

# **ASTHMA AND IMMIGRATION IN MEXICAN AMERICAN SCHOOL CHILDREN IN CHICAGO**

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## Disclosure of Conflict of Interest Information

I have no existing conflict of information to disclose

# Outline

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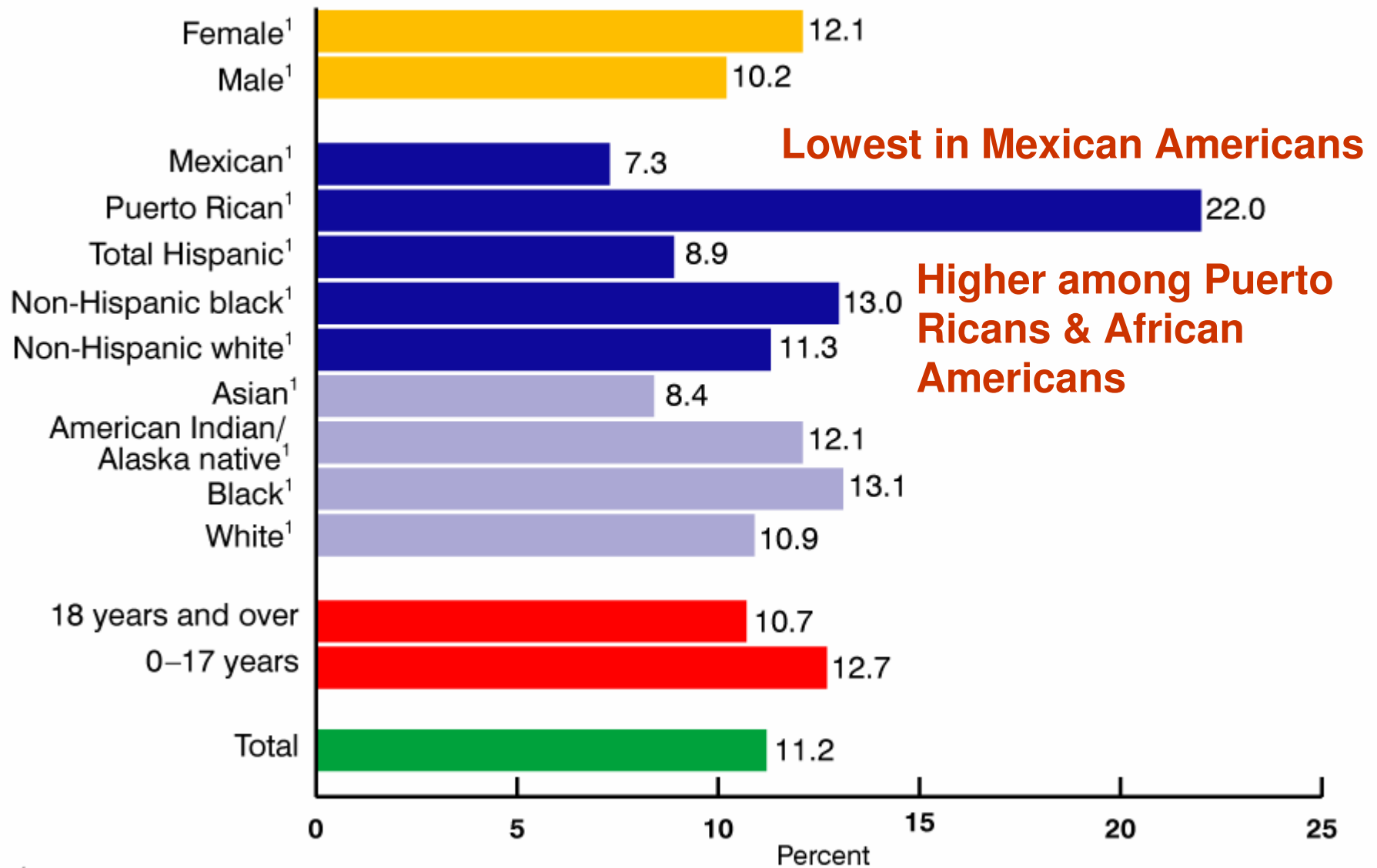
# Acknowledgements

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- All individuals who contributed to this effort

# Introduction

- **12.7% of children (9 million) have a lifetime history of asthma diagnosis**
- **Prevalence rates increased in many areas of the world**
- **Wide variations between and within countries**
- **Differentials may be due to potentially modifiable factors**
- **Migrant studies**
  - **Help understand the interplay between genetic and environmental factors**
  - **Identify risk factors**
  - **Guide prevention efforts**

### Figure 3. Percent of lifetime asthma diagnosis: United States, 2005



<sup>1</sup> Age adjusted to 2000 U.S. standard population.

