

## Estimating the coverage of MMR vaccine in English secondary school-children in 2013

### Background

Measles vaccine was introduced into the UK routine immunisation schedule in 1968. This was replaced in 1988 by a single dose of MMR vaccine offered to children around 15 months of age. In November 1994, a combined measles-rubella (MR) vaccine was offered to all school children aged 5-16 years and in 1996, a second dose of MMR was added to the routine vaccination schedule at around 4 years of age.

### Vaccine coverage collection

In England, vaccine coverage data has been collected through the COVER (Cover of Vaccination Evaluated Rapidly) programme since 1987 and was introduced to provide a rapid feedback mechanism of vaccine coverage data to local public health teams, ensuring timely interventions could take place. In addition to collecting and publishing quarterly data on vaccine coverage at the local, regional and national level, HPA, now Public Health England (PHE) is also responsible for collecting annual coverage data by fiscal year which is published by the Health and Social Care Information Centre (HSCIC). Due to the numerous NHS reorganisations in England, from the abolition of Health Authorities in 2002 to the reconfiguration of Primary Care Trusts in 2006, coverage data at local level has been reported according to different geographical boundaries, making historical comparisons of local and regional data challenging.

### Calculation of MMR vaccine coverage

MMR vaccine coverage is evaluated for all children at 24 months and five years of age. In England there is no assessment of vaccine coverage beyond this age. Since 2003, HPA (now PHE) has collected information on a quarterly basis for all children in the PCT responsible population<sup>1</sup> who reach their second and fifth birthdays during a particular evaluation quarter (year). A quarterly (annual) request is made to each PCT Child Health department to provide computerised reports for the number of eligible children in each cohort and the numbers and proportion vaccinated for the first dose coverage (MMR1) at 24 months and for the first and second dose of MMR (MMR1 and MMR2) at five years.

### Trends in MMR coverage

Coverage of single measles vaccine was initially poor, and had only reached around 80% in 1988 when MMR vaccine was introduced. Coverage rapidly increased and by 1992 MMR coverage at 24 months had reached 92% which was sustained for the next 4-5 years. After the 1994 MR school campaign, which achieved a coverage of 92%, endemic transmission of measles was interrupted. From 1997/8 vaccine coverage of MMR fell reaching a low of around 80% for MMR1 at 2 years. As many children continued to receive MMR at a delayed age, however, coverage by five years of age only fell to around 85%. (figure 1). Coverage of the second dose at this age, however, was poor at around 75%.

Although coverage for two year olds has been recovering since 2005, in 2008, concern was raised about these cohorts of older children who may have not been fully vaccinated in the earlier part of the decade. A national catch-up campaign was therefore launched in 2008, offering MMR to any individuals less than 18 years of age who had received none or only one dose of MMR. The impact of this campaign is not known as no coverage assessment over five years is routinely conducted. Since then, routine coverage in England at 2 and 5 years has continued to improve and is currently at

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<sup>1</sup> Registered with a general practice in that PCT or unregistered but resident within the PCT

historically high levels (October to December 2012 quarter evaluation recorded 92.4% for MMR1 at 24 months; 94.1% for MMR1 at 5 years and 88.1% for MMR2 at 5 years).

### **Conclusion**

Based on analysis of coverage data, and supported by the current epidemiology of measles, protection for children up to 10 years of age is likely to be fairly high. The levels of immunity required to prevent transmission in primary school is lower than for secondary school, because of the school size and mixing patterns (1). The priority is therefore to increase uptake in secondary school age children.

MMR coverage for children currently aged 10 to 16 years is likely to remain sub-optimal and it is this group where current outbreaks are being experienced. Unvaccinated children in this age group should be the primary target group for any catch-up campaigns. Given that a single dose of MMR provides 95% protection against measles, children who require a second dose are a lower priority.

1: Gay NJ. The theory of measles elimination: implications for the design of elimination strategies. *J Infect Dis.* 2004 May 1;189 Suppl 1:S27-35.

