Programmatic Feasibility of Measles Elimination in WHO European Region

Summary:

The WHO European Region has a goal to eliminate measles and rubella and prevent congenital rubella infection by 2010. Since the goal to eliminate measles was adopted in 1998, measles incidence in WHO European Region declined from 110 cases per 1 000 000 to historically low levels ≤ 10 cases per 1 000 000 population in 2007-2008. In 2008, 29 Member States reported measles incidence less than <1 per 1 000 000 population. This is due to the high immunization coverage achieved through a routine two-dose schedule with measles-containing vaccine (MCV) and implementation of supplementary immunization activities (SIAs) to reach susceptible populations. The estimated regional coverage of MCV increased from 88% in 1998 to 94% in 2008. Moreover, reported MCV2 coverage ranged from 62% to 99% in 2008. From 2000-2008, nationwide SIAs, reaching approximately 54 million people, were implemented in at least 17 countries. Surveillance has also been strengthened by improving case investigation procedures, expanding case-based reporting and increasing laboratory testing. To address the strategy of strengthening communication, the annual European Immunization Week provides an opportunity to actively communicate the benefits and risks of immunization and advocate strongly for the protection of children with political leaders, health care professionals, and the general population. While measles incidence in the Region has declined to low levels, there has been a resurgence of measles cases in western European countries because of persistent suboptimal coverage with MCV, due to multiple reasons, leading to pockets of susceptible persons. In 2008, 92% of reported measles cases (n=8264) were from western European countries, primarily Austria, France, Germany, Italy, Spain, Switzerland, the United Kingdom, and Israel. The majority of cases were unimmunized persons (>80%) . With the decline in disease, many national immunization programmes in the Region are challenged by a combination of culture and belief systems (philosophical and religious) regarding the value of immunization and not believing that measles is a serious health threat, and vaccine hesitancy among parents. The messaging from anti-vaccination groups has become more prominent. The ongoing transmission in Western Europe has led to the Region exporting measles virus to other WHO regions leading to financial expenses, specifically the Region of the Americas where measles was eliminated in 2002. The European Regional Office is working with Member States to identify and target the population at risk and health care professionals to communicate the need for immunization, as well as how to track children to ensure they are immunized on time with two doses of a measles-containing vaccine. WHO Regional Office for Europe gives the elimination goals highest priority and believes if appropriate actions are conducted, the Region will be able to eliminate measles and rubella by 2015

There has been significant progress in the European Region towards measles and rubella elimination, evidenced by the dramatic decline in reported disease with strengthened laboratory and case-based surveillance and sustained national immunization coverage levels. The Region has also achieved and sustained poliofree status since 2002. However, the Regional target of measles elimination by 2010 will likely not be achieved on time by 30 of the 53 (57%) Member States: representing over two-thirds of the Region’s population. The goals are technically feasible and can be achieved, but not by the target of 2010. To achieve elimination in the Region the following elements are required: high-level political commitment with the required resources mobilized; societal support; partnerships using a
multisectoral approach; the strengthening of routine immunization by focusing on the pockets of low coverage. The public’s trust in immunization must be restored in Member States and immunization should be seen as a social responsibility. The ongoing monitoring of performance measure indicators should be performed to guide the programme and verify that elimination has been achieved. Financial support will be required in some Member States to sustain the gains made to date and achieve the elimination goal in the near future. The European Regional Office should provide strategic direction and technical guidance while advocating for and supporting Member States. The WHO Regional Office for Europe gives the Regional elimination goal highest priority, and considers if appropriate actions conducted and conditions are met, the Region will be able to eliminate measles before 2015.

A. Introduction:

The WHO European Region includes 53 Member States with a population of about 890 million. Interrupting indigenous measles transmission by 2007 and reducing the incidence of congenital rubella syndrome (CRS) to <1/100,000 live births by 2010 were targets approved by the WHO Regional Committee for Europe in 1988 within The Health for All policy framework for the WHO European Region. In 2002, progress towards the measles and rubella targets was further stimulated with the development and implementation of a strategic plan for measles and congenital rubella infection in the WHO European Region.

In 2005, The WHO Regional Office for Europe expanded the strategic plan to include the elimination of rubella as well. The revised Regional objectives for 2010 are:

- To eliminate endemic measles;
- To eliminate endemic rubella; and
- To prevent congenital rubella infection (<1 case of Congenital Rubella Syndrome per 100,000 live births).

