Does Social or Type

University of Chicago

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Environment 2 Diabetes in

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Influence the Ri
Urban Youth?

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Abstract

Social factors may affect the risk of childhood diabetes through the “hygiene hypothesis”, that is, children raised in high-density, impoverished settings are at lower risk for developing type 1 diabetes (T1DM). In contrast, higher risk for type 2 diabetes (T2DM) may be associated with poverty, as seen in adults from industrialized countries.

We explored differences in neighborhood environment and the incidence of T1DM and T2DM in children from a multiethnic urban population. Residents of the city of Chicago, IL with diabetes diagnosed before age 18 (n = 1237) were identified between 1992-2002. Ethnicity, address at onset, and diabetes type were taken from medical records and telephone interviews. Census tracts were assigned using address at onset and ranked by a community vitality index (CVI), which was compiled from census and other administrative data by a local research organization, according to multiple indicators of social capital, economic potential and community amenities. The CVI is normalized across the 6-county metropolitan region with scores ranging from 0 (lowest) to 100 (highest). Census tracts were grouped by decile of CVI from 1 (lowest) to 10 (top 10% or most cohesive census tracts). Incidence rates were calculated using 2000 census counts for persons <18 in each CVI decile.

Overall, as CVI increased, the incidence of T2DM in those aged 0-17 declined, while the incidence of T1DM increased slightly. This was true for both males and females, and generally within ethnic groups. In this analysis, increasing neighborhood cohesion was associated with a lower risk of T2DM, but not T1DM, in youth, suggesting differences in the etiologic role of social stressors.

Background

- **Clinicians have observed a marked increase in the diagnosis of type 2 diabetes in children and adolescents in the past few years.** (Lipton RB. Diab Metab Res Rev 2002; 18: 135-42)
- **Type 2 diabetes comprises 8% to 45% of all new cases of childhood diabetes in the US. Most of these children belong to ethnic groups at high risk for type 2 diabetes.** (Fagot-Campagna A. J Pediatr Endocrinol Metab 2000: 13 Suppl 6: 1399-402)
- **The incidence of type 2 diabetes is correlated with neighborhood deprivation.** (Connolly, V. J Epidemiol Community Health 2000; 54: 173-177)
- **Environmental risk factors may affect the incidence of type 1 diabetes in children through the "hygiene hypothesis."** (Gale, E.A. M. Diabetologia 2002; 45:588-594)

Objective

To explore differences in neighborhood social environment and the incidence of type 1 and type 2 diabetes in young people (aged 0-17) in a multiethnic, urban population.

Approach

1. Aggregated population data from MCIC to determine social environment
2. Incidence data from Chicago Childhood Diabetes Registry to determine incidence rates and type of diabetes

Method

1275 incident cases of diabetes

- Children aged 0-17 at diagnosis
- Diagnosed 1/1/1992 through 12/31/2001

Residential address at diagnosis matched to census tract (31 unmatched)

Each census tract assigned a Community Vitality Index (CVI) score 1-100

- CVI standardized across the entire 6-county Chicago metropolitan area
- CVI scores grouped into deciles for this analysis

