Washington State Department of Health

COMPARISON OF DATA SOURCES USED TO EVALUATE SCHOOL IMMUNIZATION LAW CHANGE IN WA STATE

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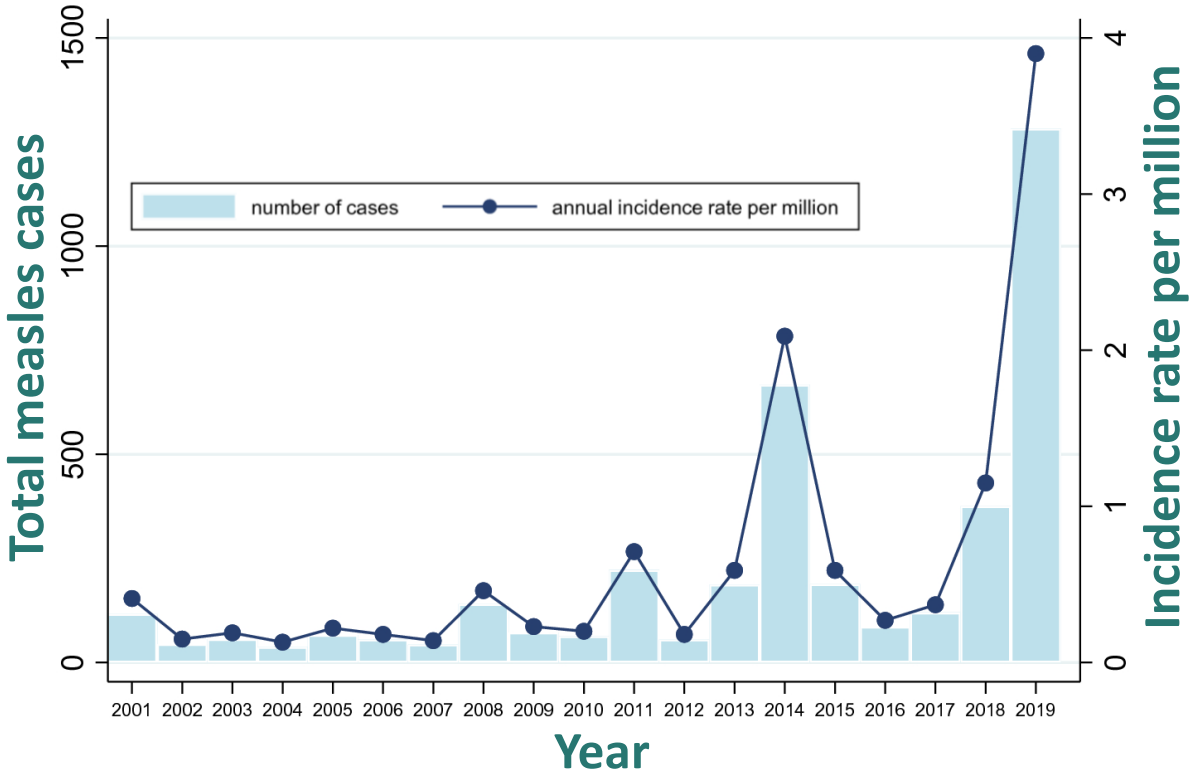
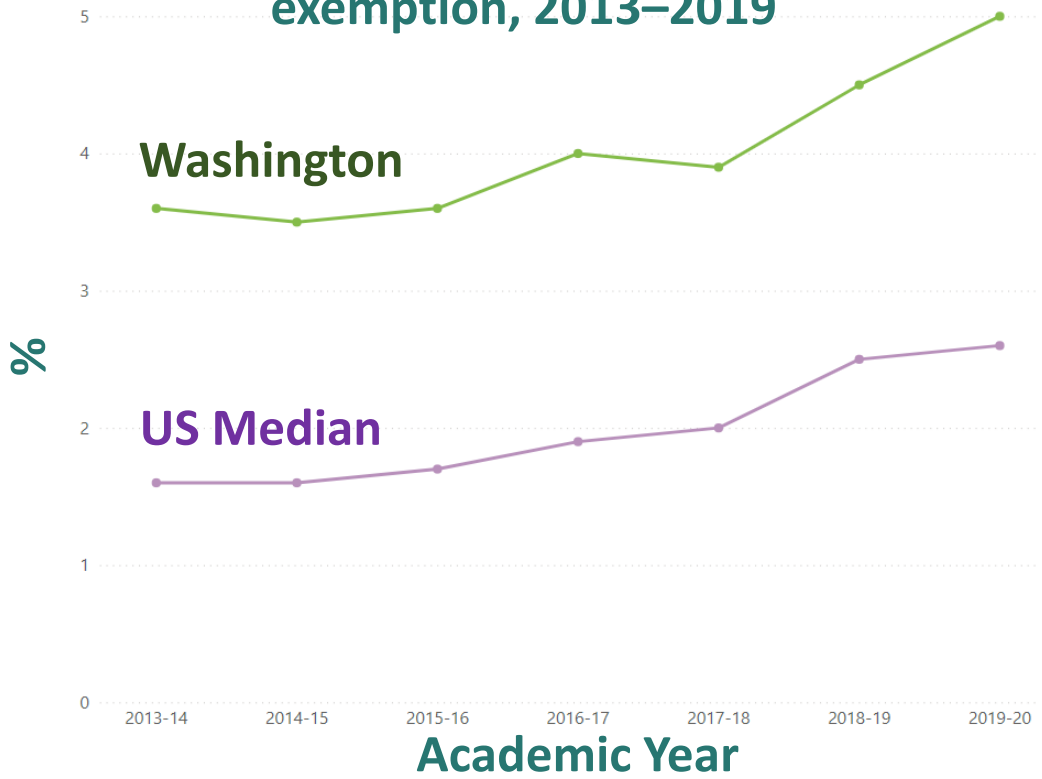
Introduction