SOURCE: National Health Interview Survey, National Center for Health Statistics, CDC.

# Literature Review

- **Rates of asthma increased upon migration**
  - **Increased with longer residence**
  - **Higher among children immigrating at younger age**

# Literature Review (Cont'd)

- Limited studies on asthma in Mexican American children
- **Eldeirawi, Kamal**, et al. JACI 2005;116:42-8
- Lara et al. Pediatrics 2006;117:43-53
- **Eldeirawi, Kamal & Persky, Victoria**. J Asthma 2006; 43:279-86
- **Eldeirawi, Kamal & Persky, Victoria**. Ann Allergy Asthma Immunol 2007;99:236-43
- Holguin et al. Am J Respir Crit Care Med 2005;171:103-8 (adults)

## Associations of Asthma with Country of Birth in MA Children Age 2 Months to 16 Years, NHANES III\* (n=4,121)

	Crude OR	95% CI	Adjusted <sup>†</sup> OR	95% CI
US-born	3.22	1.32-7.89	2.19	1.09-4.40
Mexico-born	1		1	

**US-born children Mexican American children were 2.19 more likely to have asthma than their Mexico-born peers**

\* Sampling weights were used to provide population estimates

† Adjusted for age, gender, history of ear infection, and having a regular place for health care

## Associations of Skin Test Reactivity with Country of Birth in MA Children Age 6-16 Years, NHANES III (n=1,652)

Allergen	US Born	Mexico Born	Adjusted OR*
<b>Cat</b>	<b>12.79%</b>	<b>4.29%</b>	<b>3.30</b>
<b>Mite</b>	<b>24.52%</b>	<b>14.58%</b>	<b>1.91</b>
<b>Grass</b>	<b>18.91%</b>	<b>9.56%</b>	<b>1.99</b>
<b>Ragweed</b>	<b>21.98%</b>	<b>13.67%</b>	<b>1.64</b>
<b>Roach</b>	<b>22.71%</b>	<b>40.29%</b>	<b>0.47</b>

\* Adjusted for age, gender, hx of ear infection, regular place for health care, and area of residence. All estimates were significant at  $P < 0.05$ .

## Associations of Asthma with Acculturation and Country of Birth in MA Youths 12-19 Years of Age (n=1,770), NHANES (1999-2002)

	Crude OR	Adjusted OR*	Adjusted OR†
<b>Acculturation (High vs. low)</b>	<b>3.96‡</b>	<b>2.67‡</b>	<b>2.45‡</b>
<b>Country of birth (US vs. Mexico)</b>	<b>2.58‡</b>	<b>1.68‡</b>	<b>1.18</b>

\* Adjusted for age, gender, insurance coverage, and having a regular place for health care.

† After the additional Adjustment for country of birth (with acculturation as the main exposure viable) or acculturation level (with country of birth as the main exposure variable).

‡ Significant at  $P < 0.05$

# Chicago Asthma School Study (CASS)

- Ongoing cross-sectional study
- Survey parents of students in selected schools in Chicago
  - ~ 50,000 students in more than 60 schools
- Identify students with asthma and/or respiratory symptoms
- Facilitate access to health care through referrals

## Associations of Asthma with Country of Residence in Infancy in 10,106 MA Children (CASS 2004-2005)

County (US vs. Mexico)	Crude OR	Adjusted OR*	Adjusted OR†
Country of residence in infancy	2.35‡	2.39‡	<b>1.79‡</b>
Country of birth	2.21‡	2.24‡	<b>1.37</b>

\* Adjusted for age, gender, income, and language

† Additionally adjusted for country of birth or country of residence in the first year of life

‡ Significant at  $P < 0.05$

# Study of Asthma in Children of Mexican Descent-Purpose

- Associations of lifetime doctor-diagnosed asthma with:
  - Country of birth
  - Age at immigration
  - Length of residence in the US
- Investigate factors that may explain such associations

