transmission, and they should be incorporated into national immunization plans. Member States are encouraged to review and revise existing plans or develop and implement measles/rubella/CRI national plans, if they do not currently exist. These plans need to include the introduction of rubella immunization for those Member States that do not already have such programmes, including the identification of resources required.

#### National measles and rubella elimination committees

Member States are encouraged to establish national measles and rubella elimination committees with national and subnational representation and involve partners, where appropriate. The committees can review progress towards the achievement of elimination and CRI prevention objectives.

### Surveillance

#### Infrastructure

All Member States should assess the capacity of their surveillance for vaccine-preventable diseases to ensure it is of sufficient quality to monitor, measure and report on the regional elimination targets for poliomyelitis, measles and rubella and the prevention target for CRI. In countries where mandatory reporting does not exist for these diseases, legislative changes may be required to facilitate the operation of the surveillance system. Given the number of Member States reporting an incidence of measles and/or rubella of  $\leq 1$  per 100 000, more countries should be able to report case-based information.

Surveillance assessment and training tools, being developed by the WHO Regional Office for Europe, will be available in 2006 to assist Member States.

The surveillance guidelines for measles, rubella and congenital rubella infection will be revised to incorporate the rubella elimination objective and provide a detailed set of surveillance indicators for assessing surveillance quality and for monitoring progress toward the elimination targets.

The regional measles and rubella laboratory network needs further strengthening to ensure adequate laboratory investigation of  $\geq 80\%$  of suspected measles and rubella cases when the disease incidence approaches 1 per 100 000. The testing is done in WHO-accredited laboratories or ones supervised by an accredited national laboratory, and the measles and rubella virus genotype data are available on cases from all Member States.

Many Member States require an affordable and sustainable supply of measles and rubella laboratory test kits that are comparable to the WHO recommended standard. In countries where importation of kits is a major financial or logistical burden, local production of test kits will be encouraged.

## **Immunization quality and safety**

All Member States should ensure that vaccines, which are procured and used, are of assured-quality and that their national regulatory authorities are fully functional.

High practice standards should be adhered to for vaccine management (vaccine storage, distribution and administration, including maintenance of cold chain), injection safety (availability of injection material and sharps containers) and proper disposal of injection material (safe, complete and environmentally friendly).

The strengthening detection and investigation of and response to adverse events following immunization will be essential to monitor the quality and safety of immunization and to guarantee the transparency of the programme through providing sufficient information about possible cases.

## **Coordination and partnership**

The WHO Regional Office for Europe will promote collaboration with Member States, governmental and intergovernmental agencies, nongovernmental organizations and other relevant partners to commit resources to strengthen routine national immunization systems, and to achieve the measles and rubella elimination and congenital rubella infection prevention targets.

All Member States need to foster the appropriate partnerships, including plans for intersectoral cooperation, with governmental and intergovernmental agencies, nongovernmental organizations and other relevant partners, including the private health care sector and industry, to ensure the strengthening of routine immunization services and the achievement of the elimination targets.

## **Communication/advocacy**

### **Communication plans**

All Member States, particularly those experiencing adverse publicity about immunization, should ensure they have approved communication plans, by which they can respond to

negative publicity and ensure health care providers and the public have appropriately targeted, high-quality information on immunization, addressing specific issues of concern.

### **Regional advocacy strategy**

An evidence-based strategy, with effective advocacy approaches and sensitive to different regional and subregional issues, will be developed by WHO. It will include information on the European Immunization Week initiative and offer a process for the development of targeted advocacy activities at the regional and national levels.

### **Quality immunization information**

Member States, without languages represented in the Vaccine Safety Net, should work with interested stakeholders to develop accessible information for their populations. The addition of sites in major language groups of the European Region is a priority.

Commitment from Member States to European Immunization Week is essential for the Region-wide promotion of immunization using targeted national or subnational activities. This will also enable the sharing of experiences and information to promote evidence-based advocacy and communication methods.

### **Certification process**

The WHO Regional Office for Europe will continue to collaborate with Member States, as well as stakeholders in other WHO regions, to refine the criteria used to assess the achievement of national and regional measles and rubella elimination and to develop a regional certification process.

Member States will need to establish national certification committees when appropriate and prepare documentation in line with that specified by the Regional Certification Commission for measles.