The public health problem: preventable measles in the US

Reported measles cases & incidence, 2001–2019



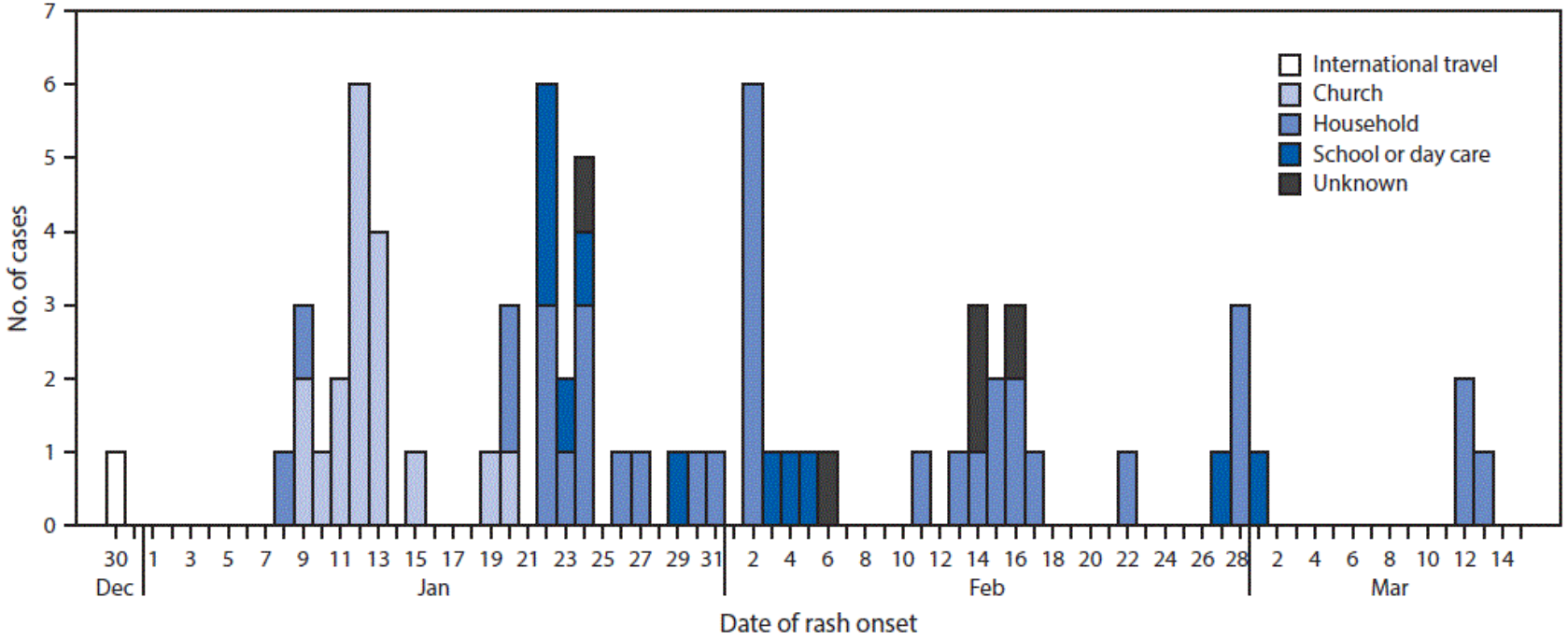
% of kindergartners with a non-medical exemption, 2013–2019



Dimala, CA, Kadia, BM, et al. Factors associated with measles resurgence in the United States in the post-elimination era. Sci Rep 2021;11: 51. / Hall E, Wodi AP, et al. Epidemiology and Prevention of Vaccine-Preventable Diseases, 2021.
Bednarczyk RA, King AR, et al. Current landscape of nonmedical vaccination exemptions in the United States: impact of policy changes. Expert Rev Vaccines. 2019;18(2):175-190.