B. Strategies:

I. The European Region’s strategy for measles and rubella elimination differs from the global mortality reduction strategy as it focuses on reaching elimination through strengthening immunization systems and achieving high coverage with two doses of measles and at least one dose of rubella vaccine through routine immunization services. The Region supported catch up supplemental immunization activities but included a wider age target group (up to 39 years in some countries), and then rely on routine immunization and not periodic follow up SIAs. The strategic plan outlined below is an integrated approach to achieve both disease targets by 2010 by implementing five key strategies:

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1 Health 21: the health for all policy for the WHO European Region. Copenhagen, Denmark, WHO Regional Office for Europe, 1999 (European Health for All Series, No. 6).
• **Achieve and sustain very high coverage (≥ 95%) with 2 doses of measles and at least one dose of rubella vaccine through high-quality routine immunization services.**
  Improve vaccine coverage to ≥95%, especially among “hard-to-reach” populations, 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.

• **Provide a second opportunity for measles immunization through supplementary immunization activities to populations susceptible to measles.**
  Consider supplementary immunization activities to reach individuals 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 persons include those attending schools or universities, those in the military and those working in health care settings.

• **Provide rubella vaccination opportunities, including supplementary immunization activities, to all rubella-susceptible children, adolescents and women of child-bearing age.**
  Consider appropriate immunization strategies to reach susceptible children and women of childbearing age, both to interrupt endemic transmission and to ensure women of childbearing age are protected should rubella virus be introduced into their community.

• **Strengthen surveillance systems by rigorous case investigation and laboratory confirmation of suspected cases.**
  Ensure that surveillance activities for measles, rubella and CRS are 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.

• **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.**
  Ensure that both health professionals and the public have access to appropriate materials about measles and rubella, including the benefits and risks associated with preventing these diseases, to remove barriers to immunization.
2. The use of partnerships to provide both financial and technical support for assuring quality of implementation of the strategies.

Table 1. Donor/partners for measles elimination in EUR Region

<table>
<thead>
<tr>
<th>Donor/Partner</th>
<th>Role</th>
<th>Amount committed (US$)</th>
<th>Funding target</th>
<th>Time-frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC/Atlanta</td>
<td>Technical/financial</td>
<td>12.73 million</td>
<td>Control</td>
<td>2002-08</td>
</tr>
<tr>
<td>MI through UNF⁴</td>
<td>Financial</td>
<td>4.34 million</td>
<td>Control</td>
<td>2007-09</td>
</tr>
<tr>
<td>GAVI</td>
<td>Financial</td>
<td>4.6 million [ISS only]</td>
<td>HSS</td>
<td>2000-08</td>
</tr>
<tr>
<td>JICA</td>
<td>Financial</td>
<td></td>
<td>HSS</td>
<td></td>
</tr>
<tr>
<td>VRF³</td>
<td>Financial</td>
<td>7 million*</td>
<td>Control</td>
<td>2002-09</td>
</tr>
<tr>
<td>World Bank</td>
<td>Financial</td>
<td></td>
<td>HSS</td>
<td></td>
</tr>
<tr>
<td>European Union</td>
<td>Advocacy</td>
<td></td>
<td></td>
<td>2002 to present</td>
</tr>
<tr>
<td>ECDC⁶</td>
<td>Technical</td>
<td></td>
<td></td>
<td>2008 to present</td>
</tr>
</tbody>
</table>

* used to purchase 2.9 million doses of vaccines for Azerbaijan, Russia, Georgia and Armenia

3. Outline what additional disease control strategies and advocacy/partnerships would be needed if an eradication goal is set.

High-level political commitment at all levels with required resources mobilized will be needed for measles eradication, especially in western European countries. Existing partners are critical and there is a need to strengthen the collaboration with the European Union, using a multisectoral approach. There is a need for the addition of a partner with specific expertise in advocacy for measles eradication (along the lines of Rotary’s contribution to the global polio initiative) which would facilitate achievement of the goal. At the regional and national levels, the active support of professional associations and pro-vaccination partnerships will be invaluable to counteract anti-vaccination sentiment.

Further operational research on communication strategies and development of communication tool kits will be required to reach vulnerable and high-risk populations as well as to address culture and belief systems. Further efforts to address susceptible populations will need to be defined in western part of Europe and case-based surveillance will need to be strengthened to monitor progress towards the goal.

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⁴ Measles Initiative 2007 funds from IFFIm, channeled through UNFIP
⁵ Vishnevskaya-Rostropovich Foundation, HQ in Baku, Azerbaijan
⁶ European Center for Disease Control
C. Measles Epidemiology in the Region:

*Describe measles epidemiology before and after each goal/target is set.*

Measles, rubella and CRS case counts are submitted annually to the WHO Regional Office for Europe using the WHO/UNICEF Joint Reporting Form. Since January 2002, countries have been encouraged to report measles cases monthly by age group, vaccination and laboratory confirmation status, and to report outbreaks. At the national level, different methods are used to collect information from local health authorities: these include aggregate, case-based and sentinel physician reporting. The Regional Office developed a computerized information system for infectious diseases (CISID), with monthly updated surveillance-related information for the general public. High-quality laboratory investigation using standardized diagnostic methods and reagents, implementing a quality assessment programme including an annual accreditation review, proficiency testing and monthly online reporting of laboratory indicators were established.