## 5. Indicators

Four outcome indicators will be used to measure progress towards meeting the objectives:

- the number of countries with a measles incidence of <1 per 1 000 000 population
- the number of countries with a rubella incidence of <1 per 1 000 000 population
- the number of countries with a CRS incidence of <1 per 100 000 live births
- the number of countries with MCV1 coverage of  $\geq 95\%$  at national level and  $\geq 90\%$  in all districts.

The following performance indicators are linked to the key strategies.

### Vaccination

- By January 2007, 70% of Member States are administering the first dose of measles and rubella vaccine(s) by two years of age to  $\geq 95\%$  of children at the national level and/or  $\geq 90\%$  in all first administrative levels; and 60% are administering a second dose of measles vaccine to  $\geq 95\%$  of children at the national level and/or  $\geq 90\%$  in all first administrative levels.
- By January 2008, 80% of Member States are administering two doses of measles vaccine and at least one dose of rubella vaccine to  $\geq 95\%$  of children at the national level and/or  $\geq 90\%$  of children in all first administrative levels.
- By January 2009, 95% of Member States are administering two doses of measles vaccine and at least one dose of rubella vaccine to  $\geq 95\%$  of all children at the national level and/or  $\geq 90\%$  of children in all first administrative levels.

### Surveillance

- By January 2007, 60% of Member States meet at least 80% of primary surveillance indicators<sup>1</sup>.
- By January 2008, 80% of Member States meet at least 80% of primary surveillance indicators.
- By January 2009, 90% of Member States meet at least 90% of primary surveillance indicators.
- By January 2010, 100% of Member States meet at least 90% of primary surveillance indicators.

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<sup>1</sup> Primary surveillance indicators and a detailed set of surveillance indicators will be made available in updated surveillance guidelines for measles, rubella and congenital rubella infection for the WHO European Region.

## **Communication**

- By 2006, 35 Member States participate at either national or subnational level in the European Immunization Week.
- By 2007, 45 Member States participate at either national or subnational level in the European Immunization Week.
- By 2007, a WHO European Region strategy on advocacy for immunization has been developed.
- By 2007, 52 Member States have developed and implemented communication plans.
- By 2008, the Vaccine Safety Net includes >20 accredited web sites in at least nine languages.
- By 2010, the Vaccine Safety Net includes >25 accredited web sites in at least 10 languages.

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## Annex 1. Number of cases and incidence of measles, rubella and CRS (2004)

Member State	Population	Measles		Rubella		CRS
		Number of cases	Incidence per 100 000 population	Number of cases	Incidence per 100 000 population	Number of cases
Albania	3 212 702	0	0	0	0	0
Andorra	70 684	0	0	0	0	0
Armenia	3 795 926	1 783	46.97	733	19.31	ND
Austria	8 053 513	15	0.19	ND	–	ND
Azerbaijan	8 238 683	827	10.04	5 796	70.35	0
Belarus	10 023 087	2	0.02	4 492	44.82	1
Belgium	10 291 637	61	0.59	38	0.37	ND
Bosnia and Herzegovina	4 185 901	28	0.67	43	1.03	0
Bulgaria	7 643 689	0	0	474	6.2	0
Croatia	4 660 186	54	1.16	2	0.04	0
Cyprus	808 871	0	0	6	0.74	0
Czech Republic	10 230 243	17	0.17	31	0.3	0
Denmark	5 356 974	0	0	ND	–	0
Estonia	1 330 408	0	0	22	1.65	0
Finland	5 188 120	0	0	0	0	ND
France	60 098 596	4 448	7.4	ND	–	ND
Georgia	5 155 027	6 847	132.82	4 809	93.29	1
Germany	81 921 472	121	0.15	ND	–	2
Greece	10 633 783	1	0.01	2	0.02	ND
Hungary	9 768 626	0	0	36	0.37	1
Iceland	287 050	0	0	0	0	0
Ireland	3 951 096	334	8.45	49	1.24	1
Israel	6 558 960	116	1.77	11	0.17	0
Italy	57 276 044	599	1.05	363	0.63	ND
Kazakhstan	15 918 221	2 204	13.85	15 103	94.88	0
Kyrgyzstan	5 159 175	8	0.02 <sup>a</sup>	7	0.14	1
Latvia	2 366 077	0	0	52	2.2	0
Lithuania	3 663 052	1	0.03	93	2.54	0
Luxembourg	458 358	0	0	0	0	0
Malta	396 323	4	1.01	0	0	0
Monaco	30 000	ND	–	ND	–	ND
Netherlands	16 096 243	11	0.07	46	0.29	ND
Norway	4 537 165	7	0.15	2	0.04	0
Poland	38 465 328	11	0.03	4 857	12.63	0
Portugal	10 072 004	5	0.05	8	0.08	0
Republic of Moldova	4 250 415	4	0.09	170	4	0
Romania	22 212 048	117	0.53	47 444	213.6	8
Russian Federation	142 000 000	2 444	1.72	146 220	103.09	2
San Marino	28 856	0	0	1	3.47	0
Serbia and Montenegro	10 490 603	11	0.1	303	2.89	ND
Slovakia	5 415 749	2	0.04	3	0.06	0
Slovenia	1 978 882	0	0	1	0.05	0
Spain	39 901 860	26	0.07	90	0.23	0
Sweden	8 799 321	5	0.06	0	0	0
Switzerland	7 157 109	39	0.54	ND	–	0
Tajikistan	6 255 622	4	0.06	567	9.06	ND
TFYR Macedonia <sup>b</sup>	2 060 698	9	0.44	33	1.6	ND
Turkey	70 357 216	8 927	12.69	ND	–	ND
Turkmenistan	5 113 261	1	0.02	26	0.51	ND
Ukraine	47 743 184	146	0.31	31 606	66.2	ND
United Kingdom	59 855 556	189	0.32	17	0.03	0
Uzbekistan	26 320 010	75	0.28	498	1.89	0

