

# Spotlight on measles 2010: Preliminary report of an ongoing measles outbreak in a subpopulation with low vaccination coverage in Berlin, Germany, January-March 2010

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Since early January 2010, Berlin has been experiencing a measles outbreak with 62 cases as of 31 March. The index case acquired the infection in India. In recent years, measles incidence in Berlin has been lower than the German average and vaccination coverage in school children has increased since 2001. However, this outbreak involves schools and kindergartens with low vaccination coverage and parents with critical attitudes towards vaccination, which makes the implementation of public health interventions challenging.

## Background

Since the implementation of the new national Protection Against Infection Act (Infektionsschutzgesetz; IfSG) in Germany in 2001, clinically suspected measles cases as well as laboratory confirmation for measles has to be reported to the District Health Offices [1]. The District Health Office evaluates the information according to the case definition for measles [2] and enters case-based data into the electronic reporting system. Since 2001, the number of measles cases and the annual measles incidences in Berlin have been low compared with the national average. The highest annual number of measles cases in Berlin was reported in 2006 (n=57). The annual incidences ranged from 0.06 to 1.51 cases per 100,000 inhabitants in Berlin compared with 0.15 and 7.32 per 100,000 country-wide (Table) [3]. The measles vaccination coverage in children at school entrance examination has increased significantly during the past years. In 2001, 91.2% of children presented with at least one measles vaccination at school entry and only 24.0% had two vaccinations [4]. In 2008, 95.2% were vaccinated once and 88.2% twice against measles [5]. In the neighbouring Federal State of Brandenburg the

vaccination coverage is significantly higher: 93.4% of children had two measles vaccinations at school entry in 2008 [6]. Despite these efforts, a measles outbreak with so far 62 cases was observed in Berlin between early January and 31 March 2010.

## Outbreak description

The index case of this outbreak, a secondary school student from Berlin was diagnosed on 5 January 2010. The patient was not vaccinated against measles and the medical history pointed to travel-related acquisition of the infection, since he had travelled to India at the end of 2009. The diagnosis was laboratory-confirmed on 14 January 2010 and the result was reported to the responsible District Health Office on 15 January 2010. Since samples of the index case were not available, PCR was performed at the National Reference Centre for Measles, Mumps and Rubella at the Robert Koch-Institute (RKI) on a sample of a related case diagnosed on 19 January 2010. This analysis confirmed measles virus genotype D8 (MVs/Berlin.DEU/03.10) which is identical to viruses endemic in India (MVs/Imphal.IND/19.09) and therefore supported introduction from the Indian subcontinent. To date, genotyping revealed measles virus genotype D8 in 13 cases. However, genotyping is not yet completed for all cases. There is evidence that some of the measles cases currently observed in Berlin are not linked to the outbreak. These infections might be concurrently imported from other regions (e.g. Bulgaria, South Africa). Epidemiological and laboratory investigations are ongoing to clarify the situation thoroughly.

As of week 12, 2010, the total number of cases has reached 62. So far, the outbreak has affected 52 residents living in four of the twelve Districts of Berlin (Figure 1) and 10 residents of the surrounding Federal State of Brandenburg. The number of cases per week related to the outbreak is shown in Figure 2. The index patient is attending a private school (Waldorf-Schule; anthroposophic education). The proportion of students vaccinated against measles in this school is estimated to be significantly below 70%. Parents sending their children to Waldorf schools and kindergartens are known for their critical attitudes towards vaccinations in general and especially with regards to measles vaccination. Thus, the outbreak spread mainly among unvaccinated children and adolescents attending Waldorf institutions (schools and kindergartens in two districts) and their siblings. In addition, children and adolescents attending public schools and kindergartens were exposed and infected via direct contacts with Waldorf students and their families. None of the reported cases had been vaccinated against measles before being exposed during this outbreak (some children received an active post-exposure vaccination). All measles cases resident in Brandenburg were students attending schools in Berlin or unvaccinated siblings of such students. No measles transmission was observed in schools and kindergartens in this Federal State. The mean age of the cases was 10.5 years (range: 1-18 years). To date, there have not been any reports of hospitalisations or complications due to measles infections in connection with this outbreak.

### Public health intervention and challenges

After diagnosis of the index case in early January the responsible District Health Offices implemented public health interventions according to the Protection Against Infection Act to interrupt the spread of measles. The measures included:

- Temporary exclusion of students and teachers without measles vaccination or naturally acquired

immunity from schools with confirmed measles cases;

- Offering measles vaccination for unvaccinated students and teachers in affected schools (vaccinations in collaboration with private practitioners);
- Equivalent measures in kindergartens with measles cases;
- Active detection of contacts and exposed persons;
- Sampling of clinical material from measles patients to confirm diagnosis and perform genotyping at the National Reference Centre for Measles, Mumps and Rubella;
- Recommendation of temporary restrictions of private contacts with unprotected persons and of any public activities in groups for patients and their unvaccinated family members;
- Public health information to increase regional clinicians' alertness regarding measles in their area;
- Enhanced communication with educational institutions and parents with critical attitudes towards vaccination of the children.