## Information for planning

PHE has constructed a “Ready Reckoner 2013” spreadsheet to estimate the number of 10-16 year old children that are unvaccinated in each area team, based on historic coverage collected from three different NHS configurations. Data has been corrected for known under-reporting and to allow for some catch-up vaccination, in 2008 or in any recent outbreaks. The adjustment chosen has been based on an audit of data quality in 12 London PCTs in 2001 which suggested that around 24% (201/836) of children recorded as unvaccinated for MMR at five years of age had received at least one dose of vaccine. Allowing for additional vaccination as part of catch-up programmes and outbreak response this adjustment has been increased to 30% - a higher figure (50%) is used for the dose 2 adjustment based on MMR data collected from a sentinel set of GP practices through ImmForm. This suggests that the following numbers of children have received MMR (table 1) and that the average number of unvaccinated children per general practice is of the order of 30-40.

**Table: Estimated numbers of un-vaccinated and under-vaccinated children aged 10-16 years by MMR status, England**

Age (years)	Approximate year of birth	MMR status	
		No dose	1 dose
16	1997	38938	62800
15	1998	41635	62375
14	1999	45228	62108
13	2000	50388	58563
12	2001	56445	61599
11	2002	54963	62255
10	2003	47586	53689
Total	1997-2003	335183	423389

Although these numbers represent the estimated target population for the programme, it is known that current records are likely to be inaccurate – in particular many children recorded as unvaccinated will have received vaccine. Therefore, if current systems are used to identify children, a larger number of children will need to be identified, but once records are checked a smaller number will truly require vaccination. Data from the ImmForm sentinel collection (based on 5,250 practices) suggests that on average around 60 children aged 10-16 years per practice will be recorded on GP systems as unvaccinated.

The range of children per practice varies and is lower in the north and higher in London and the south East.(table 2). Comparison of the proportion estimated from adjusted COVER data and the current GP records from ImmForm suggests that the discrepancy is higher in older children (i.e. more children aged 14-16 years will be recorded as unvaccinated but will have received vaccine) than in younger children where GP records are more accurate.

**Table 2: Children aged 10-16 recorded as incompletely vaccinated on GP systems**

	Average unvaccinated	Average one dose MMR
North East SHA	31	44
North West SHA	50	59
Yorkshire and The Humber SHA	39	42
East Midlands SHA	45	48
West Midlands SHA	58	60
NHS East of England	58	65
London SHA	84	70
South East Coast SHA	81	83
South Central SHA	75	86
South West SHA	59	61

