Using Michigan's Immunization Information System to Assess When Children Fall Behind in the Recommended Vaccination Schedule

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Outline

- Vaccine recommendations for children 0 to 2 years of age
- Michigan's childhood vaccination coverage
- Using the Michigan Care Improvement Registry (MCIR) to assess vaccination coverage
- When and which vaccines Michigan children fall behind on
- Results and methods to address identified issues

Childhood Vaccine Recommendations

- From 0 to 2 years of age children are recommended up to 25* vaccinations to prevent 14 infectious diseases[1]
- Schedule designed to protect children when most vulnerable
- Recommendations based on ages vaccines are safe and effective
- No known benefits to delaying vaccinations[2]
  - Susceptible to diseases longer periods, risk being exposed to diseases
- A majority of children do not receive vaccinations on time
  - 2016 assessment of NIS data: only 23% of children 24-35 months of age were vaccinated with the primary 4313314 series on time[3]
  - Michigan study of vaccine timeliness at age 24 months of children born 2006-2010: only 13.2% were vaccinated on time[4]

*3 HepB, 2 or 3 Rotavirus, 4 DTaP, 3 or 4 Hib, 4 PCV, 3 IPV, 1 MMR, 1 Varicella, 2 HepA; doesn't include influenza

1. Recommended childhood and adolescent immunization schedule: https://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html
2. The Childhood Immunization Schedule: https://www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-child-immun-color-office.pdf
3. Kurosky et al. Completion and compliance of childhood vaccinations in the United States. *Vaccine*. 2016;34(3): 387-395.
4. Wagner et al. Vaccination Timeliness at Age 24 months in Michigan Children Born 2006-2010. Am J of Prev Med. 2018;54(1);96-102

Vaccination Coverage for Children 19 – 35 months of age, National Immunization Survey (NIS), 2007-2016

Year	Measure	MI Coverage	MI Sample Size	National Coverage	Point Estimate Rank
2007	4313314	66.9 ± 7.5	270	66.5 ± 1.3	20th
2008	4313314	69.8 ± 6.8	282	68.4 ± 1.2	17th
2009	4313314*	52.1 ± 7.4	331	44.3 ± 1.4	5th
2010	4313314*	65.2 ± 5.7	270	56.6 ± 1.3	5th
2011	4313314*	66.2 ± 7.6	386	68.5 ± 1.3	34th
2012	4313314*	70.5 ± 7.3	283	68.4 ± 1.4	22nd
2013	4313314*	70.0 ± 7.4	212	70.4 ± 1.5	24th
2014	**4313314***	**65.0 ± 8.5**	**245**	**71.6 ± 1.5**	**47th**
2015	4313314*	67.6 ± 7.3	254	72.2 ± 1.4	44th
2016	4313314*	70.2 ± 7.6	230	70.7 ± 1.5	29th

4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 HepB, 1 Varicella, 4 PCV; *Full Hib series (3 or 4 doses depending on vaccine received)

