Going Small:
Strategies for Identifying Local Pockets of Need

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Why measure vaccination rates?

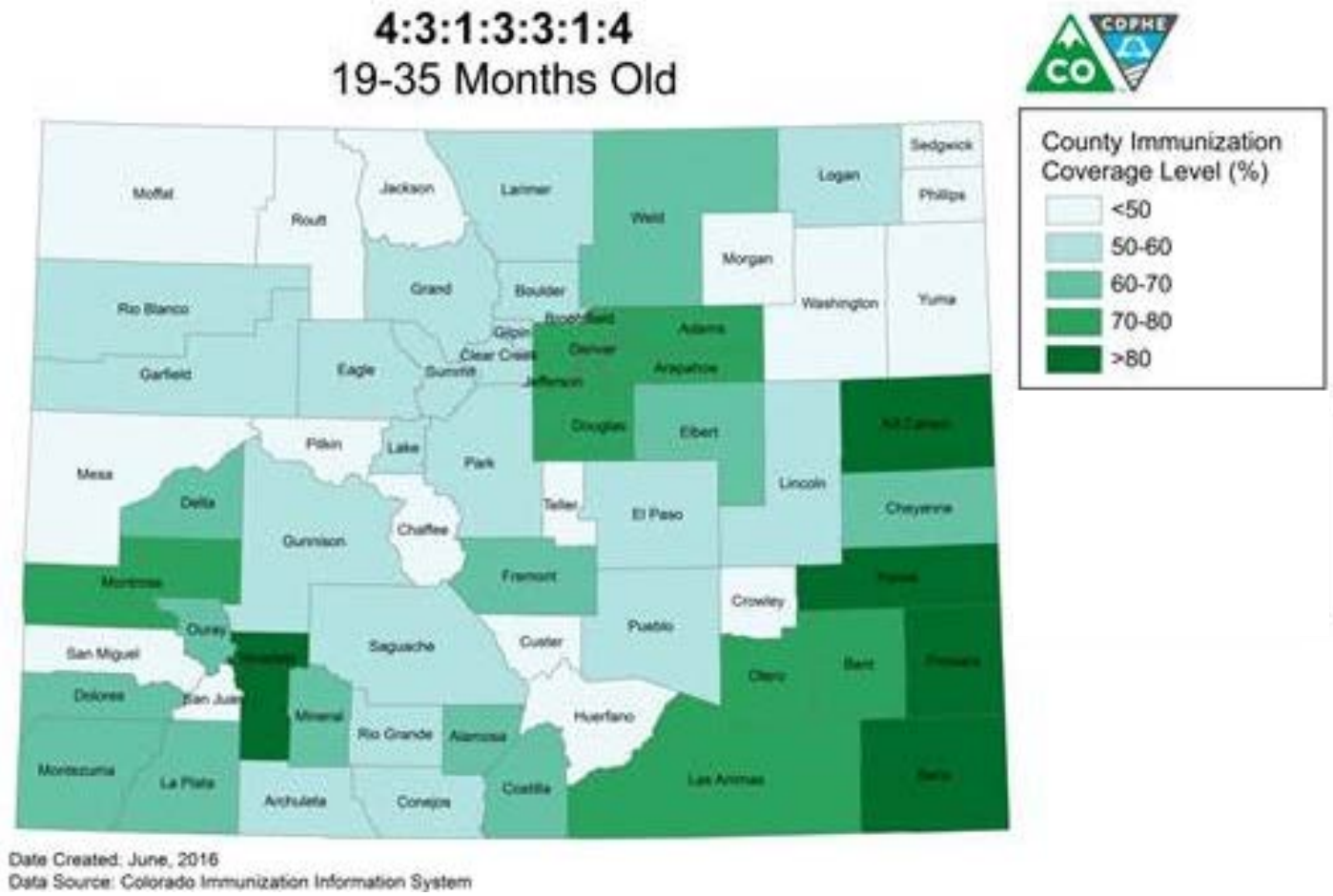
"What gets *measured*
gets *improved*"

Peter Drucker

Identifying Pockets of Need

Data requirements

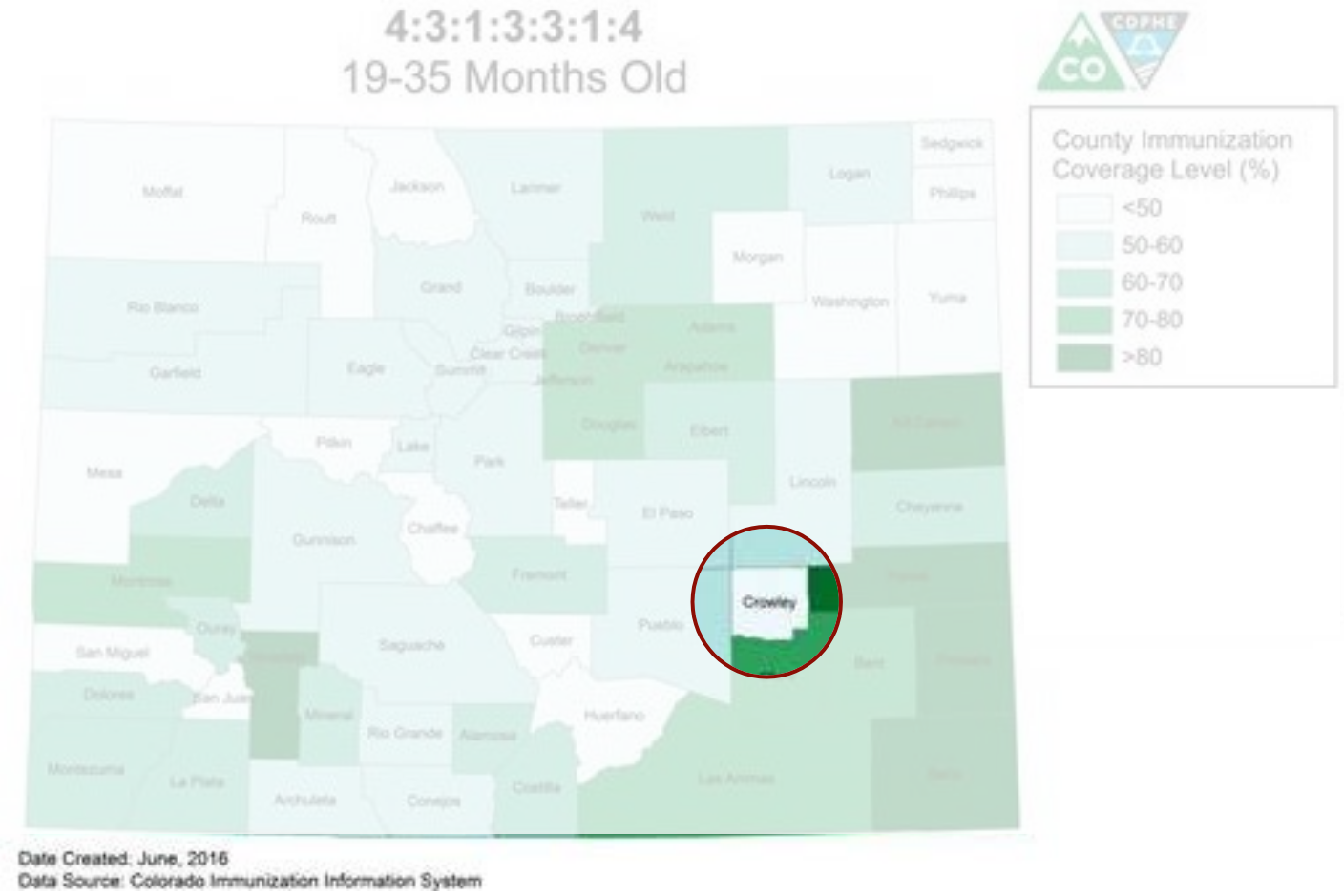
- Timeliness
- Accuracy
- Completeness
- Geospatial granularity



