



Big Data in Early Childhood: Using Integrated Data to Guide Impact

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Zero to Three
National Training Institute
December 11, 2014

Overview

- Early childhood period as crucial opportunity
- Understanding childhood influences in communities
- Creating an integrated child data system as a community resources
- Using integrated data to inform policy and practice



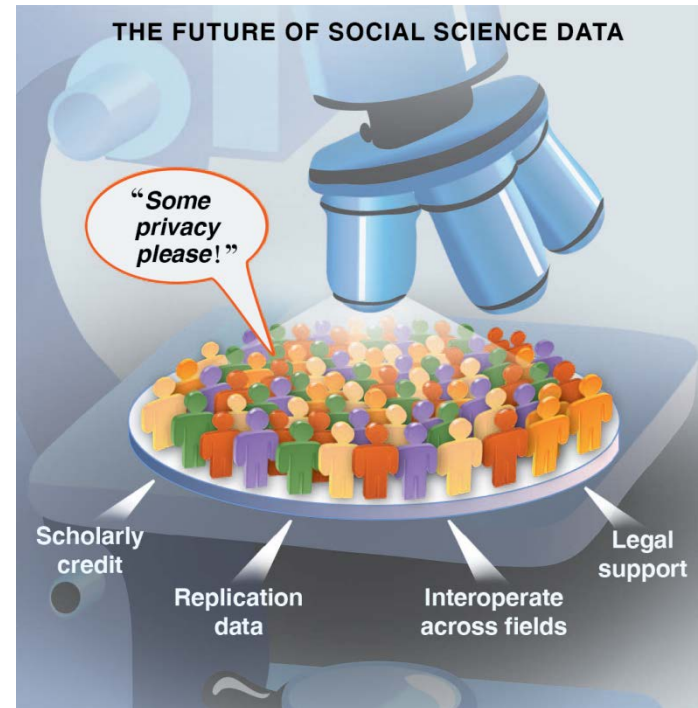
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Big data presents tremendous opportunities and challenges

“Analogous to what it must have been like when they first handed out microscopes to microbiologists, social scientists are getting to the point in many areas at which enough information exists to understand and address major previously intractable problems that affect human society.” *Gary King, MIT*

Science, 331, 11 February, 2014, 719



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Big data defined

Definition:

Digital information that challenges existing technology due to size, complexity, analytic demands



Common Features

Origin: Generated as by product of other activity

Proportionality: Encompass all data from a particular source

Dynamic: Capture events over time

Variability: Many types and varying forms

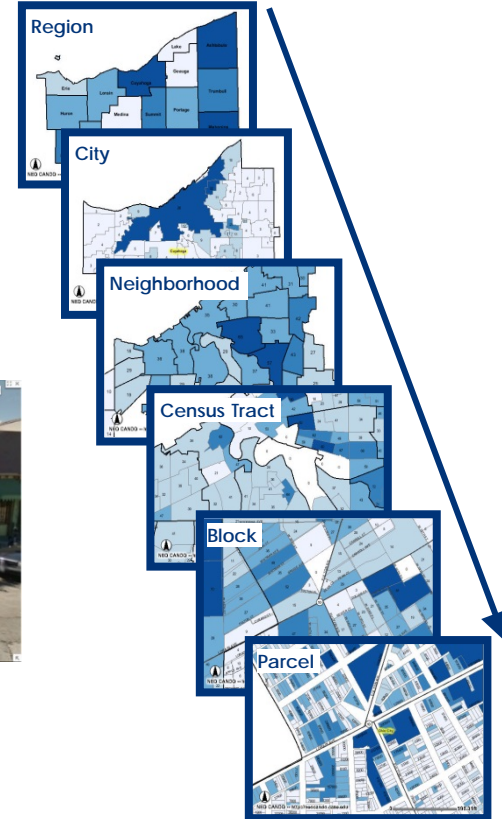
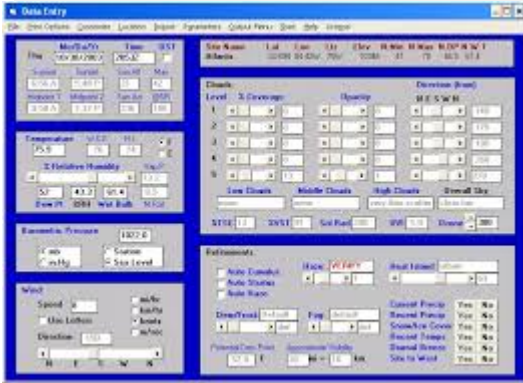
Velocity: Real time data capture



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Digital processes generate social data: E-Records, E-transactions, digital media, E-government

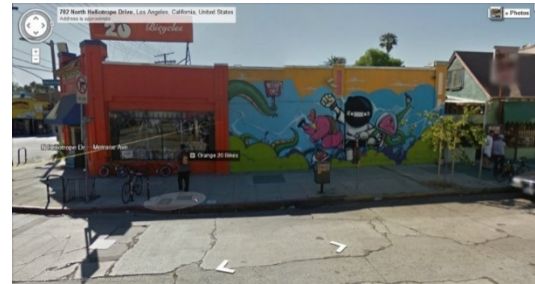


Case ID	Case Description	Case Status
1000001	Multiple sclerosis	Open
1000002	Single diagnosis code	Open
1000003	Describe diagnosis code	Open
1000004	ICD-9-CM code	Open
1000005	ICD-9-CM code	Open
1000006	ICD-9-CM code	Open
1000007	ICD-9-CM code	Open
1000008	ICD-9-CM code	Open
1000009	ICD-9-CM code	Open
1000010	ICD-9-CM code	Open