https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/7-series/index.html

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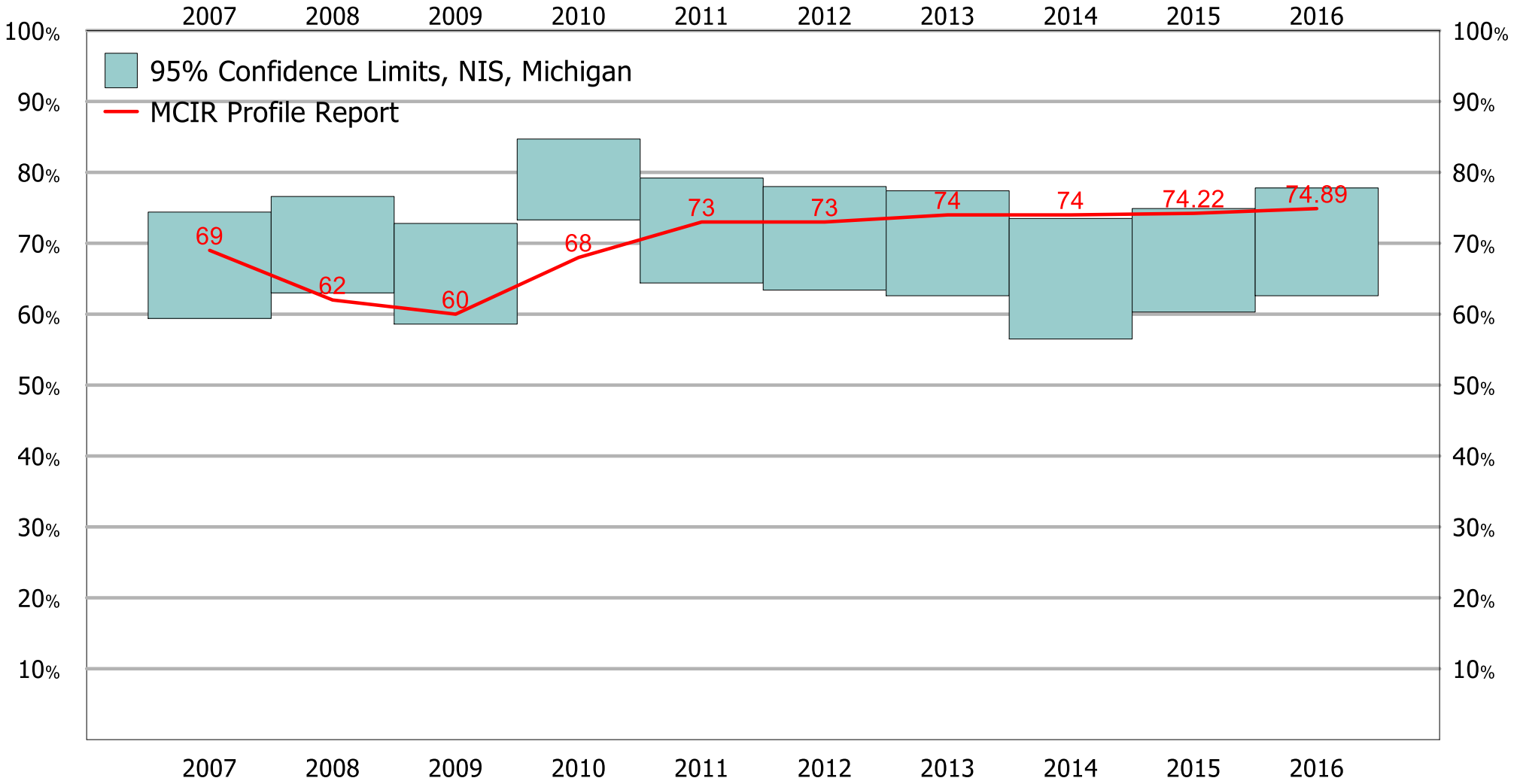
Michigan's Immunization Information System, MCIR

- A statewide, population-based IIS
  - Implemented in 1998 for health care providers to track children's vaccinations
  - Continually populated since 1994 with birth records
  - Required reporting within 72 hours of administration for children aged less than 20 years
- As of June 30, 2018:
  - 9.7 million Michigan residents with a MCIR record
    - Pediatric (<=18 years): 2.4 million
    - Adult (>18 years): 7.3 million
    - 133.5 million vaccination records
- MCIR can be used to assess vaccination coverage at any age
  - NIS data provide coverage for 19-35 month olds
  - Large sample sizes