ND = no data received

<sup>a</sup> Incidence does not include seven imported cases.

<sup>b</sup> The former Yugoslav Republic of Macedonia.

Source: Data obtained from Member States on the WHO/UNICEF annual reporting form, 2005.

## **Annex 2. Resolution EUR/RC55/R7 of the WHO Regional Committee for Europe, fifty-fifth session, 2005**

### **Strengthening national immunization systems through measles and rubella elimination and prevention of congenital rubella infections in WHO's European Region**

#### **The Regional Committee,**

Recalling the United Nations Millennium Development Goals and the *Strategic directions for improving the health and development of children and adolescents* that identify immunization as a strategy to reduce mortality and morbidity in children under five and help address the problems of poverty in high-risk and vulnerable populations, recommendations from the United Nations General Assembly special session on children (2002); and the World Health Assembly resolutions WHA56.20 on reducing global measles mortality, WHA56.21 on the strategy for child and adolescent health and development and WHA58.15 on the draft global immunization strategy 2006–2015;

Recognizing that immunization is one of the most cost-effective public health interventions available, that immunization programmes have been an integral part of public health services and a key prevention component of primary health care in the European Region for decades;

Recognizing that the certification of the Region as poliomyelitis-free in 2002 was the result of concerted activities by all Member States to ensure that all children are protected through vaccination, and that high quality surveillance for the poliovirus must be maintained until global poliomyelitis eradication is declared;

Recognizing that the success of immunization programmes has led to disease control achievements but that these gains can only be maintained and further progress made with continued attention and strong support to immunization programmes, including the introduction of new vaccines when supported by scientific evidence;

Mindful that there are high-risk and vulnerable populations within the European Region that still lack adequate immunization coverage because of limited access to primary health care services for geographical, cultural, ethnic or socioeconomic reasons, as well as unfounded mistrust of vaccinations;

Acknowledging the right of children to the highest attainable standard of health and equitable access to health care services and the need to achieve and maintain high coverage with childhood vaccines to ensure protection of and minimize disease transmission among all children;

Noting that reducing measles mortality will facilitate the achievement of the Millennium Development Goal targets globally and that rubella is a recognized and preventable cause of serious birth defects;

Acknowledging that measles and rubella can be eliminated in the WHO European Region and that congenital rubella infections can be prevented by using combined measles

and rubella vaccines in a routine two-dose vaccination schedule within childhood immunization programmes by achieving and maintaining high coverage and by targeting susceptible populations, including women of childbearing age;

Having reviewed document EUR/RC55/6 on the European strategy for child and adolescent health and development, including strengthening national immunization systems through measles and rubella elimination and prevention of congenital rubella infections;