 **Susan LaMotte**
@SusanLaMotte

Everyone's talking about #bigdata in #HR.
Everyone! read.bi/ZE8SZR

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In early childhood...many systems at work



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But Big Data can be a heavy lift

- Ownership and access
- Transmission
- Data quality
- Data management and storage
- Analytic tools and models
- Visualization
- Applications



<http://www.nytimes.com/2014/08/18/technology/for-big-data-scientists-hurdle-to-insights-is-janitor-work.html>



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A growing field

- Actionable Intelligence for Social Policy (AISP) Network (11 sites) – U. Pennsylvania
 - States: MI, SC, WA, WI, FL*
 - Counties: Los Angeles, CA; Allegheny, PA; Cuyahoga, OH
 - Cities: Chicago, NYC, Philly
- Site hosts vary
 - Government, University, Nonprofits
- Children's Data Network
 - <http://www.datanetwork.org/about-us/>



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Building a data infrastructure in Cuyahoga County

Since 1999, Cuyahoga County has developed and launched a continuum of supports for young children and their families

- Proven strategies
 - High quality and targeted home visiting
 - High quality early childhood education + educator supports
 - Medical insurance outreach and medical home strategies
- Promising strategies
 - Early childhood mental health services
 - Early literacy services
 - Low cost lead abatement & parent education



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Origination of CHILD System - ChildHood Integrated LongitudinalData (CHILD) System



- Began with child registry of all children born in Cuyahoga County since 1992
- Draws on routinely available administrative data to monitor program delivery and outcomes
- Brings together data at the child level for longitudinal analyses
- Now expanding data to reflect experiences throughout childhood



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CHILD System Data Sources

- 400,000 children and counting

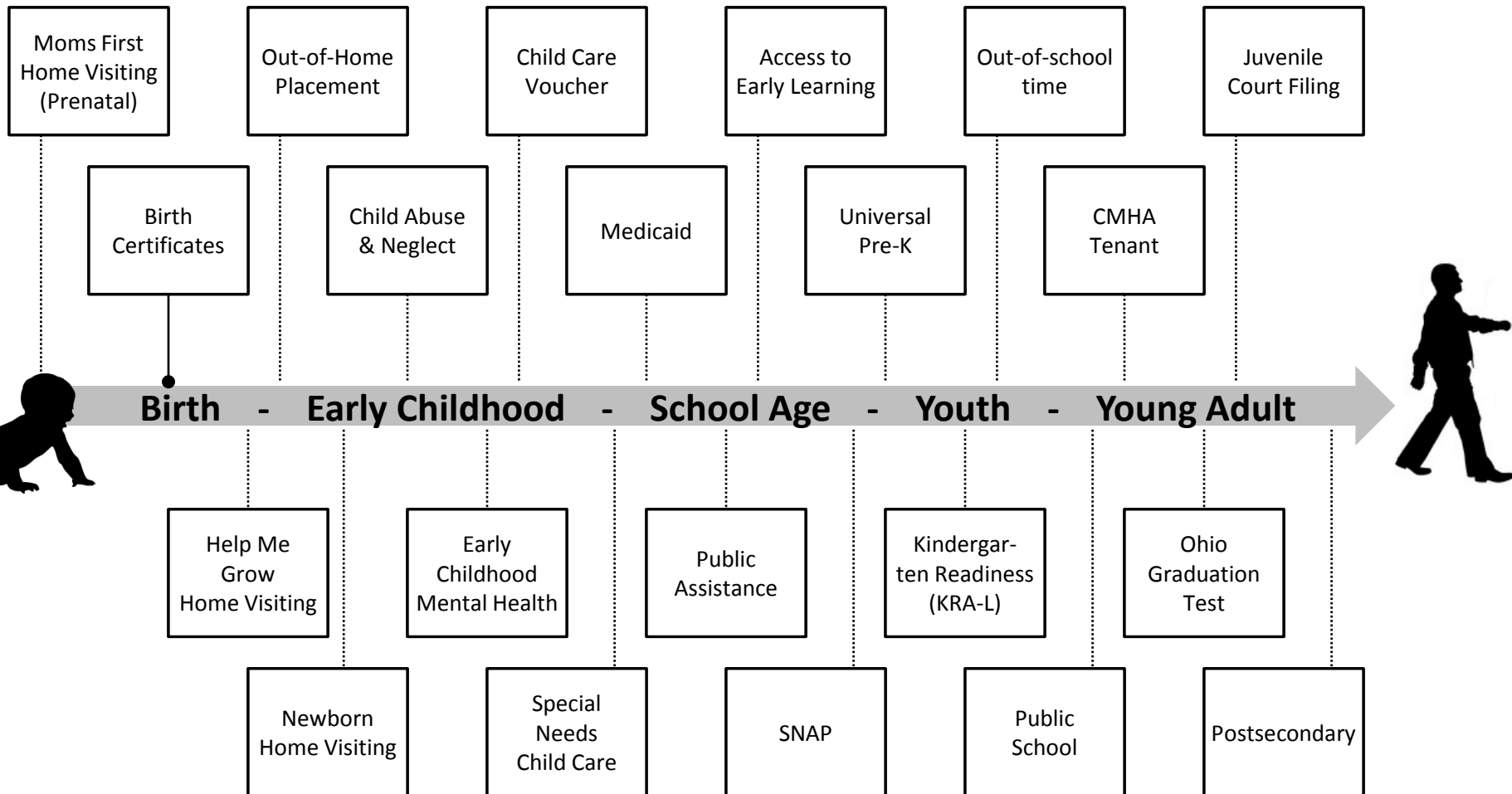
- Birth certificates
 - Maternal health
 - Low birth weight births
- Death certificates
 - Infant mortality
- Child welfare
 - Abuse/neglect investigations
 - Placements and services
- Public school data
 - Attendance
 - Kindergarten readiness
 - Proficiency tests
 - Graduation
- Homeless Services
- Public Assistance Receipt
 - Medicaid receipt
 - Food Stamp receipt
 - TANF receipt
 - Child care voucher receipt
- IIC program participation
 - Home visiting services
 - Special needs child care
 - Early mental health
 - Universal pre-k
- Juvenile Justice
 - Delinquency Filings
- Geo-data
 - Neighborhood and environmental conditions