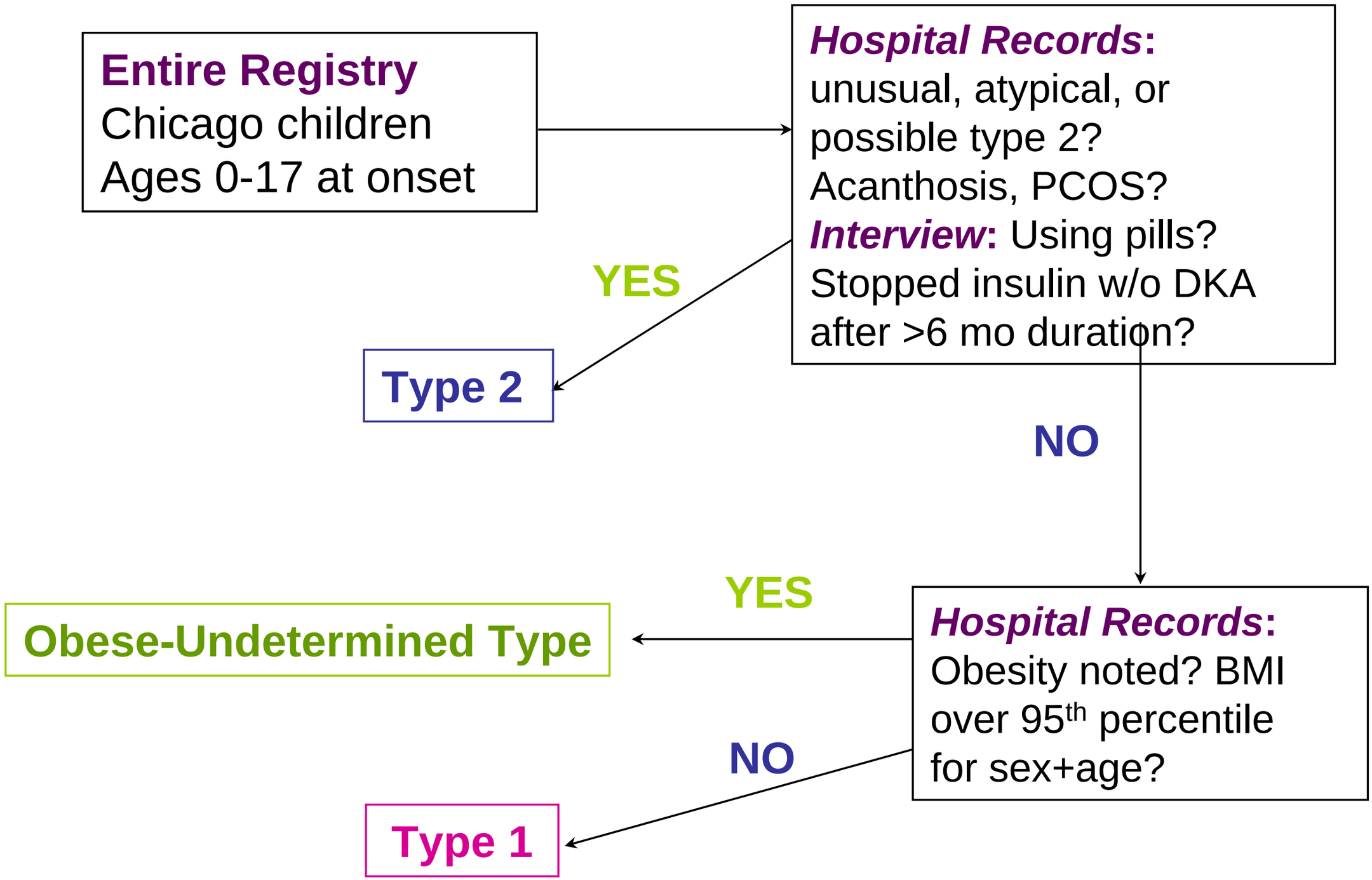
Method: Chicago Childhood Diabetes Registry

Population-based incidence registry:

- New cases of diabetes (ICD-9: 250) since 1992
- Resident of Chicago, aged 0-17 at diagnosis

- Ascertained from hospital/clinic records, Health Dept., Public Aid, diabetes camp (85% complete)
- Family/patient interviews ~6 years after diagnosis

