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Original article

# Impact of mandatory vaccination extension on infant vaccine coverages: Promising preliminary results

*Impact de l'extension de la vaccination obligatoire sur les couvertures vaccinales du nourrisson :  
des premiers résultats prometteurs*

R. Cohen<sup>a</sup>, J. Gaudelus<sup>b,c</sup>, B. Leboucher<sup>d</sup>, J.-P. Stahl<sup>e</sup>, F. Denis<sup>f</sup>, D. Subtil<sup>g</sup>, P. Pujol<sup>h,\*</sup>,  
H. Lepetit<sup>i</sup>, L. Longfier<sup>i</sup>, A. Martinot<sup>j</sup>

<sup>a</sup> Unité court séjour petits nourrissons, CHI de Créteil, 40, avenue de Verdun, 94010 Créteil cedex, France

<sup>b</sup> Service de pédiatrie, hôpital Jean-Verdier, 93140 Bondy, France

<sup>c</sup> Université Paris-XIII, 93017 Bobigny, France

<sup>d</sup> Pôle femme-mère-enfant, unité de réanimation et médecine Néonatales, CHU Angers, 4, rue Larrey, 49933 Angers cedex 9, France

<sup>e</sup> Service de maladies infectieuses et tropicales, université-1 de Grenoble, CHU, BP 217, 38043 Grenoble, France

<sup>f</sup> Service de bactériologie-virologie-hygiène, CHU Dupuytren, 2, avenue Martin-Luther-King, 87042 Limoges cedex, France

<sup>g</sup> Service de gynéco-obstétrique, CHU Lille, 59000 Lille, France

<sup>h</sup> GSK France, 23, rue François-Jacob, 92500 Rueil-Malmaison, France

<sup>i</sup> Institut des Mamans, 10, boulevard des Frères Voisin, 92130 Issy-les-Moulineaux, France

<sup>j</sup> Santé publique, épidémiologie et qualité des soins, EA 2694, université Lille, CHU Lille, 59000 Lille, France

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## Abstract

**Objective.** – In France infant vaccines protecting against 11 diseases have changed from a recommended to a mandatory status for all children born on or after January 1, 2018. Using the Vaccinoscopie survey, we measured the impact of this new vaccination policy on vaccine coverage rates (VCRs) and on mothers' perception of vaccination.

**Methods.** – Online survey with 1000 mothers of 0- to 11-month-old infants.

**Results.** – VCRs for at least one dose at the age of 6 months strongly progressed for diseases that previously did not meet Public Health objectives (+8 points for Hepatitis B and +31 points for meningococcal C vaccines). Mothers were more favorable to mandatory vaccination and better informed in 2018 than in 2017.

**Conclusion.** – These first results showed a positive impact of the extension of mandatory vaccination on mothers' opinion regarding vaccination and on infant VCRs.

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**Keywords:** Mandatory vaccination ; Vaccination coverage

## Résumé

**Objectifs.** – En France, pour les enfants nés depuis le 1<sup>er</sup> janvier 2018, les vaccins du nourrisson protégeant contre 11 maladies, auparavant recommandés, sont devenus obligatoires. L'enquête Vaccinoscopie permet de mesurer l'impact de cette nouvelle politique vaccinale sur les couvertures vaccinales (CV) et l'opinion des mères sur la vaccination.

**Méthodes.** – Étude réalisée sur Internet par questionnaire auto-administré auprès de 1000 mères de nourrissons âgés de 0–11 mois.

\* Corresponding author.

E-mail address: [patricia.pujol@gsk.com](mailto:patricia.pujol@gsk.com) (P. Pujol).

**Résultats.** – Les CV pour au moins une dose à l'âge de 6 mois ont fortement progressé pour les valences qui n'atteignaient pas les objectifs de santé publique (+8 points pour l'hépatite B et +31 points pour le méningocoque C). Les mères étaient plus favorables à la vaccination obligatoire et mieux informées en 2018 qu'en 2017.

**Conclusion.** – Ces premiers résultats montrent un impact positif de l'extension de la vaccination obligatoire sur les CV du nourrisson et sur l'opinion des mères quant à la vaccination.

