

Somos diferentes/We are different:

Racial and ethnic heterogeneity in self-reported diabetes prevalence trends across Hispanic subgroups,
National Health Interview Survey, 1997-2012

SAStravaganza 2015

Cassandra Arroyo-Johnson, MS, PhD

Department of Surgery

Division of Public Health Sciences



Washington University in St. Louis

SCHOOL OF MEDICINE

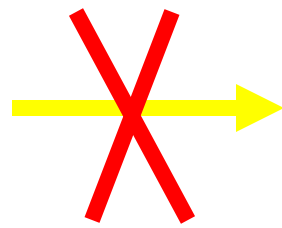
Acknowledgements

- Krista D. Mincey, MPH, DrPH – Xavier University of Louisiana
 - Nicole Ackermann, MPH
 - Laurel Milam, MA
 - Graham Colditz, DrPH, MD
 - Melody S. Goodman, PhD, MS
-
- Alvin J. Siteman Cancer Center (2014-present)
 - Washington University School of Medicine (2014-present)
 - Barnes-Jewish Hospital Foundation (2014 – present)
 - MSM Center for Excellence in Health Disparities (Pilot Project '04-06)
 - NIH-Funded T-32 MSM Cardiovascular Research Training Program (Post-doc)
 - NIH RCMI Grant G12-RR03034 (Post-doc)

Background

- The Hispanic population represents the largest and most rapidly growing minority group in the US.
- Census projections indicate a 200% increase in the US Hispanic population by the year 2050.
- Hispanics will account for at least 67% of the total population growth from 2015-2060.
- Various sociodemographic attributes have been demonstrated to have a significant inverse relationship on risk factor prevalence and adverse outcomes for US Hispanics, including:
 - Race/Ethnicity
 - Socioeconomic status (SES) – education, income, insurance, etc.
 - Language barriers/Primary language spoken (PLS)

Disadvantaged
SES status



Less favorable
health
outcomes

What is the Hispanic Paradox?

Definition:

Health outcomes **unexpectedly** equal or better than Non-Hispanic whites in the US, in spite of the “**Hispanics**” less favorable socioeconomic status.

Related outcomes:

- Chronic disease (Diabetes, CVD)
- Adult mortality
- Birth weight
- Infant mortality (mainly neonatal mortality)

HISPANIC PARADOX

Potential Explanations

- Effects of social networks
- Healthy migrant hypothesis
- Cultural differences in diet
- Differences in type of occupation

Hispanic Paradox: IS IT REAL?

- “Hispanics” is a loaded term
 - Diverse population
 - Different diets
 - Different immigration patterns
 - Different social/political climates in country of origin
 - Acculturation/assimilation effects
- Evidence against Hispanic Paradox continues to mount...

Overview: Applied Methods

- Pan-ethnic grouping = all Hispanic subgroups
- HHANES
- NHANES
- BRFSS
- Recently, HCHS/SOL
- Sample size = Pooling data
- Estimating and predicting trends over time minimal

Public Health Significance

- Risk factors for diabetes and other chronic conditions are disproportionately higher among US Hispanics.
- Little public health information is known about national diabetes risk factor trends among US Hispanics.
- Exploration of heterogeneity of diabetes prevalence across Hispanic subgroup over time sparse or outdated.
- Findings can be used to develop tailored, culturally relevant risk reduction efforts in US Hispanics.

Study Goals

- (1) Describe the heterogeneity within Hispanics for self-reported diabetes aggregated, disaggregated, and over time
- (2) Estimate time trends in the prevalence of self-reported diabetes over time when compared to non-Hispanic whites and non-Hispanic blacks
- (3) Identify disparities in the prevalence of diabetes over time among Hispanic subgroups, non-Hispanic whites, and non-Hispanic blacks.

National Health Interview Survey

- Publicly available data
- Annual face-to-face interviews
- Nationally representative sample of households
 - Each week a probability sample of civilian noninstitutionalized US population interviewed
 - Information obtained on health and other characteristics for EACH member of the household
- Currently the **ONLY** publicly available source for health data on Hispanic subgroups at the national level.