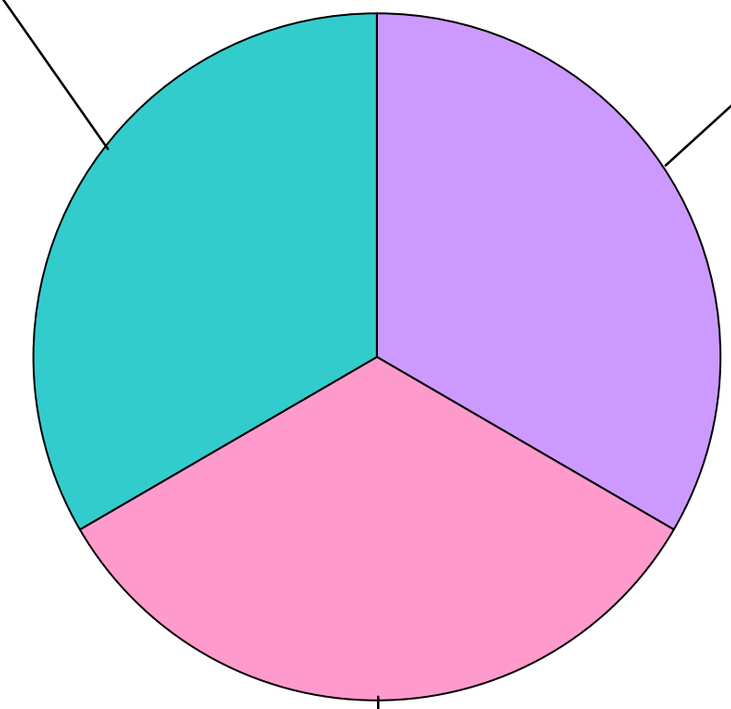
Method: Classifying Type of Diabetes



Method: Community Vitality Index

Community Amenities 33%

- **Art, Culture, Leisure and Amusements:** Number of opportunities within 3 miles
- **Restaurants:** Number within 2 miles
- **Community Institutions:** Number of libraries, houses of worship and higher education institutions within 2 miles