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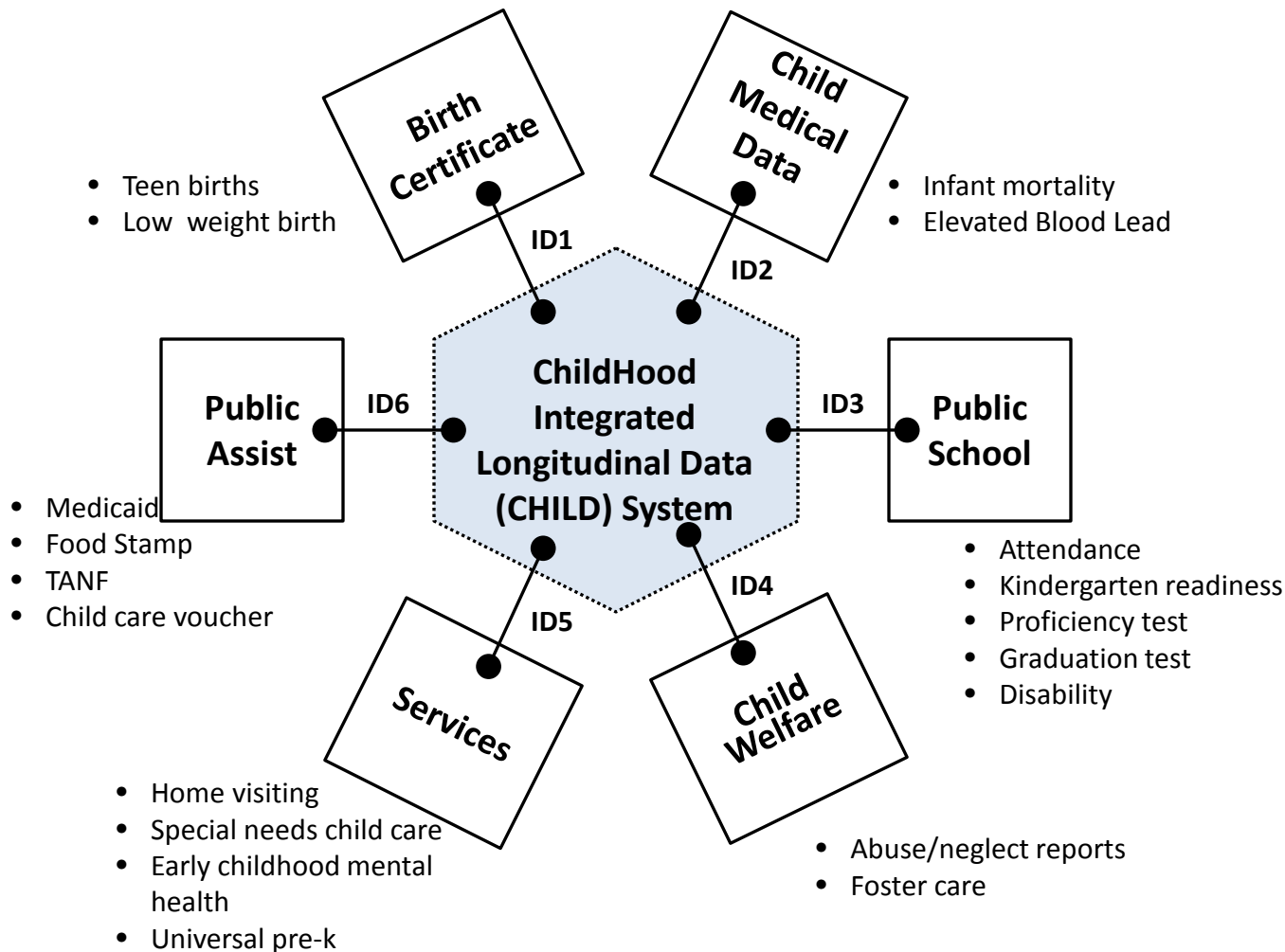
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IDS provides longitudinal perspective