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**Mots clés :** Couverture vaccinale ; Vaccination obligatoire

France is now one of the countries with the highest rates of vaccine hesitancy. An international survey conducted across 67 countries on trust in vaccination among 65,819 individuals in 2015 reported that 41% of interviewed French people expressed concern over vaccine safety (country with the highest score, overall average of 17%) [1]. This mistrust in vaccination is particularly reflected by non-optimal vaccination coverage rates (VCRs) for some of the vaccines recommended in the infant immunization schedule [2]. VCR objectives suggested by the High Council for Public Health (French acronym HCSP) at the age of 24 months are not fulfilled for Hepatitis B (HepB), meningococcal C disease (MenC), measles-mumps-rubella (MMR), and pneumococcal disease (Pn) vaccines, causing measles outbreaks and high incidence of invasive meningococcal C disease in recent years [3–5].

The French government thus decided to mandate all infant vaccines that were previously only recommended. Before January 2018 only three infant vaccines were mandatory: vaccines against diphtheria (D), tetanus (T), and poliomyelitis (IPV). Vaccination against eight additional diseases are now also mandatory for all infants born on or after January 1, 2018: pertussis (P), *Haemophilus influenzae* type b (Hib), HepB, Pn, MMR, and MenC vaccines [6]. This extension of mandatory vaccination was promoted by a large-scale communication strategy from the French Health authorities, targeting both health professionals and the general public. Numerous educational tools have been developed and disseminated to communicate on this extension of mandatory vaccines: creation of a website dedicated to vaccination (<http://www.vaccination-info-service.fr>), flyers on vaccines, posters, and use of all types of media communication (TV, web and printed press media, social media network).

Monitoring the acceptance of this mandatory vaccination extension and the impact on VCRs is crucial. The Vaccinoscopia study, conducted by the French Institut des Mamans on behalf of GSK manufacturer, is one of the most important surveys on vaccination in France. It is an online standardized questionnaire survey conducted every year since 2008 to measure the opinion and attitude of mothers towards vaccination. Children VCRs are also analyzed based on the report by mothers of all vaccinations recorded in their child's health record. The methodology was further described in previous publications [7,8]. The 2018 survey took place between September 6 and October 1, 2018 and included a representative sample of 1000 mothers of 0- to 11-month-old infants. The sample sizes of

the Vaccinoscopia survey varied from 1000 to 2250 mothers across the years. This had no impact on the comparability of results from one year to another. Indeed, data was representative of the relevant population each year, thanks to quota sampling and weighting of data. Statistical tests were performed to identify any significant changes across the years: these statistical tests took into account the different sample sizes.

To our knowledge these are the first results published on the impact of this extended mandatory vaccination on both mothers' opinion of vaccination and VCRs at 6 months of age.

## 1. Impact of mandatory vaccination extension on infant VCRs: promising results

Among 250 infants aged 6 to 8 months, we measured the proportion of infants who received at least one dose of the DTaP-IPV, DTaP/IPV, Hib, HepB, and Pn vaccines at 6 months of age (recommended in the French vaccination calendar at 2 and 4 months of age), and of the MenC vaccine (recommended at 5 months of age since 2017). The aim was to evaluate the beginnings of the new vaccine policy [9].

For vaccines recommended at 2 and 4 months of age, we observed stable VCRs for components that already had very high VCRs ( $\geq 96.0\%$  for DTaP/IPV and Hib in 2017). However, we observed an 8.1 point-progression of the VCR for at least one dose for the Hepatitis B virus component in 2018 versus 2017 (VCR at 96.8% and 88.7%, respectively,  $P < 0.01$ ). Pneumococcal VCR – already very high – showed a non-significant increase between 2017 and 2018 (Table 1).

We observed a major increase in VCR for MenC vaccination – recommended at 5 months of age – from 43.0% in 2017 (introduction of this vaccination in the French calendar) to 74.2% in 2018 ( $P < 0.001$ ) (Table 1).

## 2. Impact of extended mandatory vaccination on the mothers' opinion of vaccination: a changing mindset

Almost all mothers (94.9%) had heard about mandatory vaccination, mainly through TV (76.4%), printed press media (34.9%), Internet (33.7%), and from their family physician (30.9%). The proportion of well-inclined mothers towards vaccination against all severe vaccine preventable diseases was 68.4% in 2018 compared with 64.7% in 2017 (Fig. 1). The proportion of mothers who believed to be rather well or highly informed about vaccination significantly increased from 64.6% in 2017 to

**Table 1**  
Evolution of vaccine coverage rates for at least one dose at 6 months of age in infants included between 2016 and 2018. Study population: 250 infants aged 6 to 8 months.

