



Department
of Health

Immunized on time?

Impact of household dynamics on timing and completeness of early childhood immunization series

New York State Immunization Information System

Seungjun Seo, MS

NYSIIS Introduction

- New York State Immunization Information System (NYSIIS)
 - Began in early 1990's
 - Legislation in 2006
 - Mandated reporting persons under 19
 - Individuals 19 and older participate by consent
 - Birth records
 - NYC maintains a separate IIS

NYSIIS Introduction

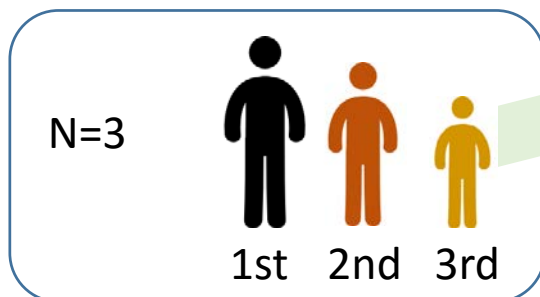
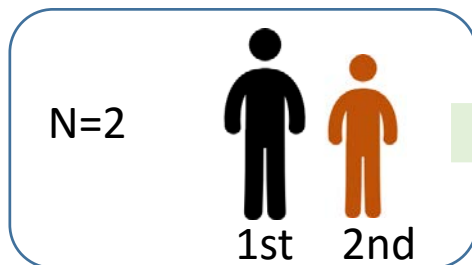
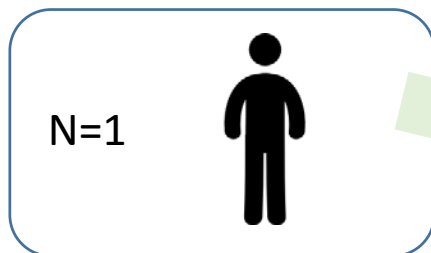
- 6.6 million patients
- 87.6 million immunizations
- Over 10,000 organizations participating
- 23,979 individual users accounts
- 80 EHR vendors

Purpose

- Householding
 - Easy patient look up – at the family level
 - Potential for use in “patient portal”
 - Reminder recall
 - Reports
 - Outreach

Purpose

Household



Association ?

Number of Children

Birth Order

Gender

Age Gap

Birth Season

Twin Status

Immunization

Immunization
Series
Completion

4313314

4 DTaP 3 polio 1 MMR
3 Hib 3 Hep B
1 varicella 4 PCV

Methods

Cohort

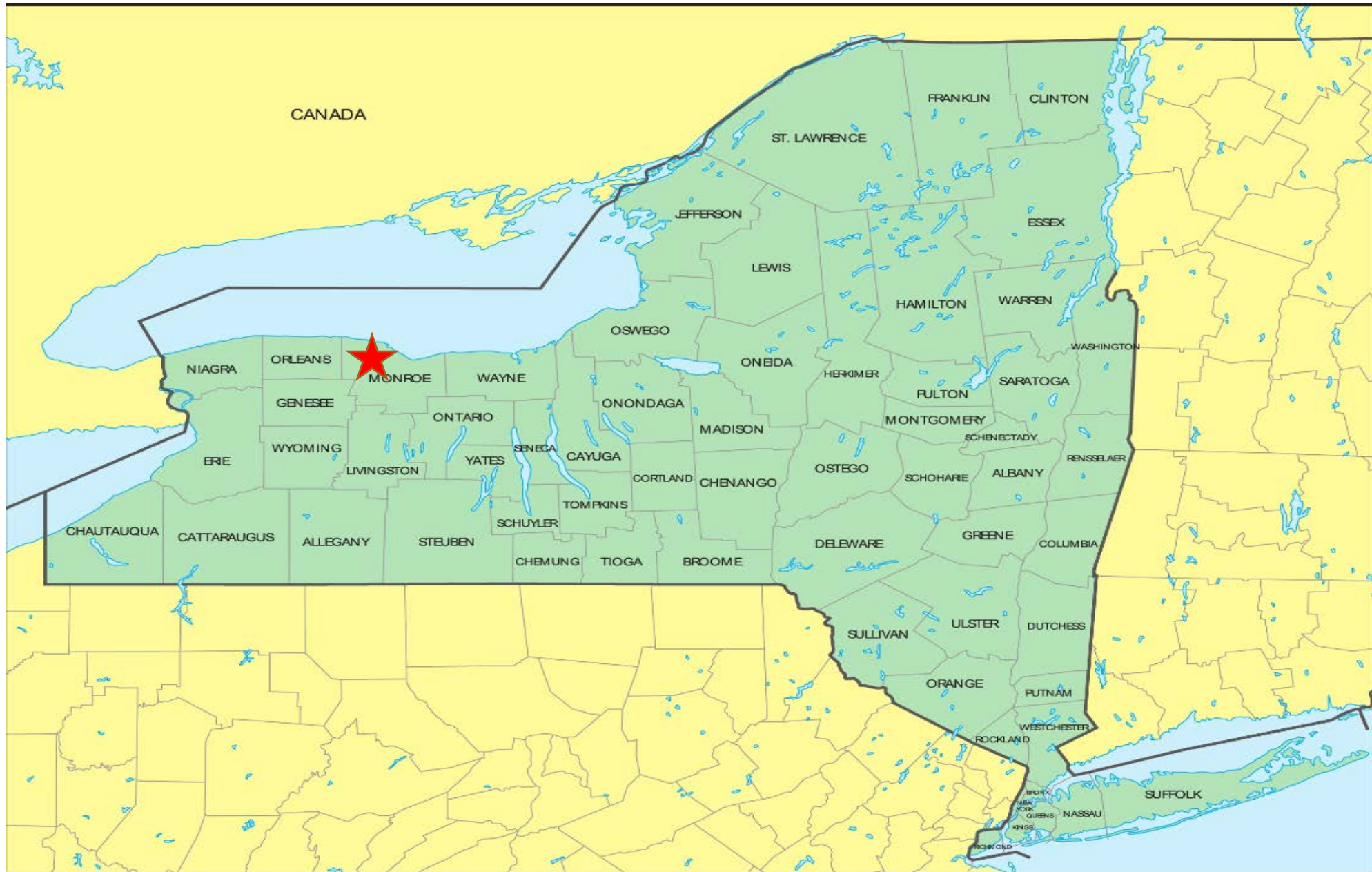
- Pilot Test
 - Children in Monroe County
 - born Since August 1, 2010
- Total=57,994
- Invalid*=8,411,
- N= 49,583 (36 months+=25,732)