Longitudinal Pipeline

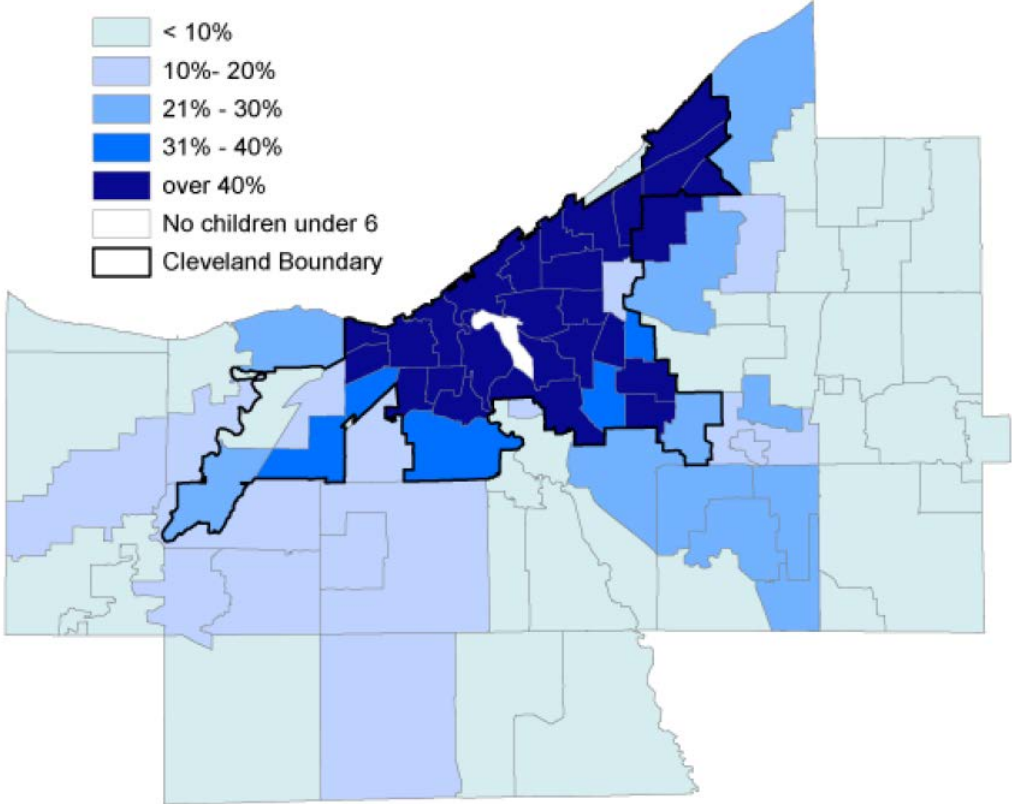
IDS approach: CHILD system



Child Well-Being: Poverty

Child Poverty in Cuyahoga County

Percentage of Children under 6 years old living below the poverty level, 2005-2009



Source: American Community Survey data, 2005-2009
Prepared by: Center on Urban Poverty and Community Development, MSASS, Case Western Reserve University

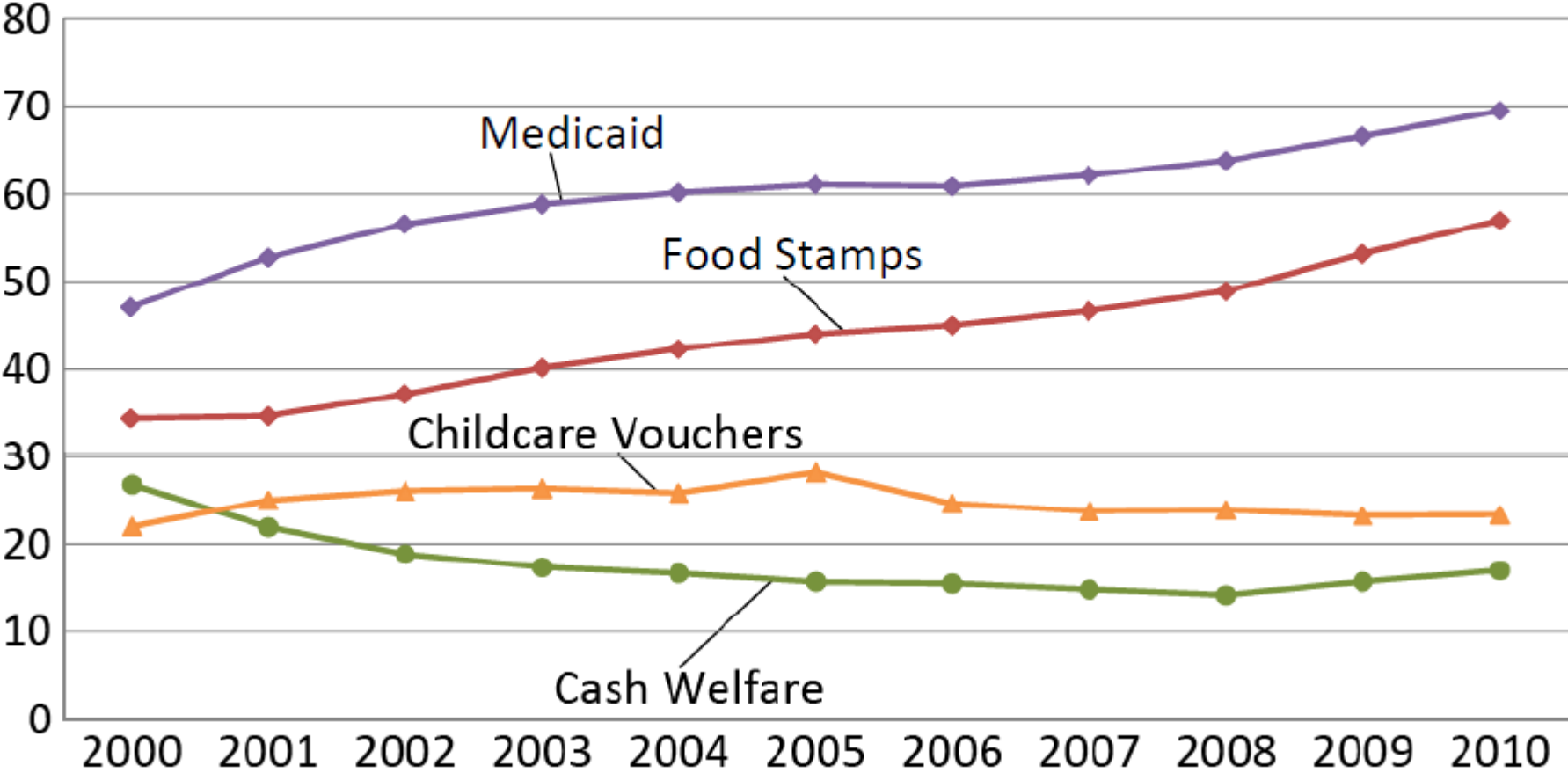


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Child Well-Being: Public Assistance