- **Health and Human Services:** Number of providers within 3 miles



Social Capital 33%

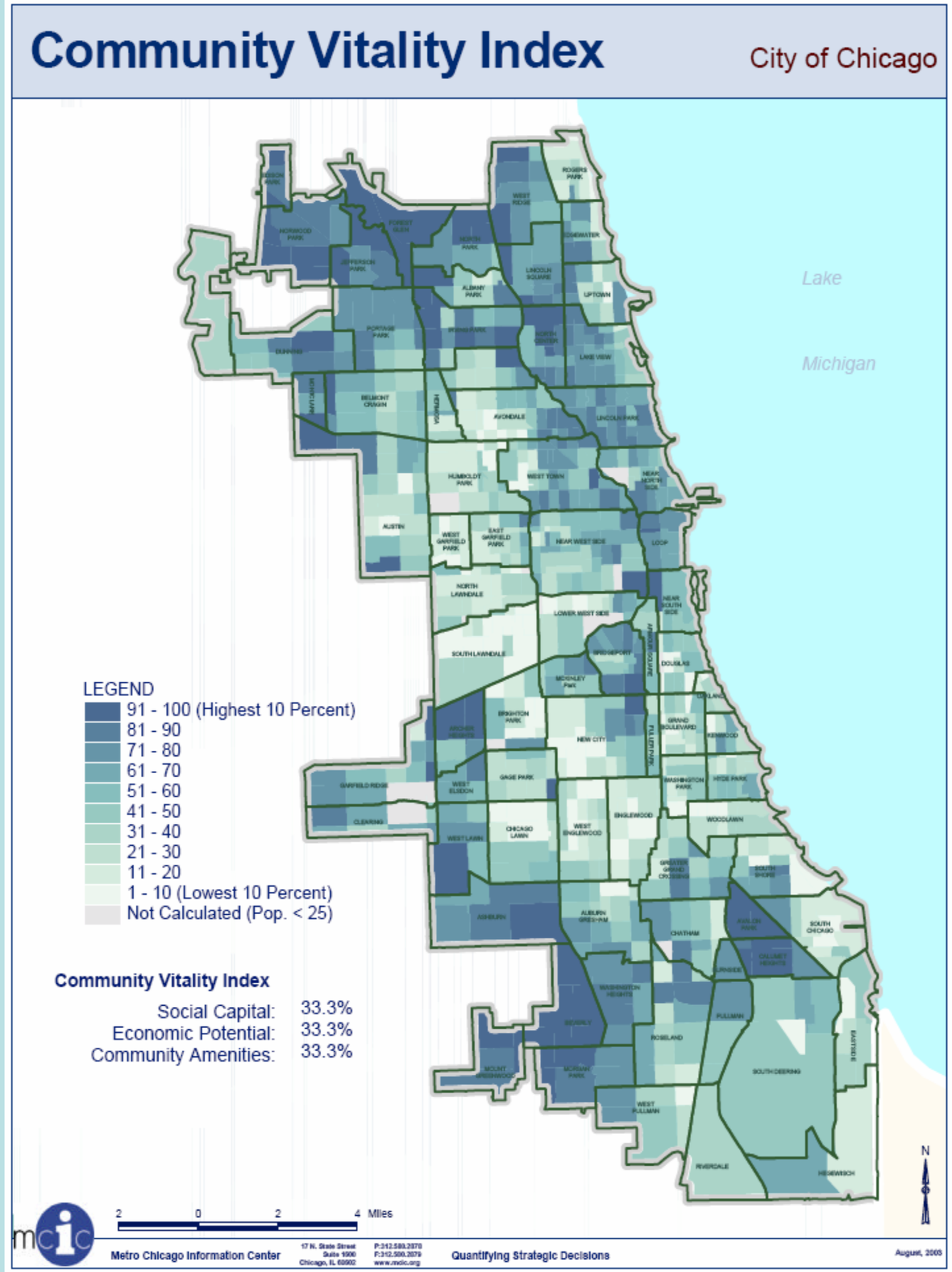
- **Civic Engagement:** Percent of voting in most recent national November election
- **Community Diversity:** Age distribution, ethnic diversity and income mix
- **Interaction Potential:** Common language, social support in household, available adults
- **Stability:** Mobility and immigration