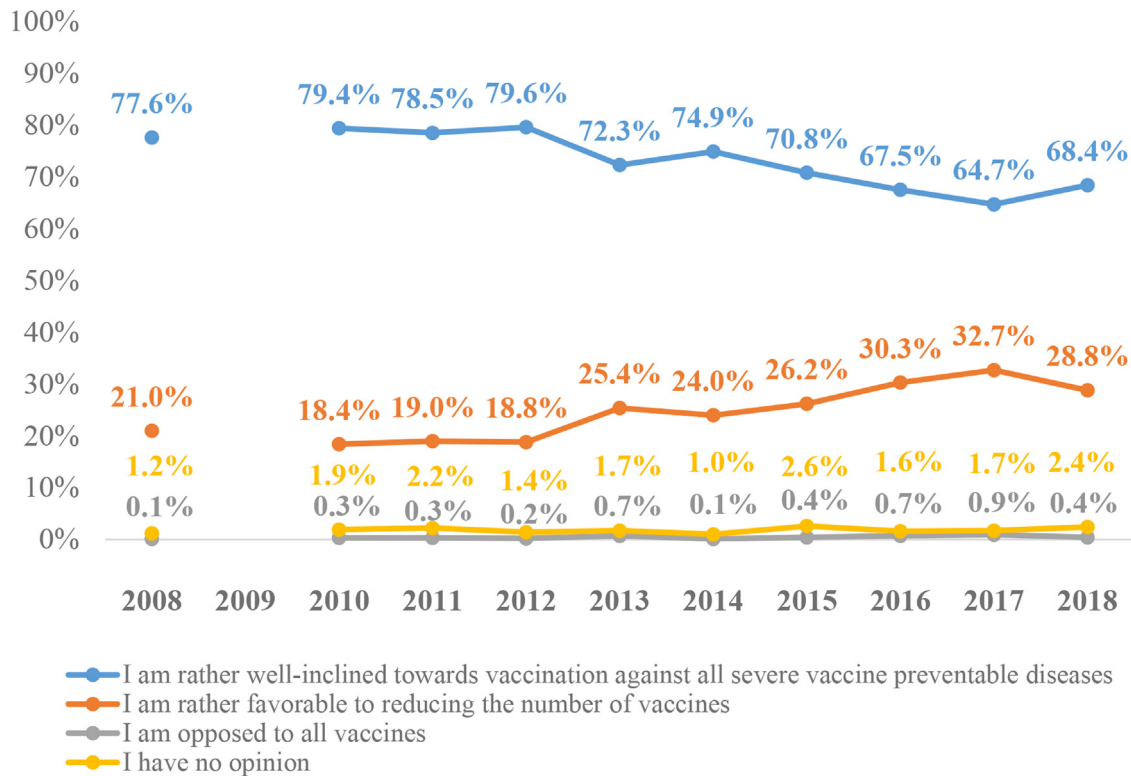
Évolution des couvertures vaccinales pour au moins une dose chez le nourrisson à l'âge de 6 mois inclus de 2016 à 2018. Base : 250 nourrissons de 6 à 8 mois.

	2016			2017			2018		
	n	VCR	[95% CI]	n	VCR	[95% CI]	n	VCR	[95% CI]
DT-IPV	244	97.5%	[95.5;99.4]	243	97.3%	[95.3;99.7]	245	97.9%	[96.1%;99.7%]
DTaP/IPV	244	97.5%	[95.5%;99.4%]	242	96.9%	[94.7%;99.0%]	245	97.9%	[96.1%;99.7%]
Hib	240	96.0%	[93.6%;98.5%]	240	96.0%	[93.6%;98.4%]	244	97.7%	[95.8%;99.6%]
HepB	216	86.4%	[82.1%;90.6%]	222	88.7%	[84.8%;92.6%]	242	96.8%*	[94.6%;99.0%]
Pn	225	90.1%	[86.4%;93.8%]	235	94.0%	[91.0%;96.9%]	240	96.1%	[93.7%;98.5%]
MenC	0	0.0%	[0.0%;0.0%]	107	43.0%**	[36.8%;49.1%]	186	74.2%**	[68.8%;79.6%]

n: number of infants vaccinated; VCR: vaccine coverage rate; CI: confidence interval; DT-IPV: tetanus, diphtheria, inactivated poliovirus; aP: acellular pertussis; Hib: *Haemophilus influenzae* type b; HepB: hepatitis B; Pn: pneumococcal disease; MenC: meningococcal C disease.