**1990 – 2004:** The incidence of measles cases in the European Region was cyclical, with a peak every 4 years (1993, 1997 and 2001); however, the incidence decreased significantly from 1990 to 2003. The 29,887 cases reported in 2004 represent a regional incidence of 3.4/100 000 population. This correlates with the slow increase in reported measles vaccine coverage from 1990 to 2001; coverage decreased slightly in 2002–2003. From 1999 to 2003, 18 outbreaks were reported in the region; this included outbreaks with more than 250 reported cases in Ireland 2003–2004, Italy 2002–2003, Switzerland 2003, France 2003 and Germany 2003, and in some newly independent states (NIS). Although measles deaths are underreported, 10 deaths were notified in both 2002 and 2003, and 7 in 2004. During 2002–2004, the proportion of reported hospitalized cases ranged from 11% to 18%.

**2005 – 2008:** The total annual number of measles cases reported in the European Region was highest in 2006 (53 344 cases) and lowest in 2007 (6949 cases); 8969 cases were reported in 2008. For comparison, measles incidence in 2002 was 53.3 cases/1 000 000 population. During 2005–2008, the number of countries reporting measles incidence meeting 1 indicator of elimination – that is, <1 case/ 1 000 000 total population – varied between 20 (38%) and 29 (55%). In 2008, 3575 (45.8%) reported cases were confirmed by laboratory, 952 (12.1%) were confirmed by epidemiologic link and 3287(42.1%) were diagnosed clinically. In 2008, of 7627 cases with known age and vaccination status, 6268 (82.2%) occurred among unvaccinated individuals and 2899 (38.0%) among people aged ≥15 years or more.

During 2005–2008, a total of 120 measles outbreaks, including 17 outbreaks with 250 cases, were reported in 28 countries. Large nationwide multiyear outbreaks, some of which started as early as 2004, occurred in Ukraine (46 121 cases during 2005–2007), Kazakhstan (18,322 during 2004-2005), Romania (8542 cases during 2004–2007) and in Georgia (8391 cases during 2004–2005). Measles cases during 2005–2006 primarily occurred in Eastern Europe. However, the proportion of cases from western European countries increased from 6.2% (n=5224) during 2005–2006 to 56.6% (n=3933) in 2007 and to 95.2% (n=7436) in 2008, when cases occurred primarily in Austria, France, Germany, Israel, Italy, Spain, Switzerland and the United Kingdom.
Although measles deaths are generally underreported, during 2005–2008, 25 deaths were reported (14 in 2005, 10 in 2006 and 1 in 2008) compared with 27 deaths reported during 2001–2004. Consistent with the increase in the proportion of measles incidence in western European countries, where measles cases are not routinely hospitalized, the proportion of hospitalizations among reported cases declined from 47% in 2005 to 17% in 2008.

In conclusion, while measles incidence in EUR has declined to low levels, there has been a resurgence of measles cases in western European countries because of persistent suboptimal vaccination coverage.

Detailed country specific data/information are included in the Annexes:

- measles coverage (routine and campaigns) – Annex 1
- measles cases reported – Annex 2
• age distribution of cases reported – Annex 3
• vaccination status of cases – Annex 4
• geographical distribution of cases – Annex 5
• genotypes identified – Annex 6
• deaths or estimated deaths – Annex 7

D. Costs of Measles Elimination

To estimate the various categories of costs for measles elimination, Member States of the European Region were grouped using Gross National Income (GNI) per capita reported in the World Development Indicators (WDI), 2008:

Table 2. European Region Member States grouped by Gross National Income, 2008

<table>
<thead>
<tr>
<th>Income group</th>
<th>2006 GNI per capita (US$)</th>
<th>Number of countries</th>
<th>Estimated Total Population (millions), 2009</th>
<th>Estimated Surviving Infants (millions), 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income and Lower Middle Income (LI and LMI)</td>
<td>&lt;= 3,855</td>
<td>13</td>
<td>129.1</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>3,856-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Middle Income (UMI)</td>
<td>11,905</td>
<td>14</td>
<td>337.5</td>
<td>4.1</td>
</tr>
<tr>
<td>High Income (HI)</td>
<td>&gt; 11,905</td>
<td>26</td>
<td>425.4</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>53</td>
<td>892.5</td>
<td>10.4</td>
</tr>
</tbody>
</table>


Additional assumptions used to estimate costs are described in Annex 8.

