WHO-EM/EPI/310/E

Report on the

Intercountry meeting on measles control and elimination

Dubai, United Arab Emirates
17–19 October 2011

World Health Organization
Regional Office for the Eastern Mediterranean

Document WHO-EM/EPI/310/E/05.12/212

CONTENTS

1. INTRODUCTION

An intercountry meeting on measles/rubella control and elimination was organized by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean in Dubai, United Arab Emirates on 17–19 October, 2011. Participants from all countries of the Eastern Mediterranean Region except Libya and Yemen attended the meeting. Also in attendance were members of the Regional Immunization Technical Advisory Group (RTAG), chairpersons of National Immunization Technical Advisory Groups (NITAGs), representatives of UNICEF headquarters, regional and country offices and the Centers for Disease Control and Prevention (CDC, Atlanta) and WHO staff from headquarters, the Regional Office and country offices.

The objectives of the meeting were to:

- review and follow-up on the progress of implementing the strategic plan for measles elimination;
- review achievements of measles surveillance indicator targets;
- review the measles elimination validation process in the countries with near elimination; and,
- review and update the national plans for strengthening the measles elimination and control programme.

Dr Jaouad Mahjour, Director of the Division of Communicable Disease Control, WHO Regional Office for the Eastern Mediterranean, delivered the opening message from Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean. In his message, Dr Gezairy commended the progress that the Region had made towards measles elimination since the goal was set in 1997, but expressed concern that the target year had passed without reaching the goal. Moreover, there was a resurgence of measles cases in several countries in 2010 which had continued into 2011. This resurgence was due only to failure in reaching or sustaining the desired population immunity in those countries, which stemmed from a failure to reach the level of measles vaccination coverage necessary to interrupt measles transmission or at least to keep transmission very low. He noted that the Region was facing many challenges that would require sustained efforts and higher input by the Member States as well as continuous collaboration and support by the partners in order to curb the current resurgence of measles, sustain the gains of measles mortality reduction and achieve measles elimination. He closed by pointing out the importance of the meeting given the regional situation and emphasized the responsibility for all to identify alternative ways to ensure timely implementation of the planned activities.

Dr Mahmoud Fikri (United Arab Emirates), Dr Jalilah Jawad (Bahrain) and Dr Said Albaklani (Oman) chaired the 3-day meeting. The agenda and the list of participants are included as Annexes 1 and 2, respectively.

2. GLOBAL AND REGIONAL UPDATES ON MEASLES CONTROL AND ELIMINATION

2.1 Global measles update

Dr A. Dabbagh, WHO headquarters

In May 2010, the World Health Assembly endorsed a series of interim targets for 2015, and recommended that the decision to proceed to the eventual global eradication of measles be based on measurable progress towards the achievement of these targets. They include exceeding 90% coverage with the first dose of the measles containing vaccine nationally and exceeding 80% vaccination coverage in every district; reducing annual measles incidence to < 5 cases per million and maintaining that level; and reducing measles mortality by more than 95%, compared with 2000 estimates. Major achievements towards this goal since 2000 include the increase in global coverage of one dose of measles-containing vaccine (MCV) to 85% (up from 72% in 2000), the delivery of one billion doses of MCV through campaigns, 2/3 reduction in reported cases and 3/4 reduction in estimated deaths. Despite the progress, there are some key challenges facing India accounting for most of the global measles related deaths. The high target population for vaccination (134 million children) is a challenge as careful planning and training need to be carried out to ensure quality and immunization safety. Weak immunization systems in many countries and delayed and the variable quality of campaigns led to a resurgence of measles in Africa with a 4-fold increase in reported cases since 2008. Globally, there has been no decline in cases and deaths in the past three years. Late and unpredictable financing by the Measles Initiative is another important challenge to global progress.

A new global measles and rubella strategic plan for the years 2011–2020 is being finalized by the five founding members of the Measles Initiative. The plan has a vision of a world without measles, rubella and congenital rubella syndrome and targets that are aligned with the global 2015 targets and the regional elimination targets.

A new rubella vaccine position paper was published in 2011. The paper outlines different strategies that countries can choose based on the burden of congenital rubella syndrome (CRS), the available resources and the time frame for achieving the goal. Strong political commitment and sustainable financing must be in place before initiating the rubella vaccination. In order to avoid a potential increase in susceptibility among women of child-bearing age and increase risk of CRS, countries introducing rubella-containing vaccine should achieve and maintain immunization coverage of 80% or greater with rubella-containing vaccine delivered through routine services and/or regular supplementary immunization activities. The preferred approach is to begin with the measles-rubella (MR) vaccine or the measles-mumps-rubella (MMR) vaccine in a wide-age range campaign followed immediately with the introduction of the MR, or MMR vaccine in the routine programme. All subsequent follow-up campaigns should use MR or MMR. At present the GAVI Alliance is considering supporting rubella vaccine introduction.

2.2 Update on SAGE recommendations and the Executive Board decision on establishing a measles eradication goal and new measles targets/milestones
Dr H. Bashour, RTAG Member

The historical background about the feasibility of the measles eradication goal, the work of the Strategic Advisory Group of Experts on Immunization (SAGE) working group on measles, as well as the work of the ad hoc global measles advisory group with regard to the feasibility issue was presented. Recommendations from the SAGE meeting in November 2010 that were published in the weekly Epidemiological Record in January 2011 were also presented.

The presentation also reflected on the measles related reports presented to the Executive Board and the World Health Assembly in the past two years with a focus on Health Assembly endorsement of the global measles targets for 2015 and setting the milestones towards eradication. Those targets include achieving 90% coverage at a national level and 80% in every district, while reinforcing goals in the Global Immunization Vision and Strategy (GIVS) and achieving a reported incidence of <5 cases of measles per million as well as mortality reduction of 95% compared with the year 2000.

2.3 Measles control/elimination in the Region: progress, challenges and opportunities
Dr Nadia Teleb, WHO Regional Office for the Eastern Mediterranean

Countries of the Region have adopted two targets related to measles control and elimination. The first target is achieving measles elimination in all countries of the Region by 2010. This target was endorsed by the WHO Regional Committee for the Eastern Mediterranean in its 44th session in 1997. The second target is achieving 90% reduction of measles mortality by 2010, compared with the level in the year 2000, which is the target adopted by the Health Assembly in 2005 as one of the goals of the GIVS.

The regional strategy for measles elimination calls for achieving at least 95% coverage with two doses of measles vaccines at a national level and in each district. This vaccination coverage can be achieved by routine vaccination alone or supplemented by periodic supplementary immunization activities. Strengthening measles case-based laboratory surveillance to reach the set measles surveillance performance indicators is fundamental for validating measles elimination in any country.

Based on national reported data, routine vaccination coverage for the first dose of measles vaccine for the region increased from 79% in 2000 to 88% in 2010. Nineteen countries are providing two routine doses of measles vaccine with variable levels of coverage. Djibouti, Morocco, Somalia, South Sudan and Sudan are still using only one dose of routine measles vaccine. Eleven countries have reached the 95% coverage with two doses of routine measles vaccine at the national level.

Thanks to the implementation of measles catch-up campaigns in all countries and the progress in routine immunization in several of them, the Region achieved the measles mortality reduction target three years before the target date. The Region has also witnessed

remarkable reduction in measles morbidity. The reported number of cases has decreased by 88% between the years 1998 and 2010. However, the regional target of measles elimination in 2010 was not achieved and only seven countries of the Region have reported zero cases or were close to this target in 2010. Moreover, there has been a resurgence of measles cases in several countries in 2009, which continued through 2011. This resurgence is due to the failure to reach the level of measles vaccination coverage necessary to interrupt measles transmission or, at least, keep this transmission low. The concern is that this resurgence also occurred in countries that had been reporting high routine coverage with two doses of and/or high supplementary immunization activities vaccination coverage. A substantial proportion of the measles cases reported during these outbreaks occurred among the cohorts reported to have been vaccinated however a large percentage of these cases were proved, by case investigation, to be unvaccinated. This raises concern about the quality of the reported routine vaccination data and the quality of the implemented supplementary immunization activities. The delay in implementation of the follow-up supplementary immunization activities, whether due to the security situation or inadequate funding, was also behind the occurrence of these outbreaks in some other countries.

Measles case-based surveillance has improved significantly during the past few years. Currently 20 countries are implementing case-based surveillance nationwide and the remaining three countries are moving towards it. A measles validation committee was established in only eight countries and the remaining countries are yet to establish it.

The Regional Committee for the Eastern Mediterranean in its 59th session endorsed the new target date for measles elimination as the year 2015. Countries of the Region, especially the low performing ones, are to ensure optimum implementation of the regional strategy of measles elimination in order not to miss the new target date.

