

## Written evidence submitted by British Society for Immunology

### Introduction

- 1.1 The British Society for Immunology is the largest immunology society in Europe. We represent the interests of over 3000 immunologists working in academia, clinical medicine, and industry. Our main objective is to promote and support excellence in research, scholarship and clinical practice in immunology for the benefit of human and animal health.
- 1.2 Immunological science underpins many aspects of human health and the progression of disease. The application of immunological research extends across communicable disease and vaccination to the management and treatment of chronic diseases such as diabetes, asthma, allergies, and even cancer. It is also now becoming increasingly clear that immune responses are key to the development of many common disorders not traditionally viewed as immunologic, including metabolic, cardiovascular, and neurodegenerative conditions.
- 1.3 In this evidence to the Health Select Committee, we wish to focus on the performance of immunisation services under the new public health arrangements, highlighting what we see as critical failures in vaccination coverage for certain vaccines, a status which endangers the health and wellbeing of local populations. We believe this would make an excellent case-study and we would welcome any approach to assist the inquiry further, including through oral evidence.

### Summary

- 2.1 Vaccination has greatly reduced the burden of infections which were once common causes of illness, disability, and death. Moreover, high levels of immunisation across the population protect vulnerable groups unable to be vaccinated themselves through the effect of “herd immunity”. Nationally England benefits from a world-class immunisation schedule which continues to expand under the arrangements set out by the Health and Social Care Act. However, while national coverage figures for key vaccinations on the childhood schedule remain only slightly below World Health Organisation targets, variation in coverage across different regions leave particular communities needlessly at risk of dangerous infectious diseases.
- 2.2 For example, rates of childhood vaccination for the 5-in-1 conjugate vaccine (protecting against diphtheria, pertussis, tetanus, polio, and *Haemophilus influenzae type B*) are as low as 81.9% in some areas and there is a 30-fold difference in immunisation uptake between the highest and lowest performing local authority areas in England. For the MMR vaccine, certain parts of England where uptake is particularly low have more than a fifth of children unprotected against measles, mumps, and rubella. Significant variation also exists in vaccinations against pneumococcal disease and HPV for girls that unnecessarily exposes young people to harmful illnesses.
- 2.3 Delivery of the national immunisation programme requires strong linkage between actors at both the national and local level. Data on regional variations in coverage suggest a strong local element for driving change, for example through the work of local authority Directors of Public Health and linkage with commissioners. However, their work is significantly undermined by cuts to the public health budget and the commitment to drive annual average savings of 3.9% over

the next five years, as announced in the Spending Review. This follows £200m of in-year savings already made and redefines public health as the true “Cinderella service” of the health system.

### **Immunisation and herd immunity**

- 3.1 Vaccination has greatly reduced – and in some cases even eliminated – the burden of infectious diseases both nationally and globally. As an intervention strategy it is perhaps public health’s best buy, offering a highly cost effective solution which has been exceptionally successful in managing communicable diseases which were once common causes of illness, disability and death. For these reasons the World Health Organisation ranks vaccination second only to the supply of clean water as the public health intervention which has made the greatest impact on human health.<sup>i</sup>
  
- 3.2 Good vaccination coverage is essential to preserve herd immunity. Herd immunity is achieved when a critical proportion of the population is protected against an infectious disease such that it is difficult for the infection to spread from person to person. Because of disease, frailty, or medical treatment, some people (for example new-born babies, individuals who are HIV-positive, and patients undergoing treatment for cancer) are unable to receive vaccinations. These vulnerable groups therefore rely on herd immunity as a critical protection against infectious pathogens which could be life threatening. The effects of childhood vaccination against pneumococcal disease provide a demonstration of the wider benefits of herd immunity. The vaccine is only given to infants, but cases of invasive pneumococcal disease (IPV) in older children and adults, who do not receive the vaccine, have fallen by 36% since the immunisation was first introduced in 2006.<sup>ii</sup>
  
- 3.3 Herd immunity is vital in protecting sections of society against life threatening disease. However lower vaccination coverage, and more specifically, inequitable coverage across specific parts of England, compromises this protection and threatens the emergence or re-emergence of dangerous infections. For example, if 95% of people are vaccinated against an infection, and the 5% who are unvaccinated are distributed evenly throughout the population, then it remains difficult for the disease to spread. However, in real life scenarios unvaccinated groups tend not to be distributed throughout the population but grouped together in specific locations, often as a result of socio-economic factors.<sup>iii</sup> This makes it much easier for any infection to spread amongst localised groups of unprotected individuals. It is important therefore not only to maintain strong vaccination coverage at the national level but also to ensure comprehensive uptake across the population.

