# **EPH268**

# Private market uptake of varicella vaccination and related sociodemographic differences: A Danish nationwide observational study

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# INTRODUCTION

- Varicella, caused by the varicella zoster virus and characterized by vesicular rash and fever, is one of the most contagious diseases affecting approximately 90% of children before the age of ten.
- Although varicella infection is often a relatively benign childhood disease, it constitutes a considerable health and societal burden.
- Prevention of varicella is possible by vaccination.
- Currently, varicella vaccination is not part of the Danish National Immunization Program (NIP) but has been available for out-of-pocket purchase since 2019.
- Socioeconomic inequalities in the willingness of parents to choose or afford varicella vaccination for their children may exist.

# OBJECTIVES

• The **overall objectives** of this study were to investigate the private market uptake of varicella vaccination in Denmark from 2019 to 2022 and the potential sociodemographic and socioeconomic differences.

## RESULTS

- Varicella vaccination coverage increased markedly from 2019 to 2022 (Fig. 1), with the highest uptake in the youngest age-groups (<10 years) (Fig. 2), and highest in the capital and metropolitan areas (Fig. 3).
- Vaccination uptake was more common among children from • socioeconomically advantaged families in terms of parents with high education, high income, living in the capital or metropolitan areas, as well as among children with at least one parent educated within nursing or medicine (Table 1).
- The adjusted multivariable model showed a stepwise increase in the likelihood of vaccination with the degree of parental education and income level (Table 1).
- The social inequality in uptake seemed to increase over time (Table 2).

## FIGURE 3:

Heatmap of vaccination coverage (minimum one vaccine) among all 1-18-year-olds (2022)



## MATERIAL & METHODS

- This nationwide, population-based study was based on **1,320,408** individuals aged 1 to 18 years in the period from 1 January 2019 through 31 December 2022.
- Data on sociodemographic factors for children and their parents were obtained from Statistics Denmark's registers and linked to varicella vaccination status in the Danish Vaccination Register.
- Data on sociodemographic included age/birthyear, sex, parental educational level, parents with a healthcare-related education (limited to nursing and medicine), equivalized disposable household income, and place of residence.
- Associations were estimated by crude and adjusted multivariable logistic regression models (i.e., multivariable prediction model). We accounted for time trend and for the dependency between siblings by applying a robust standard error estimator.

### FIGURE 1:

Number of individuals (1-18 years) vaccinated (initiated/completed) by year of administration



## FIGURE 2: Age-specific number of individuals that initiated varicella vaccination in 2022



#### TABLE 1: Crude and adjusted odds ratio (OR) of vaccine uptake according to sociodemographic and socioeconomic factors among the 1,320,408 1-18-year-olds included in the study population

|                                    | Crude*<br>OR (95% CI) | Adjusted**<br>OR (95% CI) |
|------------------------------------|-----------------------|---------------------------|
| Parental education                 |                       |                           |
| Low education                      | Ref.                  | Ref.                      |
| Medium education                   | 2.80 (2.10-3.73)      | 2.22 (1.66-2.97)          |
| Medium/High education (BSc)        | 5.91 (4.47-7.83)      | 3.25 (2.44-4.33)          |
| High education (MSc & PhD)         | 17.38 (13.15-22.97)   | 5.99 (4.50-7.98)          |
| Equivalized household income       |                       |                           |
| 1 <sup>st</sup> quartile (lowest)  | Ref.                  | Ref.                      |
| 2 <sup>nd</sup> quartile           | 1.51 (1.36-1.67)      | 1.28 (1.15-1.42)          |
| 3 <sup>rd</sup> quartile           | 2.78 (2.53-3.06)      | 1.87 (1.69-2.07)          |
| 4 <sup>th</sup> quartile (highest) | 6.82 (6.23-7.46)      | 3.06 (2.77-3.38)          |
| Municipality                       |                       |                           |
| Capital municipalities             | Ref.                  | Ref.                      |
| Commuter municipalities            | 0.40 (0.37-0.43)      | 0.83 (0.75-0.93)          |
| Metropolitan municipalities        | 0.81(0.76-0.86)       | 1.37 (1.21-1.55)          |
| Provincial municipalities          | 0.36 (0.34-0.39)      | 0.75 (0.67-0.83)          |
| Rural municipalities               | 0.20 (0.18-0.22)      | 0.60 (0.52-0.69)          |
| Health Education                   |                       |                           |
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| Health Education      2.62 (2.48-2.77)      1.87 (1.77-1.99) | NO FIEALLI EUUCALION | Rei.             | Rei.             |
|--|----------------------|------------------|------------------|
|  | Health Education     | 2.62 (2.48-2.77) | 1.87 (1.77-1.99) |

\*Adjusted for the interaction between birthyear and days in study and the main effects of both.

\*\* Further adjusted for ethnicity, maternal age of birth, the main effects of the additional variables in the model, and accounted for the dependency between siblings

| TABLE 2: Adjusted odds ratio (OR) and 95% CI of vaccine uptake per year according to educationa |  |
|---|--|
| level among the 1-18-year-olds included in the study population                                 |  |

|                             | 2019             | 2020             | 2021             | 2022              |
|-----------------------------|------------------|------------------|------------------|-------------------|
| Parental education          |                  |                  |                  |                   |
| Low education               | Ref.             | Ref.             | Ref.             | Ref.              |
| Medium education            | 2.08 (1.00-4.35) | 2.02 (1.08-3.77) | 2.06 (1.28-3.31) | 2.69 (1.49-4.85)  |
| Medium/High education (BSc) | 2.54 (1.23-5.26) | 2.43 (1.31-4.51) | 2.82 (1.77-4.50) | 4.98 (2.79-8.88)  |
| High education (MSc & PhD)  | 4.35 (2.10-8.98) | 4.48 (2.42-8.31) | 4.92 (3.09-7.85) | 9.87 (5.54-17.59) |

# **CONCLUSION & PERSPECTIVES**

- Uptake of varicella vaccination is substantially greater among children in families with high socioeconomic status as well as among those living in capital and metropolitan areas.
- It is conceivable that the observed marked social inequality will persist, or even increase, over time as varicella vaccine uptake may continue to rise.
- To ensure equitable access to varicella vaccination, the value of including the varicella vaccine in the NIP should be evaluated.



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