Economic Potential 33%

- **Commercial Vitality**: Number of business/ square mile, value of small business loans/population
- **Buying Power:** Aggregate income/square mile, shelter cost burden
- **Neighborhood Confidence Investment:** Home ownership rates, rehab loan rates, percent occupied dwelling units
- **Workforce Potential:** Education attainment, number of wage earners/square mile, labor force participation

Community Vitality Index Chicago

Source:
Metro Chicago Information Center (**MCIC**)
17 N. State St., Suite 1600
Chicago, IL 60602
www.mcic.org

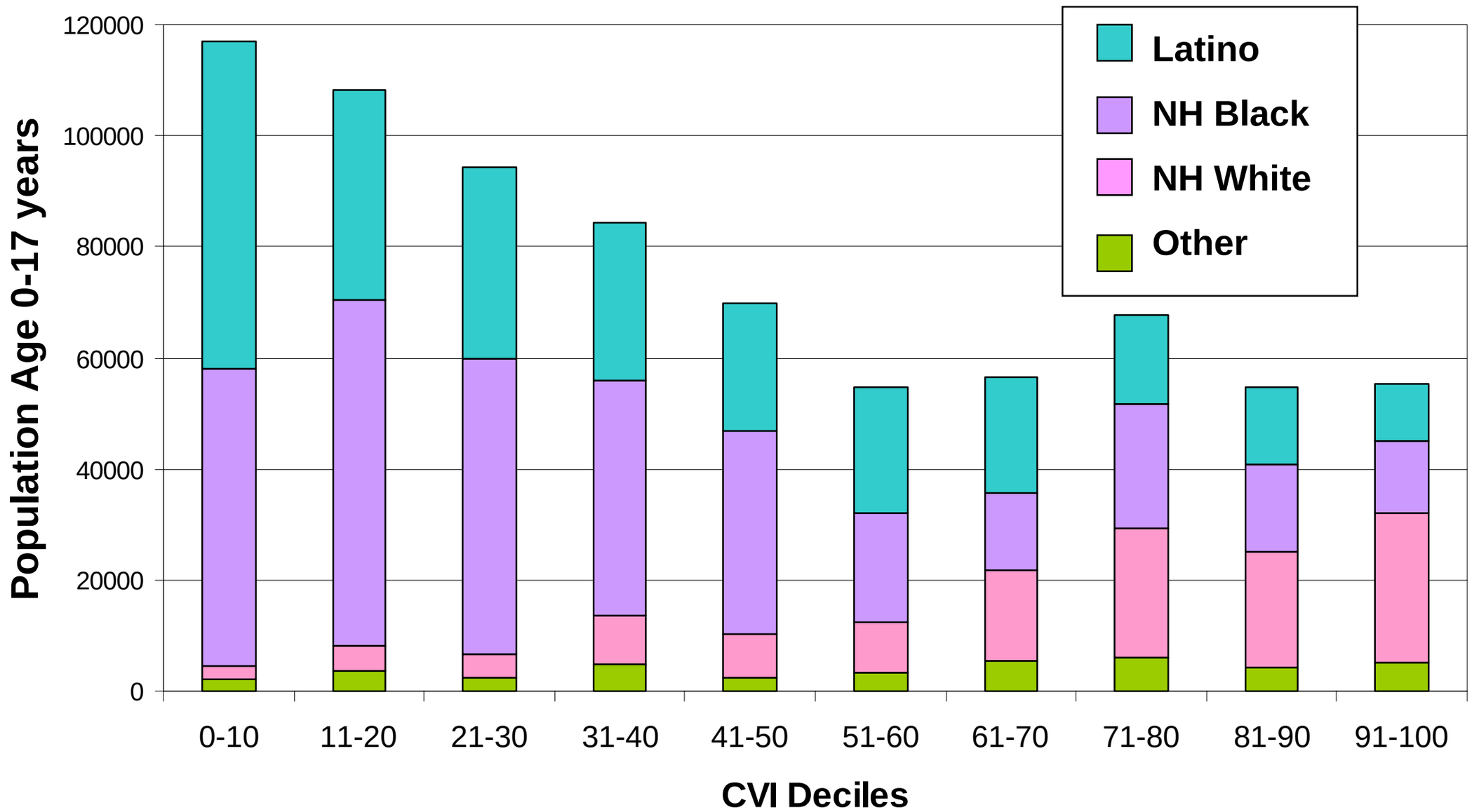


Population at Risk and Cases by CVI Decile

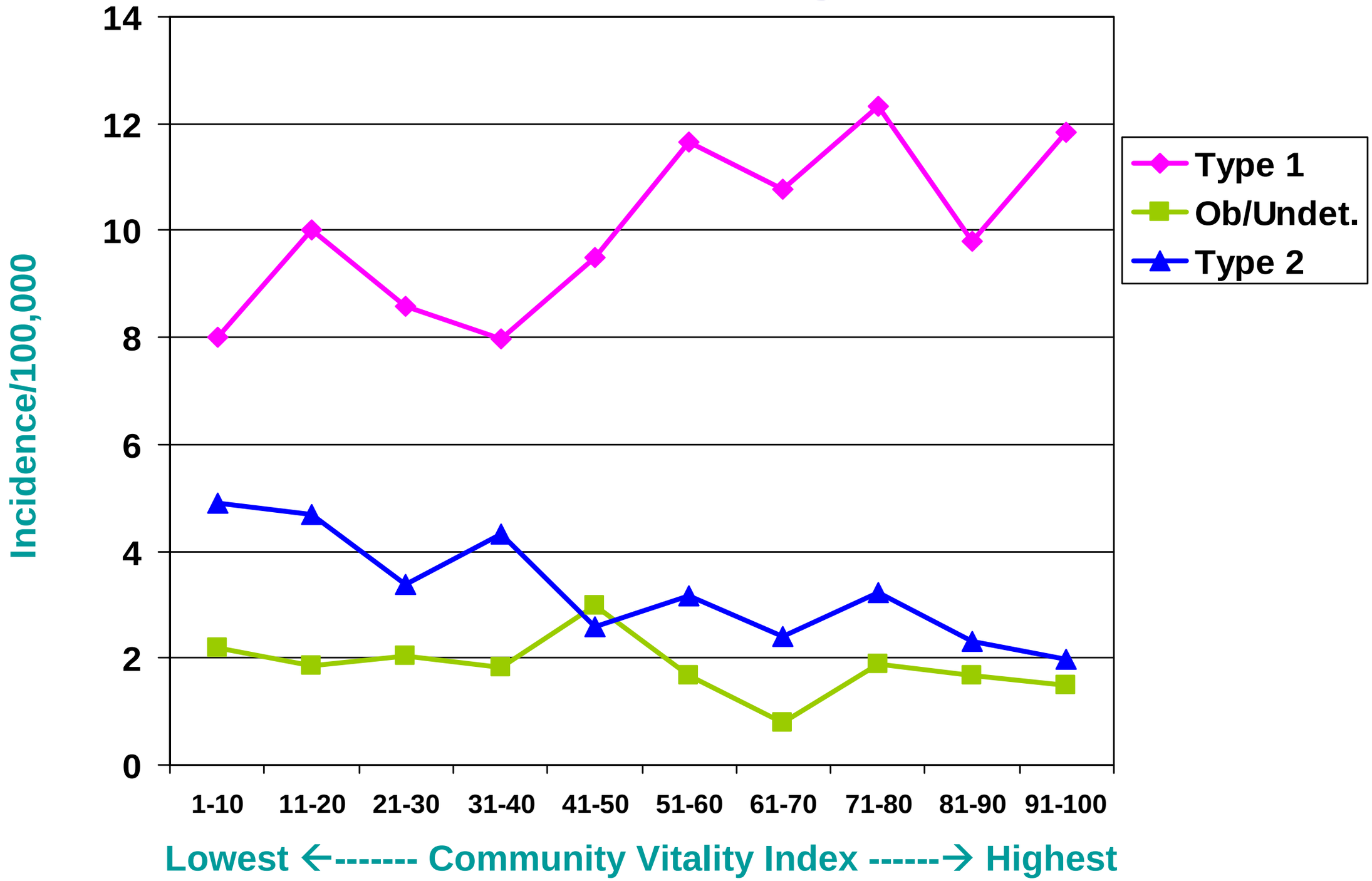
2000 US Census Counts

CVI	*Population*	*Cases*		
	aged 0-17	*T1*	*Ob/Undet'd*	*T2*
1-10	116923	103	28	63
11-20	108215	119	22	56
21-30	94209	89	21	35
31-40	84293	74	17	40
41-50	69956	73	23	20
51-60	54595	70	10	19
61-70	56484	67	5	15
71-80	67753	92	14	24
81-90	54777	59	10	14
91-100	55254	72	9	12