2019 Clark County, WA measles outbreak among mostly unvaccinated children

Number of measles cases by transmission setting & date of rash onset



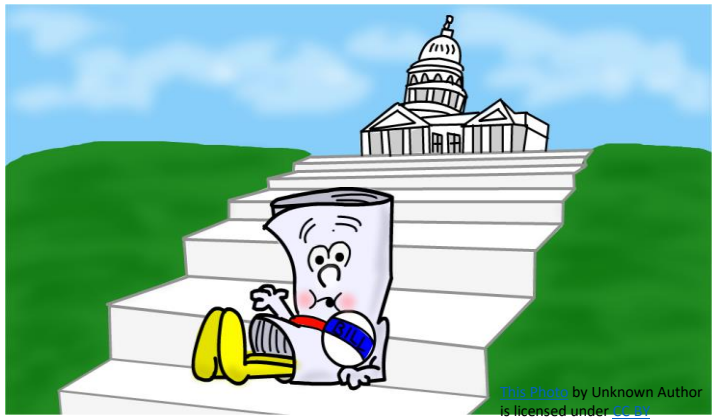
- 71 cases – most statewide since 1990
- 230 people worked on outbreak
- >$800,000 cost to Clark County Public Health

"We must **improve our immunization rates** to prevent future outbreaks & keep our children & other vulnerable people safe."
-Dr. Alan Melnick, Clark County health officer & Public Health director

Carlson A, Riethman M, et al. Notes from the Field: Community Outbreak of Measles — Clark County, Washington, 2018–2019. MMWR Morb Mortal Wkly Rep 2019;68:446–447.

EHB 1638 – removes personal belief exemptions for MMR School Immunization Requirement

- Took effect July 2019
- Medical & religious exemptions still allowed
- Only applies to MMR (personal & philosophical exemption still allowed for other vaccines)
- Concern about “replacement effect” and backlash



https://www.washingtonpost.com/health/2019/04/18/washington-state-senate-passes-vaccine-bill-rebuke-anti-vaxxers/

Objectives

1. Assess impact of EHB 1638 on WA students.
2. Describe benefits of using WA Immunization Information System (WAIIS) data compared to WA Annual School Immunization Report data.

Methods

Data Sources

WA Annual School Immunization Report (School Report)

- Immunization report aggregated at the school-level
- Schools report number of students: complete, exempt, conditional, and out of compliance for each school-required vaccine
- Traditionally used to evaluate impact of immunization policy

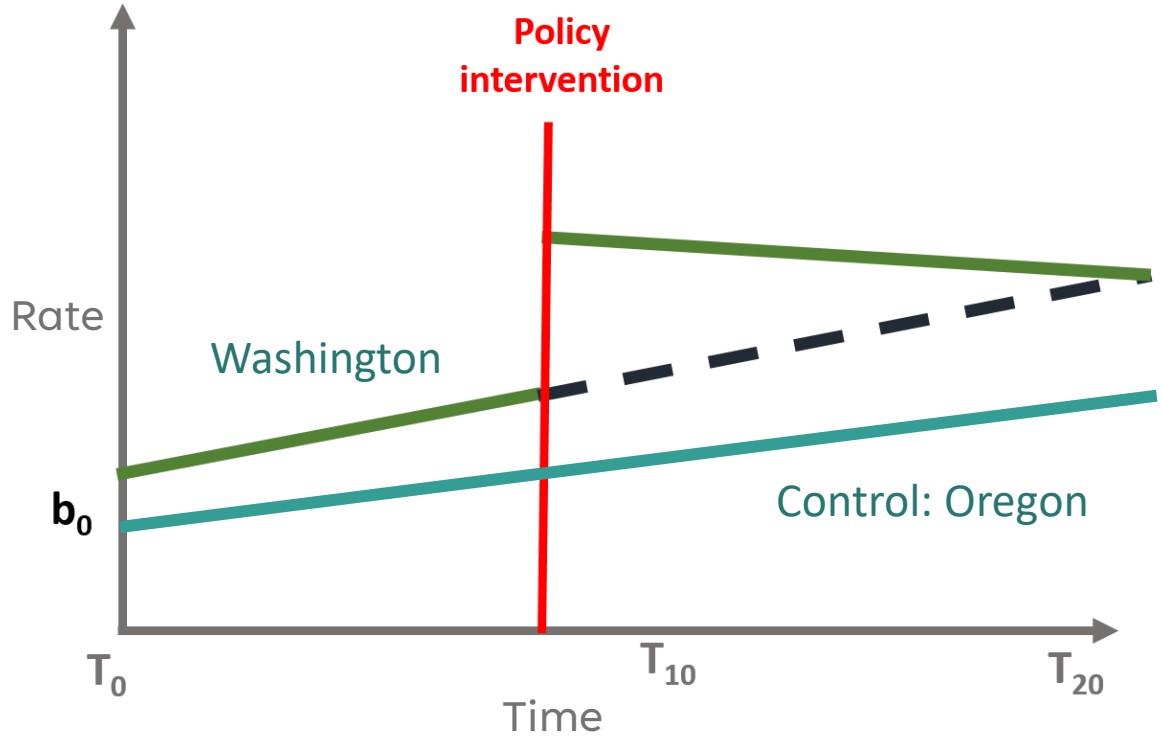
WAIIS School Module

- Began in 2016, only ~15% of schools enrolled at time of analysis
- School-roster data linked to immunization records in the WAIIS
- Individual-level data
- Schools manage and report immunization records