### **The Regional Committee:**

#### **1. Urges Member States:**

- a) to commit themselves and give high priority to achieving measles and rubella elimination and congenital rubella infection prevention targets by 2010
- b) to strengthen routine immunization programmes by achieving and maintaining high vaccination coverage with childhood vaccines and ensuring that all children, adolescents and women of childbearing age have equal access to safe and high quality immunization services;
- c) to ensure that surveillance, including the required laboratory networks for measles, rubella, congenital rubella infections and poliomyelitis, is sufficient to achieve and sustain the elimination targets;
- d) to support, where appropriate, the implementation of an immunization week within the Region for advocacy to promote immunization;
- e) to foster the appropriate partnerships, including plans for intersectoral cooperation, with governmental and intergovernmental agencies, nongovernmental organizations and other relevant partners, including the private health care sector and industry to ensure the strengthening of routine immunization services and the achievement of the elimination targets;

#### **2. Requests the Regional Director:**

- a) to support and advocate for collaborative efforts with Member States, governmental and intergovernmental agencies, nongovernmental organizations and other relevant partners to commit resources to strengthen routine national immunization systems; to achieve the measles and rubella elimination and congenital rubella infection prevention targets; and to implement an immunization week within the Region;
- b) to provide the strategic direction and technical guidance, as outlined in the *Global Immunization Vision and Strategy 2006–2015* to Member States to support their progress towards strengthening routine national immunization systems, including analysis of reasons for insufficient vaccine coverage and the introduction of new vaccines and technologies; and achieving the elimination targets;
- c) to work in partnership with other WHO regions to facilitate communication and common approaches, where appropriate, on achieving elimination targets;
- d) to provide the Regional Committee with an update on progress at its fifty-eighth session.

### Annex 3. National immunization policies for measles and rubella (2005) and reported vaccine coverage (2004)

Member State	Type of MCV1	Age at first dose	MCV1 coverage (%)	Type of MCV2	Age at second dose	MCV2 coverage (%)
Albania	MMR	1 year	96.2	MMR	5 years	95.7
Andorra	MMR	15 months	97.6	MMR	5 years	ND
Armenia	MMR	1 year	91.5	MMR	6 years	94.4
Austria	MMR	1–2 years	73.5	MMR	1–2 years	47.4
Azerbaijan	MMR	12 months	98.4	MMR	6 years	97.8
Belarus	MMR	12 months	99	MMR	6 years	98.5
Belgium	MMR	1 year	82.2	MMR	10–13 years	ND
Bosnia and Herzegovina	MMR	2 years	88	MMR (Rubella girls)	6–7 years (14 years)	88
Bulgaria	MMR	13 months	94.7	MMR	12 years	90.8
Croatia	MMR	1 year	95.7	MMR	6 years and 10 years	97.8
Cyprus	MMR	13 months	86.3	MMR	4–6 years	ND
Czech Republic	MMR	15 months	96.9	MMR	21 months	96.9
Denmark	MMR	15 months	96	MMR (Rubella girls)	12 years (Under 18 years)	88
Estonia	MMR	1 year	95.5	MMR	13 years	97.2
Finland	MMR	14–18 months	97	MMR	8 years	ND
France	MMR	12 months	86	MMR	13–24 months	86
Georgia	MMR	1 year	86	MMR	5 years and 13 years	75
Germany	MMR	11–14 months	92.5	MMR	15–23 months	50.9
Greece	MMR	15 months	88	MMR	4–6 years	ND
Hungary	MMR	15 months	99.9	MMR	11 years	99.7
Iceland	MMR	18 months	93	MMR	12 years	89
Ireland	MMR	12–15 months	81.1	MMR	4–5 years	ND
Israel	MMR	12 months	95	MMR	6 years	ND
Italy	MMR	12–15 months	84	MMR	5–12 years	ND
Kazakhstan	MMR	1 year	98.9	MMR (Rubella)	6–7 years (15 years)	100
Kyrgyzstan	MMR	12 months	99.3	MR	6 years	98.1
Latvia	MMR	15 months	98.7	MMR	7 years	92.4
Lithuania	MMR	15 months	97.7	MMR	6 years and 12 years	93.4
Luxembourg	MMR	15 months	91	MMR	5 years	ND
Malta	MMR	15 months	87.4	MMR	7 years	ND
Monaco	MMR	12 months	99	MMR	13–24 months	ND
Netherlands	MMR	14 months	96.3	MMR	9 years	97.7
Norway	MMR	15 months	88	MMR	12 years	90
Poland	MMR	13–14 months	97.4	Measles (Rubella girls)	7 years (13 years)	48.5
Portugal	MMR	15 months	94.8	MMR	5–6 years	ND
Republic of Moldova	MMR	12 months	96.3	MMR	6–7 years	97.8
Romania	MMR	12–15 months	97.1	MMR (Rubella girls)	7 years (14 years)	96.5
Russian Federation	Measles / Rubella	12 months	98.4 / 92	Measles	6 years	96.8
San Marino	MMR	15–16 months	97.5	MMR	5–6 years	95.6
Serbia and Montenegro	MMR	12 months	95.7	MMR	12 years	96.4
Slovakia	MMR	M14 months	98	MMR	11 years	98
Slovenia	MMR	12 months	94	MMR	6 years	ND
Spain	MMR	12–15 months	97.3	MMR	3–6 years	91.2
Sweden	MMR	18 months	94.5	MMR	12 years	95.2
Switzerland	MMR	12 months	82	MMR	15–24 months	ND
Tajikistan	Measles	12 months	99	Measles	6 years	97.8
TFYR Macedonia <sup>a</sup>	MMR	13 months	96.4	MMR (Rubella)	7 years (14 years)	94.8
Turkey	Measles	9 months	81	Measles	6 years	97
Turkmenistan	Measles	12–15 months	97.3	Measles	6 years	90
Ukraine	MMR	12–15 months	99	MMR (Rubella (irls)	6 years and 11 years (15 years)	97
United Kingdom	MMR	13 months	81	MMR	3–5 years	76
Uzbekistan	Measles	12 months	98.5	Measles	6 years	98.6