Immunization Series

4313314 completion rate

4:DTaP 3:polio 1:MMR 3:Hib 3:Hep B 1:varicella 4:PCV

* Invalid: children without mother's name, ZIP code or any identification information



Methods

Match Criteria

1

Match All

- Client's ZIP
- Client's mother's name
- (first name, maiden last name)



2

Match At Least One

- Client's address
- Client's address history
- Client's phone number
- Response person's address

Methods

Client	ZIP	Mother's name	Address (Street)	Phone	Same household?
A	10000	Mary Smith	123 New York ST	518-000-0001	Yes
B	10000	Mary Smith	123 New York ST	-	Yes
C	10000	Mary Smith	-	518-000-0001	Yes
D	10000	Linda Smith	123 New York ST	-	No
E	20000	Mary Smith	-	518-000-0001	No

Methods: Address Cleansing

Well that will be simple....

Right?

Methods: Address Cleansing

1. Standardizing

	Examples
Abbreviation	STREET → ST (226 USPS official abbreviation)
Ordinal numbers	SECOND → 2ND
Cardinal point	NORTH → N
Space	101 ST → 101 ST

Methods: Address Cleansing

2. Correcting

	Examples
City name	ROCHETSER → ROCHESTER
Special characters	101 &&ST → 101 ST (except #- : apartment number)