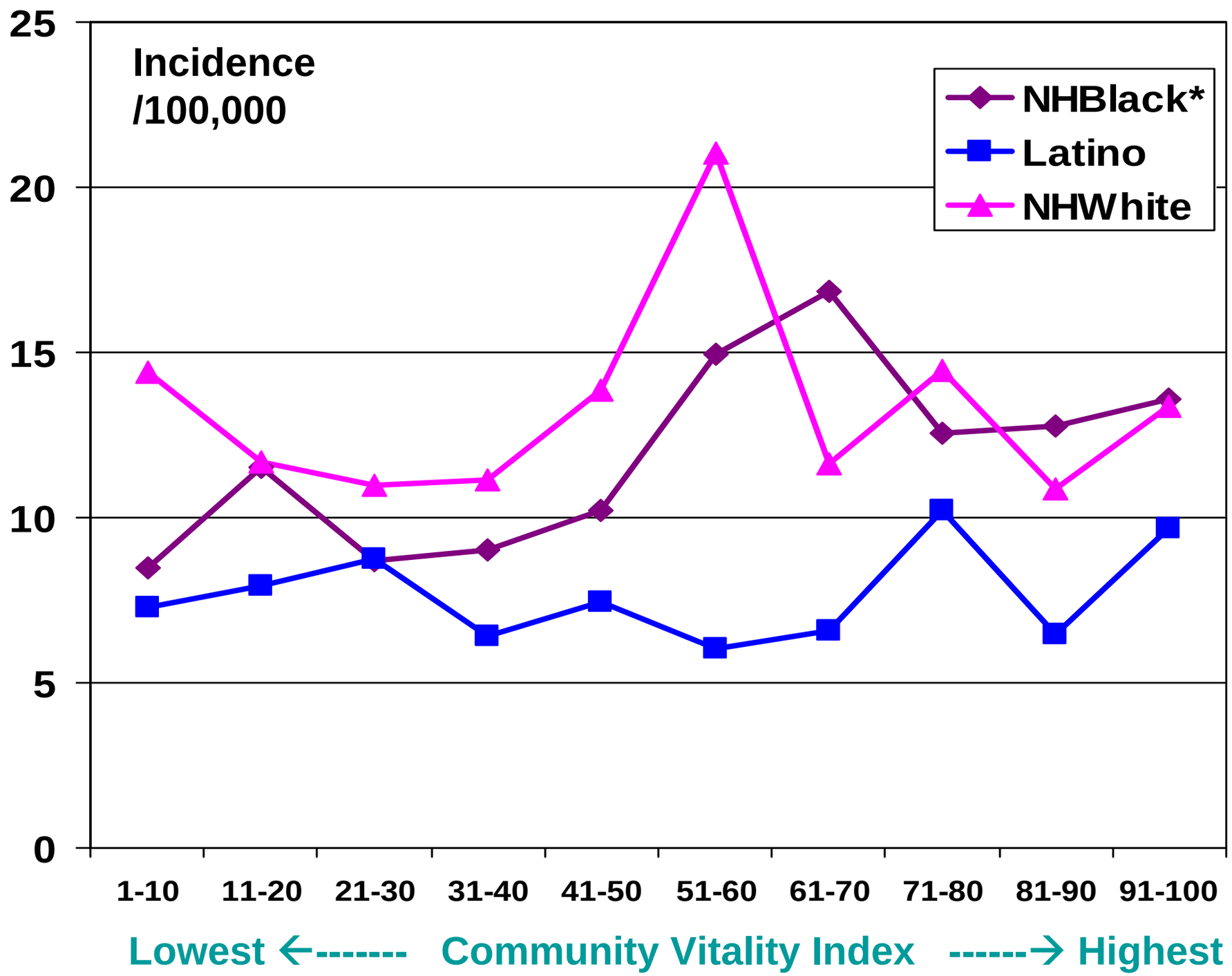
Ethnic Distribution in Chicago by CVI Decile



