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Progress and challenges in measles and rubella elimination in the WHO European Region

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ABSTRACT

Introduction: Despite availability of safe and cost-effective vaccines to prevent it, measles remains one of the significant causes of death among children under five years of age globally. The World Health Organization (WHO) European Region has seen a drastic decline in measles and rubella cases in recent years, and a few of the once common measles genotypes are no longer detected. Buoyed by this success, all Member States of the Region reconfirmed their commitment in 2010 to eliminating measles and rubella, and made this a central objective of the European Vaccine Action Plan 2015–2020 (EVAP). Nevertheless, sporadic outbreaks continue, recently affecting primarily adolescents and young adults with no vaccination or an incomplete vaccination history. The European Regional Verification Commission for Measles and Rubella Elimination was established in 2011 to evaluate the status of measles and rubella elimination based on documentation submitted annually by each country's national verification committee.

Discussion: Each country's commitment to eliminate measles and rubella is influenced by competing health priorities, and in some cases lack of capacity and resources. All countries need to improve case-base surveillance for both measles and rubella, ensure documentation of each outbreak and strengthen the link between epidemiology and laboratory data. Achieving high coverage with measles- and rubella-containing vaccines will require a multisectoral approach to address the root causes of lower uptake in identified communities including service delivery challenges or vaccine safety concerns caused by circulating myths about vaccination.

Conclusions: The WHO European Region has made steady progress towards eliminating measles and rubella and over half of the countries interrupted endemic transmission of both diseases by 2015. The programmatic challenges in disease surveillance, vaccination service delivery and communication in the remaining endemic countries should be addressed through periodic evaluation of the strategies by all stakeholders and exploring additional opportunities to accelerate the ongoing elimination activities.

1. Introduction

Measles and rubella are both highly contagious viral diseases. Worldwide, measles causes significant mortality in children under five years of age [1] with the fatality rates varying from 0.05% [2] in developed countries to as high as 30% in emergency settings (e.g. among refugees and disadvantaged populations) [3]. Globally there has been a marked decline in measles and rubella cases and deaths following the widespread use of safe and cost-effective measles- and rubella-containing vaccines in national childhood vaccination programmes. The World Health Organization (WHO) estimates that measles-related deaths have declined globally from about 548,300 in 2000 [4] to an estimated 114,900 in 2014 [5]. The reported rubella cases declined from about 670,800 in 2000 to an estimated 33,100 in 2014, although rubella surveillance data are inconsistent [6].

Elimination of measles, rubella and congenital rubella syndrome (CRS) are goals of the Global Vaccine Action Plan (GVAP) endorsed by the World Health Assembly in 2012 [7]. All WHO

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regions have now established goals to eliminate measles (and in some regions also rubella) by 2020 [5].

In the European Region, all 53 Member States have committed to elimination of both measles and rubella. In the September 2010 meeting of the WHO European Regional Committee, Member States renewed their commitment to eliminate measles and rubella and prevent CRS by 2015 by, (1) increasing demand for and delivery of vaccination to achieve and sustain ≥95% coverage with two doses of measles-containing vaccine across a wide age range, (2) implementing effective outbreak control measures, and (3) further strengthening surveillance to identify cases and outbreaks promptly, and to validate elimination [8]. In September 2014, all Member States reaffirmed their commitment to the goal of measles and rubella elimination as part of the endorsement of the European Vaccine Action Plan 2015–2020 (EVAP) by the WHO European Regional Committee [9]. While a number of countries in the Region are still endemic for measles and rubella, a growing number of countries have interrupted endemic transmission of these diseases. This report summarizes the progress made towards measles and rubella elimination in the WHO European Region.

1.1. Measles and rubella cases

The number of measles cases in the Region declined from over 185,000 in 1990 to 24,957 in 2015 [10] (see Fig. 1). The number of reported rubella cases declined from 29,617 in 2012 to 2 437 in 2015 [10]. Data submitted by countries show that 2 535 measles cases were reported in 33 countries while 1 090 rubella cases were reported in 17 countries in the Region during the first three-quarters of 2016 *[WHO surveillance database, data not published].* Compared to the same period in 2015, the Region has seen an 89% reduction in the number of reported measles cases and an 80% reduction in the number of reported rubella cases in 2016. In both years fewer countries reported rubella cases (including zero reporting) than measles cases [10,11].