ND = no data received

<sup>a</sup>The former Yugoslav Republic of Macedonia.

Source: Data obtained from Member States on the WHO/UNICEF annual reporting form, 2005.

## Annex 4. Mumps in the WHO European Region

Mumps is a systemic disease characterized by swelling of one or more of the salivary glands, usually the parotid glands. About 5% of people with mumps have clinical evidence of central nervous system infection. Orchitis is a common complication after puberty, but sterility rarely occurs. HEALTH21 identified a target for mumps control of <1 case per 100 000 population by the year 2010.

### Surveillance for mumps

Member States provide WHO with the total number of mumps cases for a given year by using the WHO/UNICEF annual reporting forms. WHO has published case definitions for mumps<sup>1</sup>; it is unknown, however, how many of the reported cases are laboratory confirmed. Laboratory testing for mumps is not currently part of the European Region measles and rubella laboratory network. There is no mechanism established to collect information routinely on mumps outbreaks.

### Vaccination programmes

Fifty (96%) of 52 Member States in the European Region use mumps vaccine; 47 use MMR vaccine (Annex 3) and 47 have a routine two-dose schedule for mumps vaccine. The mumps vaccine strains used include Jeryl Lynn, Leningrad-3, Leningrad-Zagreb, RIT 4385 and Urabe. At least three Member States in the western part of the Region previously used the Rubini strain, which was found not to offer long-term protection. A WHO position paper on mumps vaccines was published in 2001.<sup>2</sup>