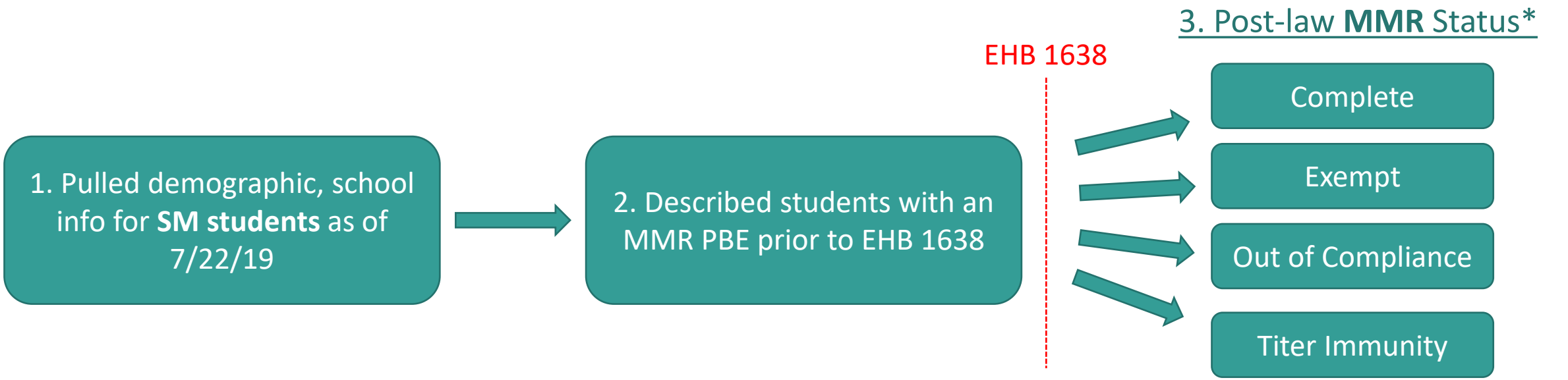
School Report Methodology

1. Assessed over time:
   - Kindergarten MMR Completion Rates
   - K-12 MMR Exemption Rate (Any Type)
   - K-12 Overall Exemption Type Rates (medical, religious, religious membership, personal belief)
2. Mapped school district rates to assess geographic clustering

Statistical methods: Interrupted time series analysis, chi squared tests, Pearson correlation coefficients.



School Module Methodology



*Based on immunization/exemption data from May 2019 – May 2020.

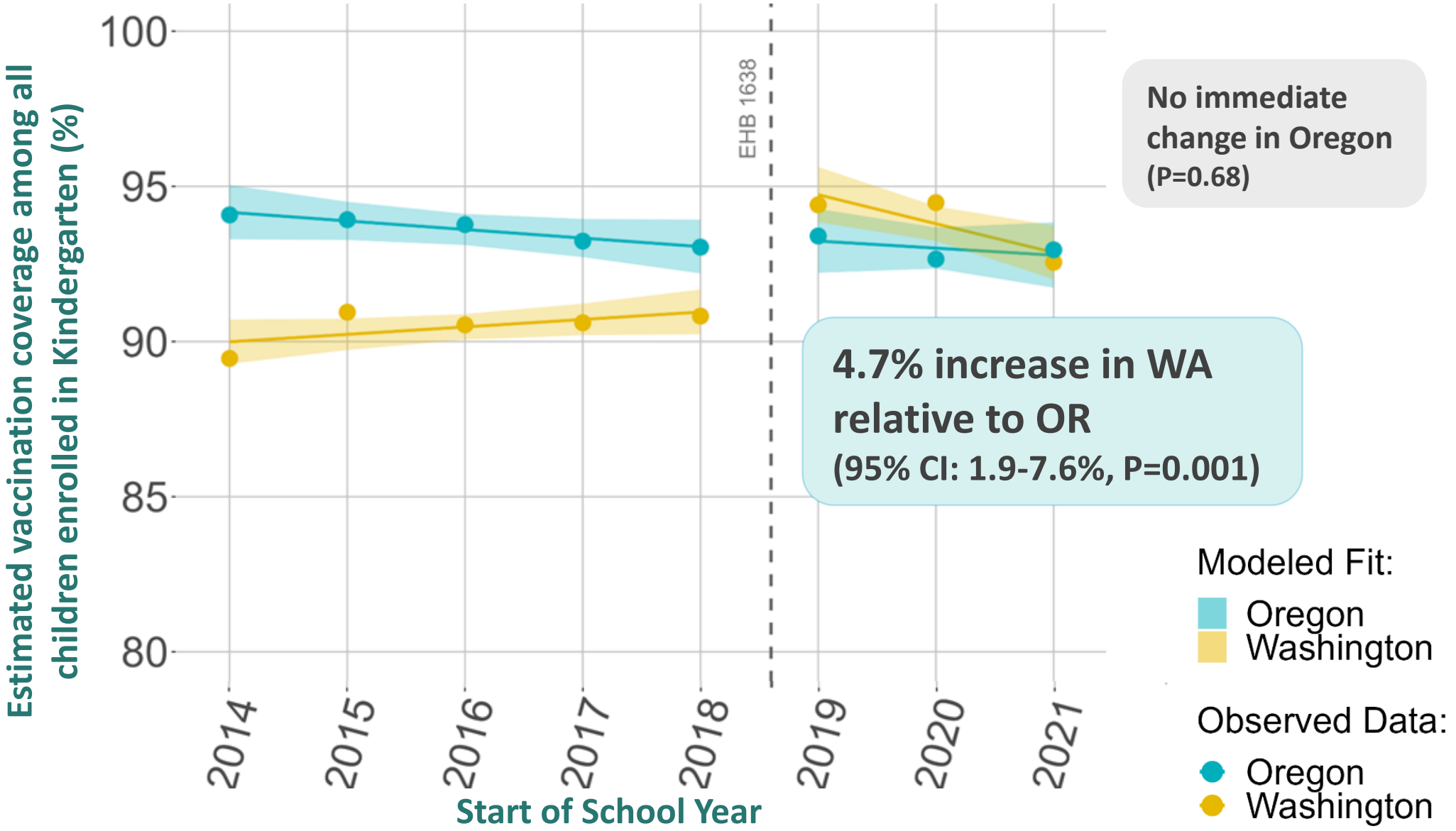
Statistical methods: chi squared tests and multivariable logistic regression models to explore impact on decision to complete series or seek another exemption type.