3. PROGRESS IN ACHIEVING AND SUSTAINING HIGH POPULATION IMMUNITY AGAINST MEASLES

3.1 Measles population immunity: strengths and gaps

Dr Irtaza Chaudhri, WHO Regional Office for the Eastern Mediterranean

Increasing population immunity is one of the three strategies for reaching measles control and the measles elimination goal. The other two strategies are a strong case-based laboratory surveillance system and effective case management. Appropriate age selection for MCV1 administration and maintaining of cold chain at all levels particularly at the service delivery level is essential to reach the required population immunity levels. MCV1 and MCV2 coverage at the national as well as the district level should be 95% or more. While MCV1 is delivered through routine strategy, MCV2 can be delivered through routine or supplementary immunization activities or a combination. However effort should be made to reach MCV2 target coverage through routine immunization.

Bahrain, Egypt, Jordan, Oman, occupied Palestinian territory, Syrian Arab Republic and Tunisia reported <1 confirmed case of measles per million population in 2010. Large numbers of cases were reported from Afghanistan (76.87 per million), Kuwait (10.4 per

million), Somalia (66.59 per million), Morocco (16.12 per million), Qatar (59.79 per million), Saudi Arabia (15.84 per million), Sudan (15.17 per million), United Arab Emirates (16.16 per million) and Yemen (15.52 per million).

Member States are encouraged to improve the quality of routine and supplementary immunization activities coverage and to use the measles population immunity tool at national as well as district levels to keep a watch on the situation and to take the appropriate timely action.

3.2 Measles outbreaks in 2010–2011: underlying causes, country response and future plans

Experience of Morocco

Morocco has developed a national strategy for measles elimination, which was implemented during the period 2003-2008. During this period, the national immunization programme introduced the second dose of MCV2 at the age of 6 years at school entry. In 2008, a catch-up campaign was conducted targeting 9 months to 14 year old children. The coverage was reported to be 99%.

In 2010, a case-based surveillance system was established with laboratory confirmation. The year 2010 recorded 21 outbreaks with 494 cases reported. 83% of outbreaks had more than 10 cases and the largest outbreak was in Fes (90 cases). Almost all the regions of the country were affected except for the eastern region, 76% patients were under 25 years old, and 40% of cases had no history of vaccination. There was 1 death (a girl 12 years old, unvaccinated and from a rural area).

Similarly in 2011, 6 outbreaks with a total of 530 cases were notified. All outbreaks had more than 10 recorded cases. The largest number of cases notified was in Fes (291cases). Out of the total, 94% of patients were under 25 years and 44% were unvaccinated.

All outbreaks were investigated and confirmed, the circulated genotype were also identified as D4. In addition, all the cases have received vitamin A.

Most of the cases notified were from the districts with low coverage of the first dose, and where the second dose had not been introduced.

The national measles programme has recommended the strengthening of the coverage of the first dose to reach above 95% at the national and district levels. In addition, a second dose at 18 months will be introduced simultaneously in 2012. Furthermore, a catch-up campaign targeting the age group 9 months to 15 years will be conducted as soon as is possible.

Experience of Sudan

Since 2004 and despite the adoption of measles elimination strategies, Sudan has experienced several outbreaks throughout the country. A catch-up campaign was conducted, vaccinating more than 10 million children aged 9 months to 15 years of age, in addition to periodic follow-up campaigns reaching coverage of more than 95%. Furthermore, Sudan has adopted case-based surveillance since 2006, with a WHO accredited laboratory.

It has been noted that the case fatality ratio has increased in 2011 contrary to the previous year, with many complications recorded. The most prominent complications were pneumonia and dehydration respectively. The underlying causes of the outbreaks were the rapid accumulation of those susceptible as a result of the low routine coverage, late implementation of the follow-up campaign, open borders with endemic countries and a lack of security in some areas. As a result, the measles programme response was to conduct follow-up and mop-up campaigns as well as to strengthen surveillance and case management.

Sudan is facing many challenges in the elimination process which include delayed funding of the campaigns, insecurity and open boarders with neighbouring endemic countries, hard to reach populations, competing priorities and outbreak response budgets.

The way forward is to introduce proper planning and management for the implementation of the measles strategic plan for the years 2011–2015; the need for a preparedness plan for outbreaks guided by monitoring the susceptibility profile at all levels; advocacy and resource mobilization; and the development of a special plan for nomadic populations. In addition, it is important to increase immunity through routine vaccination by strengthening the RED (Reach Every District) approach strategy, defaulter tracing, increasing people demand for vaccination and conducting periodic follow-up campaigns.

Furthermore, strengthening measles surveillance through continuous orientation of health cadres, involvement of the private sector, coordination with other departments and continued genotyping for the measles virus is also required.

Sudan will introduce the second dose of the measles vaccine as soon as is possible and will strengthen the role of newly established validation committees.

Experience of Somalia

The immunity profile of Somalia, even before the current crisis, is one of the lowest in the world. The current food/security crisis increased the risk of contracting infectious diseases, disease severity and death. Raising the immunity profile is identified as one of the essential humanitarian interventions to avoid outbreaks of vaccine-preventable disease and to maintain its polio-free status.

As of the beginning of 2011, seven large outbreaks were reported all over Somalia. The current famine, which has affected the south–central zone of Somalia has resulted in severe malnutrition, huge population movement and overcrowding in internally displaced population

(IDP) camps. These conditions have exacerbated the severity and extent of the outbreak. The underlying causes of all the outbreaks have been identified as due to the chronic low routine immunization coverage and the banning of immunization activities by hard-liners controlling the south–central zone, in about half of the country. Five of the seven outbreaks have been investigated and an outbreak response instituted. In response to the huge outbreaks, WHO Somalia along with other partners has drafted an emergency response vaccination plan to cover 2.9 million children aged from 6 months to 15 years old. In addition to the measles vaccine, the emergency vaccination package consists of vitamin A, (6–59 months), polio vaccine (59 months), and de-worming tablets (12–59 months). As per this plan, the campaign was implemented in Mogadishu and a few other districts of the South-central zone, vaccinating close to 1 million children. In addition to the emergency vaccination that is being implemented, WHO Somalia has established an Expanded Programme on Immunization (EPI) unit within the Ministry of Health in Mogadishu, strengthened the coordination of health cluster partners, strengthened measles management and supported emergency vaccination in refugee camps in Kenya conducted by the Ministry of Health, WHO and UNICEF Kenya. Partners will continue to negotiate access to the insecure areas and the country plans to continue to strengthen the routine immunization and surveillance in the entire country and implement the emergency vaccination response in south–central zone.

Experience of Qatar

Since 2000, the first dose of MMR is administered at 12 months old and the second dose at four years old. In 2010, the second dose schedule was changed to 18 months. Qatar was one of the countries of the Region at the measles elimination stage. However, during the past few years there has been a resurgence of measles cases reported in different parts of the state.

The latest measles resurgence is a normal result of the demographic explosion in the past six years, where the population more than doubled in size to reach 1.7 million in 2010. Also the highest proportion of new expatriates come from endemic areas. The incidence rate of measles was high in 2007, and dropped in 2008–2009 as a result of the measles catch-up campaign, which was conducted in late 2007. However, measles incidence went up again in 2010–2011.

Between January and August 2011, the number of suspected measles cases was 175; out of that 55% were confirmed as measles and 9% as rubella. More than a quarter of the confirmed measles cases were vaccinated, 46% of the confirmed cases were not vaccinated, out of them 24% were below age of vaccination. The vaccination status is unknown in the remaining proportion. The proportionate distribution of cases among nationals and expatriates is almost 2:8, which follows the demographic status of the country, where 80% of the population are expatriates. The reported coverage of MCV1 and MCV2 is above 95% and MCV2 is less than 95%.

The national measles supplementary immunization activities conducted in 2011 on 9–27 October , targeted the age group 12 months to 20 years, and 200 000 cases at the national level. The most important areas for improvement are in specimen collection, tracing

defaulters, and the surveillance situation analysis. An action plan was initiated which will address these areas and will be implemented as soon as possible.

United Arab Emirates

The measles elimination plan in United Arab Emirates started in 1998 and was revised further in 2007. The national immunization programme of the United Arab Emirates provides two doses of MMR vaccine at the end of 12 months and at school entry (5–6 years). In addition, girls are given rubella only at 14–15 years of age. The immunization coverage has been consistently high at approximately 94% at the national level and no deaths attributable to measles have been reported for more than ten years. The measles surveillance system in the country has mandatory weekly zero reporting for measles, incidence was 1.6 per 100 000 (laboratory confirmed and clinical confirmed cases were included) and the country plans to shift to rash-fever surveillance from the clinical case definition soon. Serology testing is already being done and there are plans to start genotyping of circulating strains soon to know the indigenous transmission and to strengthen the programme.

4. GROUP WORK: REVIEWING AND UPDATING COUNTRY PLANS TOWARDS ACHIEVING MEASLES ELIMINATION

The meeting included two group work sessions that discussed the country situations with regard to the main pillars for achieving and documenting measles elimination: improving population immunity and strengthening measles case-based surveillance.