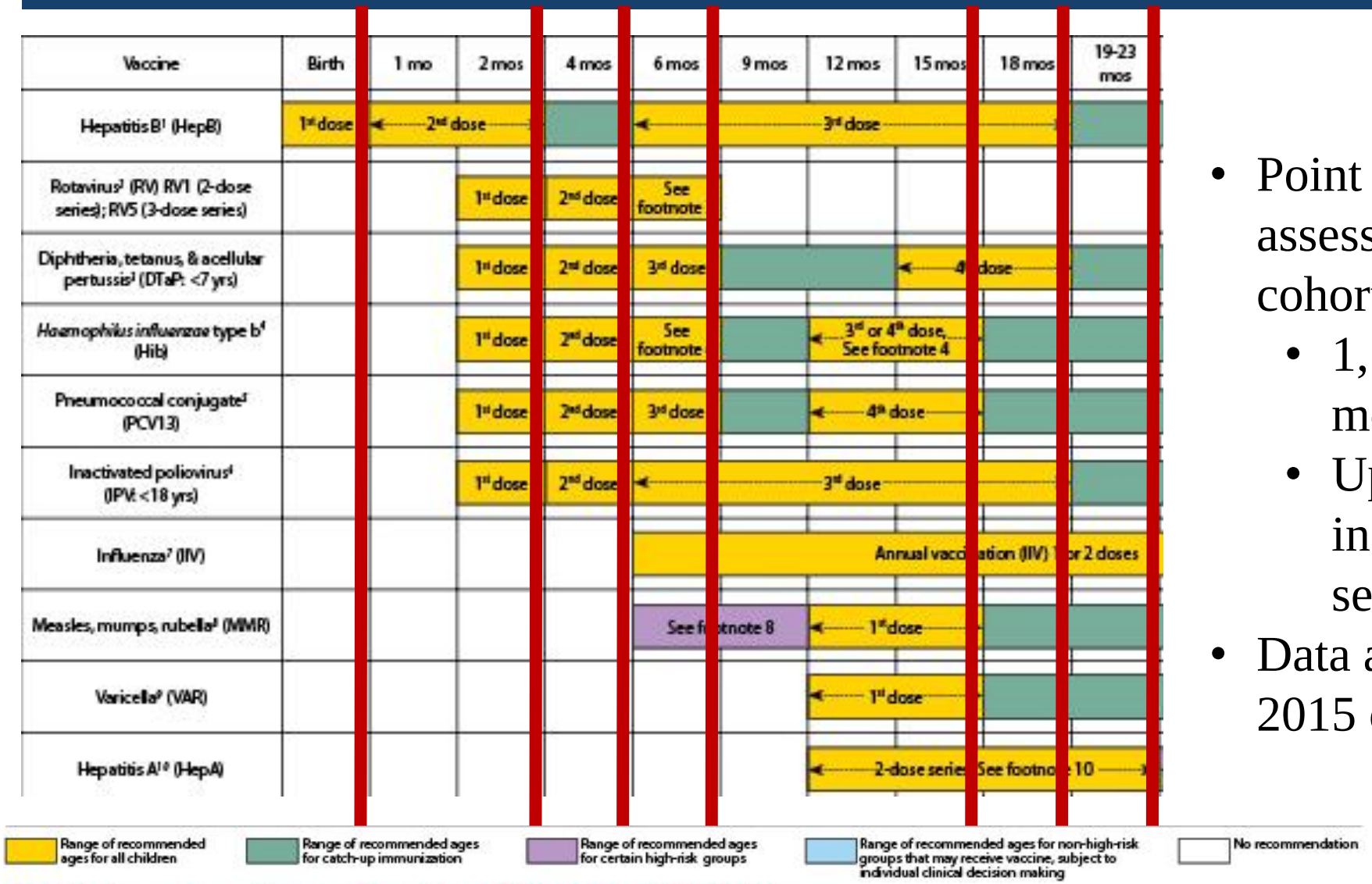
NIS Coverage Estimates for 4:3:1:3:3:1:4
Compared to MCIR Profile Report
Children age 19 through 35 months
Michigan, 2007 - 2016



Study Objectives

- Drop in NIS coverage and stagnant MCIR data prompted MDHHS to determine:
  - **When** children fall behind in their recommended vaccinations
  - **Which** vaccines children are not receiving