# Methods-Study Population

**6,896 of Mexican Descent Enrolled in CASS  
Between January and May of 2004**

**2,851 Targeted:  
All Mexico-born (1,366)  
Random Sample of US-born (1,485)**

**2,233 with Correct Contact Information**

# Methods-Data Collection

**Mailed Study Materials:  
Questionnaire (English or Spanish) & Return Envelopes**

**Telephone Interviews  
Bilingual/Bicultural Trained Interviewers**

**2,023 Completed Questionnaires (English or Spanish)**

**71% Response Rate      ~ 91% Participation Rate**

**199 by Mail**

**1,824 by Telephone**

# Methods-Definitions

- Doctor-diagnosed asthma:
  - Has a doctor ever said that your child had asthma?
- Country of birth:
  - Where was your child born?
- Age at immigration:
  - How old was your child when he/she moved to the US?
- Length of residence in the US
  - Overall, how long has your child lived in the US?

# Covariates

- Age, gender, income
- Family history
- Regular doctor or clinic
- Exposure to pets/farm animals
- Breastfeeding
- Ear infection/other infections
- Antibiotic and Tylenol use in infancy
- Language/acclulturation
- Environmental tobacco smoke
- Daycare, no. of siblings/children, birth order,

# Statistical Analysis

- Pearson chi-squared statistics to compare proportions
- GEE logistic regression analyses
- Independent variables:
  - Country of birth
  - Age at immigration
  - Length of residence in the US

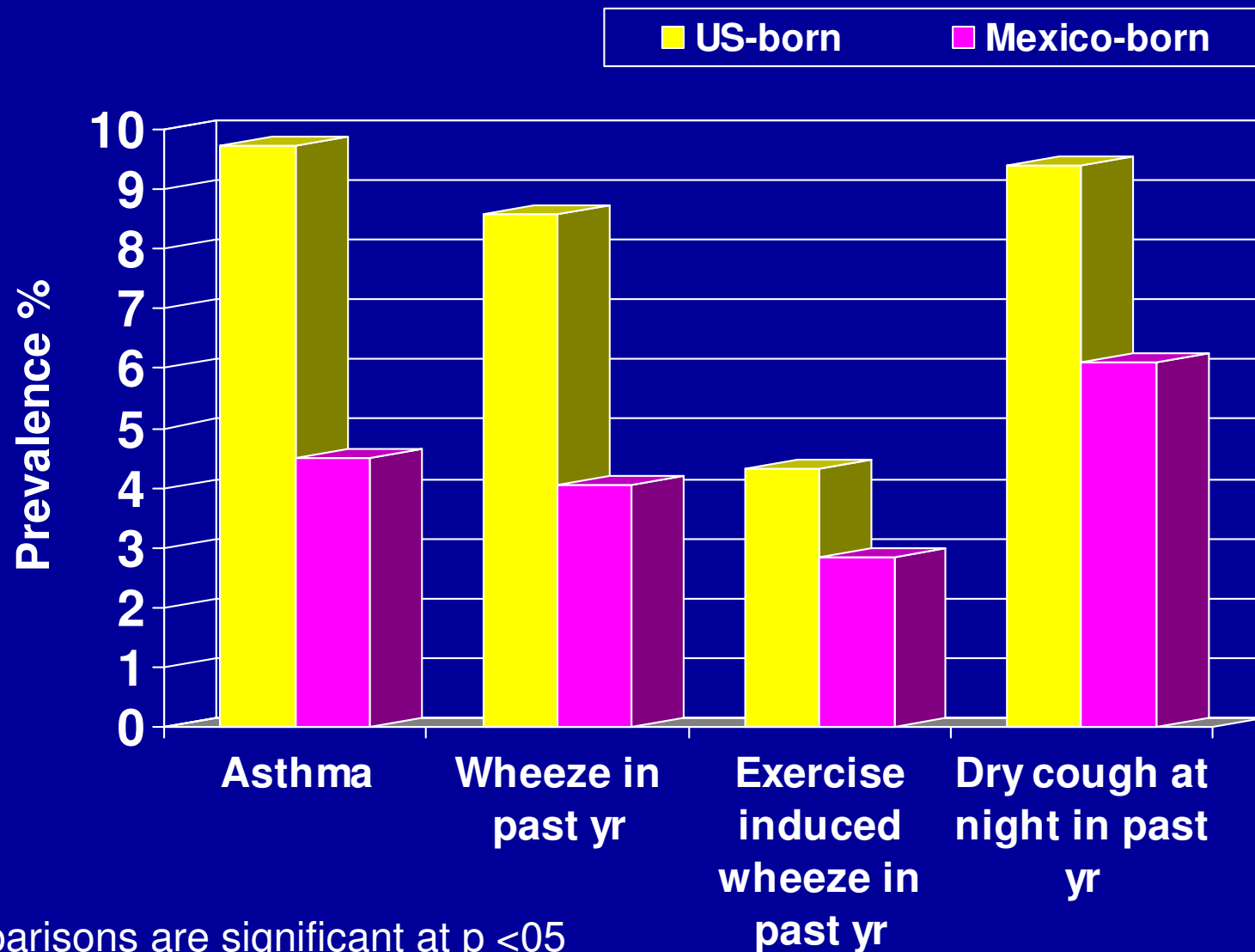
# Statistical Analysis (Cont'd)