The countries were divided into five groups, based on country situation with relation to measles elimination. In each group, each country gave a 10 minutes presentation, followed by 30 minutes discussion, moderated by facilitators with active involvement of all countries. Individual provincial presentations were submitted by each province of Pakistan. The objectives of the group work were to:

- review measles population immunity in each country with regard to measles vaccination coverage vis-a-vis the occurrence of measles;
- review implementation of planned activities for improving population immunity since the measles meeting in 2010; and
- specify the planned activities for 2011–2012 for reaching high vaccination coverage for MCV1 and MCV2, and implementing necessary supplementary immunization activities as part of the country plans for measles elimination.

The recommendations of the group work are shown in Annex 3.

5. IMPROVING MEASLES SURVEILLANCE

5.1 Measles surveillance in the Region: where we are from the target performance indicators?

Dr Nasrin Musa, WHO Regional Office for the Eastern Mediterranean

To validate measles elimination, the following measles surveillance performance indicators must be achieved.

Reporting rate of non measles cases

- Reporting rate of more than ≥2/100 000 population at national level.
- Reporting rate of more than ≥2/100 000 population in 80% or more at the sub national level.

Laboratory confirmation

- Specimens adequate for detecting acute measles infection should be collected from at least 80% or more of suspected cases.

Adequacy of investigation

- 80% of suspected measles cases should have had an adequate investigation initiated within 48 hours of notification.

Virus detection

- Specimens adequate for detecting the virus should be collected from 80% or more of laboratory confirmed outbreaks.

According to the available data, the measles surveillance performance indicators in the Region for 2007–2010 are as follows.

2010	2009	2008	2007	Indicator
86%	72%	77%	80%	% of countries ≥80% of suspected cases tested
50%	43%	56%	59%	% of countries ≥80% cases with complete investigation
68%	73%	68%	70%	% of countries with ≥80% specimen received at laboratory 7 day of collection
91%	96%	96%	100%	% of countries with ≥80% adequate specimens
86%	95%	81%	90%	% of countries with ≥80% results reported within 7 days
42%	52%	52%	42%	% of countries that achieved the reporting rate ≥2/100 000 population at national level
14%	9%	9%	14%	% of countries that achieved the reporting rate ≥2/100 000 population at 80% of first sub-national level

Bahrain is the only country that achieved the required standard sets of measles surveillance performance indicators 2008–2010. Other countries fluctuated in their achievement between consecutive years.

Gaps identified in surveillance are as follows.

- No uniform case definition throughout the Region.
- Incomplete case investigation data.
- No proper reports on investigation/control of measles outbreaks.
- Lack of proper documentation.
- No EPI surveillance officer or regular laboratory meetings for case classification.
- Under-reporting from the private sector.
- No investigation of low performing districts.
- Minimal collection of specimens for virus detection to monitor the interruption of endemic transmission/importations.
- Investigations conducted within 48 hours are not tracked.

5.2 Measles/rubella laboratory network: progress and challenges

Dr Hinda Ahmed, WHO Regional Office for the Eastern Mediterranean

The regional measles and rubella laboratory network (LabNet) has made considerable progress in its capacity to accommodate diagnostic requirements for measles/rubella case-based surveillance. All countries in the Region have established national measles and rubella laboratories served by WHO trained staff to support and provide the EPI teams reliable measles laboratories data that are in line with WHO set standard. A new laboratory has been established in the new country of South Sudan and this will be tested shortly. Besides serological diagnostic capacity, 19 of the 23 countries have well established virus detection by RT-PCR or virus isolation in cell culture, which was built on the existing Polio LabNet. In addition to the two regional reference laboratories in Tunis and Muscat, four other countries (Egypt, Islamic Republic of Iran, Morocco and Pakistan) have virus sequencing capacity.

Laboratories are functioning at a high level of proficiency and meet performance indicators and timeliness of reporting criteria on measles case-based surveillance with laboratory confirmation reported in the monthly measles bulletin. In 2011, up until June, the LabNet tested 11 957 serum samples where 4623 were laboratory confirmed for measles and 1387 for rubella. All countries passed the proficiency panel, however some laboratories were delayed in their reporting, due mainly to the shortage of kits. The LabNet demonstrated good concordance with their serum testing and virus detection. Filter paper with dried serum spots, virus isolates or RT-PCR product was a method for sending the samples to the regional reference laboratory to overcome shipment difficulties and cost constraints. In some countries oral fluid sampling has taken off for detection of the IgM antibody against measles or rubella and virus detection for genotyping.

The Region has improved its virologic surveillance for measles, although gaps still remain in identifying measles virus genotypes in Lebanon, occupied Palestinian territory, South Sudan and the United Arab Emirates. D4 is the dominating genotype in the Region

followed by B3. However, lately importation of D8 in Bahrain and Saudi Arabia and H1 in Afghanistan and the Islamic Republic of Iran seem to have been notably detected. In 2011, 11 of the 19 countries reporting measles cases had the measles virus genotype identified: B3, D4, D8, and H1. Rubella genotype information is available from some countries in the Region, including genotypes 1E, 1G and 2B.

Challenges and areas to be improved include timely reporting of measles virus genotype and sequence to WHO-genotype database or to measles nucleotide sequence databases (MeaNS) with either the national measles laboratory or the regional reference laboratory providing case information data and authority for submission. Also, measles case classification by the measles expert team, while ensuring case confirmation by using additional test confirmation and genotyping in countries where measles cases are becoming rare. A key criterion for measles and rubella elimination is demonstration of the absence of an endemic viral genotype for at least 12 months. Countries with reported cases of measles are encouraged to monitor the circulating measles virus by improving collection of clinical specimens (throat swab, urine or oral fluid) for virus detection and genotyping.

5.3 Documenting elimination of measles: review and status of measles molecular epidemiology in the Americas

Dr P. Rota, Centers for Disease Control and Prevention

Molecular epidemiologic studies are a key component of verification of measles and rubella elimination. A criterion for verification of elimination is absence of an endemic genotype for one year. Genetic data in conjunction with standard epidemiologic information can be used to track transmission patterns and identify sources of infection. Virologic surveillance in the Americas provided verification for regional elimination of measles and rubella. No endemic genotypes of measles or rubella have been detected and the genotypes associated with current cases reflect the multiple, imported sources of viruses. Virologic surveillance is continuing to help identify the sources of imported viruses throughout the Region. There is a need to continue to strengthen global efforts to collect virologic specimens including the use of recently validated specimen types (dried blood spots, oral fluid) and to improve sequence/genotype data reporting. Additional targets for sequence analysis (expanded sequence windows) are needed to provide greater resolution within genotypes.

Molecular methods will have an expanding role in case confirmation/classification in low incidence settings. Outbreaks often include cases of primary and secondary vaccine failure and IgM results are not always a reliable marker for infection in cases of secondary vaccine failure. In addition, vaccine reactions are detected and can be confused with disease. RT-PCR can help to confirm cases if serologic results are inconsistent, and sequence analysis can confirm the presence of vaccine virus in the case of a suspected vaccine reaction.

5.4 Achieving strong measles surveillance in the Islamic Republic of Iran

Dr Sayed Mohsen Zahraei, Ministry of Health and Medical Education

In 2002, the Ministry of Health and Medical Education developed a national measles elimination plan that included conducting a nationwide measles immunization campaign in

2003 using a combined measles and rubella vaccine for all persons aged 5–25 years, a target population representing 50% of the total population of Iran. The national measles immunization programme officially started in 1967. Since 1984, systematic immunization of children has occurred, and as determined on the basis of a comprehensive registration system, immunization coverage and the number of measles cases have been documented.

There is a robust communicable diseases surveillance system in the country supported by laws relating to mandatory reporting of vaccine-preventable diseases including measles. The national guidelines for measles surveillance in the elimination phase were published in 2004 and revised in 2009 in accordance with the WHO standard recommendations for measles surveillance. The guidelines, distributed to all health facilities, state that immediate reporting of suspected measles cases is mandatory by law. WHO standard case definitions are used for disease reporting. Measles surveillance was changed to case-based surveillance in 2004, to support the elimination phase of the programme.

Rate of suspected non-measles cases detection per 100 000 populations has been increased from 1.3 in 2006 to 2.8 in 2010 and 3.2 in 2011(as of end of September). Incidence of measles (laboratory and epidemiological confirmed cases) in 2009 and 2010 were 2.2 and 3.2 respectively and decreased again to 0.2 in 2011. Completeness of case investigation has been around 99% each year since 2005 and also approximately 90% of reported suspected cases have had adequate blood samples since 2005. There was no outbreak in the first nine months of 2011. As of end of September 2011, out of 1977 total suspected cases, 1785 serum specimen were tested by the national reference laboratory and only 13 cases confirmed by laboratory. Genotyping has been done on five of them and all of them were D4. Iran has fully committed to the regional elimination goal and is near to achieve measles elimination—that is, interruption of endemic measles virus transmission, based on the sensitivity of the surveillance system, low incidence of measles and the limited transmission after detection of a confirmed case.