Percent of children under the age of 6 receiving public assistance (unduplicated annual totals), Cuyahoga County



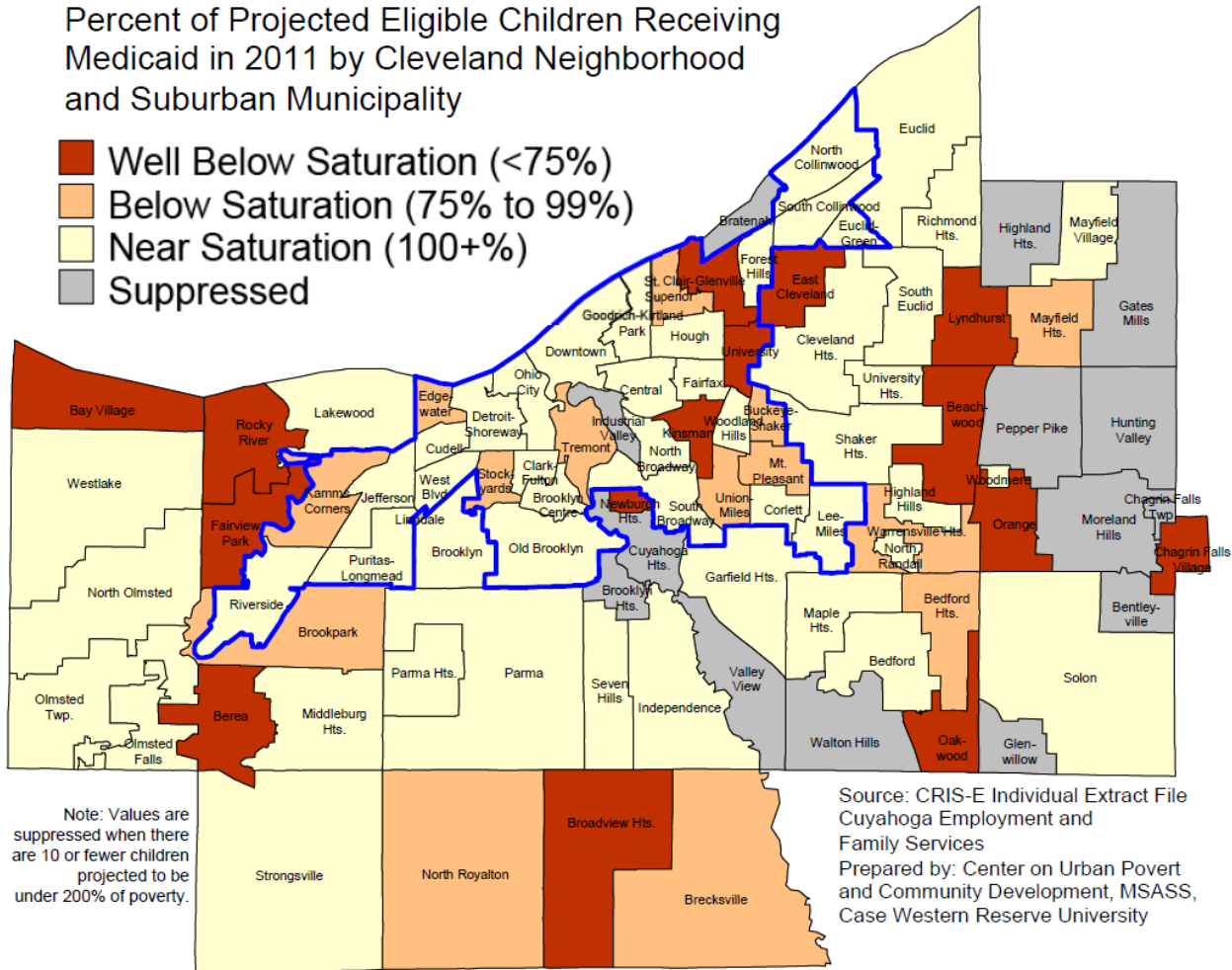
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Child Well-Being: Medicaid

Percent of Projected Eligible Children Receiving Medicaid in 2011 by Cleveland Neighborhood and Suburban Municipality

- Well Below Saturation (<75%)
- Below Saturation (75% to 99%)
- Near Saturation (100+%)
- Suppressed



Source: CRIS-E Individual Extract File
Cuyahoga Employment and Family Services
Prepared by: Center on Urban Poverty and Community Development, MSASS, Case Western Reserve University