Study Population

- Inclusion criteria
 - Adults \geq 18 years of age
 - Non-Hispanic White, Non-Hispanic Black, Puerto Rican, Mexican/Mexican American and Cuban/Cuban American respondents
- Exclusion criteria
 - Pregnant women
 - Pre-diabetes & borderline diabetes
 - "Other" race AND Hispanic subgroups
- Aggregate data from respondents

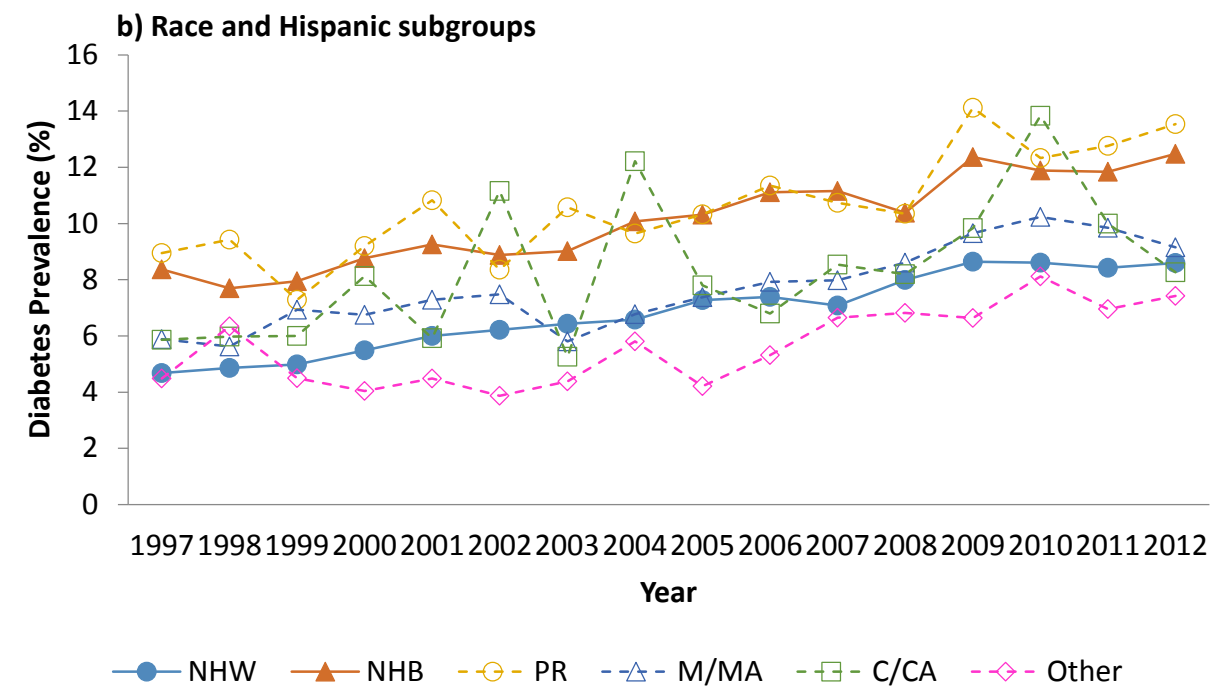
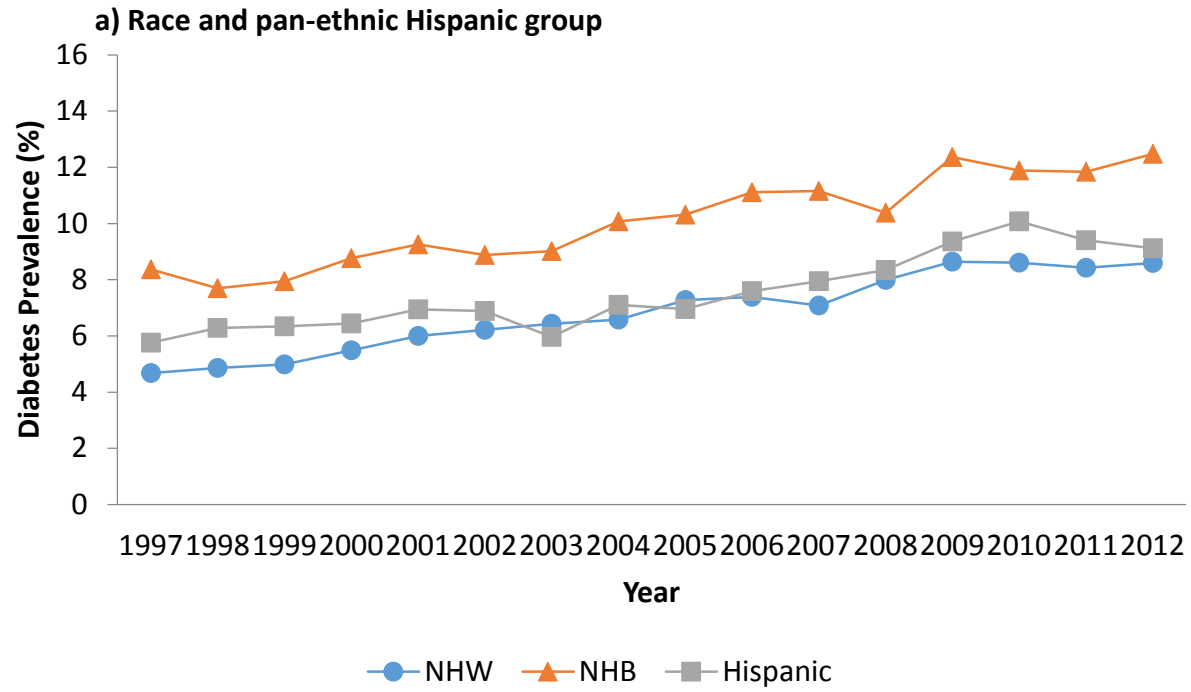
Statistical Analysis