5.5 Challenges to strengthening measles surveillance in Pakistan

Dr Altaf Bosan, Ministry of Health

Adoption of the elimination strategy started with establishing measles case-based surveillance in the country, providing guidelines and tools and training district teams (master trainers) from all districts of the country. Nearly 2000 cases have been brought into the surveillance network this year. All districts were assigned to conduct training for their field staff through trained master trainers. Four measles surveillance officers were hired to support provincial EPI offices and samples are being received and tested in the national laboratory and feedback is being provided on a regular basis.

Pakistan has established measles case-based surveillance, challenges have been addressed and a plan is in place for further improvement of the programme. There are gaps to be addressed regarding the establishment of case-based surveillance in every district of the country and the private sector needs to be involved. Due to the lack of a strong system, samples are not being collected from all districts of the country for testing on a regular basis and districts are responsive only in outbreak situations that have been highlighted by the media. Federal EPI is supporting provinces through mop-up activities to control such outbreaks.

In order to develop a more robust surveillance system for the detection of measles infection in the country, the following suggestions were given and a plan of action to be implemented jointly with provinces and partner agencies (WHO and UNICEF) will be finalized for 2012.

- Advocacy of heads of hospitals, health units, physicians, paediatricians and other concerned stakeholders to assist in surveillance.
- Capacity-building of district management and establishing it as the regular job of the medical officer in charge of the health unit.
- Measles surveillance will be supported by the well-established AFP surveillance network.
- Disease early warning systems (DEWS) may assist the district management in alerting them to the rise of suspected cases.
- WHO surveillance officers and government surveillance coordinators are to be responsible for leading the surveillance at the district level.
- Provincial surveillance officers supported through this programme are to be made fully responsible for reporting to the provincial EPI manager and to play a coordination role between districts and the provincial EPI office.
- Provincial laboratories for the testing of samples are to be established to take urgent action to control the situation.
- Measles case-based surveillance is to be added to the AFP surveillance curriculum and trainings.
- Sample collection and the transportation mechanism are to be clarified to all districts with clear responsibilities outlined.
- Resources for training activities and laboratory material are to be ensured.
- Monitoring and supervision may be strengthened to supervise EPI in general and measles elimination activities in particular.

6. BRIEFING ON NEW DEVELOPMENTS IN PROCEDURES AND MOLECULAR TECHNIQUES FOR MEASLES VIROLOGIC SURVEILLANCE

6.1 Regional molecular surveillance: gaps for improving surveillance and sharing information

Dr H. Triki, Regional Reference Laboratory Tunisia

Measles laboratory surveillance is based on the serological confirmation of suspected cases and virological characterization of circulating viruses. Virus detection/genotyping helps to confirm the source of epidemic viruses, document interruption of the transmission of endemic viruses and evaluate the impact of vaccination efforts.

During the past five years, measles detection/genotyping activities were substantially intensified in the Region; measles circulating genotypes were identified in 19 countries. They were not identified in Lebanon, occupied Palestinian territory and the United Arab Emirates. Two major genotypes circulate in the Region: genotypes D4 and B3 representing 51% and 34% of the viruses detected from 2000 to 2011. Genotype D8 come in the third position (7%). First detected in Morocco, it has been more frequently detected since 2007 and was

identified in 5 countries (Bahrain, Islamic Republic of Iran, Kuwait, Oman and Saudi Arabia).

Phylogenetic analysis of the circulating viruses from genotype D4 shows that the recent isolates from 2010/11 in the Islamic Republic of Iran, Iraq and Pakistan are close to each other and to those that have been circulating in the three countries starting from 2007 indicating a continuous endemic circulation. It is noteworthy that this D4 lineage has replaced other D4 lineages that circulated in the early 2000s. A few viruses from the same lineage were also isolated in Afghanistan, Oman and Saudi Arabia; they are most probably from imported origin at least in Oman and Saudi Arabia. D4 isolates from another lineage were also isolated in Morocco, Oman and Saudi Arabia in 2010–2011; they are close to those previously identified in Egypt, Qatar, Sudan and Syrian Arab Republic.

Phylogenetic analysis of B3 isolates shows a continued circulation in Libya of the new B3 variant in 2010/11. This variant was first detected in Libya and Tunisia during the year 2009. The variant was also detected in Sudan 2009/10 and closely related isolates were recently reported from Cote d'Ivoire and Nigeria. The viruses that caused the big epidemic in Saudi Arabia 2010–2011 belong to another B3 lineage and are very close to those detected in Oman 2009, Somalia 2010 and Djibouti 2008.

This data shows that molecular surveillance of measles has tremendously improved in the Region; however, additional efforts are still needed especially in terms of reporting and sharing sequence data. As of 30 September 2011, measles cases were reported from 16 countries but only 7 countries reported the detected genotypes to the WHO genotype database and submitted the sequences in the MeaNS sequence database. In some countries, samples for virological surveillance were not collected. In other countries, adequate samples were collected and the genotypes were identified but the sequence data were not shared within the network.

In conclusion, the laboratories are performing very well but can do better in terms of timeliness of genotype identification and the sharing of sequence data.

6.2 Quality control for molecular tests and reporting measles/rubella genotype information to the WHO genotype database and MeaNS

Dr P. Rota, Centers for Disease Control and Prevention

Molecular characterization of measles and rubella viruses plays an increasingly important role in laboratory surveillance, and it is necessary to develop a quality control programme for molecular techniques. This is difficult because molecular techniques do not rely on the use of commercially available kits, so the quality control must be able to assess a range of homemade assays. All molecular tests must be validated such that the lower limit of detection has been measured, the specificity is determined, and the assays produce minimal background banding. In addition, positive control RNA of known sequence preferably with genetic markers too should be used to clearly identify control reactions. The assays should have defined/optimized reaction conditions and the ability to detect all circulating genotypes. CDC can provide the following reagents and kits in support of molecular testing in the WHO

global measles/rubella laboratory network: measles genotyping RT-PCR kit, measles FTA practice panel (5 samples), measles positive control RNA, and real time RT-PCR (primers and probes). For rubella, CDC can provide: rubella detection RT-PCR kit, rubella genotyping RT-PCR kit, positive control RNA, and FTA practice panels.

Experience has shown that FTA disks are an efficient and low cost way to provide positive controls for standard measles and rubella RT-PCR reactions. Both measles and rubella viruses are inactivated by the FTA discs. The practice panel contains FTA discs loaded with lysates of measles or rubella infected cells. The disks can be used to test RNA extraction, RT-PCR, sequencing and sequence analysis. A take home, practice panel should be included as follow up for all inter-country training courses focusing on molecular methods. It is necessary to implement a standard quality control programme for molecular techniques and to include these quality control measures in accreditation checklists.

At present, results of virus detection and genotyping must be completed within two months of receipt of specimens and the data reported to the WHO monthly, for at least 80% of samples. For measles, genotype information should be reported to the WHO measles database and sequence information should be reported to MeaNS. For rubella, genotype information should be reported to the WHO rubella database.

6.3 2010 measles/rubella proficiency panel outcome and distribution of proficiency tests and serogical and molecular assays

Dr Hinda Ahmed, WHO Regional Office for the Eastern Mediterranean

The regional measles and rubella LabNet annually participates in a global proficiency panel of a 20 serum sample to monitor the laboratory performance and reliability of the test results. As in previous years excellent test performance was shown, 20 of the 22 countries that participated in the proficiency panel in 2011 received a score of 100%, and the remaining two laboratories received 95%. However, five laboratories did not meet the indicator of reporting the results within 14 days of receiving the panel. The LabNet was reminded to pay attention to the recently revised scoring system of the proficiency programme, which will be implemented in the 2011 panel.

Virus detection is an area being strengthened and 19 laboratories in the Region do perform molecular techniques such as RT-PCR and or sequencing. To validate the performance of these new techniques, the global laboratory CDC Atlanta has developed panels on FTA cards to ensure that no infectious material will be shipped; and the development of a quality control protocol for reporting is in process. To pilot it the regional LabNet has implemented a molecular “practice panel” programme and provided good feedback.

7. CONCLUSIONS

Participants noted with satisfaction the substantial progress made by several countries of the Region towards achieving measles elimination. Participants also noted the new target date of measles elimination by 2015, which was endorsed by countries at the Fifty-eighth Session of the Regional Committee for the Eastern Mediterranean in 2011 (EM/RC58/R.5).

Concern was raised about the outbreaks of measles reported from several countries in the Region, including countries reporting high coverage with two doses of measles vaccine. The need for accelerating the efforts in all countries was underlined, especially the low-performing countries, in order to meet the regional target of measles elimination by 2015. The meeting noted also the possible effect of devolution in Pakistan on EPI and the possible delay in measles elimination, and commended the establishment of a federal EPI coordination body, which should continue to preserve the essential central functions of EPI.

Participants made a number of recommendations and reiterated the importance of completing the implementation of the recommendations of previous measles control/elimination meetings.