These measures showed some success. The peak of the outbreak was seen in the week 5, 2010 (n=17), with decreasing case numbers in the following weeks. However, only few of the offered measles vaccinations were accepted (numbers are currently not available because the exposed unvaccinated children were sent to private practitioners for measles vaccinations). Four students developed measles after receiving a post-exposure measles vaccination (vaccination 4–5 days after the last contact). This observation underlines the importance to apply active vaccination earlier after exposure (preferably within three days after first exposure); furthermore passive vaccination with the specific immunoglobulin should be considered for effective individual post-exposure measles prevention. After the initial peak, the outbreak continued to spread on a relatively low level, and the first case in a district not directly neighbouring the district of residence of the index case occurred at the end of week 11 (Figure 1). Currently most concern is directed towards a

### TABLE

Number of reported measles cases, measles incidence and measles vaccine coverage at school entry examination in the Federal State of Berlin and in Germany 2001–2008

	Case reports				Vaccination coverage	
	Berlin		Germany		1st/2nd dose (%)	Germany 1st/2nd dose (%)
	n	n/100,000	n	n/100,000		
2001	51	1.51	6,037	7.32	91.2 / 24.0	91.4 / 25.9
2002	24	0.71	4,656	5.64	not available	91.3 / 33.1
2003	2	0.06	777	0.94	not available	92.5 / 50.9
2004	11	0.32	123	0.15	93.4 / 71.7	93.3 / 65.7
2005	39	1.15	781	0.95	93.5 / 78.8	94.0 / 76.6
2006	57	1.67	2,308	2.80	93.8 / 83.6	94.5 / 83.2
2007	8	0.23	566	0.69	94.5 / 86.8	95.4 / 88.4
2008	29	0.85	916	1.11	95.2 / 88.2	95.9 / 91.3

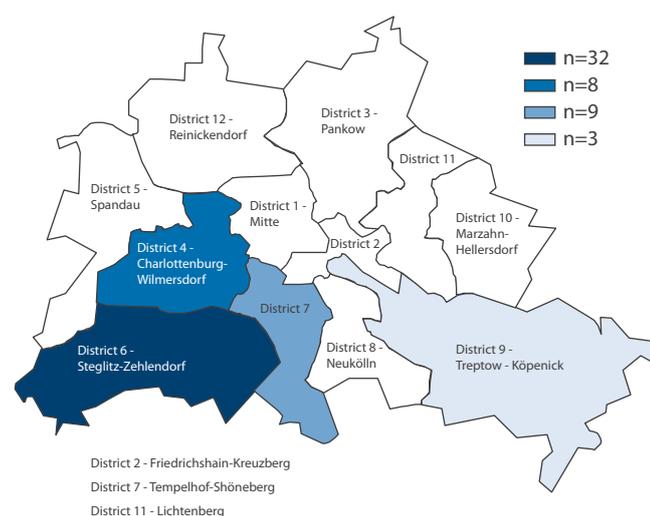
Source: [3-5].

Waldorf kindergarten in a neighbouring district with a measles vaccination coverage of less than 60%.

In early February, parents whose children were affected by the temporary school exclusion filed an action against the respective District Health Office at the

**FIGURE 1**

Measles outbreak, cases by district, Berlin, 5 January–31 March 2010 (n=52)



Berlin Administration Court. The claim argued that the health authority's decision impeded the unvaccinated children's rights to visit school and to acquire immunity against measles through natural infection. Measles was claimed to be a harmless infection in children without severe complications and possible long-term disabilities. The specific vaccination against measles was perceived to be inefficient and dangerous. However, in mid-February the Berlin Administrative Court decided to dismiss the claim and declared that the measures taken by the public health authorities had been adequate to contain the outbreak. However, further claims are pending at the Berlin High Administrative Court.