- Merge 15 years of NHIS data ([DATA step w/ MERGE command](#))
- Annual, weighted age-adjusted prevalence based on Census 2000 population distribution. ([PROC SURVEYFREQ w/ WEIGHT](#))
- Primary outcome = self-reported diabetes
- Stratification variables = race/ethnicity & level of education
- Graphical displays of outcomes by
 - Race/Ethnicity
 - Hispanic subgroup
 - Level of education
- Chi-square tests and ANOVA for univariate and bivariate analyses ([PROC SURVEYFREQ & SURVEYMEANS](#))
- Time trend: Linear regression with “year” as predictor ([PROC SURVEYREG](#))

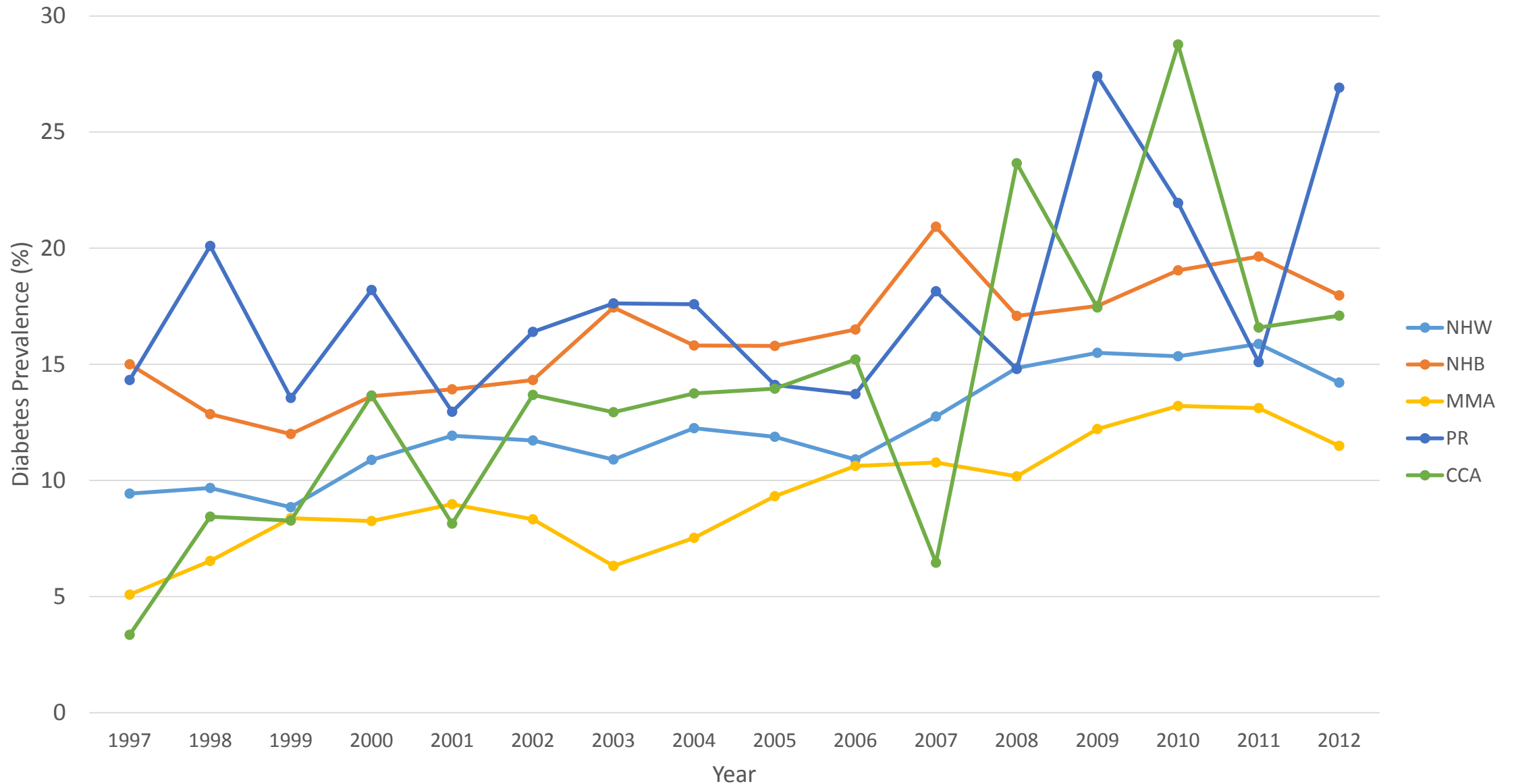
Participant Characteristics, NHIS 1997-2012