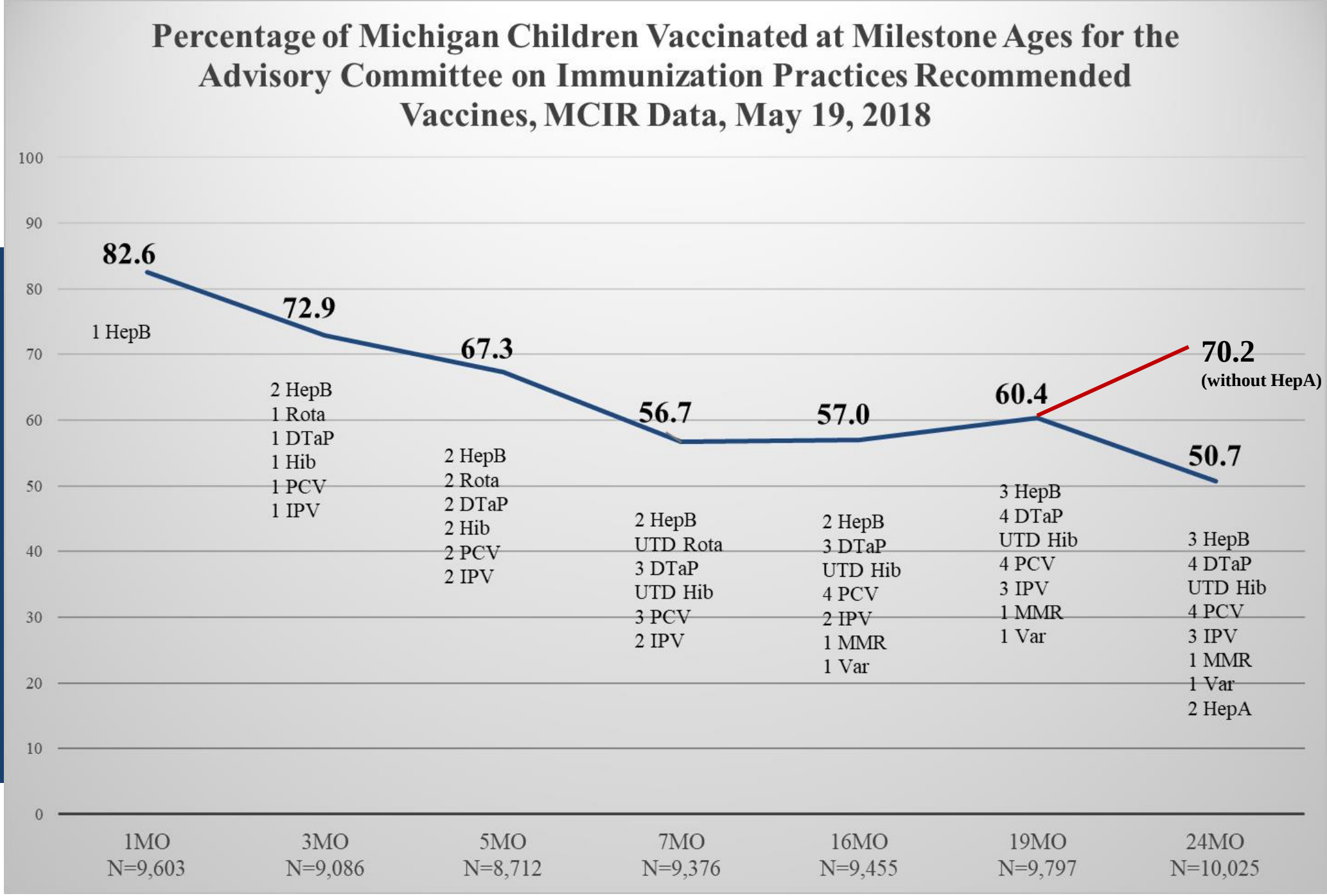
Methods



- Point in time coverage assessment of one month cohorts at:
  - 1, 3, 5, 7, 16, 19, and 24 months of age
  - Up-to-date status for individual antigens and series based on age
- Data analyzed since November 2015 on a bimonthly schedule