School Report Results

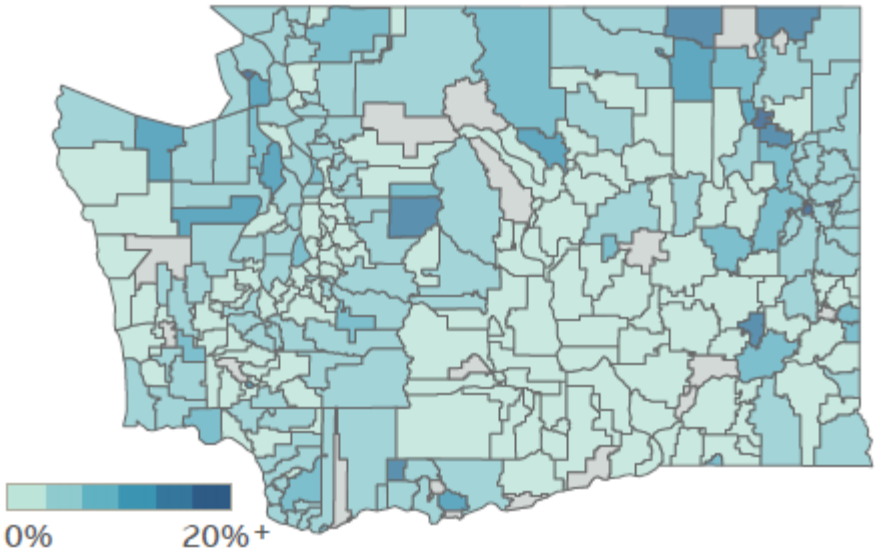
Kindergarten MMR Completion and K-12 Exemption Rates, WA 2014-2022

School Year	Kindergarten MMR Completion	K-12 Any MMR Exemption	K-12 Religious Exemption	K-12 Religious Membership Exemption	K- 12 Medical Exemption	K-12 Personal Belief Exemption
2014-15	89.5%	3.2%	0.3%	0.1%	1.0%	3.9%
2015-16	90.9%	3.0%	0.3%	0.1%	1.0%	3.8%
2016-17	90.5%	3.1%	0.3%	0.1%	1.2%	3.9%
2017-18	90.7%	2.9%	0.3%	0.1%	1.0%	3.7%
2018-19	90.8%	3.1%	0.3%	0.1%	0.9%	3.7%
2019-20	94.4%	1.8%	1.4%	0.2%	1.0%	2.9%
2020-21	94.5%	1.6%	1.2%	0.2%	0.7%	2.2%
2021-22	92.7%	1.7%	1.4%	0.2%	0.7%	2.0%

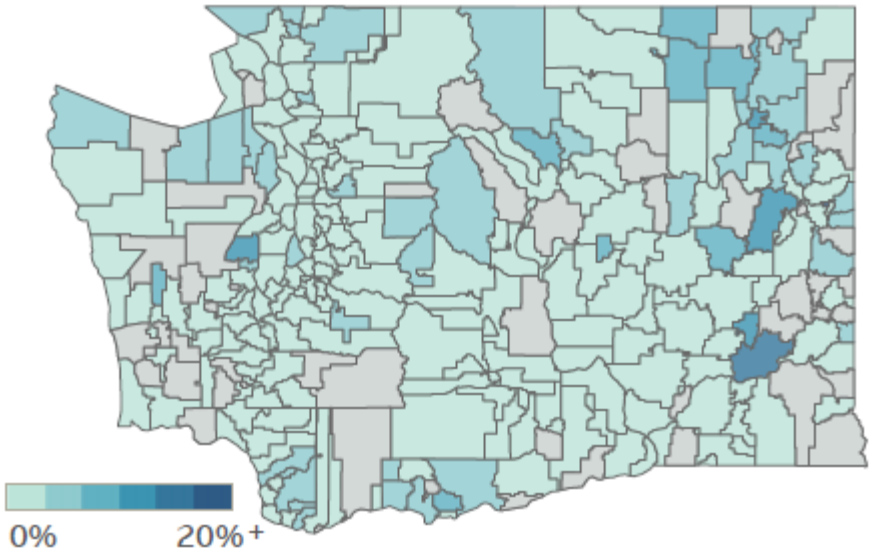
Change in MMR Completion Rates: WA vs OR



