

## AN ONGOING MEASLES OUTBREAK IN BULGARIA, 2009

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After seven years without indigenous transmission of measles in Bulgaria, an increasing number of cases have been reported since 15 April 2009. By 19 June, the total number of notifications reached 84. To date, 64 were confirmed as measles cases and 15 cases, for whom laboratory results are pending, have been classified as probable. The present measles outbreak affects mostly the Roma population living in the north-eastern part of the country. The most affected age groups are young children below 1 year of age and children 1 to 9 years of age. An immunisation campaign was started in the affected administrative regions, targeting all persons from 13 months to 30 years of age who had not received the complete two-dose MMR vaccination.

### Introduction

Measles has been a notifiable disease in Bulgaria since 1921. National case-based notification was initiated in 2004 and the European Union (EU) case definition and case classification have

been adopted since 2005 [1,2]. The Bulgarian National program for elimination of measles and congenital rubella infection (2005-2010) was approved by the Council of Ministries of Republic of Bulgaria in 2005 [3].

Measles immunisation was introduced in Bulgaria in 1969 [4] and in 1972 it became universal. Until 1982 the routine vaccination included one dose measles vaccine administered at  $\geq 10$  months of age. During the period 1983-1992 a two-dose schedule using monovalent measles vaccine was applied, firstly at 12 months and 4 years of age, and later at 12 and 24 months of age. In 1993, the measles, mumps, rubella (MMR) vaccine was introduced into the national vaccination schedule. Until 2000, the routine measles immunisation consisted of the first dose with MMR vaccine given at 13 months of age and the second dose with monovalent measles vaccine at 12 years of age. Since 2001 a routine two-dose immunisation with MMR vaccine has been implemented, administered at 13 months and 12 years of age. According to the official data, collected by the National Center of Health Information, the vaccine coverage in Bulgaria with MMR is high (Table).

The last indigenous cases of measles in Bulgaria were reported in 2001 [5]. From 2002 to 2008 only six measles cases have been registered, all of them imported: three from China (2005); one from Ukraine (2006); one from Germany (2007) and one from United Kingdom (2008) [6,7].

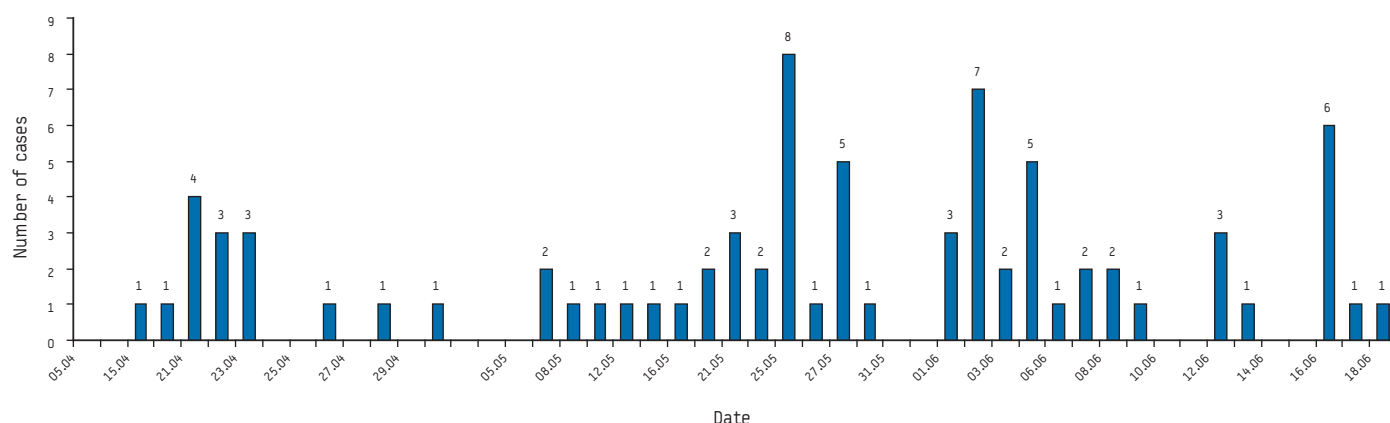
TABLE

National immunisation coverage with measles, mumps, rubella (MMR) vaccine, Bulgaria, 2005-2008