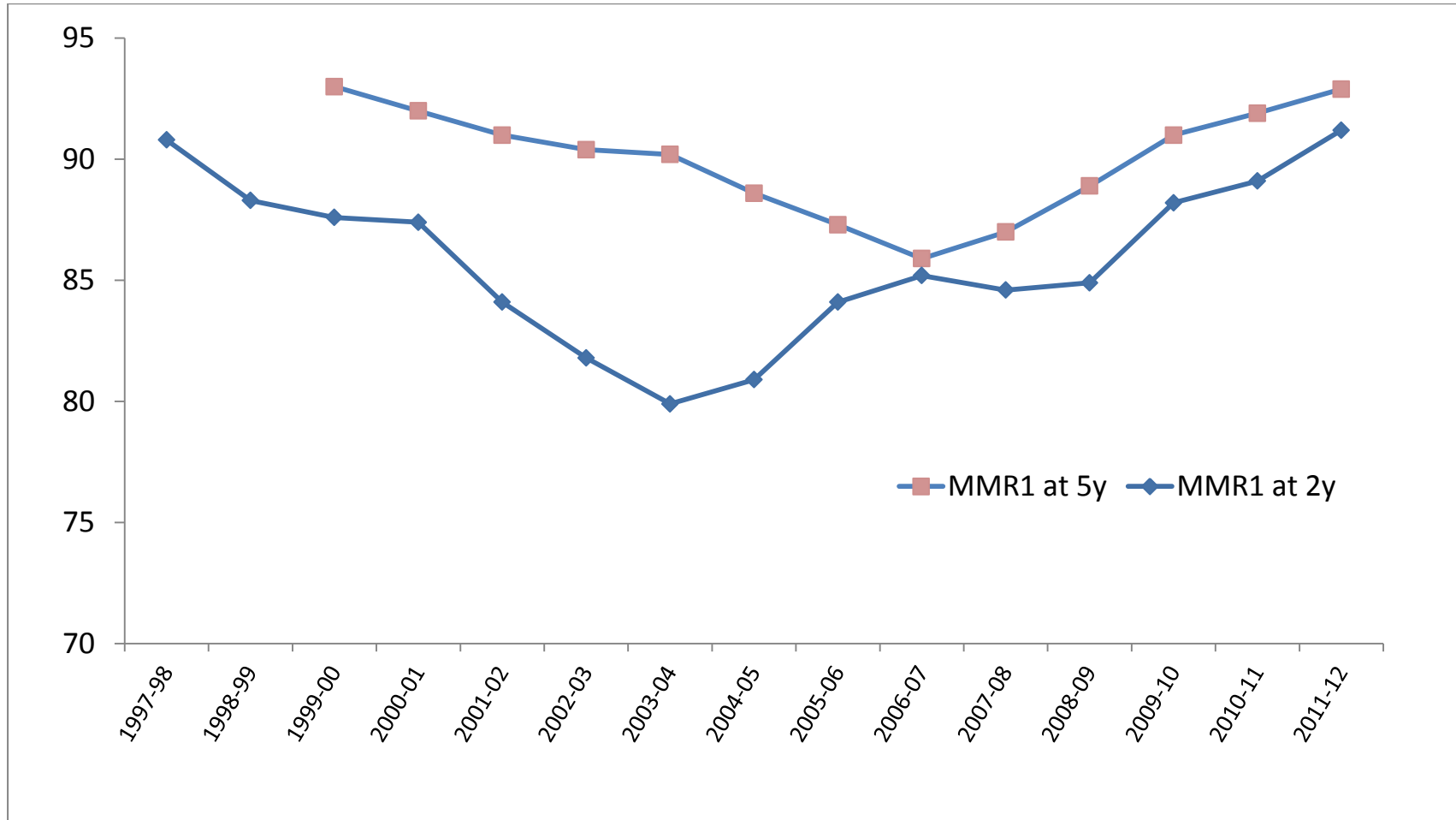
### **Longer term planning**

Although the age group that require rapid identification are those children with historic low coverage who are now attending secondary school, it is important to prevent accumulation of susceptible secondary school and adult cohorts in the future. To reduce the risk of future outbreaks, opportunities need to be developed to identify unvaccinated children at transfer from primary to secondary school. In addition, those areas where there are not yet systems in place to identify children who have not received MMR at the time of the teenage booster need to commission such a service. This provides the last routine opportunity to complete vaccination to provide protection into adulthood (including the offer of rubella protection to women of child-bearing age).

It is also essential to establish a routine collection of MMR coverage for adolescents in order to evaluate the need for and impact of future interventions, as well as to predict and respond to any potential outbreaks in England. PHE are hoping to establish an annual collection alongside the coverage monitoring for the new MenC booster dose in 2013/14. This campaign provides an opportunity to improve the accuracy of data held for school age children.

Mary Ramsay, Joanne White, Kazim Beebeejaum, Gayatri Amirthalingam, Saurabh Gupta  
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Figure 1: First dose MMR coverage at age 2 and 5 years by financial year



**Figure 2: Comparison of the proportion of children unvaccinated by age from PHE estimates based on COVER when compared to current records on GP systems (Immform)**