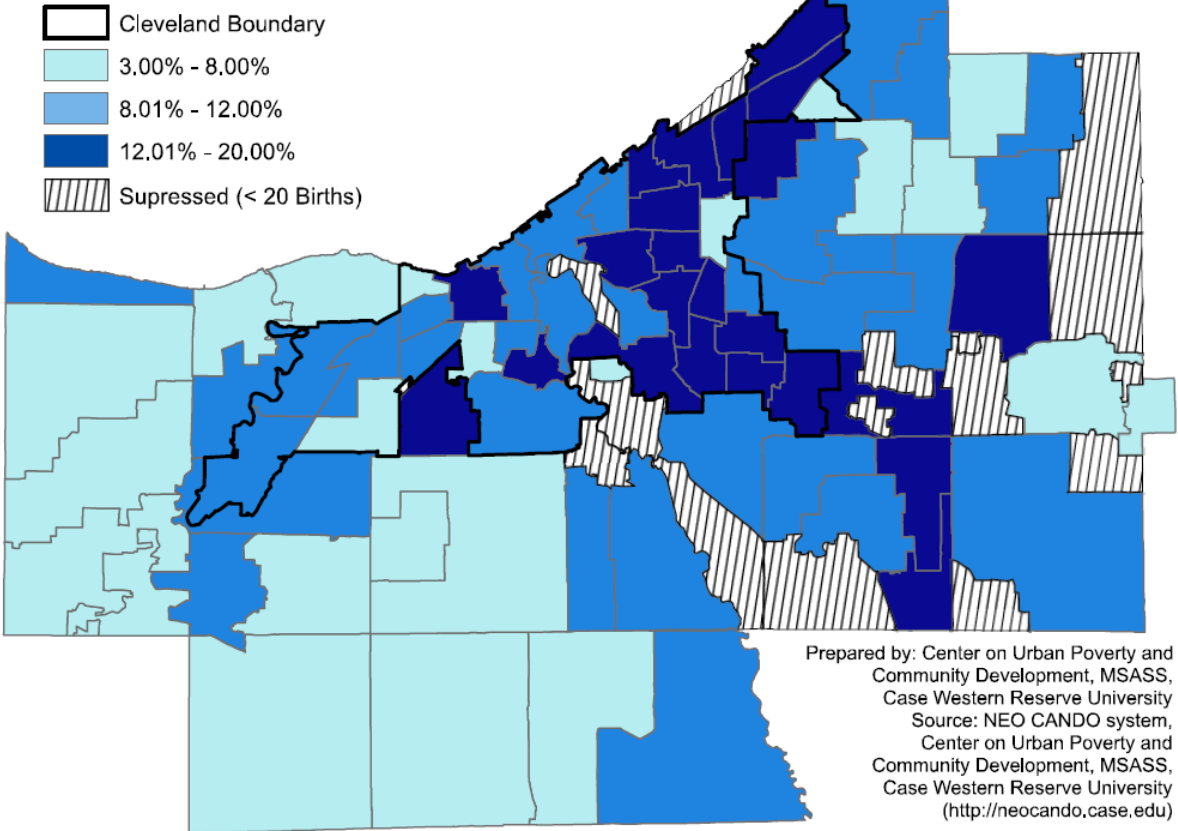


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Child Well-Being: Low Birth Weight Births

Low Birth Weight in Cuyahoga County, 2009
Percent of births weighing less than 2500 grams



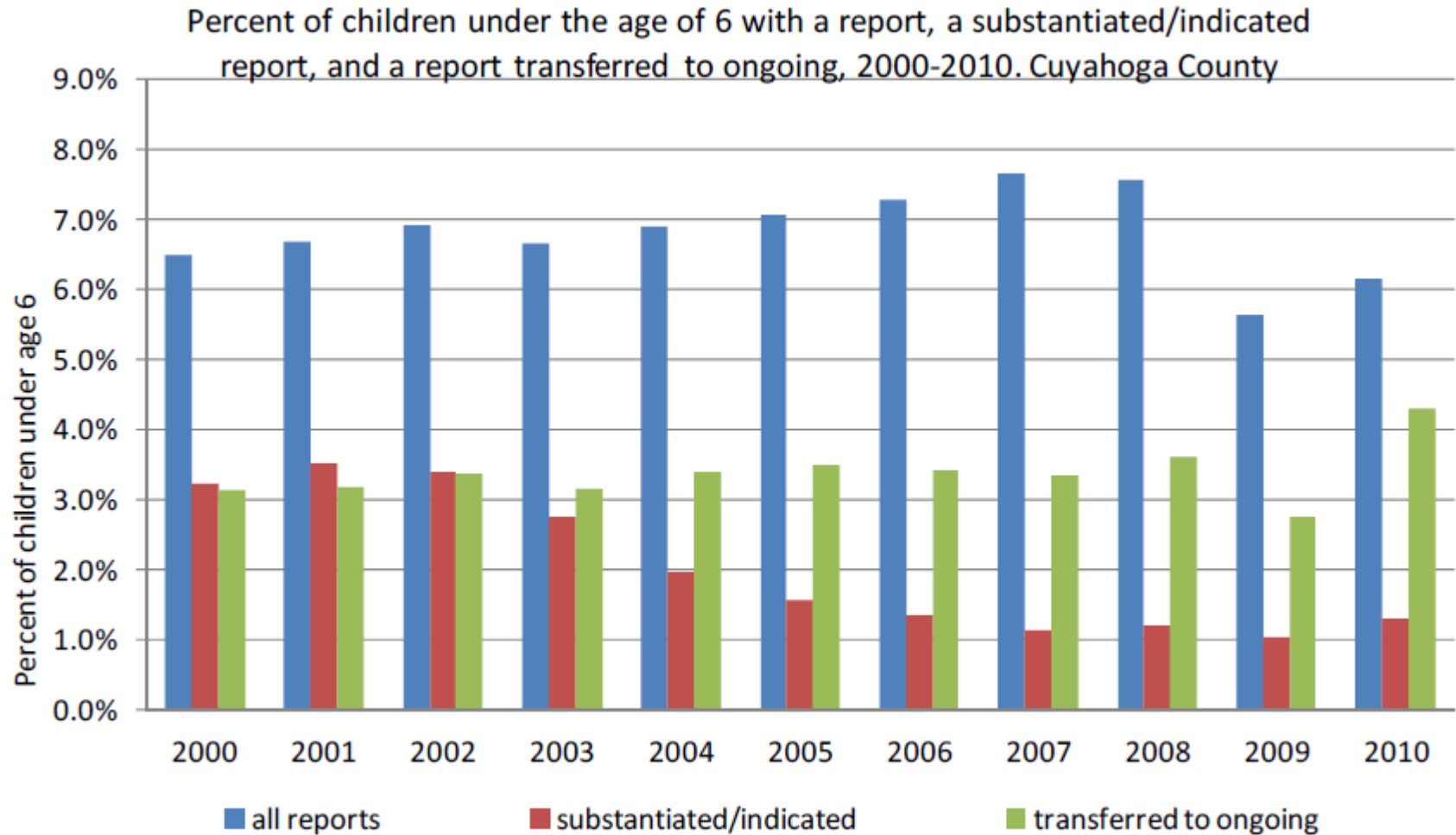
Note: 190 births had missing birth weight or address, or the address could not be geocoded.