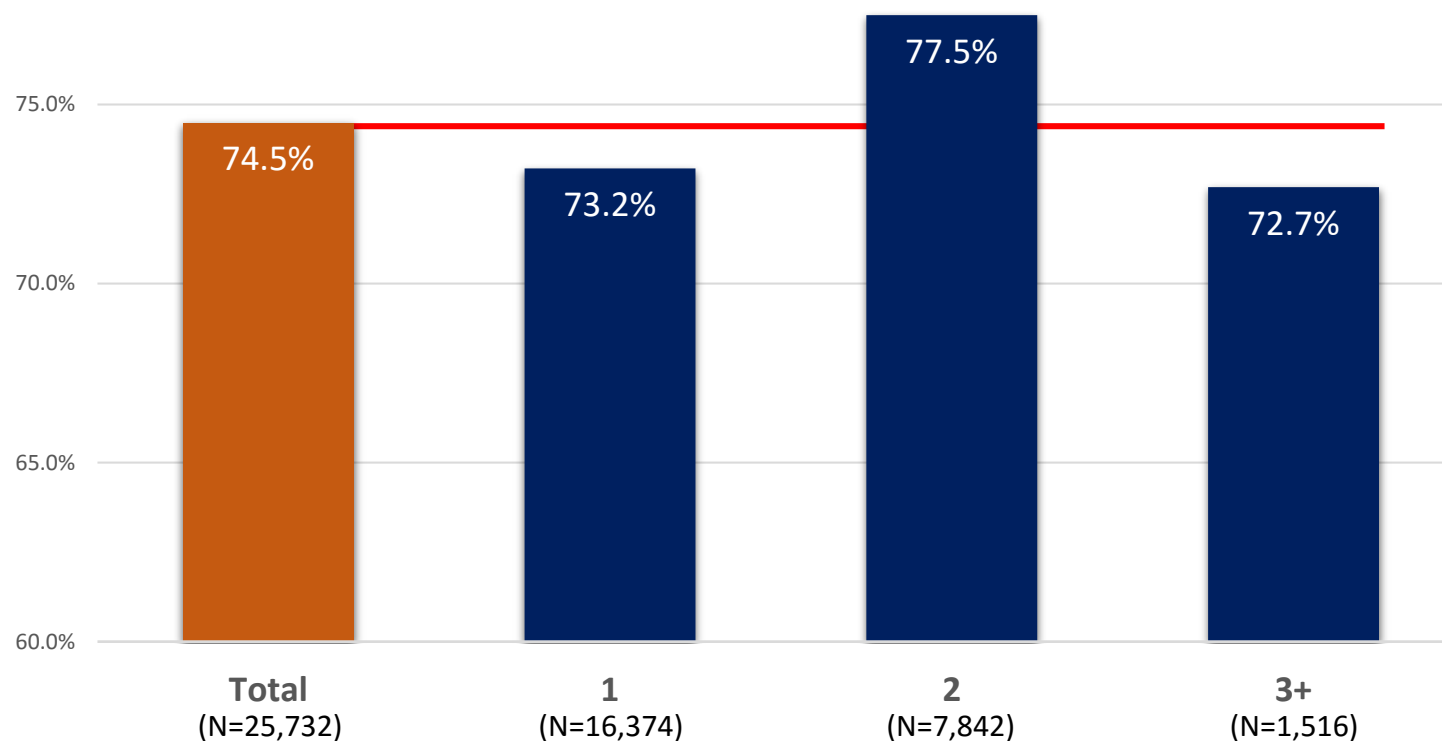
Methods: Address Cleansing

Similar Address

Two addresses are identical when they have

- identical Zip code and mother's name
- identical numbers in street lines
- minimal differences in street lines (using generalized edit distance - SAS compged function)

4313314 Completion Rate by Number of Children in Household for Children Living In Monroe County Born Since 2010



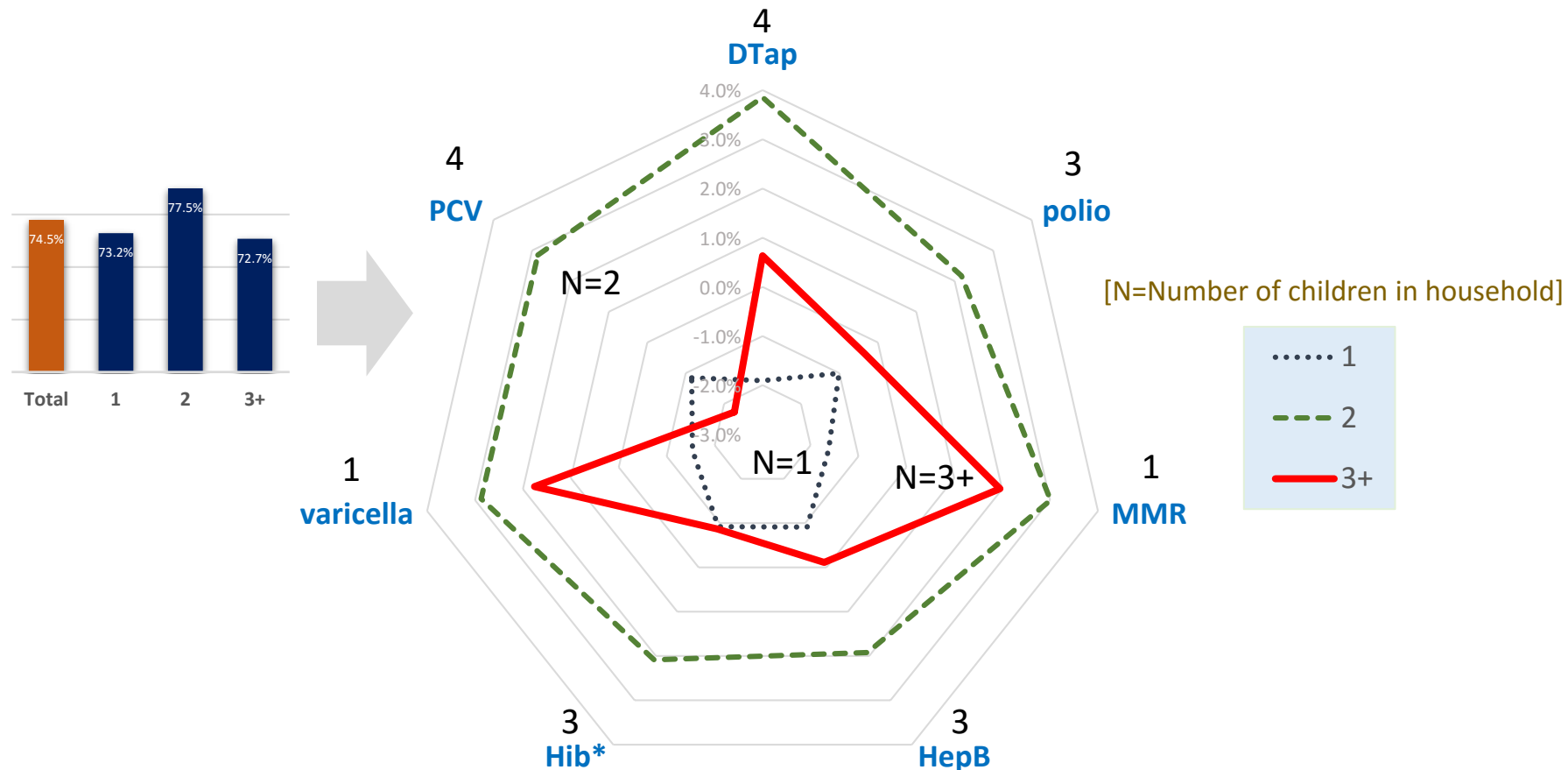
Number of children in household (N)