Cost so far:

1. The costs incurred so far to achieve the regional goal (estimates of costs from the time when the goal was set to the present).

Table 3. Total expenditures on measles supplemental immunization activities (SIAs) in EUR, 2001-2008 (in million US$)

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles vaccine</td>
<td>$9.38</td>
</tr>
<tr>
<td>AD Syringes</td>
<td>$1.18</td>
</tr>
<tr>
<td>Reconstitution syringe</td>
<td>$0.06</td>
</tr>
<tr>
<td>Safety box</td>
<td>$0.22</td>
</tr>
<tr>
<td><strong>Bundled measles vaccine</strong></td>
<td><strong>$18.10</strong></td>
</tr>
<tr>
<td>Planning</td>
<td>$0.19</td>
</tr>
<tr>
<td>Social mobilization</td>
<td>$1.82</td>
</tr>
<tr>
<td>Training</td>
<td>$0.49</td>
</tr>
<tr>
<td>Volunteer incentives (vaccine delivery)</td>
<td>$0.00</td>
</tr>
<tr>
<td>Health worker per diems / Allowances</td>
<td>$0.39</td>
</tr>
<tr>
<td>Supervisors per diems</td>
<td>$0.01</td>
</tr>
</tbody>
</table>
Cold boxes and ice packs for catch-up $1.08
Transport of vaccines and safety boxes $0.10
Monitoring and evaluation $0.39
Waste management $0.09
Measles Surveillance and Laboratory $0.34

**Total operational cost** $4.88

AEFI (for SIA) $0.06
Technical assistance from WHO $0.25

**Total expenditures for SIAs** $23.29

Number of children targeted (millions) 19.03
Cost per child targeted $1.22

Source: SIA budgets for Armenia, Azerbaijan, Georgia, Kyrgyz republic, Tajikistan, Ukraine, Uzbekistan

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# Table 4. Total expenditures on measles/rubella laboratory in EUR, 2005-2008 (in thousands US$)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total LI</td>
<td>3</td>
<td>$7.3</td>
<td>$9.4</td>
<td>$11.5</td>
<td>$5.1</td>
<td>$33.4</td>
</tr>
<tr>
<td>Total LMI</td>
<td>10</td>
<td>$21.0</td>
<td>$15.5</td>
<td>$18.4</td>
<td>$27.1</td>
<td>$82.1</td>
</tr>
<tr>
<td>Total UMI</td>
<td>14</td>
<td>$25.4</td>
<td>$28.6</td>
<td>$9.2</td>
<td>$14.9</td>
<td>$78.2</td>
</tr>
<tr>
<td>Total laboratory expenditures</td>
<td></td>
<td>$53.8</td>
<td>$53.5</td>
<td>$39.2</td>
<td>$47.1</td>
<td>$193.7</td>
</tr>
</tbody>
</table>

The costs listed in the tables above reflect best available information and may not fully reflect all relevant costs in all countries of the region.

2. **Describe/name key donors that have or are currently supporting measles control/elimination in the region who are likely to support an eradication goal.**

Same as current donors described in Table 1.

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**Future costs:**

1. **Based on country estimates, provide an assessment of resources required to achieve an eradication goal by 2020 (including the costs of laboratory containment):**
Table 5. Estimated future expenditures on surveillance and laboratory, 2009-2020 (nominal US $, millions)

<table>
<thead>
<tr>
<th>Income group</th>
<th>Surveillance cost</th>
<th>Laboratory cost</th>
<th>Total cost, surveillance and laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Income</td>
<td>$10.2</td>
<td>$80.1</td>
<td>$90.3</td>
</tr>
<tr>
<td>Upper Middle Income</td>
<td>$6.9</td>
<td>$1.2</td>
<td>$8.1</td>
</tr>
<tr>
<td>Lower Middle and Low Income</td>
<td>$2.3</td>
<td>$1.8</td>
<td>$4.2</td>
</tr>
<tr>
<td>Total</td>
<td>$19.4</td>
<td>$83.2</td>
<td>$102.6</td>
</tr>
</tbody>
</table>

Estimated total cost of measles-rubella (MR) supplemental immunization activities (SIAs) in four countries for the years 2009-2020 will be US$7.1 million.

Based on these estimates for the years 2009-2020, at least $109.6 million would be required for surveillance, laboratory and MR SIAs in the European Region. Additional details are provided in Annex 9. We are unable to estimate the costs of future laboratory containment until strategies and procedures are defined and recommended by WHO HQ.

2. Address resource needs post eradication (this should include costs of surveillance and laboratory containment, costs of vaccination strategies if vaccination will be continued post eradication.