MMR dose	2005	2006	2007	2008
First dose (13 months)	96.2%	95.7%	96.0%	95.9%
Second dose (12 years)	92.4%	93.3%	94.0%	94.3%

FIGURE 1

Number of probable and confirmed measles cases reported in Bulgaria between 15 April and 19 June 2009, by date of notification (n=79)



### Outbreak description

After seven years without indigenous transmission of measles in Bulgaria, an increasing number of cases have been reported since 15 April 2009 (Figure 1).

By 19 June, the total number of notifications reached 84. Of these, five were discarded (one patient who presented with a rash 10 days after MMR vaccination was considered as a case of adverse events following immunisation (AEFI), and four suspected cases tested IgM-negative). Of the remaining 79, to date, 64 were confirmed as measles cases (61 laboratory-confirmed by the National Reference Laboratory for Measles, Mumps and Rubella in Sofia, and three having clinical symptoms and an epidemiological link with laboratory-confirmed cases); the remaining 15 cases for whom laboratory results are pending, have been classified as probable.

The epidemiological investigation demonstrated that the index case was imported in March from Germany. The patient, a 24-year-old man, became ill on 12 March, four days after arrival from Hamburg, where he works. The initial symptoms included high fever, cough, runny nose, malaise and rash, developed three days later. The clinical presentation was compatible with measles and fulfilled the clinical criteria of measles. The patient was not hospitalised but consulted an infectious diseases specialist. A serum sample was tested and the case was classified as confirmed by the National Reference Laboratory and notified as an imported case (included in Figure 1).

The subsequent three measles cases occurred among his close contacts (family members). They were laboratory-confirmed by the National Reference Laboratory in Sofia. The samples were then sent to the WHO Regional Reference Laboratory (RRL) for Measles and Rubella in Berlin for reconfirmation and measles virus (MV) genotyping. The nucleotide sequences of the variable part of measles virus N gene (450 nt) derived from these three cases were identical and classified as genotype D4. Their sequence is represented by the official WHO name MVs/Shumen.BGR/15.09/1(D4). Later on samples collected from four further cases in epi-week 21 were sent to the RRL Berlin. The sequences derived from these cases (represented by MVs/Silistra.BGR/21.09/1[D4]) were identical

to MVs/Shumen.BGR/15.09/1[D4] demonstrating that the seven analysed cases belonged to a single chain of MV transmission. The same genetic variant of MV was previously detected during an outbreak observed between January and June 2009 in northern Germany. This confirms the assumption that the Bulgarian index case was imported from Hamburg. Outbreaks due to the introduction of imported MV (D6, D4 and B3) into the hard-to-reach populations were recently reported also from other European countries [8]. The strain name MVs/Shumen.BUL/15.09(D4) was included in the WHO/EURO CISID database. [Information in this paragraph was kindly provided by Dr Annette Mankertz and Dr Sabine Santibanez from the Robert Koch-Institut, Berlin, Germany].\*

All 78 cases following the index case occurred as a result of local transmission and were shown to be epidemiologically linked.

The present measles outbreak affects mostly the Roma population living in the north-eastern part of the country – in Razgrad, Shumen, Silistra and Dobrich regions (Figure 2). This population is characterised by large families living together and frequently moving from one place to another, looking for seasonal work in Bulgaria as well as abroad. Until now, several family clusters have been registered among this group.

The outbreak affects both genders almost equally, with male to female ratio 30/49. The most affected age groups are young children below 1 year of age (non-immunised because of the young age) and children 1 to 9 years of age, who are eligible to immunisation.

Because of the crowded households and poor living conditions of affected Roma families a large proportion of cases (51 of 79, 64.5%) were hospitalised. Complications were observed in 46.8% of cases (37/79): 33 cases developed pneumonia and four cases had abdominal disorders with diarrhea and acute abdominal pain.