	Total	NHW	NHB	M/MA	PR	C/CA
	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]	% [95% CI]
Total N^b	427,975	298,803	68,489	48,093	8,171	4,419
Male	48.6 [48.4-48.8]	48.7 [48.4-48.9]	45.2 [44.7-45.7]	53.2 [52.6-53.8]	47.8 [46.3-49.4]	50.8 [49.2-52.4]
Female	51.4 [51.2-51.6]	51.3 [51.1-51.6]	54.8 [54.2-55.3]	46.8 [46.2-47.4]	52.2 [50.6-53.7]	49.2 [47.6-50.8]
Age (y), mean (SE)^c	46.0 (0.07)	47.3 (0.08)	42.8 (0.13)	38.4 (0.14)	42.1 (0.26)	49.0 (0.48)
BMI, kg/m², (SE)	27.2 (0.02)	26.7 (0.02)	28.6 (0.04)	28.0 (0.04)	28.1 (0.09)	27.0 (0.11)
Education^c						
< HS	16.0 [15.7-16.3]	11.7 [11.4-11.9]	20.7 [20.1-21.4]	47.3 [46.4-48.2]	30.4 [28.7-32.1]	26.5 [24.7-28.3]
GED/HS	29.5 [29.2-29.7]	29.7 [29.3-30.0]	31.0 [30.5-31.5]	25.4 [24.8-26.0]	29.2 [27.9-30.5]	25.7 [24.1-27.4]
> HS	54.5 [54.1-55.0]	58.7 [58.2-59.2]	48.3 [47.4-49.2]	27.3 [26.4-28.1]	40.4 [38.6-42.3]	47.8 [45.9-49.7]
Income, %^c						
<35k	73.6 [73.3-73.9]	71.2 [70.9-71.6]	80.0 [79.4-80.7]	85.0 [84.4-85.6]	79.6 [78.3-81.0]	78.6 [76.8-80.5]
35k-55k	14.0 [13.8-14.2]	14.7 [14.5-14.9]	12.7 [12.2-13.1]	9.9 [9.4-10.3]	12.1 [11.0-13.2]	11.2 [10.1-12.5]
>55k	12.4 [12.2-12.7]	14.1 [13.8-14.3]	7.3 [6.9-7.7]	5.1 [4.8-5.4]	8.3 [7.3-9.2]	10.1 [8.4-11.7]
Health Insurance						