### Disease epidemiology

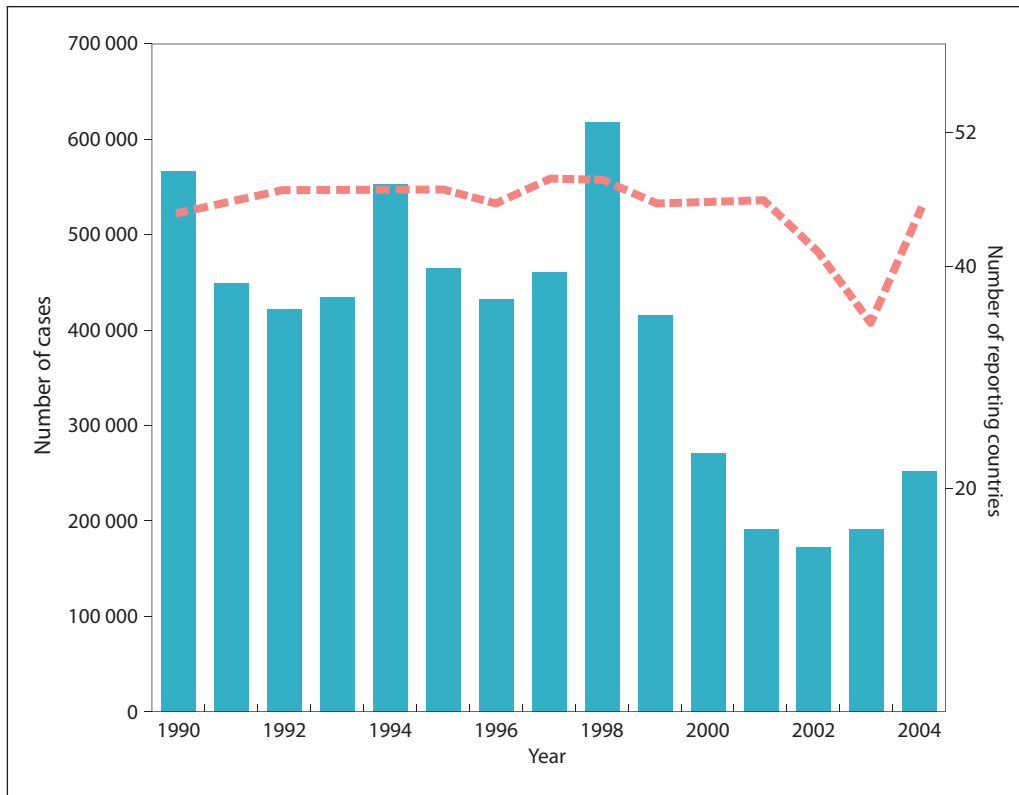
The number of mumps cases reported annually in the European Region since 1990 has varied between 172 498 in 2002 and 618 541 in 1998 (Fig. 1). In 2004, 252 472 cases were reported from 46 countries. Marked differences are seen among Member States in the incidence of mumps (Fig. 2), with the Nordic countries as a group having the lowest incidence (0.19 per 100 000).

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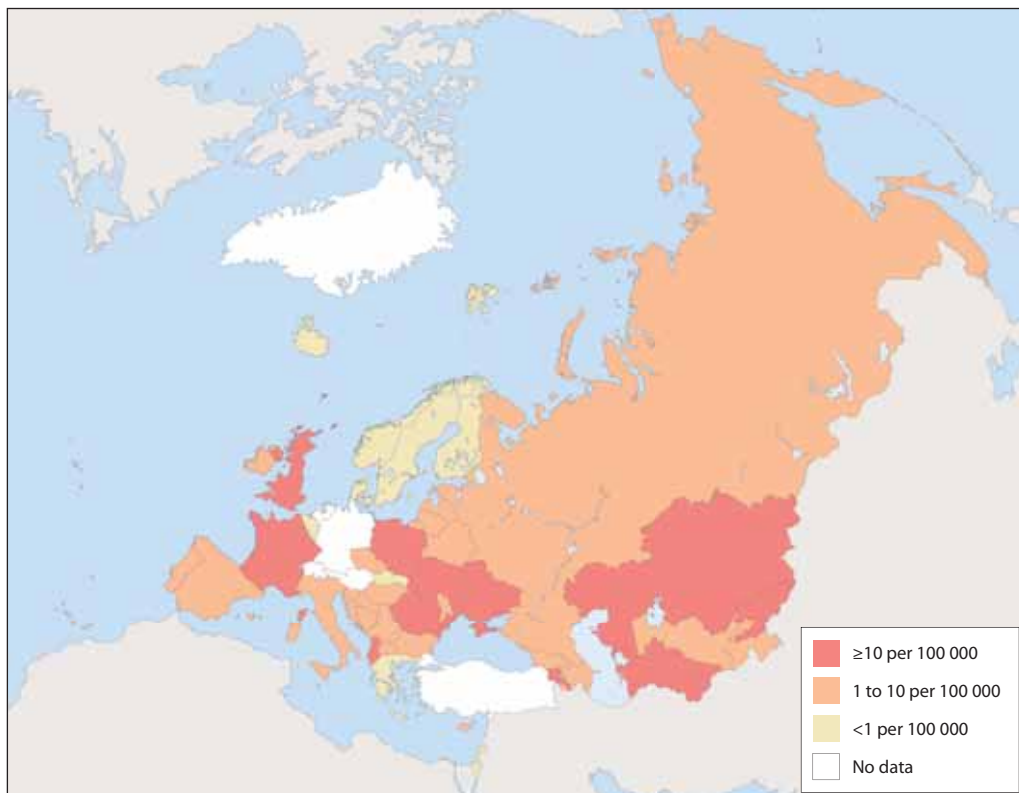
<sup>1</sup> WHO-recommended standards for surveillance of selected vaccine-preventable diseases. Geneva, World Health Organization, 2003 (document WHO/EPI/GEN/98.01) (<http://www.who.int/vaccines-documents/DocsPDF03/www742.pdf>, accessed 3 October 2005).