8. RECOMMENDATIONS

To countries

1. Where they do not exist, establish national measles validation committees as per the guidance notes shared by the Regional Office in March 2011 and notify WHO of their establishment.
2. Establish national measles expert committees. Countries might wish to utilize existing committees, such as the polio expert committee.
3. Develop and implement a comprehensive advocacy, communication and social mobilization strategy to increase the visibility of the measles elimination target in order to:

- Ensure political commitment towards measles elimination and mobilize necessary financial and technical resources.
- Engage partners, including the private sector, academic institutions and nongovernmental organizations, in resource and social mobilization and field implementation of measles elimination activities.
- Ensure the participation of non-Ministry of Health care providers, including the private sector, to all measles elimination activities, especially measles case-based surveillance.
- Raise community awareness on measles elimination and create community demand for vaccination.

4. In countries with measles vaccination coverage below the required level for elimination (at least 95% coverage with two doses of MCV at district level), strengthen routine vaccination services to achieve high coverage with the two doses of measles vaccines at the lowest administrative level.
5. In countries in need of measles follow-up supplementary immunization activities, mobilize the necessary resources (domestic and partners' resources) for the timely implementation of such activities.
6. Use epidemiological analysis of surveillance data at district level as the basis for decision-making on the target age group of supplementary immunization activities.
7. Ensure the quality of supplementary immunization activities through proper planning, optimum implementation, monitoring and supervision of the activities. Countries are

also urged to conduct post supplementary immunization activities coverage evaluation and implement mop-up activities where needed.

8. In countries reporting high coverage of routine measles vaccination, including those with low reported measles incidence and those experiencing frequent outbreaks/endemic, consider validating the measles vaccination coverage data using data quality self assessment and/or coverage evaluation surveys.
9. Strengthen measles case-based laboratory surveillance and achieve the required measles surveillance performance indicators at the district level. Countries reporting very low or zero incidence should strive for engaging non-Ministry of Health providers, including the private sector, school health programme, health insurance, military health service, etc, in case-based surveillance.
10. Use measles case definition of a clinically compatible measles case in the final classification of suspected measles cases.
11. Collect oral fluid in the case of difficulty in collecting blood samples for serology. To ensure accurate results, oral fluid should be collected as per the standard procedures.
12. Ensure specimens are collected for genotyping (urine, throat swab or oral fluid) from each suspected case and each chain of transmission of measles.
13. Share genotype information on circulating measles/rubella strains with the WHO genotype database/MeaNS within one month of the date of completion of genotyping.
14. Ensure that laboratories performing RT-PCR and sequencing use well-characterized assays with appropriate controls.
15. In GCC countries, discuss at subregional level the problems faced in measles/rubella/CRS elimination and to agree on coordinated action and cross-border response.

To WHO and partners

16. Conduct capacity-building workshops on measles surveillance performance indicators, taking into consideration the rapid turnover of EPI and surveillance staff.
17. Hold consultations on the best practices for engaging the private sector in immunization activities and on the best vaccination strategies to address cases under one year of age in countries moving towards elimination.
18. Develop a panel for sequencing and diagnostic RT-PCR and a quality control protocol for sequencing analysis.

Annex 1

PROGRAMME

Monday, 17 October 2011

08:00–09:00	Registration	
09:00–09:30	Opening session	
	Message from Dr Hussein A. Gezairy, Regional Director, WHO/EMRO	Dr J. Mahjour, DCD, WHO/EMRO
	Message from the Minister of Health, United Arab Emirates	
	Introduction of participants	
	Election of Chairman and adoption of agenda	
Session 1: Global and regional updates		
09:30–09:50	Global situation of measles	Dr A. Dabbagh, WHO/HQ
09:50–10:10	Update on SAGE recommendations/EB decision on establishing measles eradication goal and new measles targets/milestones	Dr H. Bashour, RTAG Member
10:10–10:30	Measles control/elimination in the Region: progress, challenges and opportunities	Dr N. Teleb, WHO/EMRO
10:30–11:00	Discussion	
Session 2: Progress in achieving and sustaining high population immunity against measles		
11:30–11:45	Measles population immunity in countries: strengths and gaps	Dr I. Chaudhri, WHO/EMRO
11:45–12:45	Measles outbreak in 2010–2011: underlying causes country response and future plans	Country representative
12:45–13:10	Discussion	
13:10–13:15	Orientation on the group work: progress towards achieving high population immunity	Dr N. Teleb, WHO/EMRO
14:15–17:00	Group work: review countries situation of measles population immunity	
17:00–17:30	Poster session: participants are kindly asked to review the posters and vote for the best 3 posters	

Tuesday, 18 October 2011

09:00–10:30	Group work: progress towards achieving high population immunity	
Session 3: Measles surveillance: towards achieving the target of measles surveillance performance indicators		
11:00–11:20	Measles surveillance in the Region: where we are from the targeted performance indicators?	Dr N. Musa, WHO/EMRO

11:20–11:35	Discussion	
11:35–11:55	Measles/rubella laboratory network: progress and challenges	Dr H. Ahmed, WHO/EMRO
11:55–12:15	Strengthening measles molecular epidemiology to validate measles elimination: experience of the American Region	Dr P. Rota, CDC Atlanta
12:15–12:30	Discussion	
12:30–13:00	Measles surveillance in countries Achieving strong measles surveillance in Iran Challenges facing strengthening measles surveillance in Pakistan	Country representatives
13:00–13:20	Discussion	
13:20–13:30	Introduction to group work: towards achieving the target of measles surveillance performance indicators	Dr H. Ahmed, WHO/EMRO
14:30–17:00	Group work: Group 1: Afghanistan, Pakistan, Group 2: Morocco, Somalia, South Sudan, Djibouti Group 3: Lebanon, Libya, Iraq, Yemen, Sudan Group 4: Bahrain, Oman, Qatar, Kuwait, Saudi Arabia, United Arab Emirates Group 5: Egypt, Jordan, Islamic Republic of Iran, Palestine, Syrian Arab Republic, Tunisia	
17:00–17:30	Poster session	

Wednesday, 19 October 2011

08:30–11:00	Group work presentation: towards achieving and validating measles elimination	

Session 4: Briefing on new development in procedures and molecular techniques for measles virologic surveillance

11:30–11:50	Regional molecular surveillance: gaps for improving surveillance and sharing information	Dr H. Triki, RRL, Tunisia
11:50–12:10	Quality control for molecular tests and reporting measles genotype sequence in WHO genotype data-base/means	Dr P. Rota, CDC Atlanta
12:10–12:40	Discussion	
12:40–13:00	2010 measles/rubella proficiency panel outcome and distribution of PTs serological and molecular assays	Dr H. Ahmed, WHO/EMRO
14:00	Closing session	

Annex 2

LIST OF PARTICIPANTS

AFGHANISTAN
Dr Agha Gul Dost
Manager, Expanded Programme on Immunization
Ministry of Public Health
Kabul

Dr Abdul Qader
Measles Surveillance Focal point
Ministry of Public Health
Kabul

Mr Fazal Afghan
Focal Point for Measles Laboratory
Ministry of Public Health
Kabul

Dr Ghulam Haidari Rafiqi
NITAG Chairperson
Programme Manager, Capacity Building of MOPH
Management Science for Health (MSH)
Ministry of Public Health
Kabul

BAHRAIN
Dr Jalilah Sayed Jawad Hasan
Manager, Expanded Programme on Immunization
Ministry of Health
Manama

Dr Fatma Shehab Mahmoud
Laboratory Surveillance Officer
Infection Control Disease
Ministry of Health
Manama

Ms Fathiya Ali Sataih
Laboratory Surveillance Officer
Public Health Laboratory
Ministry of Health
Manama

Ms Fatima Shehab
Surveillance Measles Technologist
Ministry of Health
Manama

DJIBOUTI
Mr Abdallah Ahmed Hade
Manager, Expanded Programme on Immunization
Ministry of Health
Djibouti

Mr Omar Youssouf Moutena
Measles Surveillance Officer
Directorate of Health Epidemiology and Information
Ministry of Health
Djibouti

EGYPT
Dr Ibrahim Moussa
Manager, Expanded Programme on Immunization
Ministry of Health and Population
Cairo

Dr Mounir Abdallah
Focal Person for Measles and Rubella Diseases
Ministry of Health and population
Cairo

Dr Sahar Mohamed Ragheb
Central Laboratory Measles Surveillance Officer
Ministry of Health and Population
Cairo

ISLAMIC REPUBLIC OF IRAN
Dr Seyed Mohsen Zahraei
Manager, Expanded Programme on Immunization
Ministry of Health and Medical Education
Teheran

Dr Rambod Soltanshahi
Senior Officer of Measles Programme
Ministry of Health and Medical Education
Teheran

Dr Talat Mokhtari Azad
Director of National Measles Laboratory
Teheran University of Medical Sciences
Ministry of Health and Medical Education
Teheran

Dr Bijan Sadrizadeh
Chairperson, National Validation Committee for Measles Elimination
Deputy NITAG Chairperson
Adviser to the Minister of Health and Medical Education
Ministry of Health and Medical Education
Teheran