Despite significant efforts made by countries to improve the notification of cases, some national surveillance systems in the Region still fail to investigate and report every suspected case of measles or rubella. Therefore no laboratory testing is conducted to confirm the diagnosis of many fever and rash cases. At this stage of elimination, incomplete case investigations remain a concern throughout the Region.

1.2. Routine and supplementary immunization activities

All WHO Member States are expected to report routine vaccination coverage data to WHO and the United Nations Children's Fund (UNICEF) in a standardized Joint Reporting Form. All 53 countries in the Region have introduced two doses of measles-rubella vaccination in their national childhood immunization schedules [12], and in 2015, all but two reported their routine vaccination coverage. Analysis of this data showed that 25 of the 51 reporting countries achieved the WHO-recommended coverage of greater than 95% for the first dose of measles-containing vaccine (MCV1) and 15 countries achieved this target for the second dose of measles-containing vaccine (MCV2) [13].

In 2015, five countries (Azerbaijan, Cyprus, Georgia, Kazakhstan, Kyrgyzstan) conducted different varieties of supplementary immunization activities (SIAs) covering various age groups using measles (M), measles-rubella (MR) or measles-mumps-rubella (MMR) vaccine. Azerbaijan, Cyprus and Kyrgyzstan have attained coverage of more than 85% in these activities. Kyrgyzstan reported more than 90% in both SIAs conducted [13] (see Figs. 2 and 3).

1.3. Characteristics of recent outbreaks

Widespread outbreaks of measles and rubella have been reported by just a few countries in the Region in the recent years. Large-scale measles outbreaks in 2015 were reported by Bosnia and Herzegovina, Germany, Kyrgyzstan and the Russian Federation [10]. Over half of the laboratory-confirmed measles cases in 2015 were predominantly among adolescents and young adults while 20% were among infants less than 12 months of age. Only 15% had received two doses of measles vaccine, 29% were not immunized, 11% were incompletely immunized and 45% had an unknown immunization status. Rubella outbreaks in 2015 were reported by Georgia, Kyrgyzstan, Poland and Ukraine [10,14], with the majority of cases reported among children less than 15 years of age. The countries' immunization response following the measles-outbreaks varied from raising awareness among health physicians and parents to post-exposure vaccination and conducting catch-up vaccinations in the affected areas [14] (see Figs. 4 and 5).

1.4. Vulnerable population groups affected

Some countries reporting both sporadic and widespread measles cases in recent years have also reported high national measles vaccination coverage. A considerable proportion of these cases had not been fully vaccinated. Despite reportedly high vaccination coverage at national level, pockets of sub-optimal vaccination coverage in the Region persist. Since 2010, outbreaks have been reported in particular population groups in the region, where there is a lower probability of being vaccinated: Roma communities in Bulgaria, Anthroposophists in Germany, the Netherlands and Switzerland, Jewish ultra-orthodox communities in Belgium, Israel, United Kingdom and orthodox Protestants in the Netherlands [15–17]. However, large outbreaks reported in France (2011), United Kingdom (2014) and Germany (2015) revealed the vulnerability of certain age groups in the general population that had not benefited from vaccination due to varied reasons.

Furthermore, susceptible health care workers (HCWs) [14,17] played an important role in nosocomial infection in a few of the measles outbreaks in the Region. Approximately 68 HCWs in the Czech Republic, 13 HCWs in Latvia and 30 in Spain were affected in 2014 and 9 were affected in Croatia in 2015 [14,17]. Most of the affected HCWs were either unvaccinated or their vaccination status was unknown. Most countries in Europe do not have a measles vaccination requirement for HCWs and even those which recommend such, the policies are variably implemented [18].

1.5. Surveillance activities

Over the past few years, countries have undertaken several steps to strengthen both the epidemiological and laboratory components of their surveillance system but the quality of the existing surveillance varies considerably across the Region.

The WHO Regional Office for Europe (Regional Office) receives monthly reports of measles and rubella cases from Member States, which include case-based and aggregate reporting with both clinical and laboratory confirmation of the cases. Rubella and CRS surveillance, however, remain a challenge with only a few countries having an established system for monitoring and reporting.

1.6. Measles and rubella laboratory activities

A critical component of laboratory surveillance is the genetic characterization of wild-type measles and rubella viruses [19]. The genotyping data of the detected viruses provide evidence to document the interruption of endemic transmission of measles and rubella. However, the genotype reports alone do not suffi-

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