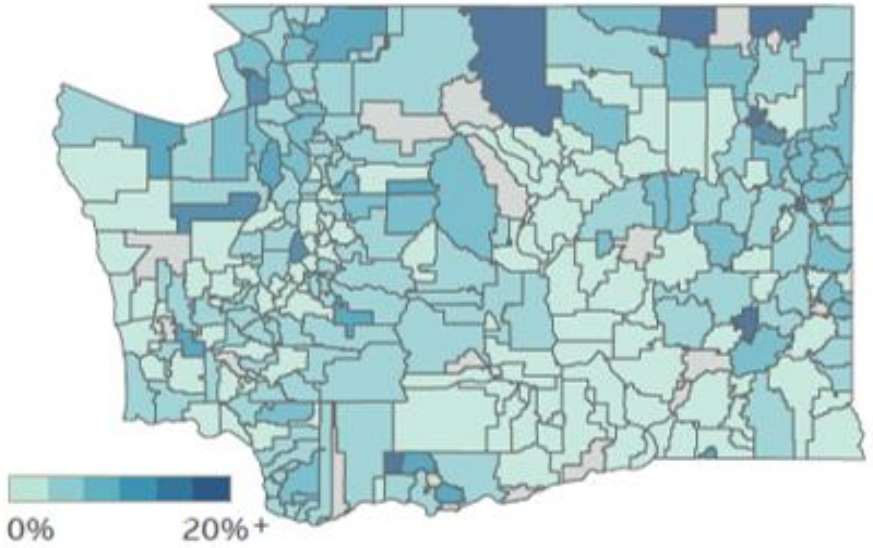
Pre-EHB 1638 MMR Exemption Rate



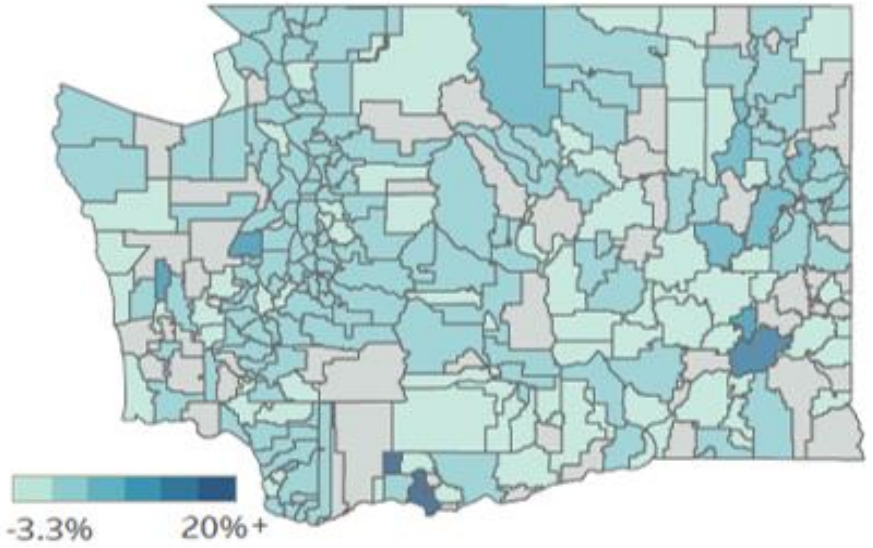
Post-EHB 1638 MMR Exemption Rate



Pre-EHB 1638 Personal Belief Exemption Rate



Change in Religious Exemptions Pre to Post



Summary of **School Report** Results

Following EHB 1638,

- Kindergarten MMR completion rates increased **4.7% relative to Oregon**
  - **3.6% absolute increase** in first year (90.8% in 2018/2019 to 94.4% in 2019/2020)
- K-12 MMR exemptions (any exemption type) **decreased ~45% statewide**
- Religious exemption rate (for any vaccine) **increased 367% (0.3% to 1.4%)**
- Personal belief exemption rate pre-EHB 1638 correlated with increase in religious exemptions