IRAQ
Dr Nabil Ibrahim
National EPI Manger Assistant
Ministry of Health
Baghdad

Ms Ghada Ghaleb Flaieh Flaieh
Bacteriologist Specialist
Central Public Health Laboratory
Baghdad

JORDAN
Dr Mohammad RatibSrour
Manager, Expanded Programme on Immunization
Communicable Diseases Directorate
Ministry of Health
Amman

Dr Rafiq Abdel Rahman Eid Saleh
Head of Public Health Laboratories
Laboratories Directorate
Ministry of Health
Amman

Dr Najwa Khuri-Bulos
NITAG Chairperson
Dean of Academic Research
Jordan University Hospital
Amman

KUWAIT
Dr Musab Ibrahim El Saleh
Head of Communicable Disease Control Unit
Ministry of Public Health
Kuwait

Dr Siham Al Mufti
Public Health Laboratory Officer
Ministry of Public Health
Kuwait

LEBANON
Ms Randa Hamadeh
Manager, Expanded Programme on Immunization
Ministry of Public Health
Beirut

Mrs Nadine Haddad
Epidemiologist
National Measles Surveillance Officer
Epidemiology Surveillance Unit
Ministry of Public Health
Beirut

Dr Mona Kamal Al Buaini
Officer for Measles Laboratory Surveillance
Rafic Hariri Governmental Hospital
Ministry of Public Health
Beirut

MOROCCO
Dr Moncef Sidhom
Medical Officer
Epidemiological Surveillance Services
Ministry of Health
Rabat

Dr Latifa Tajounte
Biologist, Virology Laboratory
National Institute of Health
Ministry of Health
Rabat

OMAN
Dr Idris Al-Abaidani
Acting Director
Department of Communicable Diseases Surveillance and Control
Ministry of Health
Muscat

Mr Salem Said Ahmed Al-Mahrouqi
EPI Supervisor
Department of Communicable Disease Surveillance and Control
Ministry of Health
Muscat

Dr Said Al Baqlani
Virologist
Central Public Health Laboratories
Ministry of Health
Muscat

PAKISTAN
Dr Altaf Hussain Bosan
Manager, Expanded Pragramme on Immunization
Ministry of Inter Provincial Coordination
Islamabad

Mr Qadir Bux Abbasi
Monitoring and Evaluation Director, EPI
National Institute of Health
Ministry of Health
Islamabad

Dr Sardar Shabbir Ahmed
Provincial EPI Manager
Azad Jammu and Kashmir

Mr Mazhar Ali Khamisani
Project Director, EPI
Sindh
Karachi

Dr Arshad Iqbal Dar
Director, Health Services
Punjab
Lahore

Dr M. Yousaf Bizinjo
Provincial EPI Manager
Balochistan
Quetta

Dr Muhammad Raza
Director, Expanded Programme on Immunization
Gilgat-Baltistan
Gilgit

Dr Sahibzada Muhamad Khalid
Deputy Director,
Expanded Programme on Immunization
Directorate of Health Services, FATA
Peshawar

Dr Janbaz Afridi
Provincial Programme Manager
Expanded Programme on Immunization
Khyber-Pakhtunkhwa
Peshawar

Professor Tariq Iqbal Bhutta
NITAG Chairperson
Department of Pediatrics King Edward Medical Collage and Mayo Hospital Lahore
Chairman of the National Immunization Advisory Group
Lahore

PALESTINE
Dr Diaa Obeid Hjaija
Deputy, Preventive Medicine Department
Expanded Programme on Immunization
Ministry of Health
Ramallah

Ms Maha Abu Radaha
Officer for Measles Laboratory Surveillance
Ministry of Health
West Bank

Dr Amin Thalji
NITAG Chairperson
Palestinian Medical Council

QATAR
Dr Asma Al Nuaimi
Manager, Expanded Programme on Immunization
Department of Public Health
Supreme Council of Health
Doha

Dr Mohammad Ahmed Janahi
NITAG Chairperson
Chairman, Expert Committee on Immunization (ECI)
National Health Authority
Doha

SAUDI ARABIA
Dr Ahmed Bin Abdullah Kholedi
Director, Infectious Disease Directorate
Expanded Programme on Immunization
Ministry of Health
Riyadh

Mr Mughram Mohamed Alamrey
Director, National Polio Laboratory
Ministry of Health
Riyadh

SOMALIA
Dr Mohamed Abdurrrahman Mohamed
Manager, Expanded Programme on Immunization
Ministry of Health
Hargeisa

Dr Omar Ali Hassan
Focal Person
Measles Surveillance Laboratory
Ministry of Health
Hargeisa

Mr Abdi Hassan Duale
Officer, Expanded Programme on Immunization
Hergeisa

Mr Mohamed Abdillahi Omar
GAVI Subnational Immunization Advisor
Mogadishu

Ms Amina Mohamed
GAVI Immunization National Officer
Mogadishu

SUDAN
Dr Amani Abdel Moniem M. Mostafa
Manager, Expanded Programme on Immunization
Federal Ministry of Health
Khartoum

Dr Salma Abdullah AlHag
Measles Surveillance Officer
Federal Ministry of Health
Khartoum

Mrs Rehab Abdel Aziz Siddig
Officer of Measles Laboratory Surveillance
Federal Ministry of Health
Khartoum

Dr Mabyou Mustafa Abdelwahab
Professor of Pediatrics
NITAG Chairperson
Faculty of Medicine and Health Sciences
International University of Africa (I.U.A)
Khartoum

SOUTH SUDAN
Dr Anthony Stephen LakuKirbak
Manager, Expanded Programme on Immunization
Ministry of Health
Juba

Mr Luka Benson
Central Focal Point for Measles Surveillance
Ministry of Health
Juba

SYRIAN ARAB REPUBLIC
Dr Ahmed Abboud
Director of Primary Health Care
Ministry of Health
Damascus

Dr Nidal Abo Rhaid
Director, National Immunization Programme
Expanded Programme on Immunization
Ministry of Health
Damascus

Dr Mouna Al Khatib
Officer in Charge of Laboratory Surveillance
Ministry of Health
Damascus

Professor Hani Mourtada
NITAG Chairperson
Head, Pediatrics Association
Damascus

TUNISIA
Dr Essia Ben Farhat Hmida
Member, National Programme for Vaccination
Primary Health Care Department
Ministry of Public Health
Tunis

Professor Taher Sfar
Head, Children's University Hospital
Member, Technical Consultative Committee for Vaccination
Ministry of Public Health
Tunis

Professor Amine Faouzi Slim
Head, Referential Laboratory for Measles and Rubella at Charles Nicole
Ministry of Public Health
Tunis
Professor Souad Bousnina
Pediatric Professor and NITAG Chairperson
Child Hospital
Tunis

UNITED ARAB EMIRATES
Dr Mahmoud Fikri
Ministry of Health
Abu-Dhabi

Dr Ibrahim Al-Kady
Director, Preventive Medicine
Ministry of health
Abu-Dhabi

REGIONAL TECHNICAL ADVISORY GROUP (RTAG)

Dr Ali Jaffar Mohammed Suleiman
Senior Advisor, Directorate General of Health Affairs
Member of the Executive Board, Health Ministers' Council for Cooperation Council States
Ministry of Health
Muscat
OMAN

Dr Francis Mahoney*
Medical Epidemiologist
Ministry of Health
Jakarta
INDONESIA

Dr Steven Lee Cochi
Acting Director
Global Immunization Division
Centers for Disease Control and Prevention
Atlanta
UNITED STATES OF AMERICA

Professor Tahir Masood Ahmad*
Dean
The Children's University Hospital
Lahore
PAKISTAN

Dr Hyam Bashour
Professor and Chair
Department of Family and Community Medicine
Damascus University
Damascus
SYRIAN ARAB REPUBLIC

Dr Moncef Sidhom
Nabeul Mayor
Nabeul
TUNISIA

* Unable to attend

Dr Rana Hajjeh
Director, Division of Bacterial Diseases
National Center for Immunization and Respiratory Diseases
Centers for Disease Control and Prevention (CDC)
Atlanta
UNITED STATES OF AMERICA

Professor Naima El Mdaghri
Head of Microbiology Laboratories
Faculty of Medicine and Pharmacy
Casablanca
MOROCCO

Dr Amr Mohamed Kandeel
Chief of the Minister's of Health Cabinet
Ministry of Health and Population
Cairo
EGYPT

Dr Magid Yahya Algunaid
Deputy Minister for Primary Health Care
Ministry of Public Health and Population
Sana'a
YEMEN

Dr Ziad Memish
Undersecretary for Preventive Medicine
Ministry of Health
Riyadh
SAUDI ARABIA

Dr El Tayeb Ahmed El Sayed
Director General Public Health and Emergency
Federal Ministry of Health
Khartoum
SUDAN

OTHER ORGANIZATIONS

Centers for Disease Control and Prevention (CDC Atlanta)
Dr James P. Alexander
Medical Officer, Global Immunization Division
National Center for Immunizations and Respiratory Diseases
Atlanta
UNITED STATES OF AMERICA