Results: Incidence of Childhood Diabetes by CVI Decile

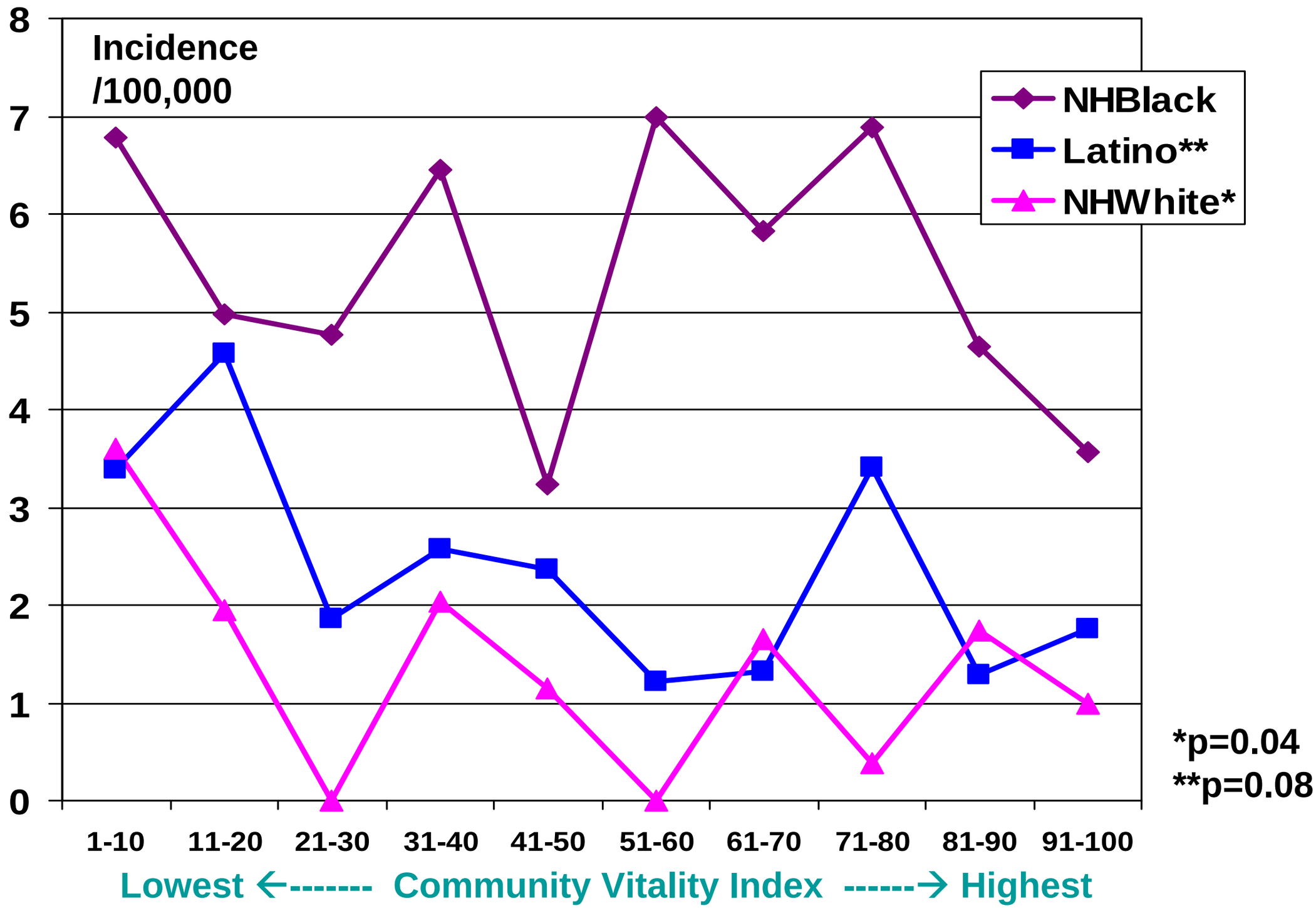


Type 1 Diabetes by Ethnicity and CVI Decile



*p = 0.04

Type 2 Diabetes by Ethnicity and CVI Decile



*p=0.04
**p=0.08

Results:
Summary of Findings

More City of Chicago residents live in census tracts with low CVI scores (compared to suburban residents)
- Fewer NH Whites reside in low CVI neighborhoods in the City of Chicago

Type 1 diabetes increased with CVI decile for NH Blacks
Type 2 diabetes decreased as CVI increased for NH Whites (and marginally for Latinos)

Obesity-related/undetermined type diabetes showed no incidence differences by community vitality index

Limitations

1. Typology for childhood diabetes based on medical records and self-report only
   - a large fraction of cases (12%) were classified with obesity-related/undetermined type diabetes
2. The calculated CVI may be an inadequate proxy for the entire neighborhood social environment
3. Specific potentially relevant exposures can be obscured when a composite socioeconomic score is utilized
4. Stratifying by CVI decile, ethnicity and type of diabetes resulted in small cells for statistical tests
   - Possible type II error

Conclusions

There appears to be an association of social class variables with the risk for both type 1 and type 2 diabetes in children and adolescents

The association of higher type 1 diabetes risk with higher social class indicators supports the “hygiene hypothesis”. This finding has not previously been reported in African-origin children.

The association of higher type 2 diabetes risk in youth with lower social class indicators corresponds to similar finding among adults.

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G Bell	A Schneider	M Oviedo	C Braunschweig
L Fogelfeld	M Sullivan	N Dumbovic	M Weigensberg
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