Identifying Pockets of Need

Is it real?

- Data quality artefact?
- Actual low vaccine coverage?
- Both?



Low data quality masquerading as low vaccination?

- Population under-capture?
- Population over-capture?
- Incomplete vaccination capture?

How to distinguish true pockets of need?

Session overview

- Introduction
- Examples of local analyses
- Small group facilitated discussion
- Reconvene
  - Summarize
  - What would aid community?

Small Area Analysis

UTILIZING SCHOOL REPORTS AND HISTORICAL / OTHER PROVIDER DATA FROM THE IIS

A Border County with “Low Coverage”

COUNTY QUARTERLY IMMUNIZATION REPORT CARD

Berrien — *Data as of: December 31, 2016*

Population

	2015 Census	MCIR	Diff.	%
Total	154,636	151,994	2,642	1
Adults (20yrs+)	116,397	104,440	11,957	10
Children (0-19yrs)	38,239	47,554	-9,315	-24

Immunization Sites

	Count	(%)
Active MCIR Immunization Sites	66	
Reported in the last 6 months	58	87
Active Vaccines for Children (VFC) Sites	13	
Reported in the last 6 months	13	100
Reg. Reporting Flu Sentinels (% of Total Sites)	0	0

Michigan is ranked 44th for 4313314 coverage (2015 NIS data)

Your County Immunization Rank n = 84 counties	
43133142 Coverage: (19-35mos)	66
1323213 Coverage: (13-17 Years)	61
Waivers: (Kindergarten, 7th Grade & Others)	15
Flu Coverage : (6 months through 8 yrs, up-to-date)	58

How do your Immunization Measures Rank among Michigan's 83 Counties + Detroit (n=84)

Measure	Berrien (MCIR)	% Diff.*	MI Avg (MCIR)	US Average 2015 NIS	Your County Rank	HP 2020 Goal
19 through 35 months	%	%	%	%	No.	
Birth Dose Hep B coverage	75.1	-0.1	79.0	72.4	69	85%
4313314 coverage†	71.0	0.5	74.9	72.2	68	80%
43133142 coverage†	45.7	1.2	54.3	–	66	-
2+ Hep A	47.9	1.4	56.0	59.6	64	85%
4+ DTaP	74.2	0.6	78.4	84.6	74	90%
4+ PCV	83.8	0.1	84.9	84.1	56	90%
UTD** Rota. (8-24 months)	71.1	-1.0	71.2	–	42	–
WIC coverage (4313314)	76.9	4.0	78.9	65.7	67	-
Medicaid coverage (4313314)	72.8	1.1	75.4	–	68	-
13 through 17 years				2015 NIS Teen		
132321 coverage‡	73.8	0.0	74.9	–	75	-
1323213 coverage‡	28.1	1.3	28.7	–	61	-
1+ Tdap	79.1	0.1	79.5	86.4	75	80%**
1+ MCV4	79.1	-0.3	79.4	81.3	72	80%**
3+ HPV (Females)	34.0	0.2	33.5	41.9	59	80%**
3+ HPV (Males)	24.4	2.0	25.8	28.1	60	-
UTD** Mening. (17 yrs)	44.8	2.1	44.7	–	50	-
Adults (Census Denominators)				2015 NHIS		
1+ Tdap (19-64yrs)	42.9	3.6	43.5	21.5	41	-
1+ PPSV (65+ yrs)	28.3	3.3	33.2	61.3	63	90%
1+ PCV13 (65+ yrs)	39.0	10.0	34.5	–	38	–
1+ Zoster (60+ yrs)	18.9	2.4	23.5	27.9	70	30%
2016-17 Flu Season	**Berrien**		**MI Avg**	**US Flu Avg**	**Rank**	**HP2020**
UTD** Flu (6mo-8yrs)	18.1	-4.7	23.2	–	58	–
1+ Flu (6mos through 17yrs)	19.7	-9.6	23.6	59.3	57	70%
1+ Flu (18yrs+)	24.1	-0.4	22.1	41.7	46	70%
School/CC Immunization Reports	**Berrien**		**MI Avg**	**Berrien**	**Berrien**	**Rank**
School Completion (Feb '16)	95.8	2.4	94.2	–	–	13
Percent Waived (K+7+O)	2.3	-1.4	3.1	Kindgtn : 2.7	7 grd : 2.1	15
Child Care Completion (Oct '15)	90.3	-0.4	87.9	–	–	29
Percent Waived	1.9	-1.3	2.1	–	–	50

* % difference in the county since the last report card: Flu data shows difference between seasons; School and CC diff. between annual reports

† 4313314(2): 4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 HepB, 1 Varicella, 4 PCV, (2 HepA)

‡ 132321(3): 1 Tdap, 3 Polio, 2 MMR, 3 HepB, 2 Var, 1 MCV4, (3 HPV-Males & Females)

** The adolescent Healthy People 2020 age group is 13 through 15 yrs

†† UTD = Up-to-date with the recommended number of vaccines.

