HPV Immunization Disparities by Age, Sex, Insurance in 2022

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INTRODUCTION

- HPV is the most common sexually transmitted infection in the United States, with over 200 genetically distinct strains, many of which are carcinogenic according to the International Agency for Research on Cancer.
- HPV vaccination helps prevent infections and related conditions, including genital warts, precancerous lesions, and cancers such as cervical, vaginal, vulvar, anal, penile, and oropharyngeal.
- Since 2015, Merck's Gardasil-9 vaccine has been approved for both sexes, covering nine high-risk HPV strains; vaccination has been recommended for girls since 2006 and boys since 2011, requiring multiple doses.

PURPOSE

- Summarize national HPV vaccination coverage among U.S. children ages 9–17 years (2022).
- Highlight disparities by age, sex, and health-insurance status to inform targeted public-health messaging and interventions.
- Translate surveillance findings into actionable priorities for clinical programs and community outreach.

METHOD

- Data source: Parent reported responses from the 2022 National Health Interview Survey (NHIS).
- Population: Children ages 9–17 years in the U.S. civilian non-institutionalized population.
- Primary measure: Receipt of ≥1 HPV vaccine dose (affirmative response to "Has [child] ever received an HPV shot or vaccine?").
- Analytic approach: Descriptive percentages from NHIS supplemented with derived comparative metrics (Age Acceleration Index (AAI), Gender Relative Risk Ratio (GRRRR), Insurance Ratio Index (IRI), Composite Vulnerability Score (CVS) to quantify relative differences across groups.

FIGURES

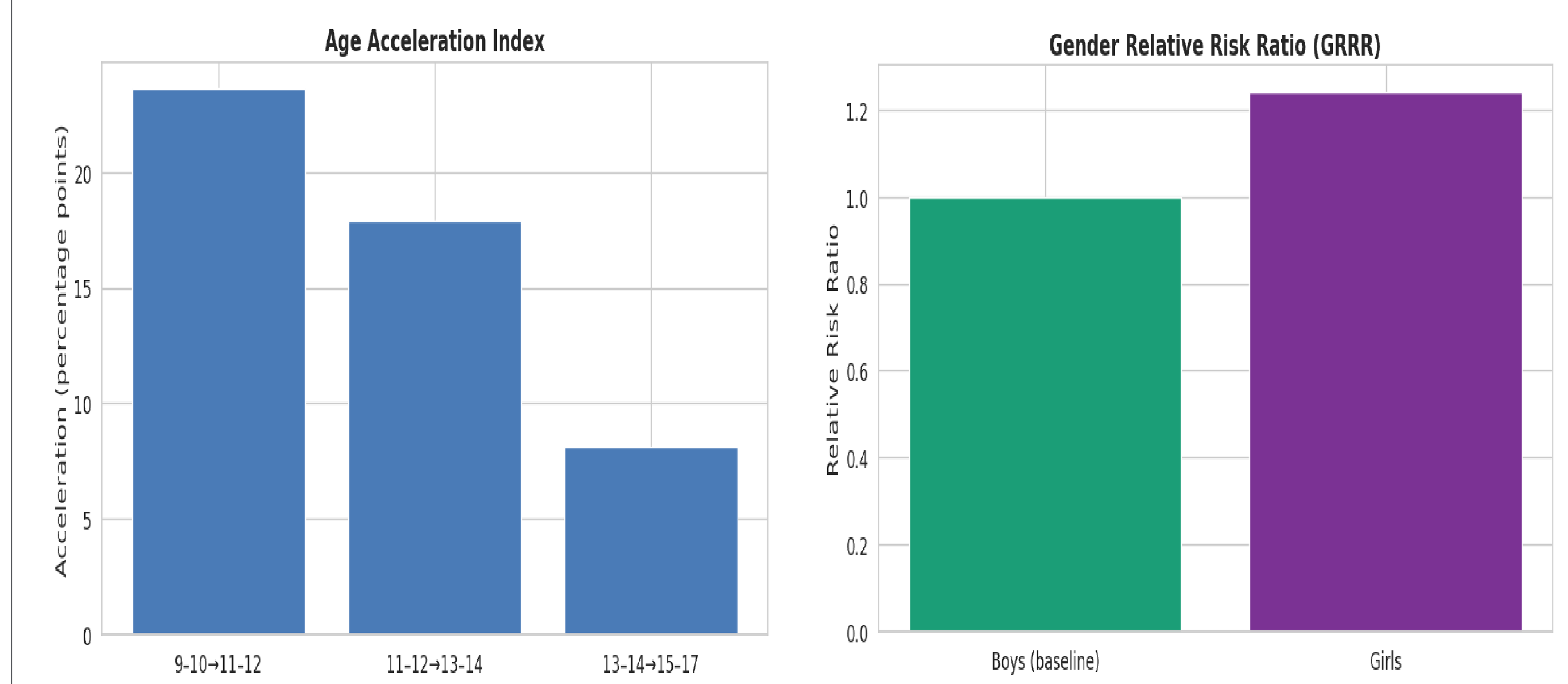

Figure 1: Age Acceleration Index (AAI) and Gender Relative Risk Ratio (GRRR)

$$AAI_{i\rightarrow j} = Coverage_{j} - Coverage_{i}$$

$$GRRR = Coverage_{girls} / Coverage_{boys}$$

$$IRI = Coverage_{private} / Coverage_{uninsured}$$

$$CVS = (Coverage_{boys} + Coverage_{uninsured} + Coverage_{9\text{-}10}) / 3$$

Table 1: Age Acceleration Index (AAI) calculated from the data source of NHIS survey 2022

Age Transition	Increase (percent points)	AAI Interpretation
9–10 → 11–12	(30.9 - 7.3 = 23.6)	Rapid early uptake
11–12 → 13–14	(48.8 - 30.9 = 17.9)	Moderate acceleration
13–14 → 15–17	(56.9 - 48.8 = 8.1)	Plateau phase

RESULTS

- Overall coverage: 38.6% of children in United States from ages 9 to17 received ≥1 HPV dose in 2022.
- Age Acceleration Index (AAI): Uptake rises sharply from 7.3% (9-10) to 30.9% (11-12), then to 48.8% (13-14) and 56.9% (15-17) largest acceleration occurs at the 9-12 years and then slows thereafter
- Gender Relative Risk Ratio (GRRR): Girls 42.9% Vs. boys 34.6%, 1.24 (girls 24% more likely than boys).
- Insurance disparity (IRI & IEG): Private 41.5% Vs. uninsured 20.7% , IRI ≈ 2.0; IEG = 20.8 percent points.
- Composite vulnerability: Averaging low coverage strata (boys, uninsured, ages 9-10) yields an estimated ~21% vaccination likelihood for the highest risk subgroup, far below the national average of 38.6%.

CONCLUSIONS

- These insights give legislators and medical experts a starting point for formulating plans to boost HPV vaccination rates and lessen inequalities among various demographic groups. The United States can significantly advance public health and prevent illnesses linked to HPV by tackling these issues.

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