(Cohort: aged 36 months +, Unit: %=4313314 completion rate before 36months*)

Significant differences in number of children in household ($p < .001$). N=2 showed the highest 4313314 completion rate and N=3+ showed the lowest rate.

* 4313314 rate= # of 4313314 children before 36months / # of total children

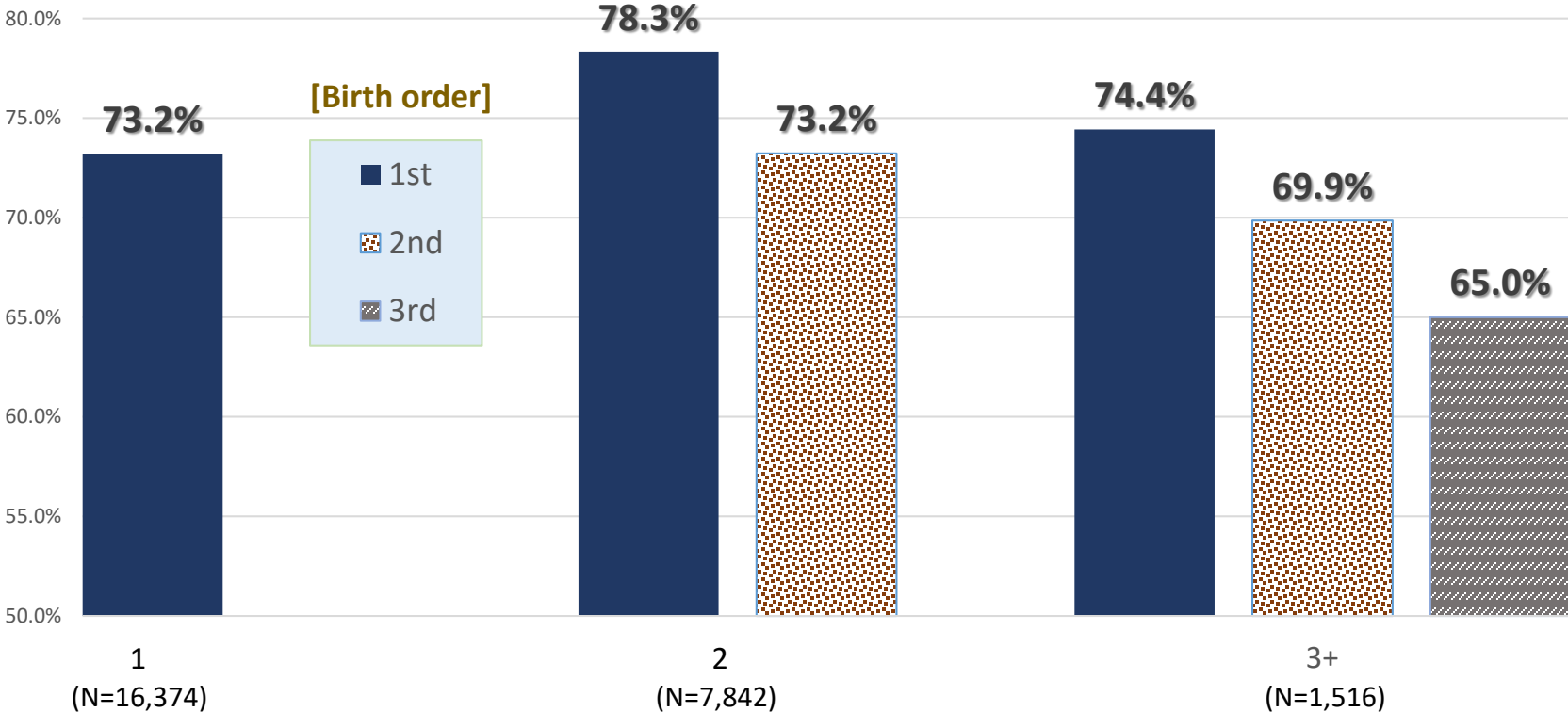
4313314 Completion Rate Difference by Vaccine Compared to Total Rate for Children Living in Monroe County Born Since 2010