Dr Paul Rota
Centers for Disease Control and Prevention
Atlanta
UNITED STATES OF AMERICA

Dr Derek T Ehrhardt
Epidemiologist
Disease Eradication and Elimination Branch
Global Immunization Division
National Center for Immunization and Respiratory Diseases
Atlanta
UNITED STATES OF AMERICA

Network for Education and Support in Immunization (NESI)
Dr Carine Dochez
Programme Manager
Department of Epidemiology and Social Medicine
University of Antwerp
Wilrijk
BELGIUM

United Nations Children's Fund (UNICEF)
Dr Edward Hoekstra
Senior Health Specialist
UNICEF Headquarters
New York
UNITED STATES OF AMERICA

Dr Haydar Omran Nasser
Regional Child Survival Specialist
UNICEF/MENARO
Amman
JORDAN

Dr Moktar Omar Ahmed
Child Survival and Development Specialist
UNICEF Djibouti

Dr Taha Al-Mula
UNICEF Iraq

Dr Azhar AbedRaza
Health Specialist
UNICEF Pakistan

Dr Ahmed Laabid
UNICEF Morocco

Dr Magdy Bayoumi
Chief, Health and Nutrition Section
UNICEF Sudan

Dr Arwa Baider
UNICEF Yemen

OBSERVERS

Dr Fatma Mohammed Sultan Alolama
Head of Child Health Care
Ministry of Health
Dubai

Dr Nada Hassan Al Marzooqi
Deputy Director of Preventive Medicine Department
Ministry of Health
Sharjah

Dr Joshi Jain Jyoti Joshi Jain
Specialist, Public Health
Preventive Medicine Department
Ministry of Health
Dubai

Dr Lubna Ali Al Shaali
Public Health Specialist
Dubai Health Authority
Sharjah

Dr Hisham Abdallah Al Khatib
Dubai Health Authority
Dubai

Mrs Suhad A. Aranky
Epidemiologist
Ministry of Health
Dubai

Dr Abbas Ragaa Yassin
Microbiologist and Screening Center
Abu Dhabi

Dr Ghada Yahia
Senior Regional Officer
Health Authority to Abu Dhabi
Abu Dhabi

WHO SECRETARIAT

Dr Jaouad Mahjour, Director, Communicable Disease Control, WHO/EMRO
Dr EzzeddineMohsni, Coordinator, Communicable Disease Control, WHO/EMRO
Dr Nadia Teleb, Regional Adviser, Vaccine Preventable Diseases and Immunization, WHO/EMRO
Dr Alya Dabbagh, Scientist, Expanded Programme on Immunization, WHO/HQ
Dr Hinda Jama Ahmed, Technical Officer, Laboratory Coordinator, Vaccine Preventable Diseases and Immunization, WHO/EMRO
Dr Irtaza Ahmad Chaudhri, Technical Officer (FSP), Vaccine Preventable Diseases and Immunization, WHO/EMRO
Dr Nasrin Musa, Technical Officer (Cold Chain), Vaccine Preventable Diseases and Immunization, WHO/EMRO
Mr Nahad Sadr-Azodi, Technical Officer (Measles), Vaccine Preventable Diseases and Immunization, WHO/EMRO
Mr Raef Bekhit, Technical Assistant (Data Management), Vaccine Preventable Diseases and Immunization, WHO/EMRO
Dr Abdul Shakoor Waciqi, National EPI Officer and GAVI Adviser, WHO Afghanistan
Dr Omer Mekki Ahmed, Medical Officer, Polio, WHO Iraq
Dr Ahmed Ali Darwish, Medical Officer, WHO Pakistan
Dr Assegid Kebede Tessema, Technical Officer/EPI, WHO Somalia
Dr Mulugeta Abraham Debesay, Team leader/Polio, WHO Somalia
Dr Yahia Mostafa Hassan, Team Leader, EPI/PEI, WHO South Sudan
Dr Aicha Al Jaber, Technical Officer, WHO Syrian Arab Republic
Dr Mohammed Osama Mere, Medical Officer, WHO Yemen
Dr Henda Triki, WHO Temporary Adviser
Dr Suleiman Al Busaidy, WHO Temporary Adviser
Dr Salah Al Awaidy, WHO Temporary Adviser
Mr Hossam Younes, Service Desk Administrator, Information Technology and Tele-communication, WHO/EMRO
Mrs Weam El Metenawy, Programme Assistant, Division of Communicable Disease Control. WHO/EMRO
Ms Ghada Oraby, Team Assistant, Communicable Disease Control, WHO/EMRO
Ms Sara Warda, Team Assistant, Division of Communicable Diseases, WHO/EMRO
Ms Mariam Soliman, Team Assistant, Division of Communicable Diseases, WHO/EMRO

Annex 3

RESULTS OF GROUP WORK

Table 1. Group 1 recommendations (Bahrain, Kuwait, Oman, Qatar and Saudi Arabia)

Population immunity key findings	Gaps	Action to be taken	Action to be taken for expatriate populations	Action to be taken for resident populations	Action to be taken by the Regional Office
Some countries are still experiencing measles outbreaks despite high measles vaccine coverage.	Influx of unvaccinated workers (all GCC). People coming for pilgrimage and some staying illegally (Saudi Arabia) or as tourists (all GCC countries). Less developed defaulter tracing system (Kuwait and Qatar). Unknown or weak review of vaccination status among high risk groups, e.g. military and police groups and college students. (Kuwait)	Vaccination coverage: surveys, DQA. More epidemiologic analysis: Coordination of EPI/laboratory. Catch-up campaigns: Multiple age cohorts (Qatar, Saudi Arabia, Kuwait). Outreach services for special populations: Kuwait.	Incoming expatriates. Mandatory vaccination regardless of vaccination status for residency visa. Option 1: on arrival. Option 2: in country of origin.	MR/MMR on renewal of residency visa. School/preschool vaccination. Special campaigns in schools with expatriates. Campaigns for adult populations based on epidemiology of disease.	Recommendations endorsed by the Regional Committee. Technical support for coverage surveys. Technical support for in-depth epidemiologic analysis.

Table 2. Group 2 recommendations (Egypt, Iraq, Jordan, occupied Palestinian territory, Syrian Arab Republic, Tunisia)

Country	Target	Current situation	Gaps	Action needed to improve and sustain immunity	Time-line for action					Support needed
					2011	2012	2013	2014	2015	
Egypt	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1 and MCV2 coverage 96.4% and 96.1% at national level respectively.	Some districts with coverage <95%. Private sector reporting and supervision. Trace defaulters.	Situation analysis for districts<95% and strengthen fever and rash surveillance.	Introduce active measles surveillance Advocacy	Achieved	Achieved	Achieved	Achieved	Training. Advocacy meetings. Validation of elimination (under processing). Surveillance should take first priority.
Jordan	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1 and MCV2 coverage 98% and 95% at national level respectively.	All districts must reach 95 % for MCV1, MCV2. High risk groups (gypsies and nomads) widely available.	Continuous training for health staff on RED approach. Developing IEC materials using immunity profile tool to monitor immunity.	Achieved	Achieved	Achieved	Achieved	Achieved	Validation of vaccination coverage. Training support
Occupied Palestinian territory	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	>95% for both MCV1 and 2	No gaps	Sustain high coverage rate in addition to strengthening surveillance.	Achieved	Achieved	Achieved	Achieved	Achieved	Technical support whenever necessary.
Iraq	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1 and 2 coverage are 89% and 91% respectively.	Unstable situation in some pockets. Low coverage in some districts. Population denominatorDelay in receiving vaccine.	Enhance routine coverage aided by cyclical campaigns targeting risk groups according to epidemiological results. Conduct national census in 2012. Collaboration with (KEMADIA) to ensure timely arrival of procured vaccines. Incorporate RED approach and DQS into the routine EPI. Measles Follow-up supplementary immunization activities	Follow-up campaign in 9 districts.	95% Introducti on of MCV2. Mop-up campaign.	95%	Achieved	Achieved	Technical support. Financial support for outbreak response and mop up in high risk areas. Early release of funds for supplementary immunization activities. High risk group vaccination.
Syrian Arab Republic	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through	> 98% for both MCV1 and 2 at national level.	Difficult in reaching some areas. Lack of awareness in	RED approach. Vaccination week. Support mobile teams Surveillance.	Mopping up in high-risk districts	Achieved	Achieved	Achieved	Achieved	Technical support and training for health workers.

	different strategies. Incidence of measles 2010= (0), 2011=(0)		some areas. Moving from urban to rural areas. Surveillance Poor coordination with private sector.	Activation of the notification in low notifying areas Training of surveillance team. Active surveillance. Seminars for private sector physicians.						
Tunisia	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	97% and 95% for MCV1 and 2 at the national level.	Importation of measles cases by tourists.	NITAG meeting revised vaccination policy. Evaluation of national measles strategy. Increase in number of health facilities that submit vaccine in addition to decreased fertility rate. Sustain high coverage rate in all districts.		Achieved	Achieved	Achieved	Achieved	Financial support to edit guidelines on validation of measles elimination. Technical and financial support to conduct lot quality assurance survey and DQS to conduct a sero survey for children <5. Conducting a global review of measles and rubella strategy.