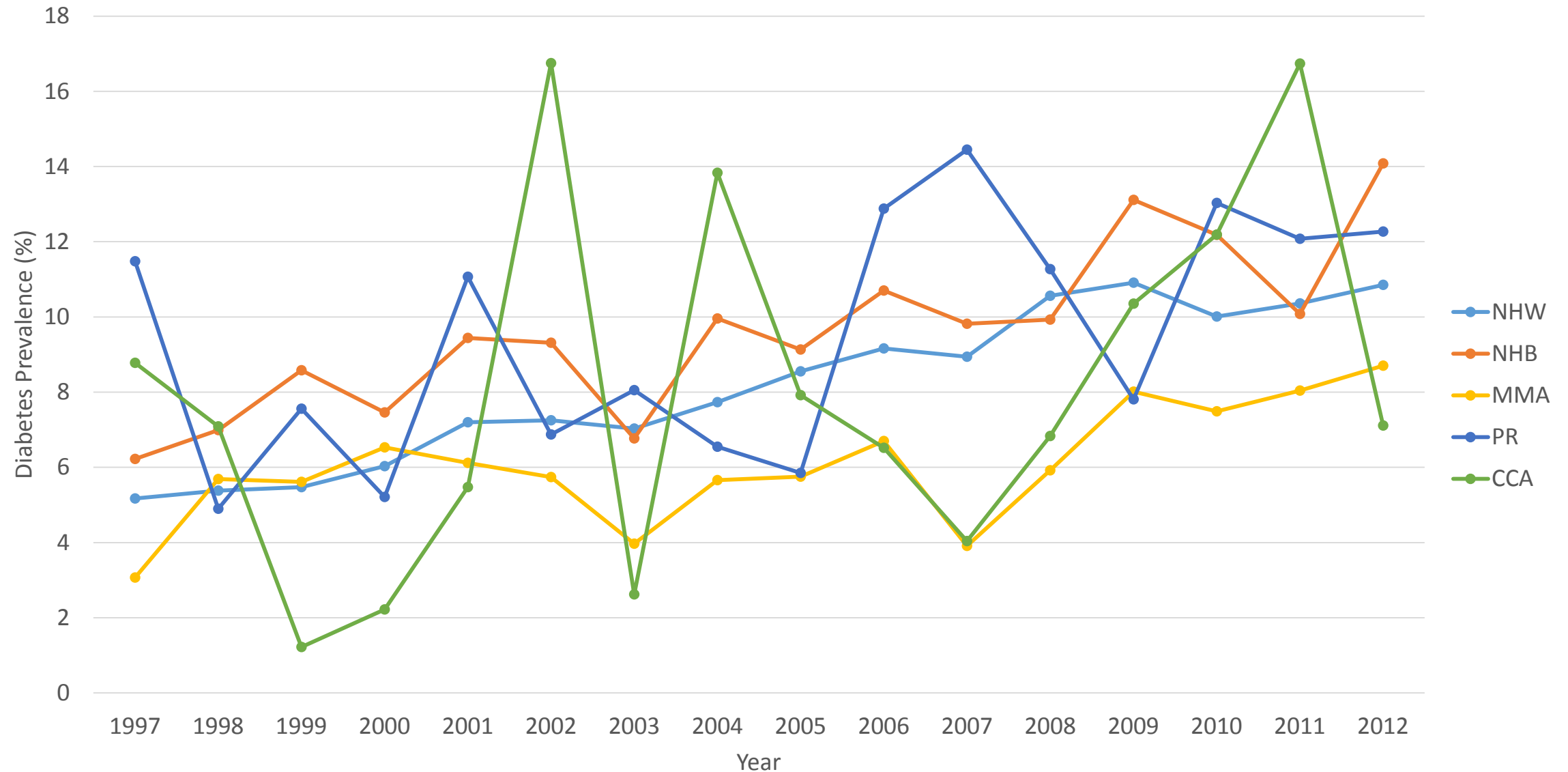
Weighted age-adjusted annual diabetes prevalence by race & Hispanic subgroup, NHIS 1997-2012



Weighted age-adjusted annual diabetes prevalence by race & Hispanic subgroup, NHIS 1997-2012: Less than HS diploma