Reference the FAQs for additional definitions including information on 1+, 2+ and 3+

MDHHS

Of 84 counties, this county:

- 4313314 coverage rate of 71% among children aged 19 through 35 months
  - Ranked 68th
  - Michigan average is 75%
- Kindergarten waiver rate of 2.7%
  - Ranked 15th for overall waivers
  - Michigan average is 3.1%

Is Coverage Truly Low?

OR…

Perhaps children receive immunizations on time, but in a neighboring state

- Doses are not reported to Michigan's IIS as they are administered

But Michigan's school requirements for Kindergarten entry prompt providers and local health jurisdictions to enter historical data and doses administered by other providers

- Doses from the IIS are used by the school immunization reporting system

PARENTS VACCINES REQUIRED FOR SCHOOL ENTRY IN MICHIGAN

Whenever children are brought into group settings, there is a chance for diseases to spread. Children must follow state vaccine laws in order to attend school. These laws are the minimum standard to help prevent disease outbreaks in school settings. The best way to protect your child from other serious diseases is to follow the recommended vaccination schedule at www.cdc.gov/vaccines. Talk to your health care provider to make sure your child is fully protected.

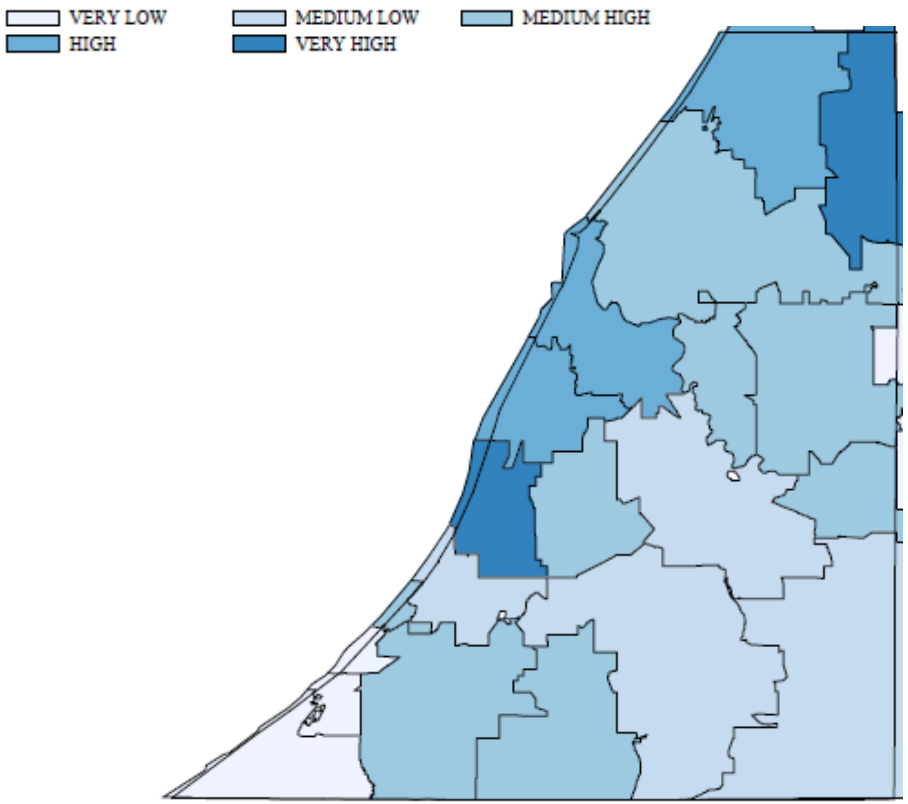
	All Kindergarteners and 4-6 year old transfer students	All 7th Graders and 7-18 year old transfer students
Diphtheria, Tetanus, Pertussis (DTP, DTaP, Tdap)	4 doses DTP or DTaP 1 dose must be at or after 4 years of age	4 doses D and T or 3 doses Td if 1st dose given at or after 1 year of age 1 dose Tdap at 11 years of age or older upon entry into 7th grade or higher
Polio	4 doses 3 doses if dose 3 was given at or after 4 years of age	
Measles, Mumps, Rubella (MMR)*	2 doses at or after 12 months of age	
Hepatitis B*	3 doses	
Meningococcal Conjugate (MenACWY)	None	1 dose at 11 years of age or older upon entry into 7th grade or higher
Varicella (Chickenpox)*	2 doses at or after 12 months of age or Current lab immunity or History of varicella disease	

During disease outbreaks, incompletely vaccinated students may be excluded from school. Parents and guardians choosing to decline vaccines must obtain a certified non-medical waiver from a local health department. Read more about waivers at www.michigan.gov/immunize.
*If the child has not received these vaccines, documented immunity is required.
All doses of vaccines must be valid (correct spacing and ages) for school entry purposes.

MDHHS

Updated March 1, 2017

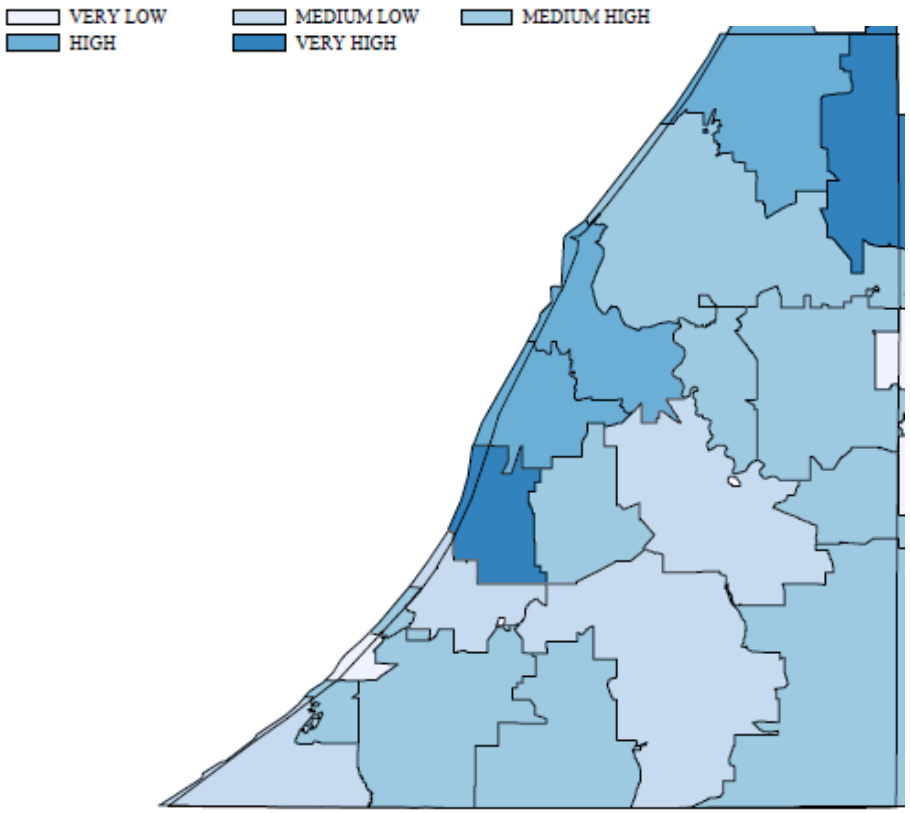
4313314 Coverage: Knowing Then *What We Knew Then*