<sup>2</sup> Mumps virus vaccines. *Weekly Epidemiological Record*, 2001, 76(45):346–355 (<http://www.who.int/docstore/wer/pdf/2001/wer7645.pdf>, accessed 13 October 2005).

**Fig. 1.** Number of cases of mumps in WHO European Region and number of reporting countries



**Fig. 2.** Mumps incidence in WHO European Region, 2004



## Annex 5. Glossary

**Congenital rubella infection (CRI)** – Fetal infection with the rubella virus that can lead to miscarriage, fetal death or the birth of a normal infant or one with some or all manifestations of CRS.

**Congenital rubella syndrome (CRS)** – One of the possible outcomes of rubella infection *in utero*, particularly during the first trimester. The birth defects associated with CRS include heart disease, blindness, hearing impairment, and developmental delay or mental retardation.

**Elimination (measles and rubella)** – The situation in which sustained virus transmission cannot occur and secondary spread from importation of disease will end naturally without intervention.

**European Region measles and rubella laboratory network** – A network of national laboratories designated by Member States and supported by regional and global reference laboratories, which are designated and coordinated by WHO.

**Imported case** – Disease in a person whose likely exposure was in another geographical area known to have the disease, and whose disease incubation period is consistent with this exposure. The genotype of the imported case's virus should be consistent with the suggested epidemiological link.

**Measles-containing vaccine (MCV)** – A vaccine containing measles vaccine alone or in combination with rubella (MR vaccine) or rubella and mumps (MMR vaccine).

**Measles-containing vaccine (MCV) coverage** – First dose coverage (MCV1) and second dose coverage (MCV2) are reported by Member States on the WHO/UNICEF annual reporting form. MCV1 is usually reported at 24 months of age. The age at which MCV2 coverage is reported is more varied within the European Region owing to differences in when the second dose is given.

**Measles control** – The routine, regular and ongoing use of measles vaccine to reduce measles morbidity and mortality, done in accordance with targets.

**National regulatory authority** – A government authority for medical products whose overall objective is to ensure that all medicines (drugs, vaccines, blood products and other biologicals) and medical devices are of assured quality, safety and efficacy and are accompanied by appropriate information to promote their rational use.



**Routine immunization** – The regular provision of immunization services to successive cohorts through vaccination at fixed sites, outreach activities and mobile sites. This includes the routine screening of immunization records.

**Rubella control** – The routine, regular and ongoing use of rubella vaccine to reduce rubella-associated morbidity and mortality in accordance with targets.

**Supplementary immunization activity** – This activity targets all people in a defined age- or risk-group, with the objective of reaching a high proportion of all susceptible individuals. Each activity is usually conducted over a wide geographical area (such as a province or country) to reduce the number of people at risk of infection. Screening for vaccination status and/or history of prior disease is not necessary.

**Surveillance (public health)** – The ongoing, systematic collection, analysis, interpretation, and dissemination of data about a health-related event for use in public health action to reduce morbidity and mortality and to improve health.

**Surveillance (sentinel)** – Surveillance based on selected population samples chosen to represent the relevant experience of particular groups.

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Immunization saves lives. Strengthening national immunization systems is an important goal in the WHO European Region.

The WHO Regional Office for Europe launched a strategic plan in 2002 to eliminate measles and prevent congenital rubella infection, and in 2005 expanded it to include the elimination of rubella as well.

This report indicates that, by the progress already made, these objectives are possible. And it identifies key strategies and actions for countries to adopt if they want to meet the targets by 2010.



### The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

### Member States

Albania  
Andorra  
Armenia  
Austria  
Azerbaijan  
Belarus  
Belgium  
Bosnia and Herzegovina  
Bulgaria  
Croatia  
Cyprus  
Czech Republic  
Denmark  
Estonia  
Finland  
France  
Georgia  
Germany  
Greece  
Hungary  
Iceland  
Ireland  
Israel  
Italy  
Kazakhstan  
Kyrgyzstan  
Latvia  
Lithuania  
Luxembourg  
Malta  
Monaco  
Netherlands  
Norway  
Poland  
Portugal  
Republic of Moldova  
Romania  
Russian Federation  
San Marino  
Serbia and Montenegro  
Slovakia  
Slovenia  
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