(Cohort: aged 36 months +, Unit: %=4313314 completion rate before 36months, 0.0%=overall rate of each vaccine)

Number of children in a household(N)=3+ showed low completion rate in PCV (number of series=4, difference=-2.3%P) and high rate in MMR and Varicella (number of series=1, difference=+2.0%P, +1.8%P , respectively) compared to total rate. Overall rate of N=1 is low and N=2 is high.

4313314 Completion Rate by Number of Children in Household and Birth Order for Children Living in Monroe County Born Since 2010

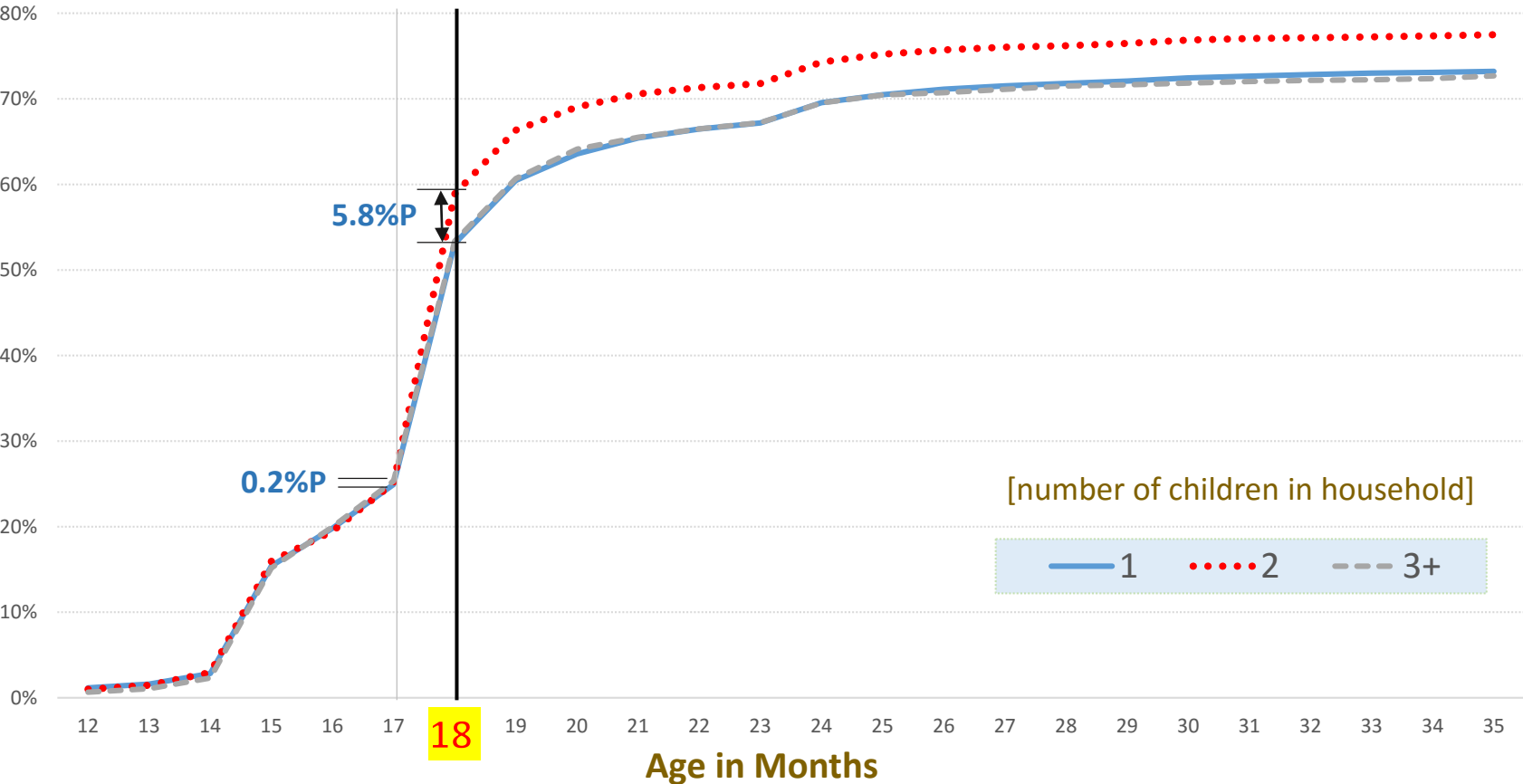


Number of children in household

(Cohort: aged 36 months +, Unit: %=4313314 completion rate before 36months)