Cohort of children aged 5 years 0 months through 6 years 4 months on September 1, 2017

- N=3229
- Birthdate range September 1, 2012 – April 2, 2011
- Approximately Kindergarten age
- Looked at their 4313314 coverage by zip code in this county as it would have looked on April 1, 2014
  - Children were aged 19 through 35 months on that date
  - Doses administered on or before April 1, 2014
  - Dose records created in IIS on or before April 1, 2014

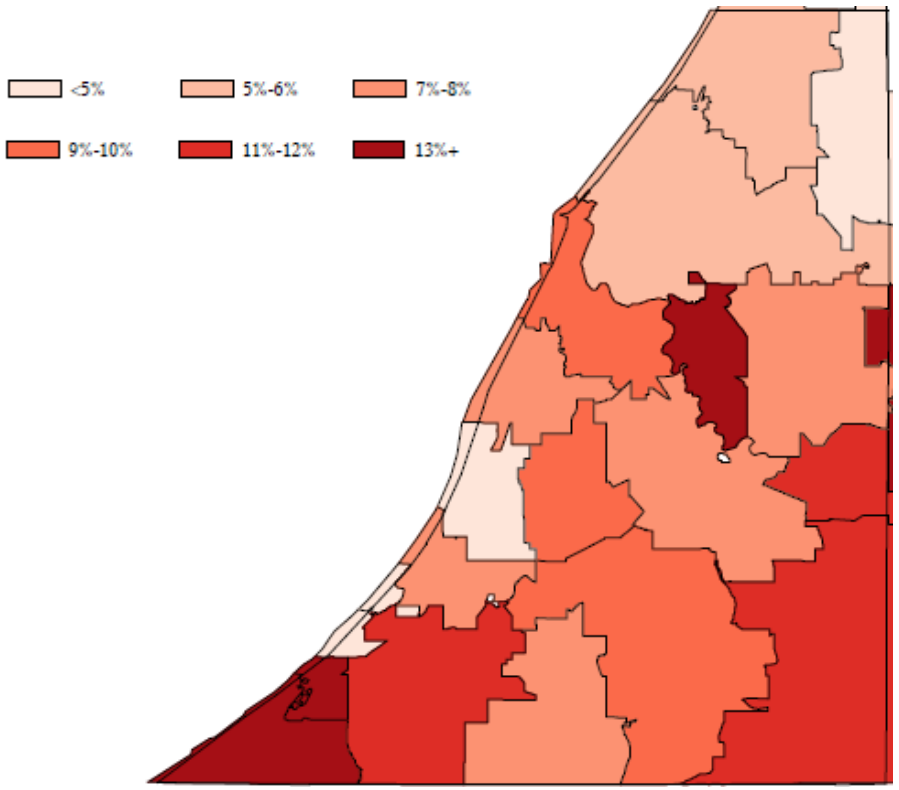
4313314 Coverage: Knowing Then *What We Know Now*



Cohort of children aged 5 years 0 months through 6 years 4 months on September 1, 2017

- N=3229
- Birthdate range September 1, 2012 – April 2, 2011
- Approximately Kindergarten age
- Looked at their 4313314 coverage by zip code in this county as it would have looked on April 1, 2014 *had all administered doses been reported.*
  - Children were aged 19 through 35 months on that date
  - Doses administered on or before April 1, 2014
  - Dose records created through March 4, 2017

Change in 4313314 Coverage



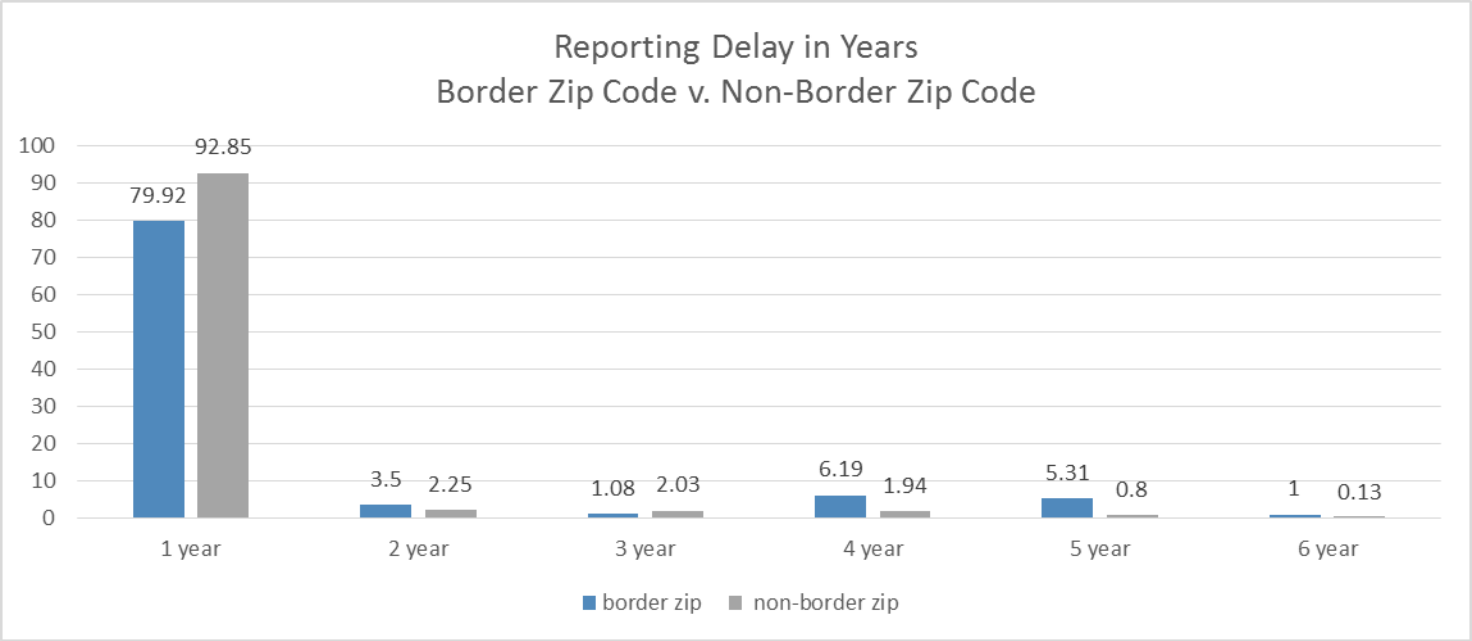
299 more children complete for the 431331 series when data reported later were included