- Change-in-estimate method to assess confounding (> 10%)
- Interactions explored
- Final models in Spanish speaking only
- Statistical significance set at  $P < 0.05$
- Final models included:
  - Age
  - Gender
  - Regular doctor or clinic
  - History of ear infection in infancy
  - Maternal exposure to any animals/pets during pregnancy
  - Family history of asthma or allergies

# Associations of Country of Birth With Demographic Variables

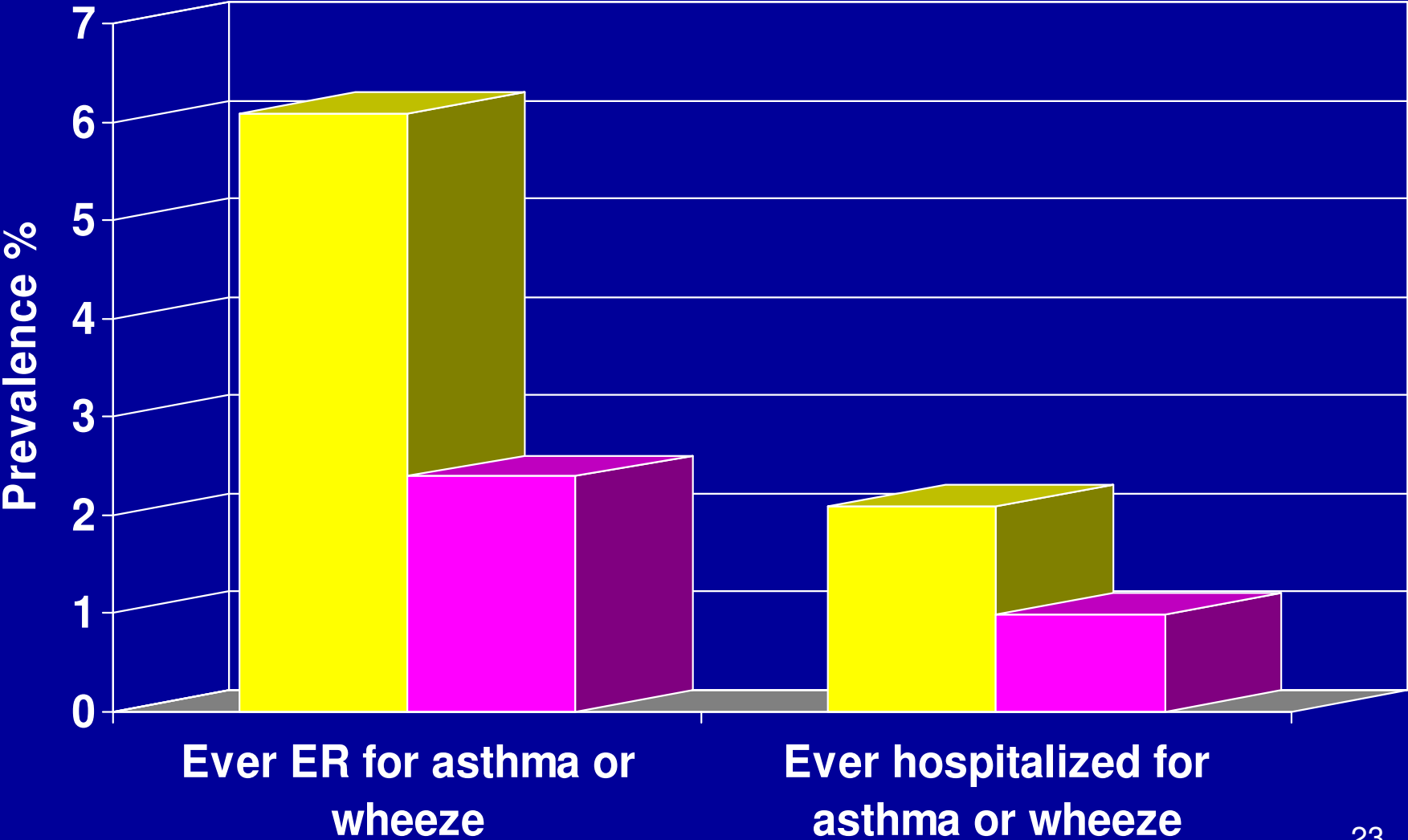
	US-born		Mexico-born		p-value
	N	%	N	%	
Age in yrs (mean)	1101	9.47	919	10.5	<0.0001
Male	533	48.41	459	49.95	0.4919