Significant differences in birth order ($p=.045$). The highest rate in first child. The negative correlation between birth order and 4313314 rate.

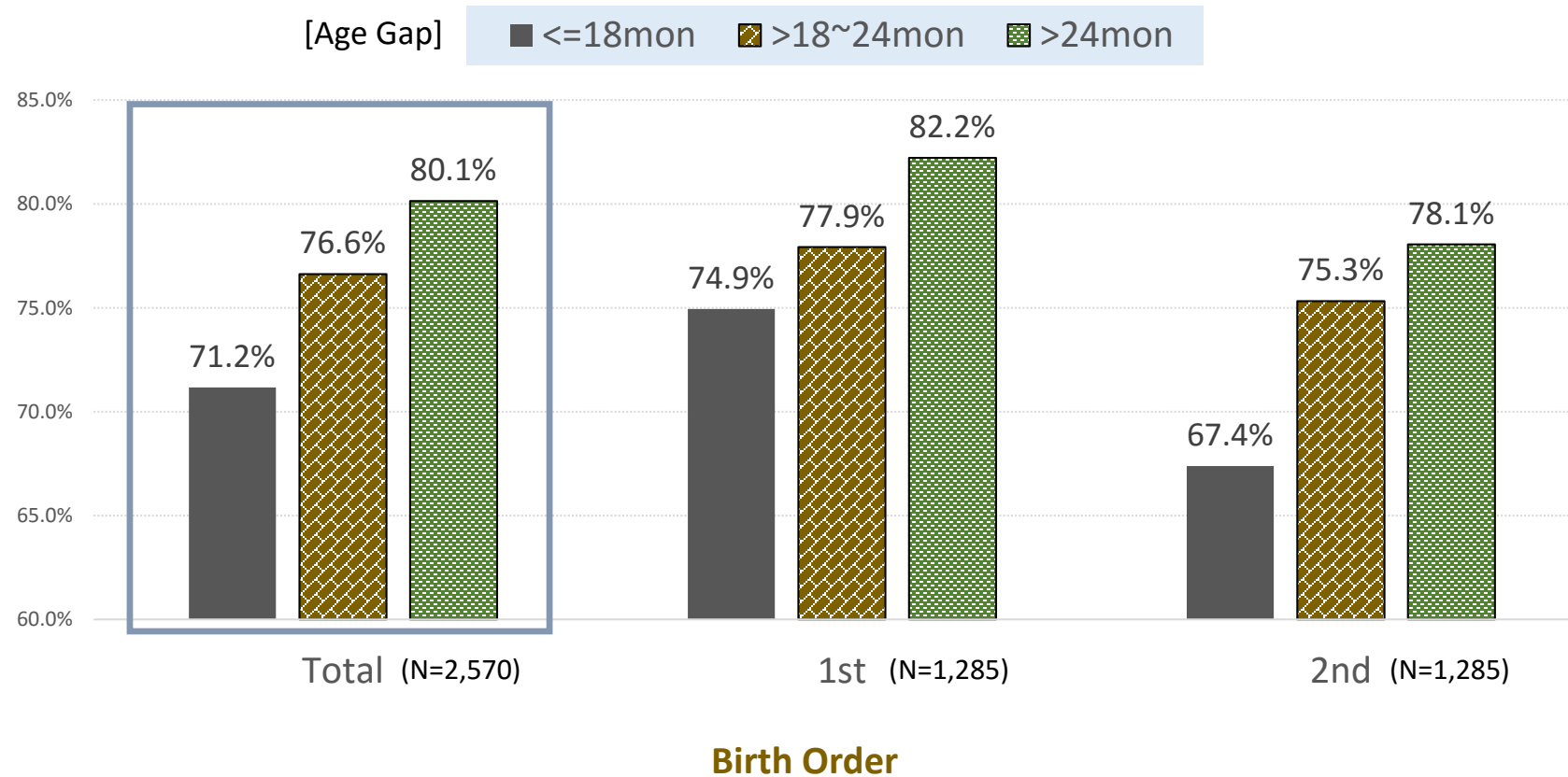
4313314 Completion Rate Trend by Number of Children in Household for Children Living in Monroe County Born Since 2010



(Cohort: aged 36 months +, Unit: %=4313314 completion rate before 36months)

Spike in 18 months. The gap existed from 18 months through 35 months among number of children in household. No significant difference before 18 months.