10% increase in coverage for the county

Increase across almost all zip codes, but magnitude of increase varies by zip code

- Border counties have larger increases, in general

Timeliness of Immunization Reports



Conclusions

Immunization assessments that utilize data collected outside of the IIS are helpful to generate hypotheses about perceived pockets of need.

Utilization of the IIS by schools to report immunization coverage rates promotes complete reporting of historical data to the IIS.

Good to collect and use historical data

- Gathering and recording these data is labor-intensive, however
- Consolidates children's immunization records
- Removes then from recall and reminder efforts

Real-time data would be more useful

- Need to enroll more / encourage more reporting from providers outside the state
- Interstate data sharing agreements should be implemented

Minnesota Small Area Analysis

- Interest in measuring HPV vaccination rate among American Indians (AI) ages 13 through 17 years
- Usual method: matching with Office of Vital Records birth certificates
- Limitations to usual method with this group
  - Vital Records data collection methods became more standardized in 2004
  - Population has likely shifted since birth
  - Method may underrepresent actual population

MDH

MIIC

Three Different Methodologies

- Matched Vital Records data to MIIC data
- Ran clinic-level rates for Indian Health Service (IHS) and tribal health clinics in Minnesota
  - MIIC adolescent assessment reports
- Ran county-level rates for IHS Contract Health Service Delivery Areas (CHSDA)
  - Counties part of or contiguous to reservations

MDH

MIIC

Outcomes

- Compared AI population HPV rates to statewide rates
  - AI rates equal to or slightly higher than statewide rates across methods
  - Actual rates differed across methods
    - MIIC assessment report rate was lowest
- Statewide HPV rates still need improvement
- Working with all clinics to raise rates through AFIX and other efforts
  - One AFIX site visitor dedicated to IHS and tribal health in 2017

MDH

MIIC

Small Area Analysis –Oregon It’s All About Fairness

Steve Robison

Andrew Osborn

Small-Area Assessment Issues

- For small areas, IIS ratio comparisons are fair when biases are roughly equal
- So how to tell if it's fair?

Some Potential Measures of Biases

- External comparisons: ratio of IIS county populations to Birth, Census or school populations.
- Internal comparison: county ratios of all IIS teens to those with some external reference point, such as a school-required shot.
  - Example: for assessing teen rates, use a bias measure across counties of the ratio of those with tdap to all teens.
- Consider weighting data by bias measures to remove local effects

Oregon Two Year Old Example

- Oregon produces county level rates for two year olds.
- This process involves using county differences in the percentage of births later captured (post-birth) into the IIS as a bias measure.

Oregon 2014 Two Year Old Bias Measures

County	Births	IIS Post-Birth Capture
BAKER	180	93.2%
BENTON	650	95.6%
CLACKAMAS	3982	91.8%
CLATSOP	393	92.1%
COLUMBIA	496	92.5%
COOS	607	94.8%
CROOK	190	99.0%
CURRY	187	81.0%
DESCHUTES	1715	93.4%
DOUGLAS	1063	92.4%
GRANT	60	85.7%
HARNEY	90	93.3%
HOOD RIVER	280	96.3%
JACKSON	2330	92.3%
JEFFERSON	297	96.0%
JOSEPHINE	837	89.1%
KLAMATH	780	96.9%

County	Births	IIS Post-Birth Capture
LAKE	81	91.1%
LANE	3517	94.3%
LINCOLN	421	91.9%
LINN	1421	94.2%
MALHEUR	468	92.9%
MARION	4281	93.7%
MORROW	128	94.7%
MULTNOMAH	9410	93.2%
POLK	846	92.5%
TILLAMOOK	234	95.3%
UMATILLA	1140	96.1%
UNION	316	90.4%
WALLOWA	68	96.9%
WASCO-SHERMAN-GILLIAM	294	94.8%
WASHINGTON	7181	95.4%
WHEELER	11	86.7%
YAMHILL	1040	93.8%

Oregon Health Authority

Considerations

- IIS assessments- consider both accuracy and precision
- A work around for bias is to use ratios
- If an external source of an overall ‘true rate’ is available, small-area ratios can be converted to rates
- If not, weightings can be applied to reduce bias

Human Papillomavirus Vaccination Coverage in New York City: a Geographical Analysis

AIRA 2017 IIS National Meeting

Vikki Papadouka, PhD, MPH
Citywide Immunization Registry (CIR)
Bureau of Immunization
New York City Department of Health and Mental Hygiene

Objective

Describe a method of estimating Human Papillomavirus (HPV) vaccine coverage by zip code to take into account reporting biases in an Immunization Information System (IIS)

Method – Population

- 13–17 year olds as of 12/31/2012
  - Age group chosen to be comparable with the National Immunization Survey (NIS)
- Data sources
  - New York Citywide Immunization Registry (CIR)
  - NYC Department of Education (DOE): Automate the Schools (ATS) database

Method – Controlling for Bias (1)