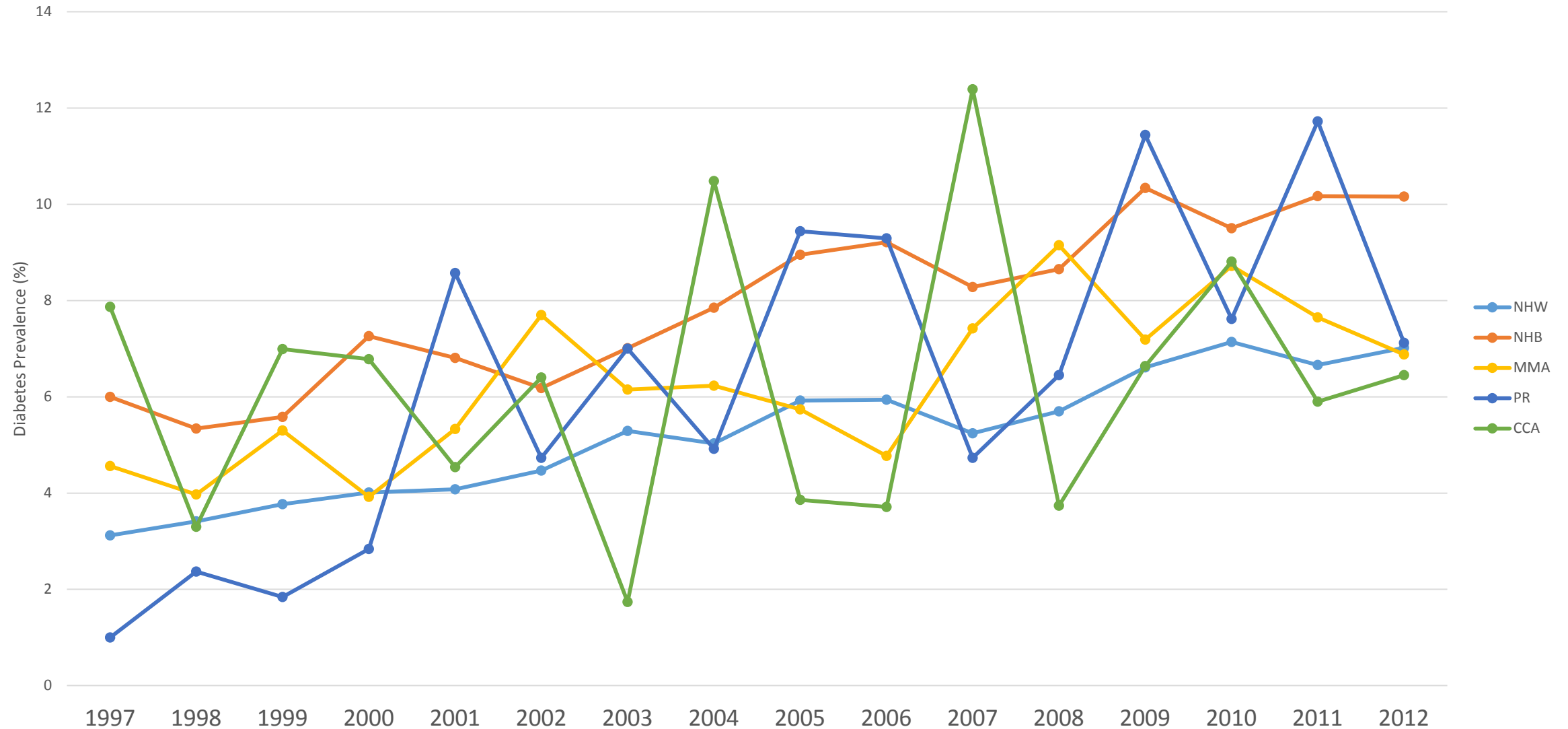


Weighted age-adjusted annual diabetes prevalence by race & Hispanic subgroup, NHIS 1997-2012: HS diploma/GED



Weighted age-adjusted annual diabetes prevalence by race & Hispanic subgroup, NHIS 1997-2012: More than HS diploma

Chart Title



Average annual diabetes prevalence by race/ethnicity, Hispanic subgroup, and education 1997-2012

	Education					
	< HS		HS/GED		> HS	
	% [CI]	p ^a	% [CI]	p ^a	% [CI]	p ^a
Race/Ethnicity						
Non-Hispanic White ^b	12.1 [11.7-12.5]	<0.0001	8.1 [7.9-8.3]	<0.0001	5.3 [5.2-5.4]	<0.0001
Non-Hispanic Black ^b	16.1 [15.3-16.9]		9.7 [9.2-10.2]		8.2 [7.8-8.6]	
Hispanic ^{b,c}	10.6 [10.0-11.1]		7.0 [6.6-7.4]		6.6 [6.2-7.1]	
Hispanic Subgroup						
Mexican/MA ^b	9.7 [9.2-10.3]	<0.0001	6.3 [5.8-6.9]	<0.0001	6.7 [6.1-7.2]	0.6804
Puerto Rican ^b	17.6 [15.7-19.6]		9.8 [8.3-11.2]		6.8 [5.8-7.8]	
Cuban/CA ^b	13.4 [11.3-15.5]		8.2 [6.6-9.8]		6.0 [4.6-7.5]	