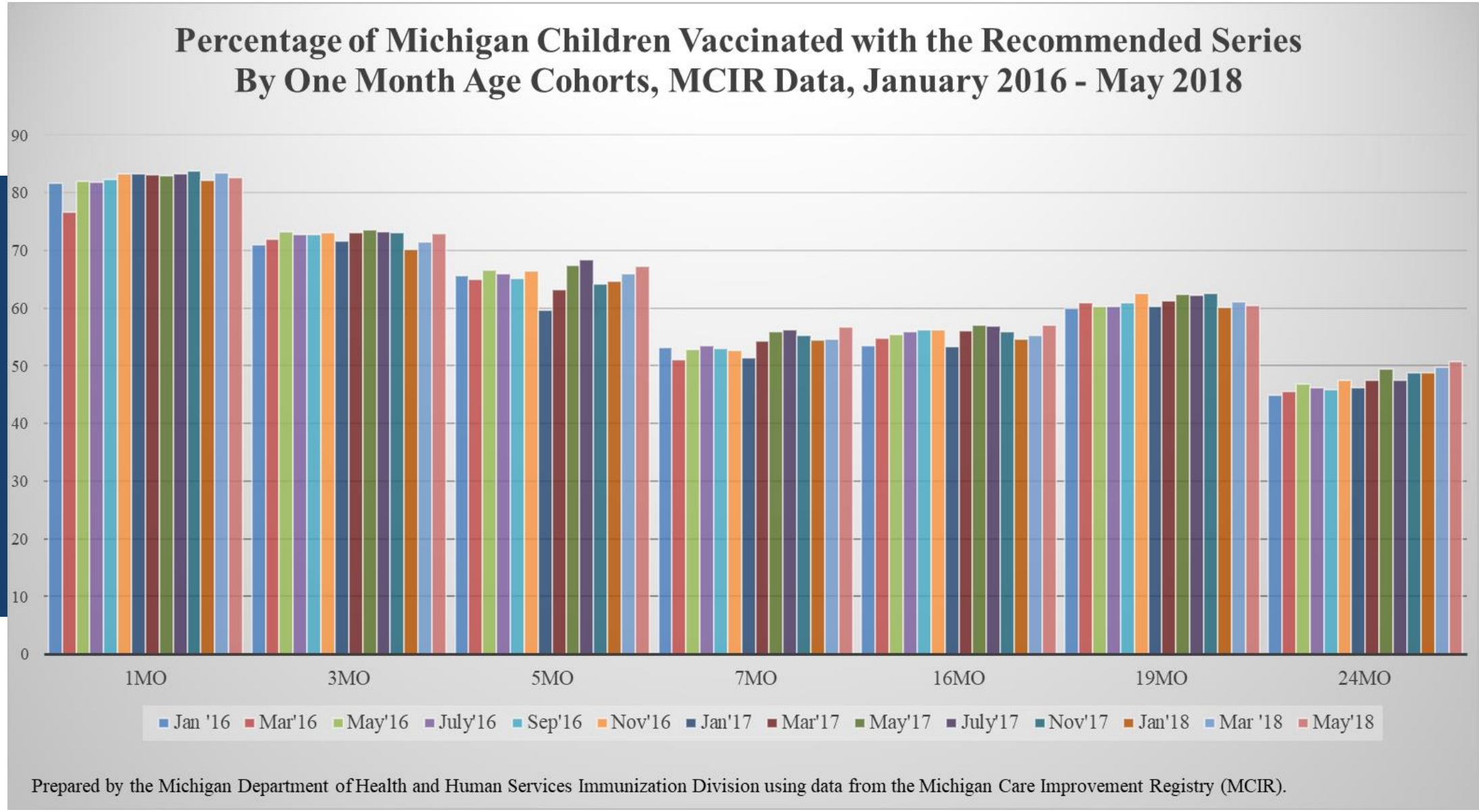
https://www.cdc.gov/vaccines/schedules/hcp/child-adolescent.html