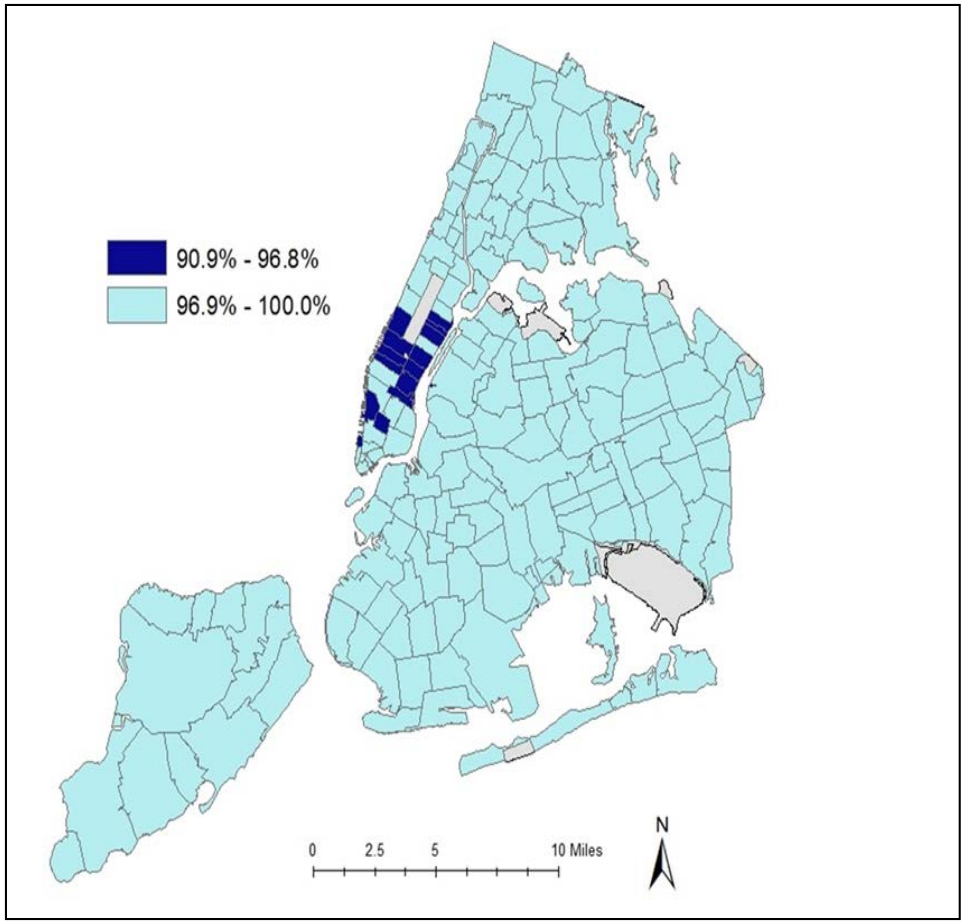
- Concern for possible reporting bias with CIR data – more complete reporting by VFC providers
- No other data on HPV vaccination available for comparison at the zip code level
- Use another adolescent vaccine as a proxy for HPV reporting

Methods – Controlling for Bias (2)

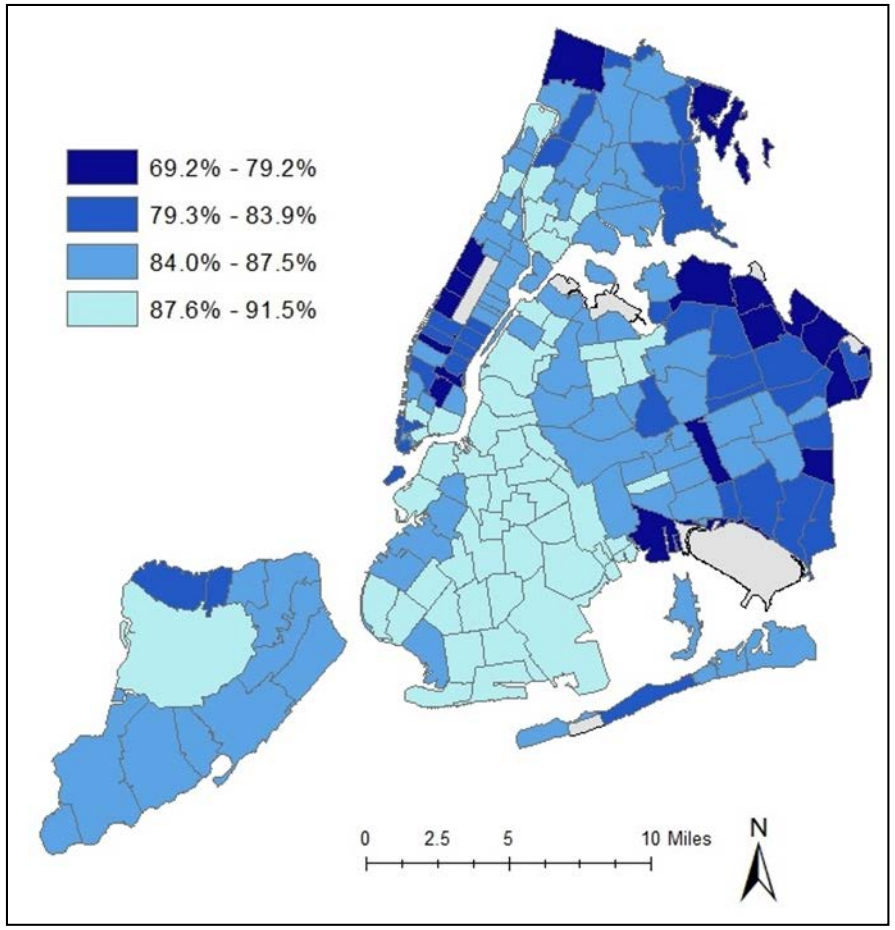
- Adolescent Tdap coverage is high in ATS
  - Tdap required of all 6th to 10th graders for 2011-12 academic year
  - Data entered into ATS by schools and updated throughout year
  - ATS collects immunization data on ~1.1 million NYC public school children, 80% of NYC's students
- Compare Tdap coverage in ATS ("gold standard") to Tdap coverage in CIR to identify areas with low reporting

Tdap Coverage: ATS vs. CIR

ATS



CIR



Data Source: NYC DOHMH, Bureau of Immunization, Immunizations and Patients in the NYC ATS and CIR as of 6/22/2012.
Zip codes with less than 10 children are excluded.