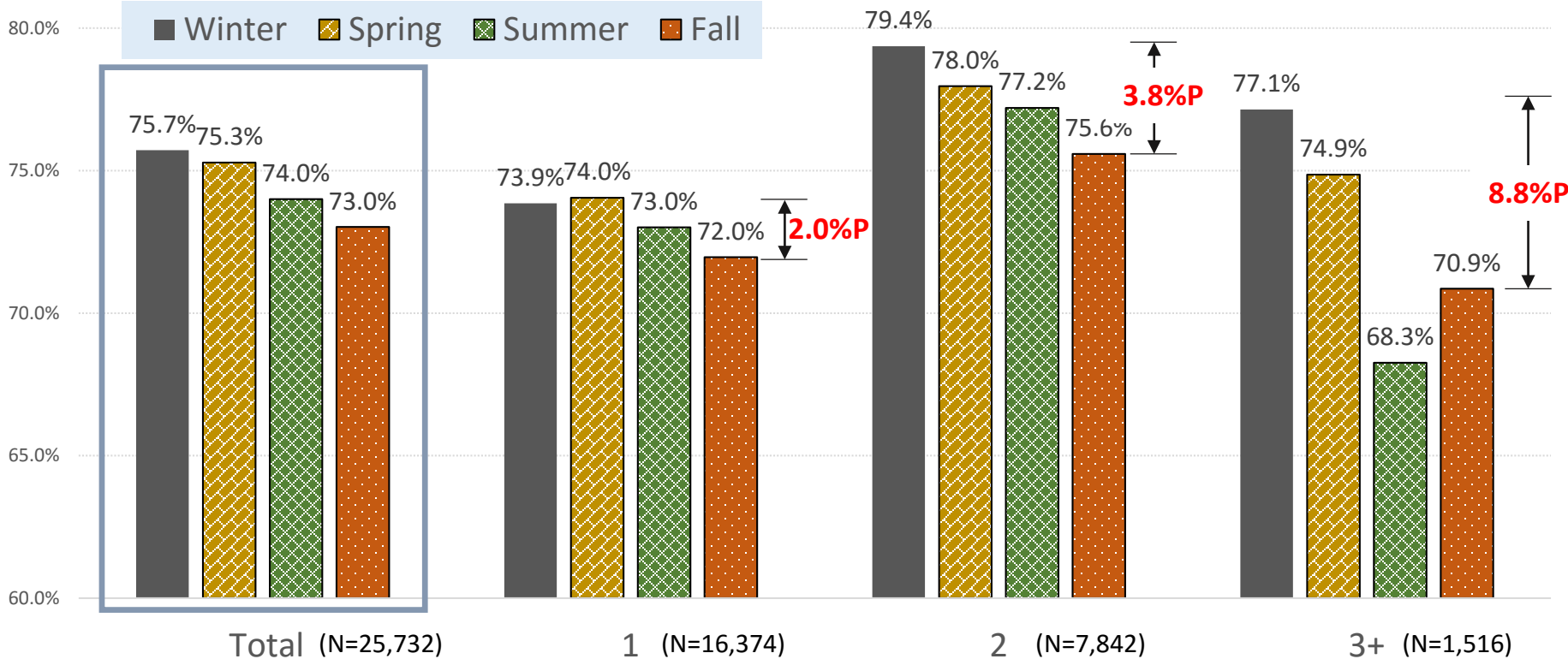
4313314 Completion Rate By Birth Order and Age Gap for Children Living in Monroe County Born Since 2010



(Cohort: Household with N of children=2 & both two siblings aged 36 months + & single born
Unit: %=4313314 completion rate before 36months)

Significant differences in age gap between first and second child given number of children in household ($p<.001$). The positive correlation between age gap and 4313314 rate. Second child with less than 18 months age gap showed only 67.4% completion rate.