Table 6. Estimated post-eradication expenditures on surveillance, laboratory and routine measles mumps rubella (MMR) vaccine, 2021-2030 (nominal US $, millions)

<table>
<thead>
<tr>
<th>Income group</th>
<th>Surveillance cost</th>
<th>Laboratory cost</th>
<th>Routine MMR, two doses</th>
<th>Routine MMR, single dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Income</td>
<td>$13.8</td>
<td>$112.3</td>
<td>$514.1</td>
<td>$257.0</td>
</tr>
<tr>
<td>Upper Middle Income</td>
<td>$9.7</td>
<td>$1.7</td>
<td>$458.3</td>
<td>$229.2</td>
</tr>
<tr>
<td>Lower Middle and Low Income</td>
<td>$3.2</td>
<td>$2.5</td>
<td>$201.3</td>
<td>$100.7</td>
</tr>
<tr>
<td>Total</td>
<td>$26.7</td>
<td>$116.5</td>
<td>$1,173.7</td>
<td>$586.9</td>
</tr>
</tbody>
</table>

Additional details in Annex 9.

Based on these estimates for the years 2020-2030, between $0.7 and $1.3 billion would be required for surveillance, laboratory, and either a single dose or two doses of the MMR vaccine.
All expenditure estimates reported in this document are likely to represent the lower bound of
the total resources that would be required for an eradication program, and should only be
considered broadly indicative of the actual resource requirements for measles eradication and
post-eradication activities.

3. Describe/name key donors that may support a measles eradication initiative.

Same as current donors described in Table 1.

E. Time Taken:

When was your most recent goal for measles elimination or mortality reduction set? What
basic conditions were present at the time the goal was set (MCV1 coverage, MCV2 coverage,
surveillance indicators, number of outbreaks/cases)? How many countries in the region have
already achieved this goal (please list) and when did they achieve it?

The most recent Regional measles and rubella elimination goals were established in 2003 and
2005, respectively. By 2004, all 52 Member States have had 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%) use rubella vaccine in
their childhood immunization programme.

First-dose MCV (MCV1) coverage in the European Region for 2004 ranged from 73% to
99%, with a population weighted mean of 92%. 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 indicator7.

For more details, please refer to section C and Annex 10.

F. Progress Towards the Current Goal:

Describe progress with the implementation of each of the strategies, e.g. MCV1 coverage,
second dose coverage (routine and SIAs), surveillance lab, etc. In addition to overall regional
progress please list on a table each country with progress to date, plan for next 5 years,
enabling factors, challenges to measles progress and overall prospects for elimination, and
maybe a few other categories.

The goals are based on a regional strategy to strengthen immunization systems which includes
all countries maintaining high immunization coverage (95% or more) using a routine two-
dose measles schedule with at least one dose of rubella vaccine. The regional operational plan
to reach the elimination target by year 2010 is being implemented with a special emphasis on
immunization campaigns among susceptible populations, and through advocacy and raising
awareness to reach high-risk population groups across the European Region using the routine
immunization systems.

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7 WHO EURO. 2006. Eliminating measles and rubella and preventing congenital rubella infection:
WHO European Region strategic plan 2005-2010. [Page 4]
Substantial progress has been achieved within the Region in the control of measles and rubella – all 53 countries now have a routine 2-dose measles vaccination programme and all have introduced rubella vaccine as of 2009. Reported measles incidence in the Region in 2007 (6923 cases to date) dropped almost 90% from 2006 levels; the number of countries reporting measles incidence of <1 per 1 000 000 population (elimination target) increased to 29 from 26 in 2004.

In 2006–2009, nationwide supplementary immunization activities were successfully implemented in Armenia, Azerbaijan, Tajikistan, Turkmenistan and Uzbekistan reaching over 17 million children, young adults, and women of childbearing age, while strengthening routine immunization programmes and surveillance.

For more details please refer to Annex 11.

F1. Enabling Factors:

Include critical elements that have contributed to the successes achieved (e.g. political commitment, population acceptability, community involvement and support, use of the polio eradication infrastructure, GAVI health system strengthening funds, introduction of rubella and CRS eliminations goals, etc.)

The following factors contributed to the success for countries feasible to achieve the regional goal:

- High political commitment with required resources mobilized
- Sustained poliofree status with national plan of action
- National measles and rubella elimination plan of action
- Sustained high routine immunization coverage with two doses of measles-containing vaccine
- Introduction of rubella vaccine
- Good health system infrastructure
- Adequate human resource capacity
- Societal support
- School entry immunization requirements
- Strategies to reach vulnerable and hard-to-reach populations
- Strong surveillance system for infectious diseases

F2. Challenges:

8 Albania, Andorra, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Hungary, Iceland, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Moldova, Monaco, Montenegro, Norway, Portugal, Russia, Slovakia, Slovenia, Turkmenistan,
Address key challenges encountered in the implementation of the strategies including: programmatic, logistical, financial, political and social challenges. Include challenges of competing priorities such as polio eradication, and specific challenges in strengthening routine system for timely 1st Measles vaccines dose.

