

# Watching the Words Change into Numbers: Consequences of Vaccine Exemption Laws

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## Abstract

**Background:** All 50 states allow medical exemptions to school vaccine requirements; 48 also permit religious exemptions. Exemptions based on philosophical beliefs are relatively new, and are allowed in 20 states. The effect of philosophical exemptions on vaccine exemption rates is unclear.

**Objective:** To examine differences in vaccine exemption rates by state and type of vaccine exemption permitted.

**Methods:** States reporting vaccination data to CDC as part of the annual school report on vaccination requirements for the 2009-2010 school year were categorized by type of exemption permitted. The proportion of exemptions was calculated for each category (medical only, medical and religious, medical, religious and philosophical) and compared using chi-square analyses. Rate ratios were calculated.

**Results:** The exemption rate among kindergarteners in states allowing only medical exemptions is 4.14 per 1,000 compared with 14.06 per 1,000 in states allowing medical and religious exemptions and 27.33 per 1,000 in states allowing medical, religious, and philosophical exemptions (p<0.001). Kindergarteners have exemption rates 3.39 (95% CI: 3.01, 3.82) and 6.59 (5.86, 7.42) times greater in states with medical and religious exemptions and medical, religious and philosophical exemptions, respectively, compared to states allowing only medical exemptions.

Exemption rates among middle schoolers were 1.26 per 1,000, 7.83 per 1,000, and 28.39 per 1,000 in states allowing medical only, medical and religious, and medical, religious and philosophical exemptions, respectively (p<0.001). Middle school students have exemption rates 6.23 (3.97, 9.76) and 22.59 (14.41, 35.41) times higher in states allowing medical and religious exemptions and states allowing medical, religious, and philosophical exemptions, respectively, compared with states allowing medical exemptions only.

**Conclusions:** States that allow philosophical exemptions have higher exemption rates than states that do not; the effect this has on vaccination coverage is not known. As additional states pass philosophical exemption laws, the potential increase in the number of children with vaccine exemptions is concerning.

## Contact

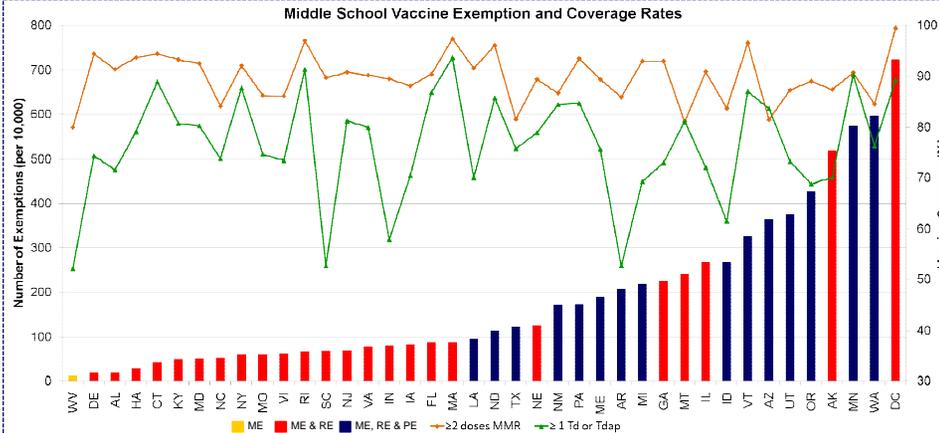
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## Methods

The number of exemptions on file during the 2009-2010 academic year for kindergarten and middle school students in each state or territory were extracted from the School Entry Immunization Assessment Report conducted annually by the Centers for Disease Control and Prevention. States and territories were categorized by the types of exemptions permitted (medical only, medical and religious, and medical, religious, and philosophical); those that did not provide denominator data were excluded from analyses. The proportion of exemptions was calculated for each category and compared using a chi-square test for trend. Rate ratios and 95% confidence intervals were calculated using states that permit only medical exemptions as the reference group.

Average middle school coverage rates for MMR, hepatitis b, varicella, Td/Tdap, and MenACWY vaccines were calculated for each exemption category using 2009 National Immunization Survey Teen data and the proportion of students contributed by each state or territory as weights. Coverage rates for each vaccine were examined by types of exemption permitted and compared using chi-square analyses.

## Results



## Conclusions

States and territories that permit religious and philosophical vaccine exemptions have higher exemption rates than those that do not. The effect that this increase in exemption rates has on vaccine coverage is unclear: differences in vaccine coverage were observed for 2 of the 5 vaccines analyzed; however, these differences likely reflect low vaccine coverage in the single state permitting only medical exemptions, and not adverse effects of increased vaccine exemption rates. Additional studies of the impact of increased vaccine exemption rates using larger datasets and examining trends over time are warranted.

**Table 1. Exemption rates and rate ratios by level of education and type of exemption**

	Exemption Type	Rate (per 1,000)		Rate Ratio	
		Rate	95% CI	Rate Ratio	95% CI
Kindergarten	ME	4.14		Ref	--
	ME & RE	14.06		3.39 (3.01, 3.82)	Ref
	ME, RE & PE	27.33		6.59 (5.86, 7.42)	1.94 (1.91, 1.98)
Middle School	ME	1.26		Ref	--
	ME & RE	7.83		6.23 (3.97, 9.75)	Ref
	ME, RE & PE	28.39		22.59 (14.41, 35.41)	3.63 (3.55, 3.71)
Combined Kindergarten & Middle School	ME	3.61		Ref	--
	ME & RE	11.07		3.03 (2.71, 3.40)	Ref
	ME, RE & PE	28.56		7.70 (6.86, 8.63)	2.54 (2.50, 2.57)

**Table 2. Middle school vaccine coverage rates by type of exemption**

	≥ 2 MMR (%)	≥ 3 HepB (%)	≥ 2 Varicella* (%)	≥ 1 Td or Tdap (%)	≥ 1 MenACWY (%)
ME	79.9	79.4	73.5	52.2	39.0
ME & RE	90.8	90.3	74.7	79.9	54.6
ME, RE & PE	87.4	88.5	78.2	78.7	53.9
<b>p</b>	<b>0.076</b>	<b>0.071</b>	<b>0.748</b>	<b>&lt;0.001</b>	<b>0.044</b>

\*Two or more doses of varicella vaccine or history of disease

The exemption rate among kindergarteners in states allowing only medical exemptions is 4.14 per 1,000 compared with 14.06 per 1,000 in states allowing medical and religious exemptions and 27.33 per 1,000 in states allowing medical, religious, and philosophical exemptions (p<0.001). Kindergarteners have exemption rates 3.39 (95% CI: 3.01, 3.82) and 6.59 (5.86, 7.42) times greater in states with medical and religious exemptions and medical, religious and philosophical exemptions, respectively, compared to states allowing only medical exemptions (Table 1). Similarly, exemption rates among middle schoolers were 1.26 per 1,000, 7.83 per 1,000, and 28.39 per 1,000 in states allowing medical only, medical and religious, and medical, religious and philosophical exemptions, respectively (p<0.001). Middle school students have exemption rates 6.23 (3.97, 9.76) and 22.59 (14.41, 35.41) times higher in states allowing medical and religious exemptions and states allowing medical, religious, and philosophical exemptions, respectively, compared with states allowing medical exemptions only.

No difference in coverage rates for MMR, hepatitis b, and varicella vaccines were observed, while coverage for ≥ 1 dose Td/Tdap and ≥ 1 dose MenACWY differed significantly by type of exemption permitted (Table 2).