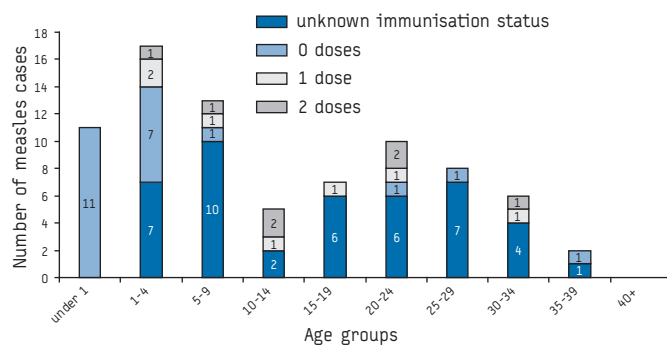
The immunisation status of all reported 79 measles cases is shown in Figure 3.

Considering the age of cases, 68 of the total of 79 measles cases should have been immunised with at least one dose of measles vaccine. However, in the majority of cases (n=43, 54.4%) the vaccination status was unknown because of the lack of documentation. Twenty-two cases were known not to have been vaccinated (including 11 below the age of one year). Only seven cases (10.3%) have received one dose and another seven (10.3%)

**FIGURE 2**  
Measles cases spread by regions, Bulgaria, April-June 2009 (n=79)



**FIGURE 3**  
Distribution of reported measles cases by immunisation status and age group, Bulgaria, April-June 2009 (n=79)



both doses of the measles vaccine. Of note is that among those immunised with two doses, three cases received the second dose during the catch-up campaign organised in response to the outbreak in May 2009, and it is most likely that they were harbouring a measles infection in the incubation period during that time, because soon after the immunisation, they fell ill with measles.

### Control measures

The outbreak and the investigations are still ongoing, and therefore the data presented are preliminary. The public health authorities expect more cases to occur, especially among the Roma population.

The control measures are in progress: the Bulgarian Ministry of Health issued a press release regarding the situation and future immunisation and surveillance activities. General practitioners and other medical staff were requested to pay special attention to rash/fever symptoms and to strengthen routine immunisation of children aged 13 months (first dose) and 12 years (second dose) by directly reaching the parents and explaining the benefits of vaccination.

An immunisation campaign was started on 27 April in the affected administrative regions, targeting all persons from 13 months to 30 years of age who had not received the complete two-dose MMR vaccination. The MMR vaccine is supplied by the Ministry of Health and is offered free of charge through the routine immunisation services (family doctors) and special outreach teams. These supplementary immunisation activities are still ongoing.

### Discussion and conclusions

Despite the high national immunisation coverage with MMR vaccine, the current measles outbreak clearly demonstrates the existence of pockets of non-immunised population, here specifically the Roma population. A quick risk assessment made by the epidemiologists investigating the outbreak concluded that the minority groups and living in closed communities as described above are at higher risk of measles infection and should be offered a supplementary measles immunisation.

In recent years, similar outbreaks, affecting unvaccinated groups, have been reported in a number of European countries, however, it seemed that the epidemic did not spread to the eastern part of Europe. During 2008, a total of 7,821 measles cases were reported to the EUVAC.NET, and most of them (90%) were from six countries: Switzerland, Italy, the United Kingdom, Germany, France and Austria [9-12].

### Acknowledgements

We thank Dr Annette Mankertz and Dr Sabine Santibanez (Robert Koch-Institut, Berlin, Germany) for the prompt investigation and identification of the origin of Bulgarian measles strains. We thank all colleagues from the Bulgarian regional inspectorates for public health prevention and control in Razgrad, Shumen, Silistra and Dobrich for providing essential epidemiological data.

#### \*Authors' correction:

On request of the authors, the paragraph on genotyping results was modified and a figure was deleted from the article after the publication. This change was made on 9 July 2009.

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This article was published on 2 July 2009.

Citation style for this article: Marinova L, Kojouharova M, Mihneva Z. An ongoing measles outbreak in Bulgaria, 2009. Euro Surveill. 2009;14(26):pii=19259. Available online: <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19259>