For each challenge outlined, describe strategies used by the region/countries to address these challenges and their outcomes.

There are still challenges in reaching the elimination goals in the European Region. Nine of the ten countries in the Region with the lowest average measles immunization rates from 2000 through 2007 are in the European Union. In 2008, 8,969 measles cases were reported in Europe; six western EU countries (Austria, Germany, Italy, Spain, Switzerland, the United Kingdom), and Israel accounted for 92% (n=8264) of the total, and three of these countries (Italy, Switzerland, and the United Kingdom) have had the most (62%) measles cases in the European Region as a whole. These cases have both public health and economic impact on individual countries. In addition, the Region is exporting measles viruses to other regions where indigenous transmission has been interrupted.

In countries with the lowest vaccination coverage, national immunization programmes are challenged by a combination of public and political complacency regarding the value of immunization, and by a disturbing rise in the influence of anti-vaccination groups and their dangerously misleading advocacy campaigns. The WHO Regional Office for Europe recommends targeting the general population at risk, as well as health care professionals with communication strategies on the need for immunization.

Furthermore, political leaders, at all levels, with the involvement of the relevant ministries, need to become more engaged in encouraging the public on the benefits of vaccination and ensuring that the required resources to reach elimination are mobilized. For example, in 2008, to address the above issues and to reiterate the importance of measles and rubella immunization, the Regional Office visited priority countries to meet with senior health authorities and professional and attend working meetings and workshops with the Member States as part of the European Immunization Week.

Other challenges include societal support for the elimination goals. There is a need for Member States to strengthen individuals participation in society through social mobilization and creating demand for immunization through appropriate strategies developed by WHO. Member States with pockets of un- and underimmunized children and countries with a slow decline in national measles immunization coverage need to address the reasons why this has occurred. Access to immunization due to: i) weakened public health systems in eastern and central Europe; ii) primary health care not covering all populations; and iii) geographical and social conditions need to be addressed in partnership with key stakeholders at the national level. Health education for the general public and medical communities need to be developed. Social exclusion and urbanization, social determinants of health, for high-risk groups, vulnerable populations, and migrants should also be addressed through key

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partnerships within and between Member States, where feasible and appropriate. Culture and belief systems (e.g., religious or philosophical) should also be addressed through targeted communication strategies.

The European Regional Office will provide strategic direction and technical guidance in these areas described through partnerships in the Region.

The elimination goals for 2010 are reachable, but countries need to ensure that the gains made to date are sustained and not jeopardized by the challenges. At this critical juncture, it is important to re-emphasize Resolution EUR/RC55/R7 of the WHO Regional Committee for Europe, “urging Member States to commit themselves and give high priority to achieving measles and rubella elimination and congenital rubella infection prevention targets by 2010.”

G. The Certification/Validation Process:

The framework for the Regional measles and rubella elimination verification process is being finalized. In order to document and verify measles and rubella elimination, the following essential criteria are proposed:

- Documentation and verification of the interruption of endemic measles and rubella in all EUR countries for a period of at least 3 years, in the presence of high-quality surveillance.

- Implementation of a high-quality surveillance system sensitive enough to detect all imported, import-related and sporadic indigenous cases.

- Demonstration of high-level population immunity profile in all age cohorts achieved either through vaccination or due to natural infection in the past.

The basic principles of the process will be as following:

- The Regional Verification Commission will be established to verify the attainment of the measles and rubella elimination goal in the Region.
- Each country will establish a National Verification Committee to develop and monitor the documentation and verification process in their respective countries
- The Regional Commission will provide standardized TORs and technical guidance to ensure uniformity in the criteria that will be used to verify elimination.
- Each National Verification Committee will prepare a plan of action for the documentation process and a timeline for evaluating the achievement of the verification goal.
- Documentation will be based mainly on the achievement and sustainability of the global, standardized indicators.

H. Measles Elimination in the Context of Health Systems Strengthening:
1. Describe interactions between measles and rubella elimination with other immunization activities (e.g. routine immunization, introduction of new vaccines, etc.) and other public health interventions.