Table 3. Group 3 recommendations (Islamic Republic of Iran, Lebanon, Morocco, Sudan)

Country	Target	Population immunity performance	Gaps	Action to be taken to improve immunity	Time line for action					Support needed
					2011	2012	2013	2014	2015	
Lebanon	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies	2010, MCV1 and MCV2 coverage are 95% and 89% respectively.	Variable coverage at district level, while national is 95%, there are districts with less than 50%. Neither private sector reporting nor defaulter tracing system in place. Under reporting affects the supply chain. Remote areas (difficult access) with no health facility High influx of refugees from the neighbouring countries	Private and public reporting. Update and integrate information system within primary health care and distributor centres. Defaulter system. Activation of NITAG. Capacity-building for staff on vaccination. Establish immunization measles validation committee. Local catch-up campaigns. Sustain role of media. Adopt RED approach.	RED approach in low coverage districts.	Catch-up camp to maintain MCV2 > 90%. Increase coverage of RED approach among other districts.	Sustain MCV1, 2 > 90%	Sustain MCV12 > 95%	Sustain MCV2 > 95%	Political support. Technical support. Validation of elimination committee. Financial support. Coordination between related ministries.
Morocco	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies	MCV1, 9 months, 75% MR, variable coverage at district levels. Catch-up campaign MR 9 months–15 years, 2008, 99%. Rubella catch-up, 15–24 (only female), coverage, 83%.	Rural districts with difficult access. Measles among elderly group (how to vaccinate?). Quality of campaign. Surveillance. Poor surveillance in private sector.	Vaccination coverage review. EPI review. Data analysis. Strengthen national immunization committee. Measles catch-up campaign (5-m-15years). Revise MCV policy and adopt 12–18 months. Improve data quality/denominator. Strengthen routine immunization coverage. Check at school entry for MCV2 vaccination and vaccinate. Surveillance. Introduce and improve case-based surveillance in private health centres.	EPI review	95% MCV1 coverage.				Technical assistance for EPI review.

Islamic Republic of Iran	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1 and MCV2 coverage are 99%, and 99% nationally respectively. Incidence of measles 2010= (7.2), 2011= (3.2).	Conflict areas. Social barriers. Health services 60%. Rural outreach area and migrant people (internally and movement population to eastern boundaries). High number of clinical cases. Lack of sampling 10%. Low reporting in private sector. Inappropriate distribution of reporting by districts externally.	Conducting community awareness programme. Social mobilization. Orientation for health workers. Reduce drop out (missed opportunity). Enhance NITAG.	Mop-up in high-risk areas. Development of classification committee. Use of oral fluid sampling. Training for physicians and health workers in all districts. Supervising surveillance system. Education and communication areas.	Follow-up campaign				Technical assistance. Financial support for campaigns.
Sudan	95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1 and MCV2 coverage are 86%, and 99% nationally respectively. Pocket of susceptible still exist.	Delay funding for follow-up campaign. Insecurity and massive population movement. GAVI Phasing out. MCV1 less than the target for elimination.88% of localities achieve less than 95%. Insecurity and conflict areas. Open borders with neighbouring countries and importation of cases. Pockets of susceptibility.	Acceleration of routine coverage after rainy season. Mop up in risk location. Strengthen RED approach. Introduce second dose routine. Follow-up campaign. Sustained outreach activities. Enhancing defaulter tracing activities. Increase people demand to measles vaccination by using the mass media and interpersonal communication. Resource mobilization (advocacy/partners).	RED strategy implemented in 5 districts and in low coverage areas.	Implement RED in 10 districts. Support of NGOs and mobile clinics.	Follow-up campaign MCV1: 93%, 87% of local reach 95%.	Follow-up campaign. MCV1: 95%, 95% of local reach 95%.	Achieve and maintain MCV1: 95%, 100% of local reach 95%.	Financial support for campaign. Support for the second dose. Social mobilization. Technical support.

Table 4. Group 4 recommendations (Afghanistan, Djibouti, Pakistan, Somalia, South Sudan)

Country	Target	Current situation 2010	Gaps	Action to be taken	Time line for action					Support needed
					2011	2012	2013	2014	2015	
Afghanistan	Achieve 95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1: 79%. MCV2: 45%- District > 90%: 79 districts District 80%–90%: 81 Districts < 50%: 38 Districts with no coverage: 9	Insecurity. Low BPHS coverage (75%–80% are in secure areas).	Categorize secure/insecure area Categorize low/high performing districts Strategy for MCV1: RED microplan. Coordination with nongovernmental organization for outreach and mobility. Immunization weeks: advocacy, awareness and acceleration. Expansion of health sub centres. New package of IMCI (with UNICEF). About 2 million nomads/IDPs need special approach. Strategy for MCV2: TT supplementary immunization activities + measles. Outbreak response. CHW+M 9–59M. Selective mop-up in draught-affected areas and with repeated outbreaks for last 3 years.		MCV1: 90% in secure areas. 85% in all districts in secure areas. MCV2 95% coverage>90% in all districts.		95% nationally. 90% for all districts.		
Djibouti	Achieve 95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies	MCV1: 85% MCV2, NA All districts > 80%	Problem of high population mobility and cross border. Access to health care. Issues related to health education and caregivers. Surveillance. Case-based surveillance with weekly reporting not exhaustive.	Follow-up campaign (9–59m). Strengthen routine immunization. Utilize missed opportunities of health facilities. Check MCV-2 at school entry. RED + acceleration. MCV2: planned for 2011 at 15m. Surveillance. Sample collection logistics to integrate with polio.		MCV1: 90% in all towns. 85% in all districts.		95% Djibouti. 90 in all districts.		

			Laboratory is available and accredited. Problems of sample collection in far areas. Two outbreaks in 2011, laboratory confirmed but no virologic detection. Indicators seem okay but need verification. To expand reporting sites from 21 to 46 (100%).	To improve community awareness to reach nomads using community health workers. Improving communication with community focal persons (mobile phone support in collaboration with UNICEF).						
Pakistan	Achieve 95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1: 80%, MCV2: 30%. 93 (out of 135) districts with 91% of population 64 districts (out of 93) already achieved =>95% MCV1 coverage. 14 districts (out of 93) achieved =>95% MCV2 coverage.	Devolution of Ministry of Health. Aftermath of 2010 and 2011 floods. Stock outs (break in financial flow after devolution). Measles and MNTe partially implemented. Non availability of vaccines and operational funds. Increased number of polio supplementary immunization activities. Limited access due to flood and security. Ownership and management issues. Limited coordination between federal and provincial levels as well as International partners. Uncoordinated supplementary immunization activities. Weak supervision and monitoring.	Scaling up implementation of RED strategy. Shifting focus to union councils. Micro-plans tuned to adjust supplementary immunization activities. Conduct outreach activities in accordance with micro-plan. Improve supervision and monitoring-at every levels. Strong advocacy for routine immunization. Polio teams should be involved in routine immunization (TORs changed). Demand creation – integrated communication strategy. Improve social mobilization activities to propagate advantages of immunization. Data quality issues to be addressed at all levels. Increasing focus on supervision to improve supplementary immunization activities quality and timely release of funds by the government.	Conduct measles supplementary immunization activities. Refresher training (vaccinators, mid-level managers and supplementary immunization activities staff).					

Somalia	To achieve 95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1: 68 MCV2: NA District unavailable	Immunity gap. Security. Access. Rejection by AS Foci of refusal	North: 100%RED. Central/South: Start RED. All: Consider increasing age group to 10–15. Follow up through child health days (CHDs). Look into quality of CHD data.	MCV1: 68%	MCV1: 85%	MCV1: 90%	MCV1: 90%		
South Sudan	Achieve 95% coverage of MCV1 and MCV2 in 95% of districts by 2015 through different strategies.	MCV1: 75% MCV2: NA	Immunity gap still exists. Surveillance. Surveillance aggregate. Surveillance system. Measles laboratory not available so far in some regions.	MCV1: Expand RED to remaining districts. Child survival initiative: January–April. MCV2: Follow-up campaign for all children born after 2005 needed. Campaign should be conducted no later than 2012. Complete the ongoing follow-up campaign (9–59 months) Improve data quality/denominator issue. Strengthen routine immunization coverage (strengthen MCV1–9 months to reach 90%. Utilize missed opportunities at health facilities. Continue using polio infrastructure. Solicit funding. Surveillance. Strengthen measles case-based surveillance. Include in integrated disease surveillance and response. Started line listing and case-based surveillance for some other sites. In the process of establishing measles in Juba in 2012.		MCV1: 95% MCV2: in 2012 for 90% coverage.				