Method – Reporting Score

- To adjust for variation in reporting, created "reporting score" for each zip code
- ***Reporting score = CIR Tdap coverage / ATS Tdap coverage***
- HPV coverage adjusted by reporting score
- Example: zip code 10001
  - Tdap: 80% in CIR; 95% in ATS; Reporting score: 80/95=0.84
  - HPV coverage in CIR: 50% ; adjusted HPV coverage = 50/0.84=59.5%

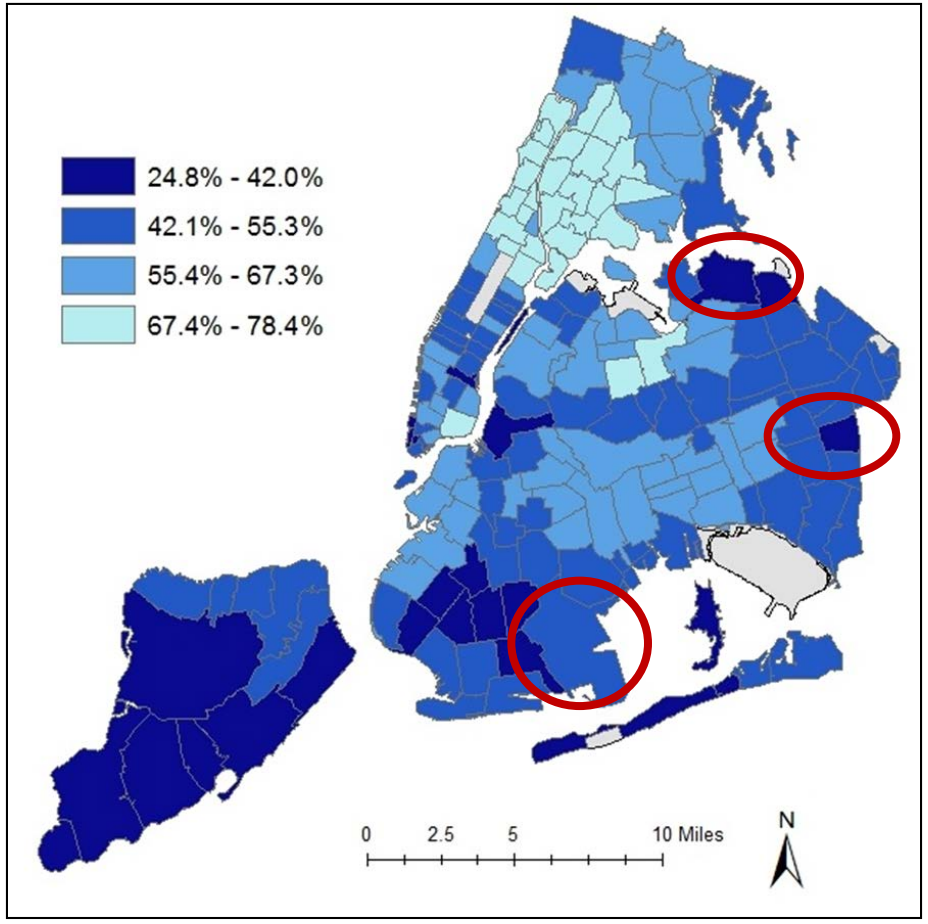
Method – HPV Coverage

- HPV CIR coverage (%) calculation:
  - Numerator: Number of children in CIR who received HPV vaccine
    - At least 1 dose (for initiation)
    - 3 doses (for completion)
  - Denominator: Number of children in CIR received any vaccine on or after their 9th birthday
- ***Adjusted HPV coverage (%) calculation = HPV CIR coverage / Reporting score***