The WHO Regional Office for Europe provides systematic and comprehensive support to attain MDG 4 by helping countries to maximize health gains from prevention of vaccine-preventable diseases through strengthening their immunization systems in order to contribute to alleviation of system-wide barriers such as:

- Improving equitable access to and utilization of immunization services through provision of optimized mixed of immunization service delivery strategies;

- Strengthening evidence-based decision-making on immunization through use of tools to empower government;

- Ensuring that immunization staff is well trained and has right skill mix, physical infrastructure is well located and vaccines and supplies are safe, accessible and appropriately used;

- Improving ability of countries to mobilize and efficiently use domestic and supplementary external resources on a reliable basis to achieve current and future target levels of immunization performance. Muse

A set of activities have been carried out to address the challenges stated above. Although the vaccination coverage is relatively high in the Region, countries that are in need are technically and financially supported further to improve access to and utilization of immunization services with special focus to hard to reach populations through enhanced implementation of reaching every district (RED) strategies. In order to strengthen evidence-based decision-making on immunization, as of May 2008 already 34 countries of the Region established their national immunization technical advisory group (NITAGs) to empower government of national immunization programs to build stewardship through making use of scientifically credible policy recommendations and ensuring transparency of policy development processes. The Regional Office is providing technical assistance to countries in establishing and strengthening their national advisory mechanisms on immunization through policy guidance. Health system changes – especially changes in service delivery at primary health care level – call for additional efforts to ensure that immunization staff is well trained and has right skill mix. The Regional Office provides support to countries in transition in improving quality of their immunization staff through curriculum and training material development and training of trainers, targeting both in-service and pre-service components of the process. Activities grouped under immunization quality and safety target that vaccines and supplies used in the Region are safe, accessible and appropriately used. Targeting self-sufficiency as the ultimate goal, in the nearer term the Regional Office provides support to countries in need to improve their ability to mobilize and efficiently use domestic and external resources on a reliable basis by strengthening their long-term planning capacities to achieve their current and future target levels of immunization performance in terms of access, utilization, quality, safety and equity. Multi-year plan on immunization is being introduced to achieve that. As of 2008, 34 countries in the Region had their multi-year plans on immunization aligned with their health sector plans.
3. **Describe the role of other public health initiatives in supporting or impeding measles elimination /control goals /Mortality reduction**

The overall pattern of low government expenditures on health, higher incidence of arrears and increased contributions from households (through formal or informal mechanisms) was accompanied by the significant weakening of the public health initiatives in the region. The existing epidemiological and other public health interventions were characterized by antiquated and very expensive technologies. Most importantly, most public health interventions were characterized by a lack of integration with other vertical health risks oriented programs (such as HIV/AIDS). The fiscal constraints faced after independence put public health interventions in an even weaker position and there are numerous examples of immunization programs collapsing for some years, with corresponding increases in specific morbidities.

One episodic example of a public health failure was the low immunization uptake that led to an outbreak of diphtheria and measles in 1994 in Georgia (Atun et al., 2000).

In CEE countries and in NIS, health care transition has led to changes in health services, including financial support for immunization services. In addition, these countries have had to deal with rising costs of vaccines and immunization-related supplies while their national economies have struggled to adapt to new economic realities. In Western Europe, a movement towards decentralized services and low social awareness of the importance of these diseases has made it difficult for public health officials to obtain or maintain the support of the public and policy decision makers. In many countries of the region, these factors have led to the accumulation of susceptible younger and older persons who have not received the two doses of measles vaccine needed to interrupt indigenous measles transmission.

Effects of transition and reforms on immunizations in some countries as experienced in the region: unlike earlier when routine immunizations were sort of mandatory and intensively monitored the disposition now that it is “recommended” could contribute to possible consequences like increased refusal, decreased timeliness and completeness and weak monitoring. Insufficient capacity of public health system to counter increased anti-vaccination movement is another dimension of it.

Vaccines were delivered free of charge to all at most times. Following reforms and transition in some systems, not all vaccines are free in some countries which lead to inequality and particularly minorities are affected. Also, unlike earlier, many different products and new vaccines are available which has resulted in markets influencing personal choices (one has to pay for a good vaccines, and free of charge vaccine is not necessarily the best available in the market). When primary responsibility of immunization is shifted from Primary Health Care workers to family physicians and/or private practitioners, as is the case in many countries, efficient functioning of some aspects of the immunization programme has suffered.

3. **Describe the opportunity costs in terms of potential lives saved for scaling up other high impact interventions or measles elimination**

We are unable to estimate opportunity costs in this regard, since all countries have endorsed the measles elimination goal and since measles mortality is extremely low in EUR Region.
1. Programmatic Feasibility:

Based on the above analysis of progress, enabling factors and challenges address the following questions for the region as a whole and for each country in the region:

1. Is the region (and individual countries of the region) likely to achieve (or maintain) its measles goal by the region’s target year?

No, regional measles elimination will not be achieved in 2010. An overall prospect of measles elimination by 2010 in the European Region by Member States is summarized in Figure 2.

Figure 2. Feasibility of achieving measles elimination in the WHO European Region in 2010.

If no, when is the region (the individual countries) likely to achieve this goal?