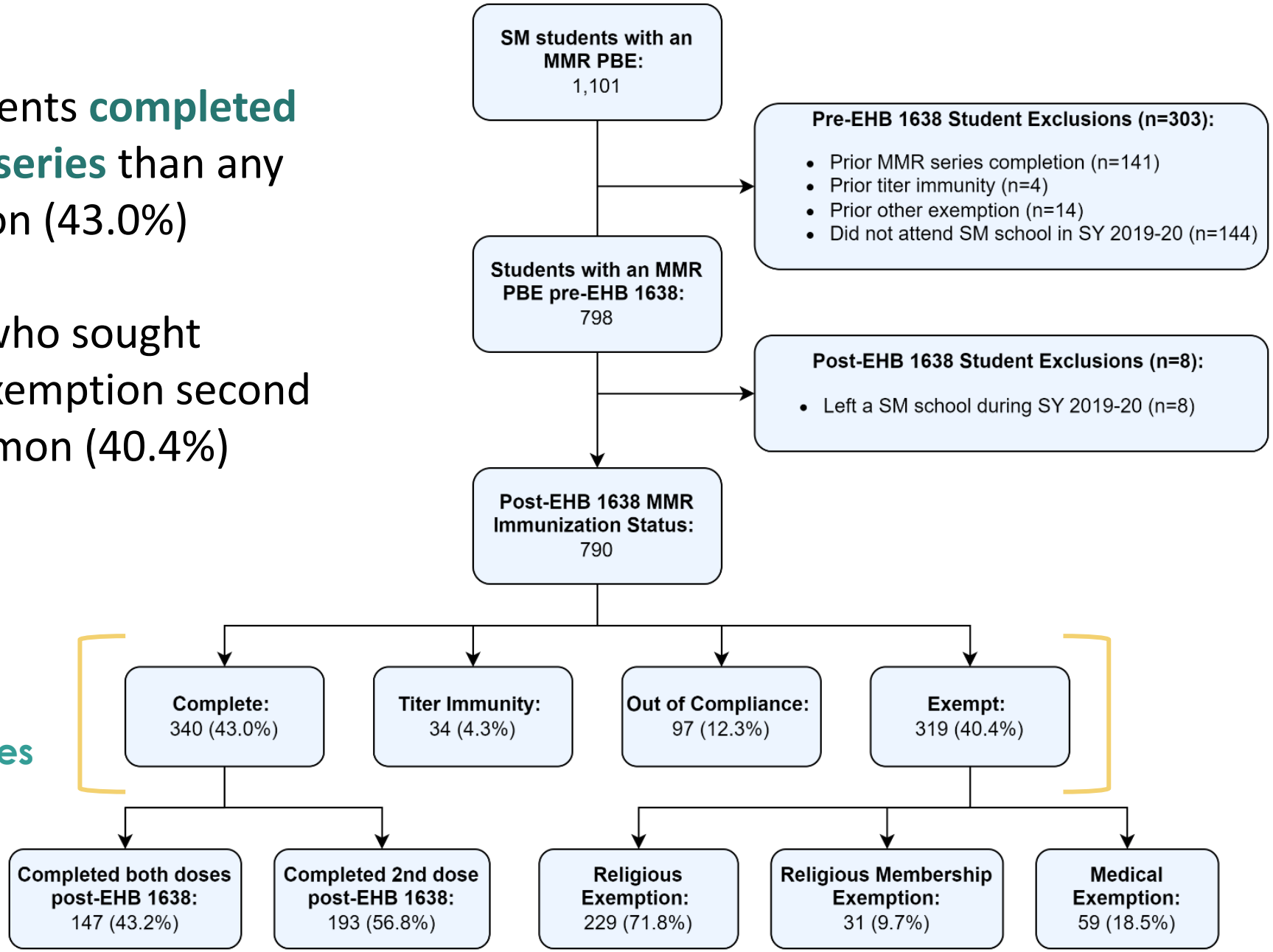
School Module Results

Characteristics of MMR personal belief exempt cohort and all other students in select schools, WA, July 2019.

	MMR PBE COHORT (n= 798)		Non-MMR PBE Cohort (n = 143,235)		p-value
	N	%	N	%	
Age of Student					
0-5 years old	47	5.9%	6,154	4.3%	0.027
6-10 years old	469	58.8%	54,343	37.9%	<0.0001
11-14 years old	182	22.8%	42,275	29.5%	<0.0001
15+	100	12.5%	40,463	28.2%	<0.0001
Sex					
Male	407	51.0%	73,515	51.3%	0.856
Female	391	49.0%	69,657	48.6%	0.837
Other/Unknown	0	0.0%	63	0.0%	n/a
Race/Ethnicity					
White (NH)	372	65.7%	60,476	45.8%	<0.0001
Black (NH)	45	8.0%	13,476	10.2%	0.078
Other (NH)	115	20.3%	36,157	27.4%	0.0002
Hispanic (all races)	34	6.0%	22,292	16.9%	<0.0001
Unknown	232	n/a	10,905	n/a	
Grade Level					
Pre-School	31	3.9%	5,227	3.6%	0.724
Kindergarten	104	13.0%	11,132	7.8%	<0.0001
Elementary School	440	55.1%	55,294	38.6%	<0.0001
Middle School	120	15.0%	31,381	21.9%	<0.0001
High School	103	12.9%	40,201	28.1%	<0.0001
School Type					
Public	739	92.6%	140,132	97.8%	<0.0001
Private	59	7.4%	3,103	2.2%	<0.0001
RUCA (code) Classification					
Urban Core (1)	652	81.7%	123,322	86.1%	0.0004
Suburban (2, 3)	54	6.8%	4,752	3.3%	<0.0001
Large Rural (4-6)	41	5.1%	9,954	6.9%	0.045
Small town/rural (7-10)	51	6.4%	5,207	3.6%	<0.0001
Other disease exemptions held (pre-EHB 1638)					
None	0	0.00%	141,486	98.8%	<0.0001
Low (1-4)	133	16.67%	1,015	0.7%	<0.0001
High (5-8)	665	83.33%	734	0.5%	<0.0001

- More students **completed the MMR series** than any other action (43.0%)
- Students who sought another exemption second most common (40.4%)

Main Outcomes



Logistic regression results comparing MMR complete-exempt and complete-ooc post-EHB 1638 immunization status, 2019-20.