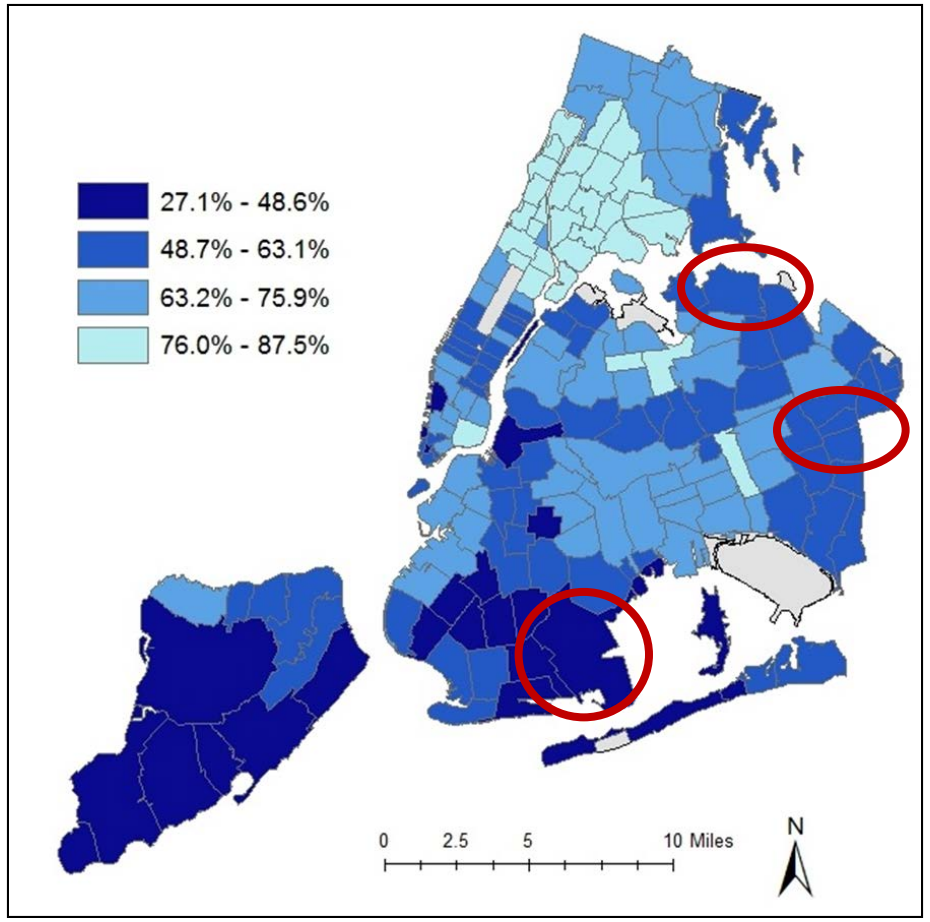
Results

HPV Initiation - Females

Unadjusted



Adjusted



Data Source: NYC DOHMH, Bureau of Immunization, Immunizations and Patients in the NYC Citywide Immunization Registry as of 12/31/2012.
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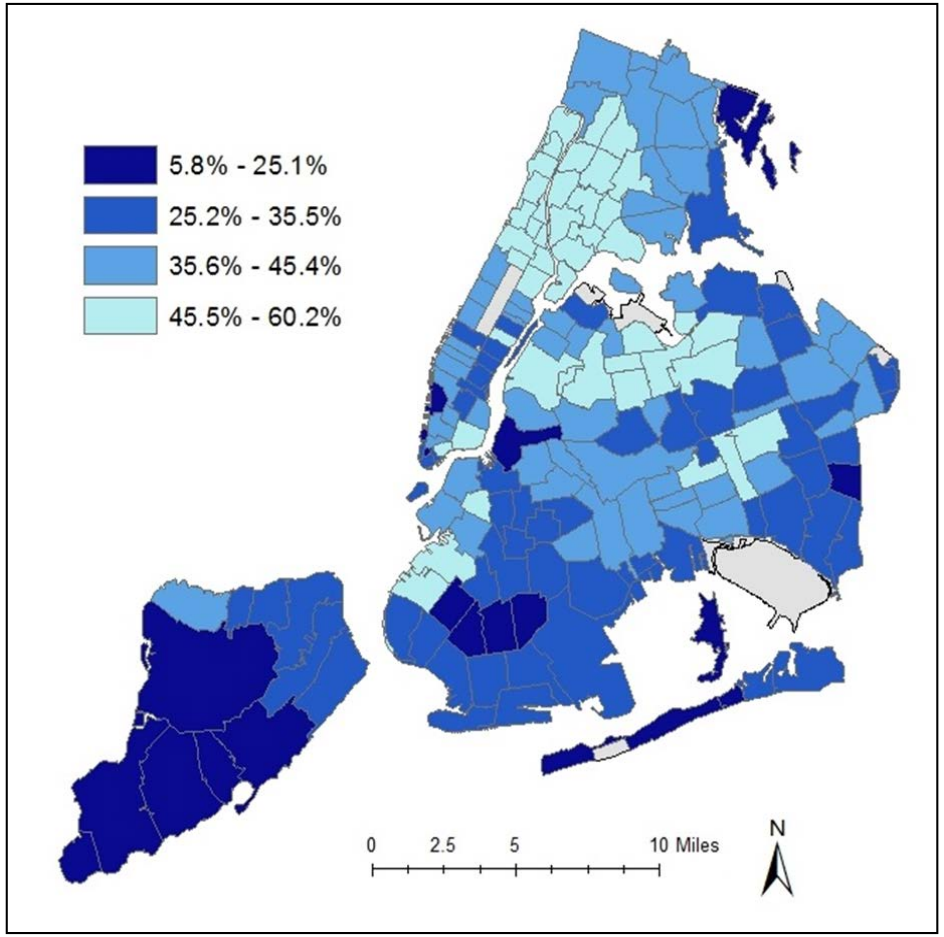
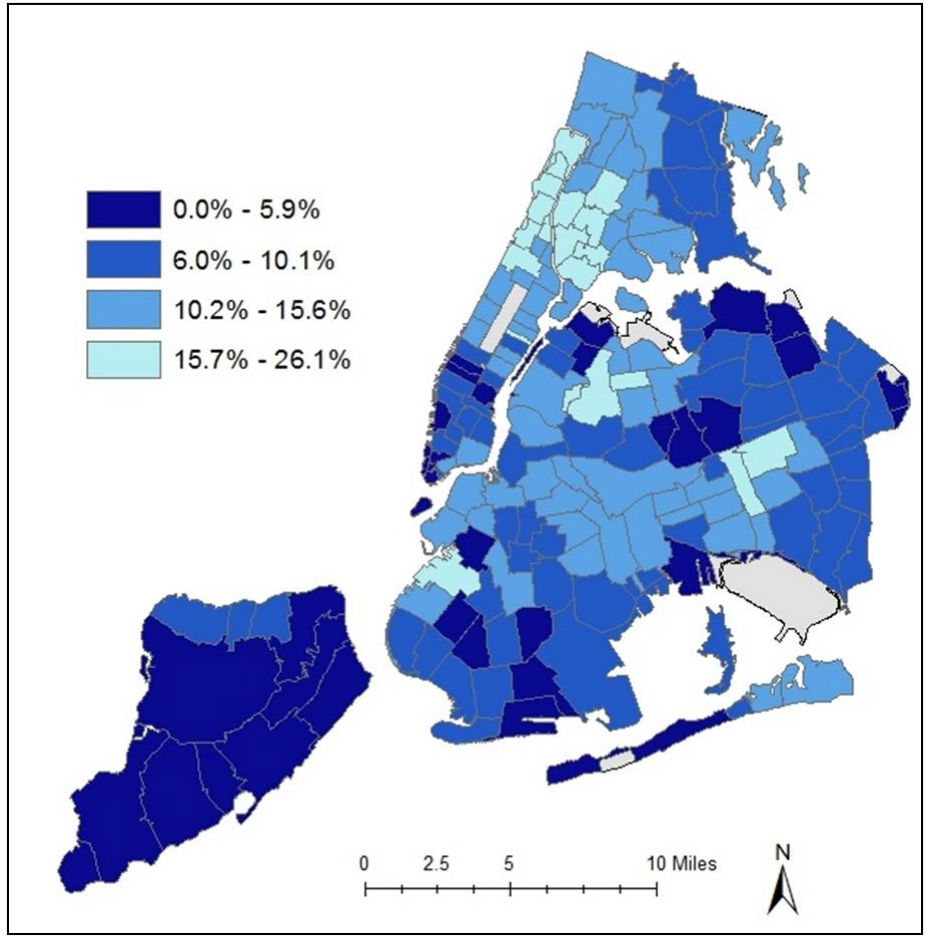
HPV Completion - Adjusted

Females



Males



Data Source: NYC DOHMH, Bureau of Immunization, Immunizations and Patients in the NYC Citywide Immunization Registry as of 12/31/2012. Children with valid NYC zip codes; Zip codes with less than 10 children are excluded. Adjusted by reporting score.

Conclusions/Limitations

- Adjusting raised coverage in areas of higher under-reporting
  - But did not change much the relative standing of each zip code
- Immunization Program used results from this analysis to target providers in low coverage areas
- This adjustment method requires another data source of immunization coverage by the same geographical unit - not always available
- ATS database captures immunizations only for children attending public schools

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.