$\bullet$ 

# Modeling The Impact of MenACWY Vaccination Among US Adolescents and Young Adults

#### Invasive Meningococcal Disease (IMD)

- Includes the spectrum of invasive infections caused by the bacteria *Neisseria meningitidis* and is uncommon, unpredictable, and can present as meningitis, bacteremia, or both.
- Develops rapidly, often among previously healthy persons, and results in **death in 10-15% of cases** and leaves **20% of survivors** with severe, life-long sequelae, such as neurologic damage or limb loss.<sup>1,2,3</sup>
- Currently, ACIP recommends MenACWY vaccination at age 11-12 with a booster dose at age 16.<sup>3</sup>

## **Methods-Overview**

- In 2005, the US implemented routine immunization of adolescents with a quadrivalent conjugate vaccine (MenACWY) for the prevention of IMD.
- The goal of the study was to assess the impact of MenACWY immunization on reducing IMD burden among the US
  adolescent population, and how the downward trajectory of IMD that began in the mid-1990s might have evolved in
  the absence of vaccination efforts.<sup>4</sup>
- A statistical model\* was developed to investigate the **potential trajectory** of IMD among adolescents and young adults **in the absence of vaccination** and evaluate the direct effect of vaccination. The model was fitted to national incidence data for serogroups C, W, and Y from 2001 to 2021, with stratification by vaccination status for IMD cases.<sup>4</sup>

### Statistical model illustrating vaccine naive population (with ranges)<sup>4</sup>:

- Model fit (blue curve) to observed data (black dots) in different age groups with 95% credible intervals (shaded areas)
- The scenario without MenACWY vaccination (counterfactual) is shown by the yellow curve
- From 2005-2021, MenACWY vaccination averted:
  - 172 cases (95% Credible Interval [Crl]: 85-345) and
     16 deaths (95% Crl: 8-31) among 11-15 year olds
  - 328 cases (95% Crl: 164-646) and 38 deaths (95% Crl: 19-75) among 16-23 year olds



#### 11-15 year age group

incidence by 110% for ages 11-15 and 47% for ages 16-23



## sanofi



- Absence of protection afforded by herd immunity in the model likely underestimates the full impact of vaccination
- Annual serogroup dominance was not considered in the vaccine effectiveness estimates
- The model **does not account** for geographically or time-dependent **variations** in incidence (e.g., outbreaks) or **vaccine uptake** across the US



### Conclusion



From 2005 to 2021, an estimated **59% total reduction in IMD burden** in adolescents and young adults in the US (11-23 years) may be **attributed to the MenACWY vaccine**.



These **estimates of vaccination effectiveness are conservative** as they represent only direct public health impact and exclude the **indirect impact due to herd immunity**.



•Vaccination Works!•

#### REFERENCES

Bosis S, et al. J Prev Med Hyg. 2015;56:E121-4. 2. Nadel S, Ninis N. Front Pediatr. 2018;6:321. 3. Mbaeyi SA, Bozio CH, Duffy J, et al. MMWRRecomm Rep. 2020;69:1–41.
 Shin T, et al. Assessing the Impact of MenACWY Conjugate Vaccine on Reducing Invasive Meningococcal Disease Among Adolescents and Young Adults in the United States. Poster presented at the National Immunization Conference. Atlanta, GA. 12-14 AUG 2024.

#### ACKNOWLEDGMENTS

Dr. Seyed Moghadas (Professor of Computational Epidemiology and Vaccine Science; Director of the Agent-Based Modeling Laboratory) York University Dr. Alison P. Galvani (Burnett and Stender Families Professor of Epidemiology; Director for Infectious Disease Modeling and Analysis CIDMA) Yale School of Public Health



Scan here to access Sanofi's digital medical corner