### **Current performance of the childhood vaccination schedule**

- 4.1 The WHO European Region recommends that each member state achieve a minimum of 95% coverage for childhood vaccinations against diseases which are preventable by immunisation and targeted for elimination.<sup>iv</sup> Specifically, these targets relate to vaccinations against diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b (Hib), measles, mumps, and rubella. The data below is from the Health and Social Care Information Centre’s NHS Immunisation Statistics<sup>v</sup>, unless otherwise stated.

#### *DTaP/IPV/Hib*

- 4.2 A 5-in-1 conjugate vaccine (DTaP/IPV/Hib) offers protection against diphtheria, tetanus, pertussis, polio, and *Haemophilus influenzae type B* and is given at 2, 3, and 4 months as part of

the routine childhood immunisation schedule. The three doses are given as close together as possible in order to provide early protection as these diseases can be particularly severe in young infants.

- 4.3 The 5-in-1 vaccine was first introduced in 2004 although data on coverage for the combined immunisation is only available from 2005/06. Following introduction, coverage figures had improved year on year until 2012/13 when there was a small decline. The latest data for 2014/15 shows a continuation of this decline and national coverage at 12 months has fallen by 0.5% since its peak 2012/13. As of 2014/15 94.2% of children at 12 months had completed the DTaP/IPV/Hib immunisation course, a proportion that lies just below the WHO recommended target.
- 4.4 However, this national figure belies significant regional variation in coverage levels across England. For example, when looking at eligible children reaching their first birthday, a total of 68 local authorities out of 149 did not meet the WHO target.
- 4.5 The recently published NHS Atlas of Variation<sup>vi</sup> further demonstrates regional inequalities in vaccine completion. Taking into account immunisation completion for DTaP/IPV/Hib at 2 years, local coverage ranges from 81.9% to 98.4% across upper-tier local authorities (UTLAs) in England. This means that the proportion of children not immunised against diphtheria, tetanus, pertussis, polio, and *Haemophilus influenzae* type b at their second birthday ranges from 0.6% in the highest performing local areas to 18.1% in the lowest performing areas (a 30-fold variation). London is the poorest performing region in England, with just 90.6% of the eligible population completing the vaccine course at 12 months.

#### MMR

- 4.6 Protection against measles, mumps, and rubella is provided by the MMR vaccine. A first dose of the vaccine is given at 12-13 months after which a booster is recommended just before the child starts school, at between 3 and 4 years of age. Coverage for completion of the primary course of MMR vaccination at two years of age fell slightly in 2014/15 to 92.3% (compared to 92.7% the previous year).
- 4.7 The MMR booster is designed to boost the child's protection against measles, mumps and rubella as up to 1 in 10 children fail to achieve full protection after the first dose [cite]. A second dose enhances protection such that only 1 in 100 children are still at risk of infection.<sup>vii</sup> The latest figures show that 88.6% of children received both their first and their second doses of MMR.
- 4.8 National coverage for MMR reached a nadir in 2003/04 when just 79.9% of children had received the vaccination by their second birthday. This was as a consequence of the now dismissed controversy surrounding a potential link between the vaccine and autism. However, concerted action at both the local and national level to boost uptake levels (for example through the national MMR catch-up campaign) has had some success and vaccination levels had improved every year since 2007/08. Worryingly, this years' data therefore represents the first decline in seven years.
- 4.9 In addition, as with the combined 5-in-1 vaccine, substantial regional variation also exists in MMR coverage. Across UTLAs in England, the percentage of immunisation coverage for MMR at 2 years ranged from 77.4% to 98.4%.<sup>vi</sup> This means that the proportion of children unprotected

against measles, mumps, or rubella ranges from 1.6% in the highest performing areas to 22.6% in the lowest performing (a 14-fold variation). Again, London is the poorest performing region, with 87.3% of children receiving their first dose of MMR vaccine and just 81.8% completing both their first and their second.