	MMR Complete vs. Exempt			MMR Complete vs. OOC		
Variable	**OR**	**95% CI**		**OR**	**95% CI**	
Grade Category						
Pre-K, Kindergarten, Elementary School	-	-	-	-	-	-
Middle School	1.26	0.72	2.19	2.11	0.73	6.11
High School	1.12	0.63	1.99	0.64	0.28	1.47
Race/Ethnicity						
White (NH)	-	-	-	-	-	-
Black (NH)	**0.42**	**0.19**	**0.94**	**0.13**	**0.05**	**0.34**
Other (NH)	**1.92**	**1.17**	**3.16**	2.23	0.84	5.89
Hispanic (all races)	1.45	0.61	3.45	0.66	0.21	2.08
School Type						
Public	-	-	-	-	-	-
Private	0.85	0.32	2.23	**0.15**	**0.05**	**0.46**
RUCA Category						
Urban Core	-	-	-	-	-	-
Suburban	**2.89**	**1.22**	**6.87**	2.54	0.57	11.37
Large Rural	2.15	0.75	6.10	**0.18**	**0.07**	**0.47**
Small town/rural	0.70	0.33	1.50	0.49	0.15	1.65
Other Immunization Exemptions held pre-EHB 1638						
High (5-8)	-	-	-	-	-	-
Low (1-4)	**2.18**	**1.25**	**3.79**	1.08	0.47	2.46
SY 2018-2019 School MMR Exemption Rate						
High (≥4.2%)	-	-	-	-	-	-
Low (< 4.2%)	**2.21**	**1.31**	**3.71**	**2.55**	**1.12**	**5.79**

Summary of **School Module** Results

- Of SM students with an MMR PBE pre-EHB 1638, **43% completed the MMR vaccine series** and **40.4% sought another MMR exemption type**.

- Identified demographic and school characteristics associated with:
  1. holding a MMR PBE pre-EHB 1638
  2. post-EHB 1638 immunization status

School Module data offer deeper insight into impact…

PROS

- Identified groups differentially impacted and possibly at increased risk to vaccine-preventable disease outbreaks.
- Allows for determination of the proportion of students who completed the MMR vaccine, claimed another MMR exemption, and remained out of compliance post-EHB 1638.
- Allows for longitudinal analysis and provides a validated data source for evaluation.

CONS

- Student roster data can be more challenging to obtain.
- Not complete yet (50% of schools enrolled as of 2022-23).

School Report data offer historical comparability…

PROS

- Allowed for a standardized comparison of rates over time.
- Allowed for the comparison to other jurisdictions (Oregon).
- Historically, how other immunization policies have been evaluated for their impact, including in WA.

CONS

- These data represent an annual snapshot in time and are primarily based on parental-reported vaccine history.
- Only at school-level.

Main Conclusions

- Immunization policies **can increase vaccine coverage** rates.

- EHB 1638 was **associated with an increase in MMR vaccination coverage,** but **religious exemption rates increased significantly.**

- Student roster data linked to the WAIIS (School Module) is a new data source that can supplement (and could eventually replace) School Report data
  - Can be used to **inform public health efforts** and **identify groups that may be at increased risk** to vaccine-preventable disease outbreaks.

Acknowledgements

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- **Elizabeth Zell**

And to the teams responsible for preparing the School Report data:

- **WA DOH School Immunization Team**
- **Oregon Health Authority School Immunization Team**

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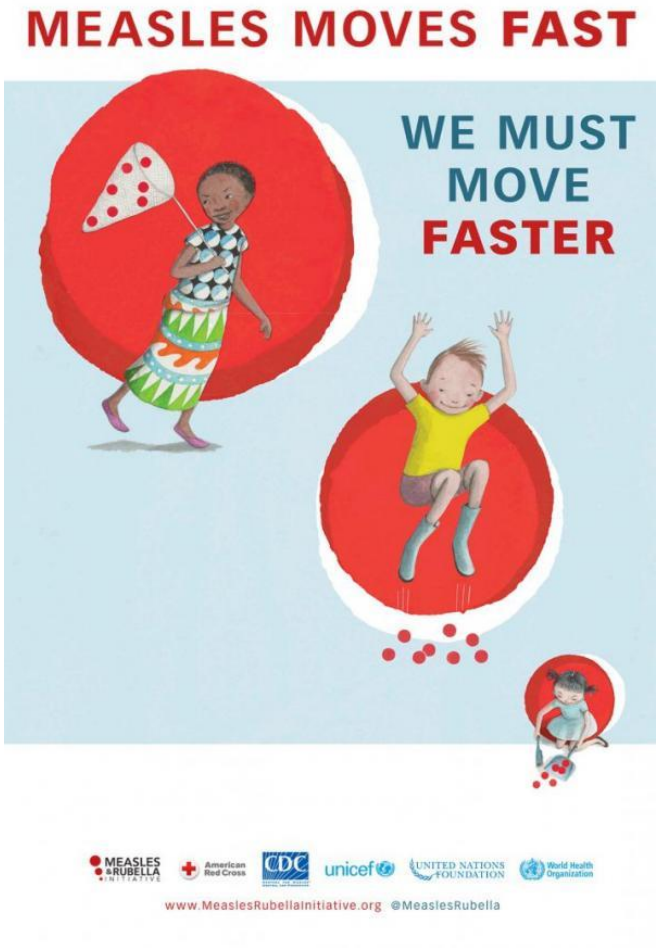
THANK YOU!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