\*  $P < 0.01$  between 2017 and 2018.

\*\*  $P < 0.001$  between 2016 and 2017 and between 2017 and 2018.



**Fig. 1.** Evolution of the proportion of 0- to 11-month-old infants' mothers (i) well-inclined towards vaccination against all severe vaccine preventable diseases, and (ii) favorable to reducing the number of vaccines, 2008–2018. Study population: 1667 mothers in 2008, 2250 mothers in 2010 and 2012, and 1000 mothers in 2011, 2013 to 2018. No data available for 2009.

Évolution du pourcentage de mères de nourrissons de 0 à 11 mois (i) en faveur d'une vaccination contre toutes les maladies graves s'il existe des vaccins et (ii) en faveur d'une réduction du nombre de vaccins, 2008–2018. Base : 1667 mères en 2008, 2250 mères en 2010 et 2012, et 1 000 mères en 2011, 2013 à 2018. Pas de données en 2009.

69.4% in 2018 ( $P < 0.05$ ). The comparison of the 2017 and 2018 survey results revealed a significant increase in the proportion of mothers well-inclined towards mandatory vaccination (35.7% versus 48.4%, respectively,  $P < 0.001$ ). This is due to a decreased proportion of mothers who do not approve of mandatory vaccination (18.0% versus 10.9%, respectively,  $P < 0.001$ ) and of mothers responding that their opinion on mandatory vaccination depends upon vaccines (41.4% versus 32.9%, respectively,  $P < 0.01$ ). Respectively 4.9% and 7.8% of mothers had no opinion on this matter.

### 3. Discussion

To our knowledge these are the first results available for 6-month-old infants on the impact of mandatory vaccination extension, apart from a press release from the French Ministry of Health issued on September 27, 2018. This press release presented results on the evolution of HepB VCR and reported a progression of +5.5 points in HepB VCR for infants born in May 2018, compared with those born in May 2017 (from 92.3% to 97.8%) [10]. The high increase in MenC VCR observed in

2018 versus 2017 cannot be solely attributed to the impact of mandatory vaccination. It is also linked to the introduction of this vaccination in the French vaccination calendar in April 2017.

These VCR increases are not only due to the mandatory nature of the French government's decision but also to an unprecedented increase in the parents' trust in vaccination programs. We reported a positive impact of the authorities' communication on the opinion of mothers. Indeed, the proportions of mothers: (i) favorable to vaccination against all severe vaccine preventable diseases and (ii) believing to be rather well/highly informed about vaccination, recently increased after a global downward trend observed for many years. Furthermore, the proportion of mothers well-inclined towards mandatory vaccination substantially increased compared with 2017.

The extension of mandatory vaccination for all infants born on or after January 1, 2018 has been well accepted. The communication strategy implemented to promote this new policy seems to have had a positive impact on the opinion of mothers regarding vaccination. We demonstrate a significant progress in VCRs for vaccines that previously did not meet the Health Public objectives (HepB and MenC).

The 2019 Vaccinoscopia survey will help further understanding the impact of mandatory vaccination on infant VCRs (primary vaccination and complete schedule VCRs for DTaP/IPV, Hib, HepB, Pn, MenC vaccines and first-dose VCR for MMR vaccine).

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#### Authors' contributions

R.C., J.G., B.L., J.-P.S., F.D., D.S., P.P., and A.M. reviewed and validated the methodology as well as the study results. H.L. and L.L. contributed to the methodology, the analysis and validation of results. P.P. wrote the article. All authors agreed to comply with the international criteria for authorship as defined by the International Committee of Medical Journal Editors.

#### Disclosure of interest

R.C., J.G., B.L., J.-P.S., F.D., D.S., P.P., H.L., L.L., and A.M. are members of the Vaccinoscopia scientific committee. P.P. is employed by the GSK group of companies. H.L. is the

founder of the French Institut des Mamans, which created and conducted the Vaccinoscopia surveys. L.L. is employed by the French Institut des Mamans. J.-P.S. is Editor-in-chief of the *Médecine et Maladies Infectieuses* journal but was not involved in the peer-review process of the article.

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