4313314 Completion Rate by Number of Children in Household and Season of Birth for Children Living in Monroe County Born Since 2010



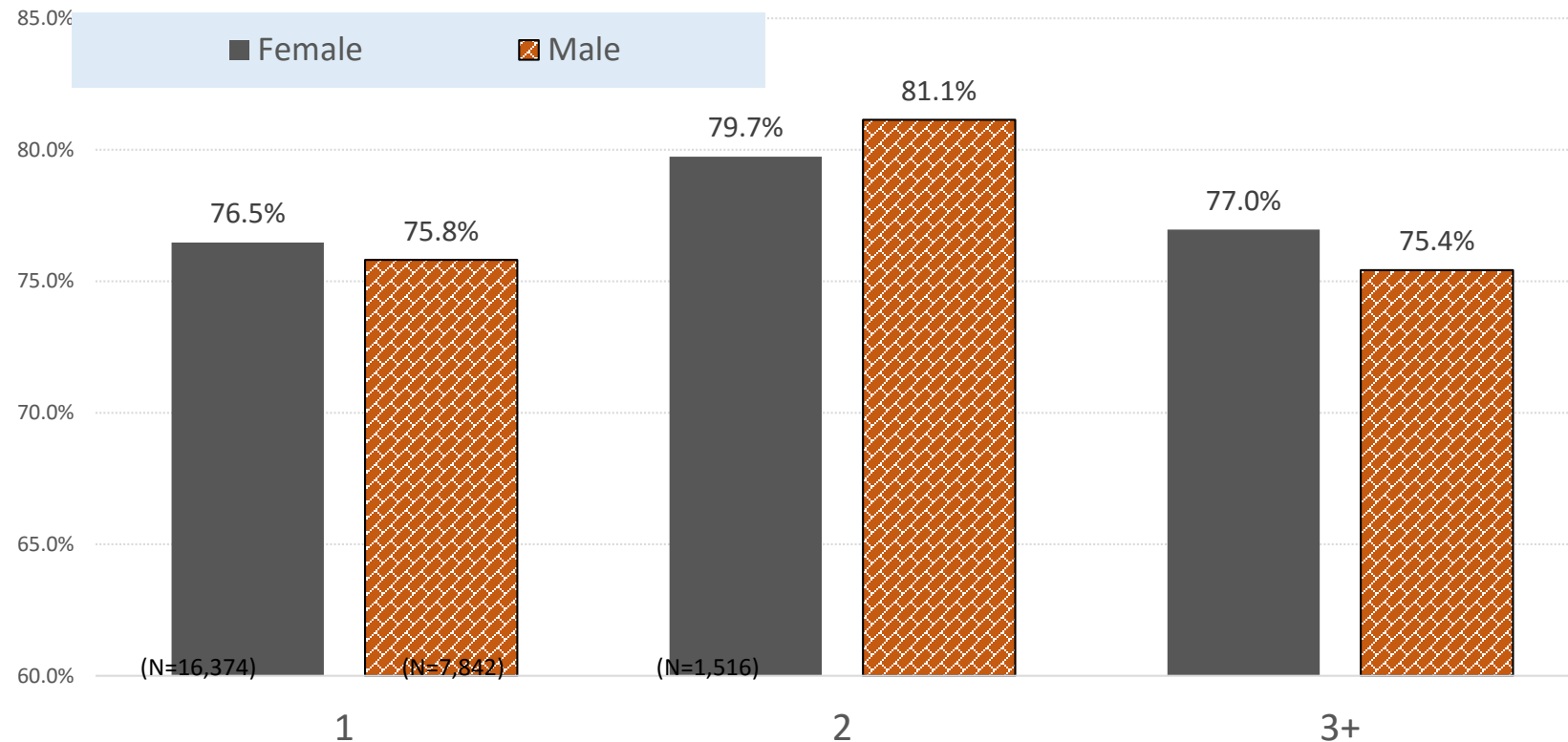
Number of children in household

(Cohort: aged 36 months +, Unit: %=4313314 completion rate before 36months)

Significant differences in birth season given number of children in household ($p=.006$). Higher rate in children born in winter and spring and lower rate in summer and fall. As number of children in household increased, the rate difference (maximum-minimum) also increased. (N=1, 2, 3+ → difference = 2.0%P, 3.8%P, 8.8%P)

4313314 Completion Rate by Number of Children in Household and Gender Status for Children Living in Monroe County Born Since 2010

Gender



Number of children in household

Cohort: aged 36 months+, Unit: %=4313314 completion rate before 36months

No significant differences in gender, given number of children in household (gender: $p=.961$).

4313314 Completion Rate by Number of Children in Household and Twin Status for Children Living in Monroe County Born Since 2010

Twin Status



Cohort: aged 36 months+ & number of children in house in (2,3+) Unit: %=4313314 completion rate before 36months

No significant differences in twins, given number of children in household (twins: $p=.279$).

Conclusions

- Evidence of an association between 4313314 rate and
 - Number of children in household
 - Birth order
 - Age gap given number of children in a household
- Potential to modify outreach/reminders based on family structure rather than individual patient
- Potential to use address cleansing techniques to assist in increasing rates at county levels –
- Limitations
 - Pilot – one county
 - Excluded those without Mother's Maiden Name
 - Exclude children born before August 1, 2010