- given the current resources
- assuming additional resources (need to specify additional resources)

If no, what needs to be in place to reach (or maintain) the regional goal by the target year?

EUR Region will likely be able to achieve regional measles elimination by 2015. Currently, the main limiting factors are political and societal commitment, in addition to resources.

3. For all regions:

What of the following would be most feasible?
• a global eradication target by 2015 or 2020
• a 95% or a 98% mortality reduction target by 2015 or 2020.

We believe that global eradication target by 2015 or 2020 would be most desirable; given that we believe that a short, rapid acceleration in measles elimination activities would be programmatically most desirable. We are concerned that a longer, less urgent target might lead to weak political commitment and lack of operational priority, leading to the sort of fatigue that we have witnessed in the context of polio eradication. However, given the current status of measles control in the South-East Asia Region of WHO, specifically in India, we recognize that a global eradication target before 2020 may not be feasible.

4. Are member states likely to make the necessary political commitments if an eradication goal is set?

Most likely member states will make the necessary political commitment; indeed many already have done so. However, we recognize that there are challenges in translating political commitment into a practical agenda at the sub-national level. The current focus on non-communicable disease prevention and control in many western European countries represents a challenge to achieving vaccine-preventable disease control and elimination.

5. Describe the societal commitments for the countries in the region for a measles eradication goal by 2020. For example, would measles eradication be perceived as a worthy goal by the society?

The societal commitment in the European Region is generally considered unlikely to perceive the eradication of measles and rubella as high priorities. This is somewhat different to the societal response to polio eradication, which is generally considered important in most countries.

6. Are member states likely to make the necessary financial commitment? What proportion of estimated funds needed is likely to be provided by the member states of the region?

It is generally considered that financial commitment will follow the political commitment in almost all countries and Member States should commit the required resources needed (over 60-70% of estimated funds will likely be provided by them). Exceptions may occur where competing priorities intervene, e.g., H1N1 pandemic or other emergency situations, chronic disease control, etc. In the poorest countries in the Region, the continuation of donor support will be required to finance SIAs and related activities leading up to the achievement of measles and rubella elimination.

7. For the region, is polio eradication a pre-requisite for embarking on measles eradication?

The Region was certified as poliofree in 2002, so this will not be a pre-requisite to measles eradication. However, achievement of global polio eradication will enhance commitment for measles eradication.

8. How does measles mortality reduction or elimination rank among the public health priorities in each countries in the Region (for each country, rank the key public health priorities along with measles)
As described in question H3, public health priorities in the Region are primarily focused on non-communicable diseases and health systems strengthening, however all Member States have endorsed the resolution for measles and rubella elimination in the Region and have committed to reach the goals. The Regional Office considers it as one of its highest priority in public health.

J. Future Strategies:

1. Describe vaccination strategies once measles eradication has been achieved (e.g. number of vaccine doses provided (if any), age of vaccination and mode of delivery (routine and or campaigns). If vaccination will be stopped, How long after eradication will it be stopped? How long will measles surveillance be continued for?

We presume that routine MMRV1, MMRV2 vaccination will have to continue indefinitely. SIAs will be indicated only where serosurveys reveal important immunity gaps in the population, but after many years of implementing elimination strategies we anticipate that SIAs will be required very rarely. Measles and rubella surveillance will need to continue for 10 years post regional elimination.

2. Describe vaccination strategies once an intermediate goal (e.g. 98% mortality reduction) has been achieved (e.g. number of vaccine doses provided, age of vaccination and mode of delivery (routine and or campaigns).

For the European Regional Office of WHO, some of the immediate strategies and activities are: to conduct advocacy at different levels including at higher political level for sustaining commitment for the measles elimination and translating it into actions. Forums like Regional Committee and EU parliament will be appropriately explored for this purpose. Working directly with the member states and with partners, professional associations and public in general will also be an important strategy.

Strengthening of surveillance systems will be addressed with the implementation of revised and integrated surveillance guidelines in priority member states. One important dimension of it would be proactive collaboration with ECDC to improve data collection and reporting from EU member states.

As the Region approaches its elimination goals, defining the verification process and beginning the required documentation will be undertaken. For this purpose, the prototype tool has already been piloted in 2008-2009. Consultations with partners and establishing regional and national commissions are expected to begin in early 2010.

In the long term, following strategies are envisaged at the Regional level:

- Strengthening routine immunization through optimized mix of service delivery strategies ensuring that susceptible populations are vaccinated
- Strengthening evidence-based decision making and communication through National Immunization Technical Advisory Groups (NITAGs)
- Ensuring health care staff are trained with the right mix of skill sets and knowledge to deliver immunizations
- Enhancing ability of countries to mobilize and efficiently use domestic and supplemental external resources