Result #1: series vaccination coverage

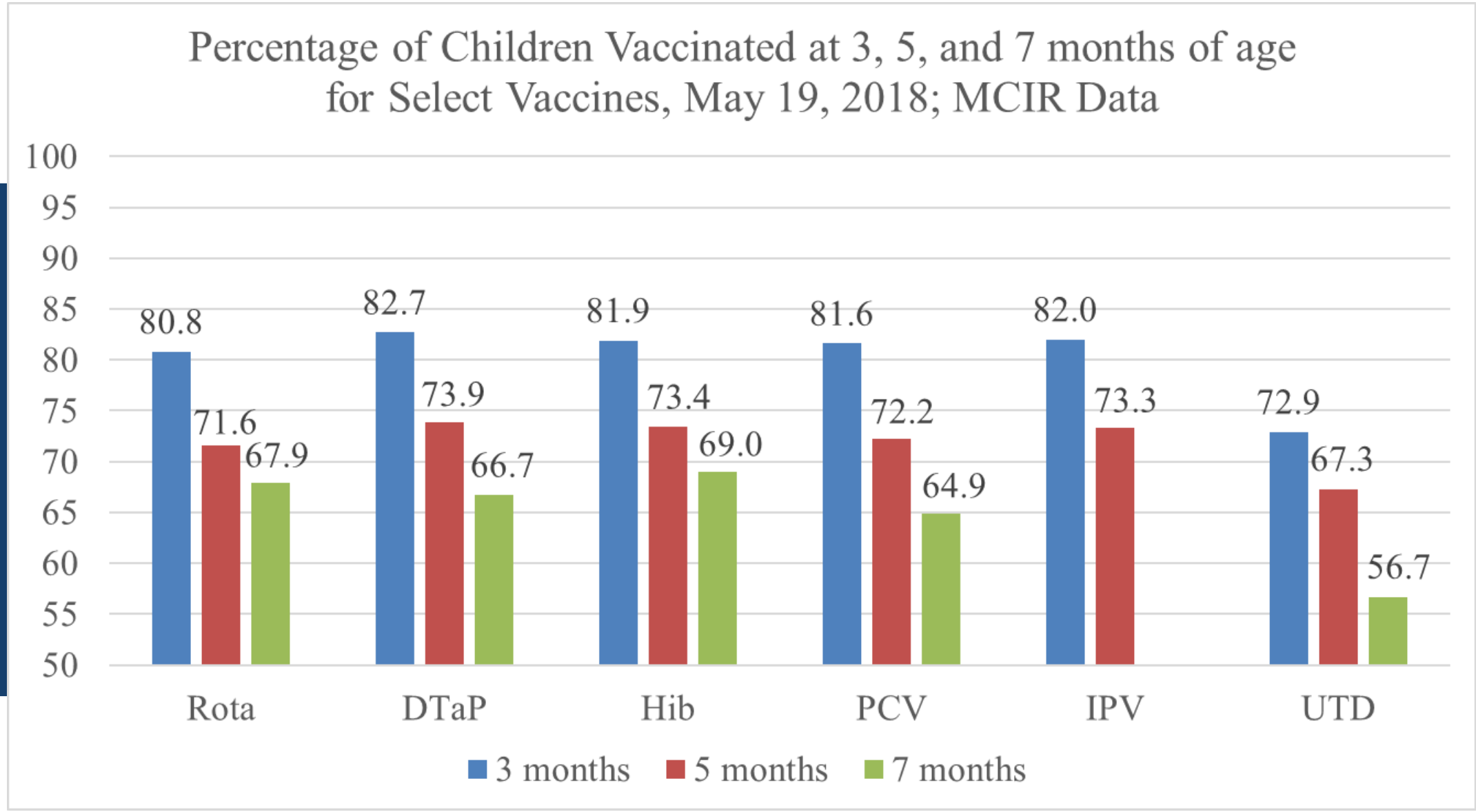


Prepared by the Michigan Department of Health and Human Services Immunization Division using data from the Michigan Care Improvement Registry (MCIR).