4.10 Measles in particular is a highly contagious pathogen which can easily spread between unprotected individuals. Lower vaccination levels have unfortunately resulted in several local outbreaks of the disease, particularly in 2013 when there were 1843 confirmed cases of measles in England and Wales. This compares with 130 the following year. These outbreaks have resulted in the entirely needless scenario of children hospitalised for serious complications arising as a result of a completely avoidable disease. Tragically, there have also been a number of deaths. The emergence of such outbreaks underlines the importance of ensuring comprehensive and equitable coverage.

#### *Other vaccines*

4.11 Other vaccinations exist on the childhood immunisation schedule which are not covered by the WHO target. These include vaccines that protect against pneumococcal disease, human papillomavirus, rotavirus, meningitis B, and meningitis C.

4.12 The pneumococcal conjugate vaccine (PCV) protects against 13 of the 95 known pneumococcal serotypes and is given to children at 2, 4, and 12 months of age as part of the UK schedule. The incidence of pneumococcal disease has fallen by 90% since the vaccine was introduced although there remain upwards of 4000 cases of the disease – which can be fatal in the infirm and the very young – every year.<sup>ii</sup> Coverage at the national level for children aged 12 months is 93.9%. Local coverage, assessed at 2 years, ranges from 75.1% to 97.5%.<sup>vi</sup> This means that the percentage of children not completing their PCV immunisation course ranges from 2.5% to 24.9% (a 10-fold variation).

4.13 The HPV vaccine gives protection against particular types of human papillomavirus that can cause cervical cancer, genital warts, and some other cancers. It was added to the UK schedule in 2008 and a recently published PHE review of the first six years of the programme concluded that the programme is achieving its aims of reducing HPV infections and there is confidence of extended impacts on cervical cancer and HPV-related diseases. National coverage of the vaccine amongst eligible 12 – 13 year olds is 86.7%.<sup>viii</sup> However as with other vaccinations there is wide regional variance in vaccine completion. For example, the proportion of girls completing the three dose HPV course ranged from 48.7% in the poorest performing area to 96.6% in the best performing.

4.14 No data is available for rotavirus and meningitis C (due to reporting problems) or meningitis B as the vaccine was only introduced in September 2015.

#### **Immunisation services post-2013**

5.1 There can be no doubt that the UK benefits from a world class immunisation schedule. It would be unfair to criticise national level coverage stats which have largely improved in recent years and remain in reach of international standards for the majority of vaccines. Moreover, our programmes continue to expand in scope under the structures and arrangements implemented following the Health and Social Care Act. For example, since the implementation of the new public health landscape the UK has included new immunisations against shingles, rotavirus, and

children's flu in the list of vaccines offered routinely on the NHS. However, as highlighted above, vaccine uptake rates are not uniform across England. We remain concerned that inequitable coverage in routine vaccine delivery is leaving some groups of the population needlessly vulnerable to infectious disease.

5.2 There are various factors which influence vaccination uptake, including socioeconomic deprivation, ethnicity, gender, and patient mobility. Furthermore, scepticism, fear, or mistrust of the effectiveness and/or safety of a vaccine can influence compliance, as has been seen with MMR most notably. And yet, a Royal College of General Practitioners assessment of flu jab uptake, which found 6% fewer vaccinations had been given in the early period of this winter compared with the same period last year, provides a worrying hint that a comparable scenario may be developing on the back of public opinion following the low-efficacy vaccine in 2014/15.<sup>ix</sup>

5.3 The successful delivery of immunisation services is achieved through the critical interdependence of the relationships between the different structures responsible for the programme. Post-2013 these structures and their responsibilities are split three ways:

- NHS England is the commissioning body for local vaccine services and is accountable to the Secretary of State for the delivery and performance of these programmes.
- Public Health England (PHE) provides system leadership for the commissioning and delivery of immunisation services, including through national communications, standards setting, and the implementation of recommendations by the Joint Committee on Vaccination and Immunisation (JCVI). In addition, PHE undertakes the purchase, storage and distribution of vaccines and also holds the coverage, surveillance data, and professional expertise that supports vaccine delivery.
- Local authorities, through Directors of Public Health, provide independent scrutiny of vaccine delivery at the local level and publish reports on the health of populations in their areas, including on immunisation coverage. This information should be used to inform the delivery of public health services, identify areas of challenge (e.g. particular hard to reach groups), and help drive service improvement.