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Child Well-Being: Child Maltreatment



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The Power of Integrated Data

- Data helps inform our understanding of the early childhood system
- Individuals and families interact with multiple systems and services, so integrated data offers a more complete view of reality
- Understanding of how systems work and how to better meet existing needs can be informed by integrated data
- Service models emphasize long term and collective impact, so data needed across services and over time



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Using Integrated Data

Examples

- Tracking well-child visits
- Understanding school readiness
- Informing 'Pay for Success' planning



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Child Health Example

- Despite dramatic increase in health insurance coverage for children ages 0-6, only 43% of poor children got all the recommended well-child visits in the first year of life
- Integrated data showed that 49% of these families were involved with other services close to birth
- A preventive approach developed by having dedicated staff at clinics reach out to families
- Result - Medical Home Pilot with one Patient Advocate each at NEON & Neighborhood Family Practice
 - 86% of families completed scheduled well-child visits, double the rate for children born on to Medicaid in Cuyahoga County



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School Readiness example

- State of Ohio passed Third Grade “Reading Guarantee” in 2012
- Used integrated data to understand early child influences on kindergarten readiness
 - Cohort of all children entering CMSD 2007-2010
 - Early childhood data examined retrospectively to birth
 - Early school performance data examined forward to 3rd grade

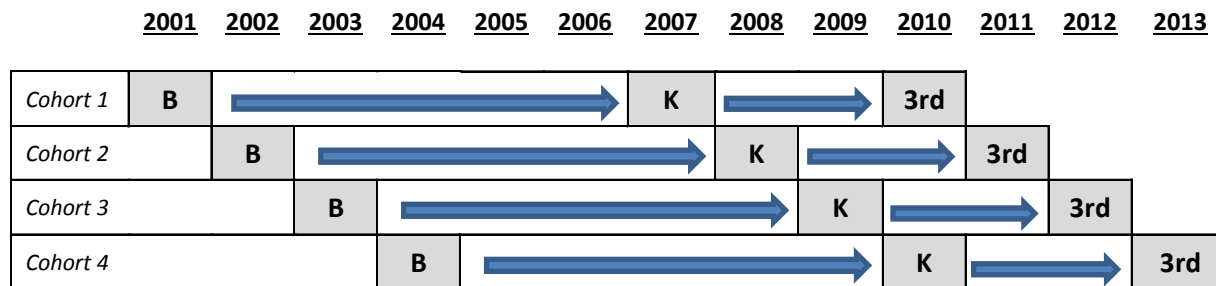
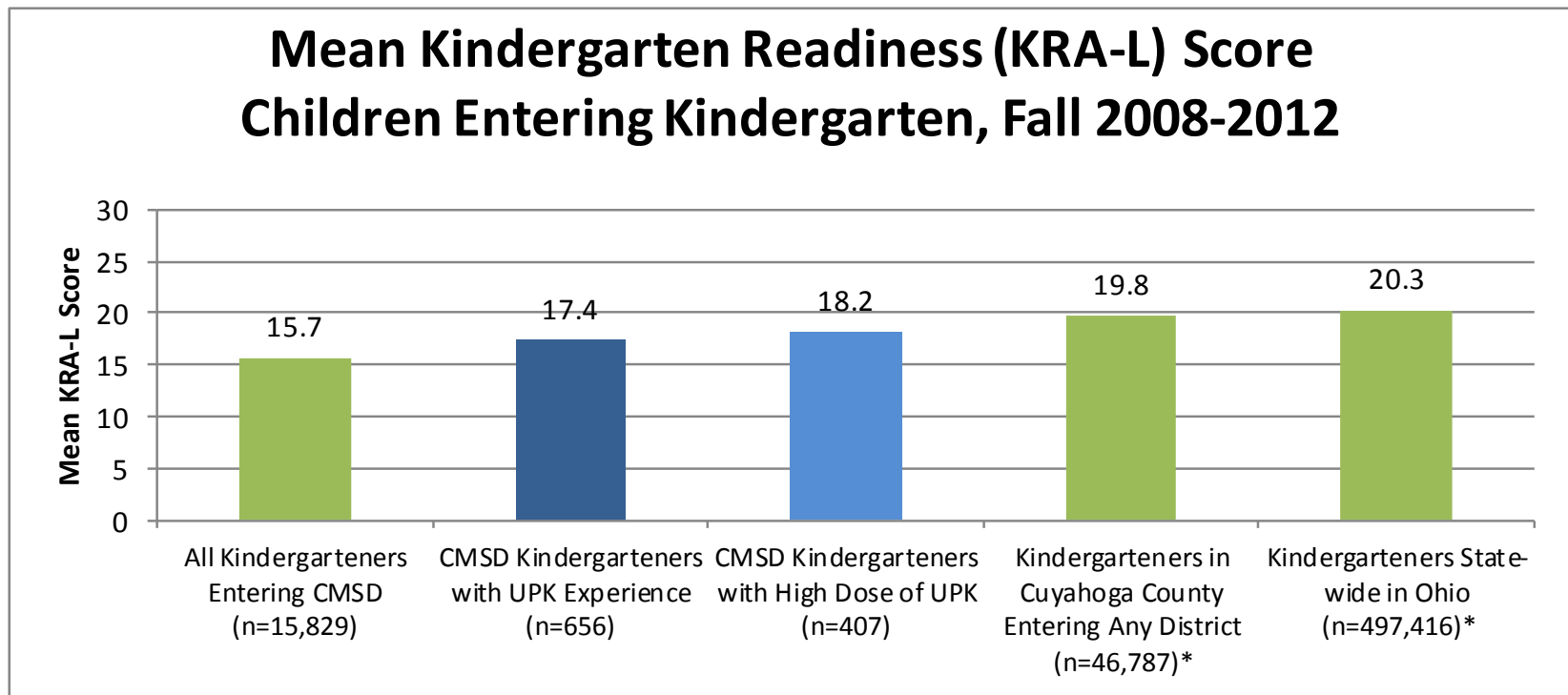