Result #2: series vaccination coverage over time

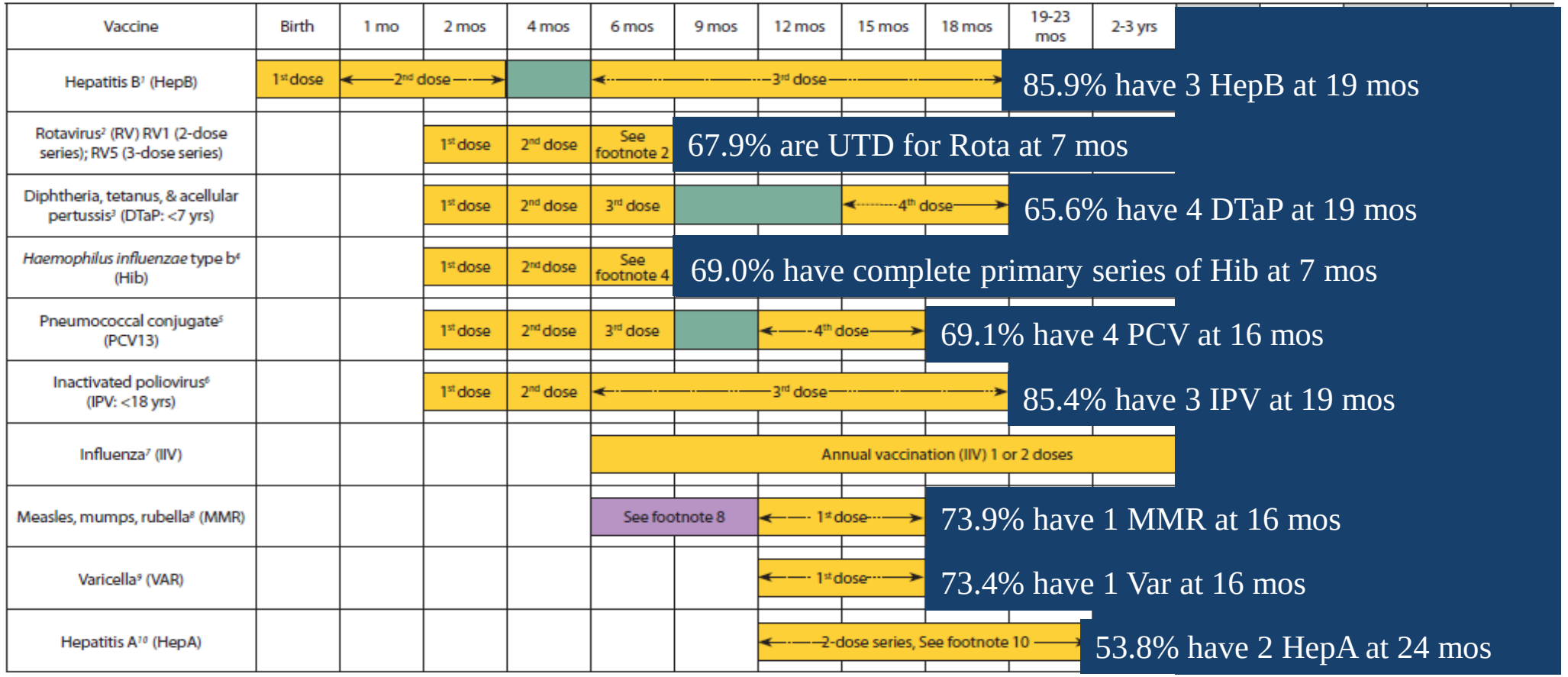


Result #3: antigen-level vaccination coverage by select age cohorts



Result #3: antigen-level vaccination coverage: May 19, 2018 data

Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger—United States, 2018.
(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).
These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green ba
To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



85.9% have 3 HepB at 19 mos

67.9% are UTD for Rota at 7 mos

65.6% have 4 DTaP at 19 mos

69.0% have complete primary series of Hib at 7 mos

69.1% have 4 PCV at 16 mos

85.4% have 3 IPV at 19 mos

73.9% have 1 MMR at 16 mos

73.4% have 1 Var at 16 mos

53.8% have 2 HepA at 24 mos

Discussion: result #1

- Result: Michigan children quickly fall behind in vaccinations
  - ~ half of children 7 months of age are not UTD
- Existing literature on why this happens
  - Complexity and frequency of the vaccination schedule
    - Missed vaccination visits[1]
    - Lack of flexibility in scheduling appointments[2]
    - Personal barriers: lack of reliable transportation, chaotic home environment, employment conflicts[2]