5.4 Inequitable regional coverage in the delivery of some vaccinations suggests a large part of the action in improving vaccination uptake must be driven from the local level. Local authority Directors of Public Health have a critical role to play in understanding their area's inequalities and how these relate to variations in vaccination coverage. Their work should influence commissioning behaviour and allow for NHS commissioners in lower performing areas to tailor service delivery towards at-risk groups. Local commissioners should also readily consider innovative approaches to widen access to immunisation services, such as vaccination by health professionals outside primary care (e.g. pharmacists), delivery in high risk settings such as care homes, or by extending clinic times.

5.5 The association between vaccine uptake and population subsets defined by socioeconomic status, ethnicity, or pre-defined clinical risk underlines a need for targeted surveillance and the development of niche communications and support for these harder to reach or vulnerable groups. Again, local authorities have a key role to play in monitoring uptake and delivering information that is tailored to different communities and groups. Moreover, the relationship between clinicians and their patients is themselves a critical factor in improving vaccine uptake and clinical leadership is especially important in assuaging fears regarding safety and efficacy. If

the NHS is truly to make good on the mantra that “every contact counts” healthcare workers at all levels across primary and secondary care should regularly check immunisation status during appointments or at other contact times, especially for children and vulnerable groups. This work should be taken forward in addition to the collective responsibility national bodies such as NHS England and PHE have in driving through improvements in vaccines uptake.

5.6 However, we strongly believe that the capacity to increase uptake in immunisation, especially in groups for whom coverage is low, is undermined by cuts to the public health budget. The recently announced commitment to drive average annual real-terms savings of 3.9% from the public health budget follows £200m already announced in the summer. These reductions in spend come at a time when the NHS is receiving unprecedented levels of funding and the lack of attention for public health serves to redefine it as the true “Cinderella service” of the health system. As highlighted in Public Health England’s annual report, full mobilisation of the public in managing their health and engaging in prevention activities could save £30 billion.<sup>x</sup> This comes at a time when the NHS, despite its funding boost, must make £22 billion of efficiency savings by 2020. As the Five Year Forward View has acknowledged the future viability of the health service, including in closing this funding gap, can only be bridged by a radical upgrade in prevention.<sup>xi</sup> Public health therefore has a significant role to play.

5.7 This present situation raises significant questions and we would urge the Committee to take consideration in its report of the potential impacts for public health – and in particular immunisation services in light of failures highlighted in this evidence – of the Government’s decision to sustain and protect public health funding.

## November 2015

## References

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<sup>i</sup> [World Health Organisation \(2008\). Vaccination greatly reduces disease, disability, death and inequality worldwide. Bulletin of the World Health Organisation.](#)

<sup>ii</sup> Answer to written parliamentary question provided by Jane Ellison, November 11 2015.

<sup>iii</sup> [University of Oxford \(2015\). Vaccine Knowledge Project: Herd immunity.](#)

<sup>iv</sup> [World Health Organisation \(1999\). Health 21: The health for all policy framework for the WHO European Region.](#)

<sup>v</sup> [Health and Social Care Information Centre \(2015\). NHS Immunisation Statistics, England – 2014-15.](#)

<sup>vi</sup> [NHS Right Care \(2015\). NHS Atlas of Variation in Healthcare.](#)

<sup>vii</sup> [Department of Health \(2013\). Public health functions to be exercised by NHS England.](#)

<sup>viii</sup> [Public Health England \(2015\). Human Papillomavirus \(HPV\) Vaccine Coverage in England, 2009/09 to 2013/14. A review of the full six years of the three-dose schedule.](#)

<sup>ix</sup> [Royal College of General Practitioners \(2015\). Thousands of patients risking their health by ‘shunning’ flu jab, say family doctors.](#)

<sup>x</sup> [Public Health England \(2015\). Annual Report and Accounts 2014/15.](#)

<sup>xi</sup> [NHS England \(2014\). Five Year Forward View: Executive Summary point 3.](#)