National Health Interview Survey (NHIS); High School (HS); General Equivalency Diploma (GED); Time trend model intercept (B_0); Five year trend in diabetes prevalence (b_{5YR}); Non-Hispanic white (NHW); non-Hispanic black (NHB); Mexican/Mexican American (M/MA); Puerto Rican (PR); Cuban/Cuban American (C/CA);

^a P for ANOVA test of race/ethnicity and Hispanic subgroup differences < .001; ^b P for ANOVA test of race/ethnicity < .001 and Hispanic subgroup differences = .03; ^c All Hispanic ethnic groups combined

Trends over time in annual weighted diabetes prevalence by race/ethnicity, Hispanic subgroup and education, NHIS 1997-2012

	Education								
	< HS			HS/GED			>HS		
	B ₀	b _{5YR}	P	B ₀	b _{5YR}	P	B ₀	b _{5YR}	P
Race/Ethnicity									
NHW	9.1	2.1	<0.001	5.0	2.1	<0.001	3.2	1.3	<0.001
NHB	12.9	2.2	<0.001	6.7	2.0	<0.001	5.5	1.7	<0.001
Hispanic ^a	7.5	1.9	<0.001	5.1	1.1	0.001	4.1	1.5	<0.001
Hispanic Subgroup									
M/MA	6.0	2.2	<0.001	4.4	1.1	0.005	4.4	1.3	0.001
PR	14.3	2.2	0.06	6.8	1.8	0.03	2.4	2.6	0.001
C/CA	6.6	4.8	0.002	5.4	1.8	0.17	5.6	0.4	0.61

National Health Interview Survey (NHIS); High School (HS); General Equivalency Diploma (GED); Time trend model intercept (B₀); Five year trend in diabetes prevalence (b_{5YR}); Non-Hispanic white (NHW); non-Hispanic black (NHB); Mexican/Mexican American (M/MA); Puerto Rican (PR); Cuban/Cuban American (C/CA);

^a All Hispanic ethnic groups combined

Other Results

- Highest prevalence seen among NHB & PR
- No significant difference between NHB & PR overall
- No significant difference between NHB & PR at 2 lower levels of education
- No significant difference between PR & CCA at higher level of education
- Trend over time varied by Hispanic subgroup and education.
- Hispanics with more than a HS education
 - Less diabetes
 - Demonstrate larger benefit than NHB's

Limitations

- Did not examine nativity, despite fact that recent studies have suggested its importance (1st gen. vs 2nd gen. etc)
- Self-reported diabetes
- Type of diabetes
- BMI calculated from self-reported height and weight.
- Cross-sectional estimates at each time-point
- Did not construct a more comprehensive measure of SES.

Strengths

- Ability to qualitatively describe trends by important sociocultural factors.
- Estimated time trend
- Large samples are available at each time point.
- Consistent sampling scheme over survey periods allow for time trend analysis.
- Subgroup data available on national level

Conclusions

- Results reveal considerable heterogeneity regarding variation in the prevalence of diabetes among US Hispanics over time.
- More comprehensive databases are necessary to
 - Ascertain ethnic variability within the US Hispanic population
 - Identify and target specific groups at higher risk
- Longitudinal studies needed to examine trends and incidence of diabetes within the US Hispanic population.
- Evidence-based, culturally appropriate targeted interventions to improve high school graduation rates, college enrollment, and retention can benefit all racial and ethnic groups.

Why is this important?

- Great potential for economic burden on healthcare system if ignored.
- Missing out on groups at higher risk.
- Ability to develop tailored intervention and prevention strategies.
- No one likes to be ignored in research.
- Move away from the traditional approaches to research involving the underserved.
- Other applications – LGBTQ, nativity analysis, high-dimensional data analysis
- Developing methods to explore and acknowledge the heterogeneity that IS the United States!!!!

Cassandra Arroyo-Johnson, PhD, MS
Assistant Professor of Surgery
Campus Box 8100
660 S Euclid Ave
St. Louis, MO 63110
(314) 286-0383

johnsonca@wudosis.wustl.edu

©2015