1. Luman E, Chu S. When and Why Children Fall Behind with Vaccinations: Missed Visits and Missed Opportunities at Milestone Ages. American Journal of Preventative Medicine. 2009; 36(2):105-111.
2. Lannon C, Brack V, Stuart J. What Mothers Say About Why Poor Children Fall Behind in Immunizations: A Summary of Focus Groups in North Carolina. *Arch Pediatr Adolesc Med.* 1995;149(10):1070-1075

Methods to address result #1

- 2018 MI study: children who received the HepB birth dose on time were less delayed for all vaccine doses[1]
- Increased access to vaccination services
  - Vaccine-only visits, extended office hours
- Strengthen provider messages
  - Provider recommendation is one of the most important predictors of vaccine acceptance
  - Discuss importance of timely vaccinations before baby is born
- Utilize MCIR
  - Forecasting - shows all vaccines a child is recommended at a visit (considers ACIP's catch-up immunization schedule)
  - Send reminder/recalls – consider younger ages

1. Wagner et al. Vaccination Timeliness at Age 24 months in Michigan Children Born 2006-2010. Am J of Prev Med. 2018;54(1);96-102

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Discussion: result #2

- Result: no notable upward trends in UTD coverage in the one month age cohorts assessed over the previous 2+ years

- MDHHS initiatives over the last 2 years:
  - County-level data sent to local health departments (LHDs), immunization action plan (IAP) coordinators, additional immunization stakeholders on a bi-monthly basis
  - Presented to our Michigan Advisory Committee on Immunizations
  - An article summarizing the findings was printed in Michigan State Medical Society's publication (provider audience)

Methods to address result #2

- Surveyed LHDs on use of data, distribution frequency, continuation of distribution
  - Moved to a quarterly basis
  - Added interactive maps and instructions for use
- Included use of the data in IAPs annual plans
- Plan to conduct statewide reminder/recalls for children 6 to 18 months on a quarterly basis

Discussion: result #3

- Result: antigen-specific differences in vaccination coverage
- Existing literature:
  - Increase in parental vaccine hesitancy
    - 2010 national survey of physicians: 89% of respondents reported at least one vaccine refusal by a parent each month[1]
    - Increasing numbers of alternative vaccination schedule requests or postponing vaccinations
  - Misconceptions on the safety of vaccinations[2]
- MI study (unpublished[3]) investigating the neighborhood characteristics on low coverage of DTaP dose 4
  - Affluence: may be related to anti-vaccination sentiment
  - Socioeconomic disadvantage: may be an indication of limited access to healthcare resources

1. Kempe A et al. Prevalence of parental concerns about childhood vaccines: the experience of primary care physicians. Am J Prev Med 2011; 40:548- 55; PMID:21496754
2. Edwards K et al. Countering Vaccine Hesitancy. Pediatrics; August 2016
3. Manuscript preparation in progress: contact Rachel Potter (PotterR1@Michigan.gov) with questions

Methods to address result #3

- MDHHS increased provider education initiatives on vaccine hesitancy
  - Hosted a webinar, “Promoting Vaccine Confidence: A New Approach to Vaccine Hesitancy” on April 18, 2018
    - Over 700 people participated in the webinar
    - Methods to address antigen-specific concerns
  - Developed a peer educational module
- Summaries of the data are included in multiple nurse education modules
- Continue work to determine useful community-level interventions based on antigen
- Additional antigen-level analyses

Take home messages for the IIS community

- IIS's are a valuable resource for investigating and understanding vaccination coverage within your state.
- IIS data can help programs develop targeted interventions.
- When IIS data summaries are shared with stakeholders you also need to include examples/instructions for data use.

Questions

- Cristi Bramer: BramerC@Michigan.gov