Figure 1: Cohort-based Study Design

- Showed negative influence of maternal education, poverty, as well as home visiting and high-quality preschool experiences



Children from UPK Sites Entering CMSD Are More Prepared



The Kindergarten Readiness Assessment-Literacy (KRA-L) has a value of 0-29 and has three score bands: Band 1 0-13 (Assess broadly for intense instruction), Band 2 14-23 (Assess for targeted instruction), and Band 3 24-29 (Assess for enriched instruction). Children scoring Band 1 may be at serious risk of being unprepared for kindergarten.



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Pay for Success Example

- CHILD system data were used to explore the experiences of homeless families with child welfare services, particularly the use of foster care services.
- The population was sufficiently large and costly to merit new intervention.
- Cuyahoga County launched the first county-level Pay For Success initiative with a focus on reducing foster care stays for children whose families experience homelessness.



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Disseminating Results

Child & Family Well Being Indicators	County District 2 (2008)	Cuyahoga County (2008)
Births	1,443	16,246
# Teen Births, mother's age 10 - 14 (rate per 1,000)	2 (1)	42 (1)
# Teen Births, mother's age 15 - 19 (rate per 1,000)	124 (39)	2,031 (41)
% of Mothers without High School diploma	14%	19%
% Low Birth Weight	9%	10%
% Premature Low Weight Births	6%	7%
% Mothers w/adequate prenatal care	52%	53%
% Mothers w/out prenatal care	1%	1%
% Healthy Births	53%	49%
Infant Deaths (rate per 1,000 births)*		

Child & Family Well Being Indicators	County District 8 (2008)	Cuyahoga County (2008)
Births	1,877	16,246
# Teen Births, mother's age 10 - 14 (rate per 1,000)	12 (2)	42 (1)
# Teen Births, mother's age 15 - 19 (rate per 1,000)	358 (79)	2,031 (41)
% of Mothers without High School diploma	32%	19%
% Low Birth Weight	14%	10%
% Premature Low Weight Births	9%	7%
% Mothers w/adequate prenatal care	42%	53%
% Mothers w/out prenatal care	2%	1%
% Healthy Births	36%	49%
Infant Deaths (rate per 1,000 births)*	29 (15)	164 (10)
#(%) Children with Elevated Blood Lead Levels ($\geq 5\mu\text{g}/\text{dl}$)	637 (16%)	3,951 (16%)
#(%) Children with Elevated Blood Lead Levels ($\geq 10\mu\text{g}/\text{dl}$)	168 (4%)	1,174 (5%)



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Informing system responses

- What does the CMSD kindergarten class look like?

Family Well Being Indicators	CMSD Kindergarten Class 2008-09¹	Cleveland²	Cuyahoga County³
% Teen Births, mother's age 10 – 14	<1	<1	<1
% Teen Births, mother's age 15 – 19	22.4	16.7	9.8
% of Mothers without H.S. diploma	41.7	30.2	15.9
% Low Birth Weight	12.6	11.6	9.4
% Premature Low Weight Births	8.7	8.2	6.7
% Mothers w/ adequate prenatal care (Kessner Index)	63.1	69.4	81.3
% Mothers w/out prenatal care	1.9	1.7	0.9
% Healthy Births (based on information about Apgar, prenatal care, birthweight, gestational age)	56.4	61.5	70.9
% Children with a substantiated or indicated report of abuse/neglect by age 4	12.1	9.6	5.1
% Children referred to ongoing services with Child & Family Services by age 4	19.8	14.7	7.6
% Children with any report of abuse/neglect by age 4, including substantiated and unsubstantiated	35.2	26.7	14.7
% Children in households receiving Food Stamps in 2008	76.9	51.1	28.8
% Children in households receiving Cash Assistance in 2008	19.0	11.3	6.1



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Weaknesses of early childhood re: Big Data

- Organizational culture and politics not sufficiently data driven and data savvy
- Big data requires long term investments, but funding is tough to raise, and short term results come quicker from “one off” data collection
- Proportion of early childhood research effort devoted to big data small relative to survey and observational data
- Too few early childhood folks with Big Data skills



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Challenges to pursuing Big Data

- Funding!
- Data access – data sharing, privacy concerns
- Data depth – matching variables, service measures, outcome measures
- Data frequency/recency
 - how frequent is enough?
 - Capacity issues for data partners



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Navigating Big Data challenges

- Defining the “system”
- Securing and sustaining funding
- Promoting collaboration
- Using data to inform decisionmaking
- Managing partner expectations



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What's Next?

- Undertake more study of factors that predict longitudinal outcomes for children
- Explore mechanisms to make aggregate data from more available to the policy and practice communities
- Extend CHILD System to include more early childhood data (e.g., Head Start, developmental disabilities) and data from later adolescence (e.g., juvenile court involvement, school systems)



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