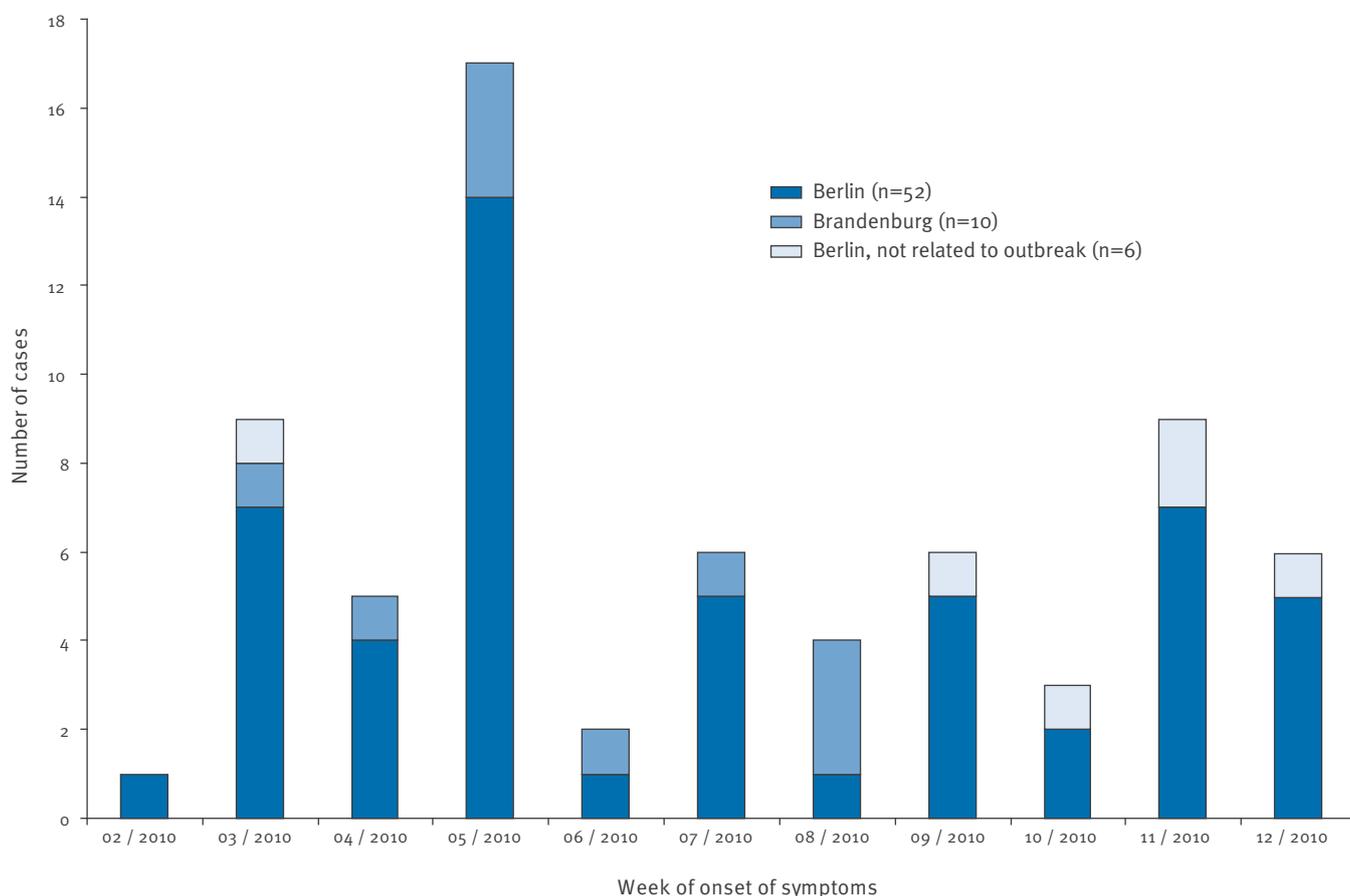
For now, parents must be aware that their unvaccinated children can acquire the infection while travelling in regions with endemic measles or ongoing measles outbreaks. Physicians should be encouraged to focus on parents with unvaccinated children and strongly recommend active measles vaccination before travelling.

### Conclusion

We give a preliminary overview of a measles outbreak in Berlin. There is epidemiological and laboratory-confirmed evidence that the index case acquired the infection when travelling in India. The outbreak affected unvaccinated children and adolescents whose parents

**FIGURE 2**

Measles outbreak, cases by week of onset of symptoms and place of residence including reported cases from week 2 to 12 2010 (n=62 outbreak-related cases, n=6 cases not related with the outbreak)



are known to have critical attitudes towards measles vaccination. Although vaccination coverage in Berlin has increased significantly in general, measles transmission chains can still be established in schools and kindergartens with high proportions of unvaccinated children. Public health authorities were extremely challenged in this situation because the measures taken according to infectious disease protection legislation were not generally accepted by the parents. Thus measles could be re-introduced and continue to spread on a low level within the unvaccinated parts of the population in Berlin for a not clearly foreseeable time.

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