# Prevalence of Asthma & Respiratory Symptoms by Country of Birth



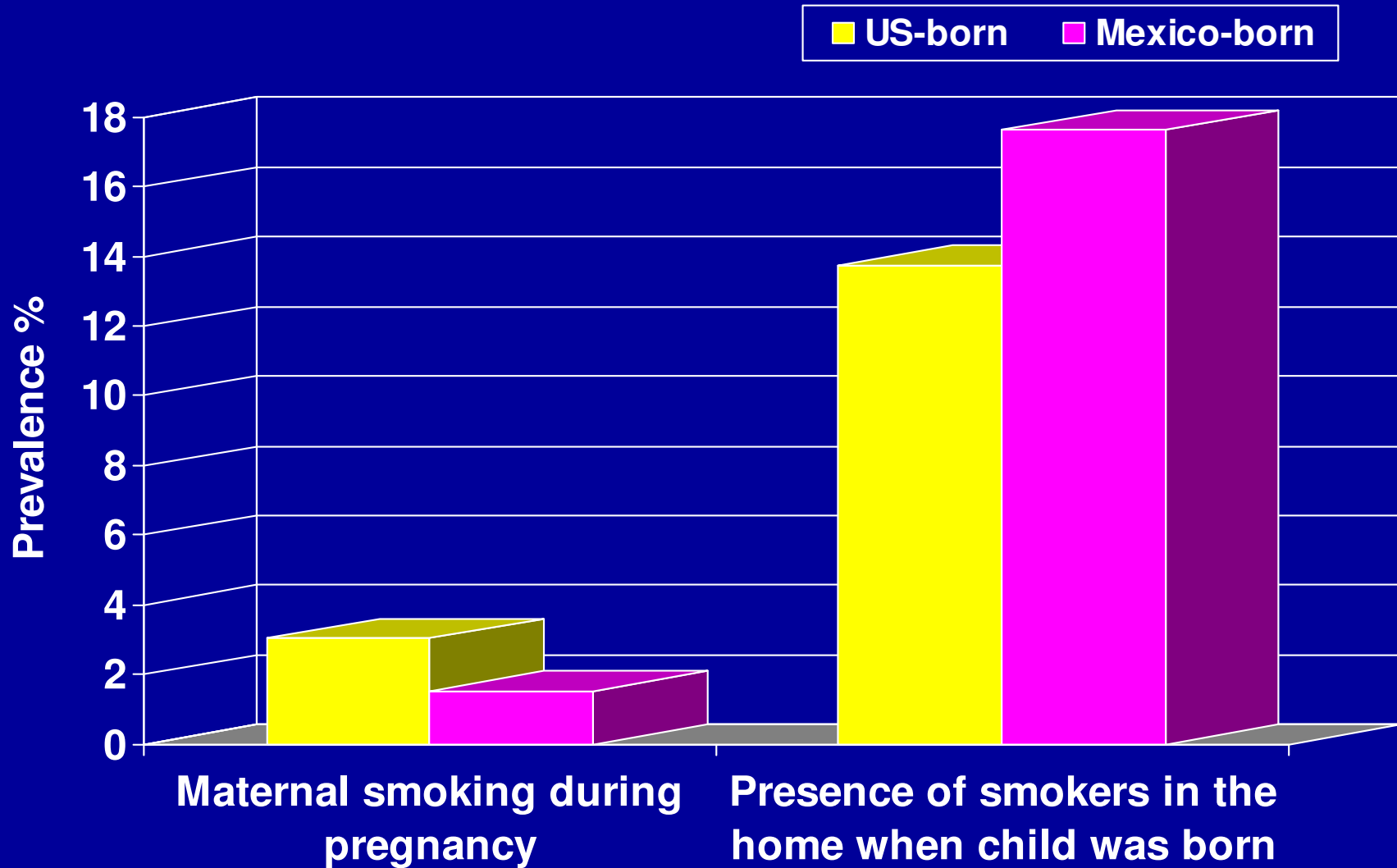
# Asthma Severity by Country of Birth

■ US-born    ■ Mexico-born



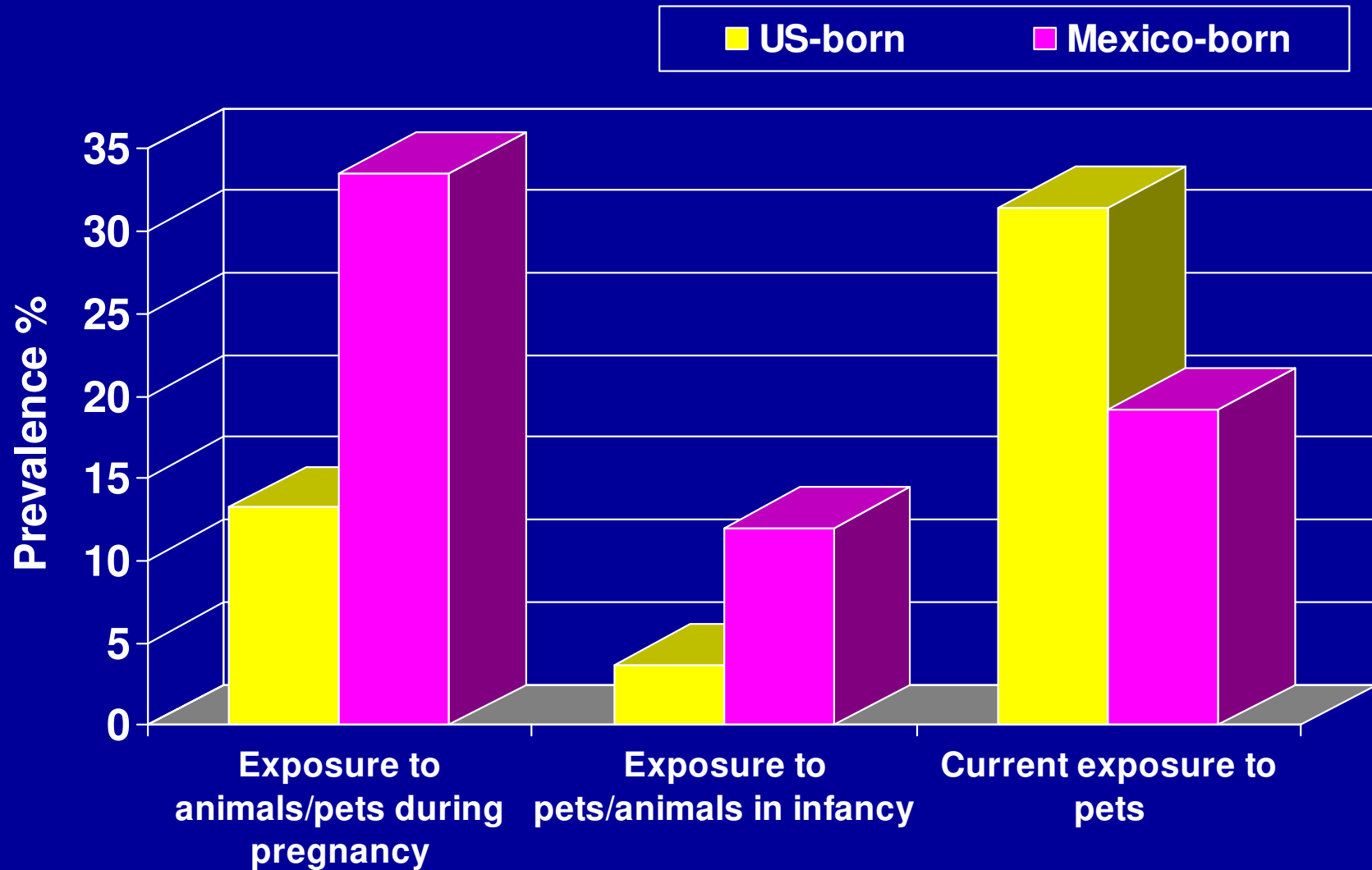
All comparisons are significant at  $p < 0.05$

# Exposure to ETS by Country of Birth

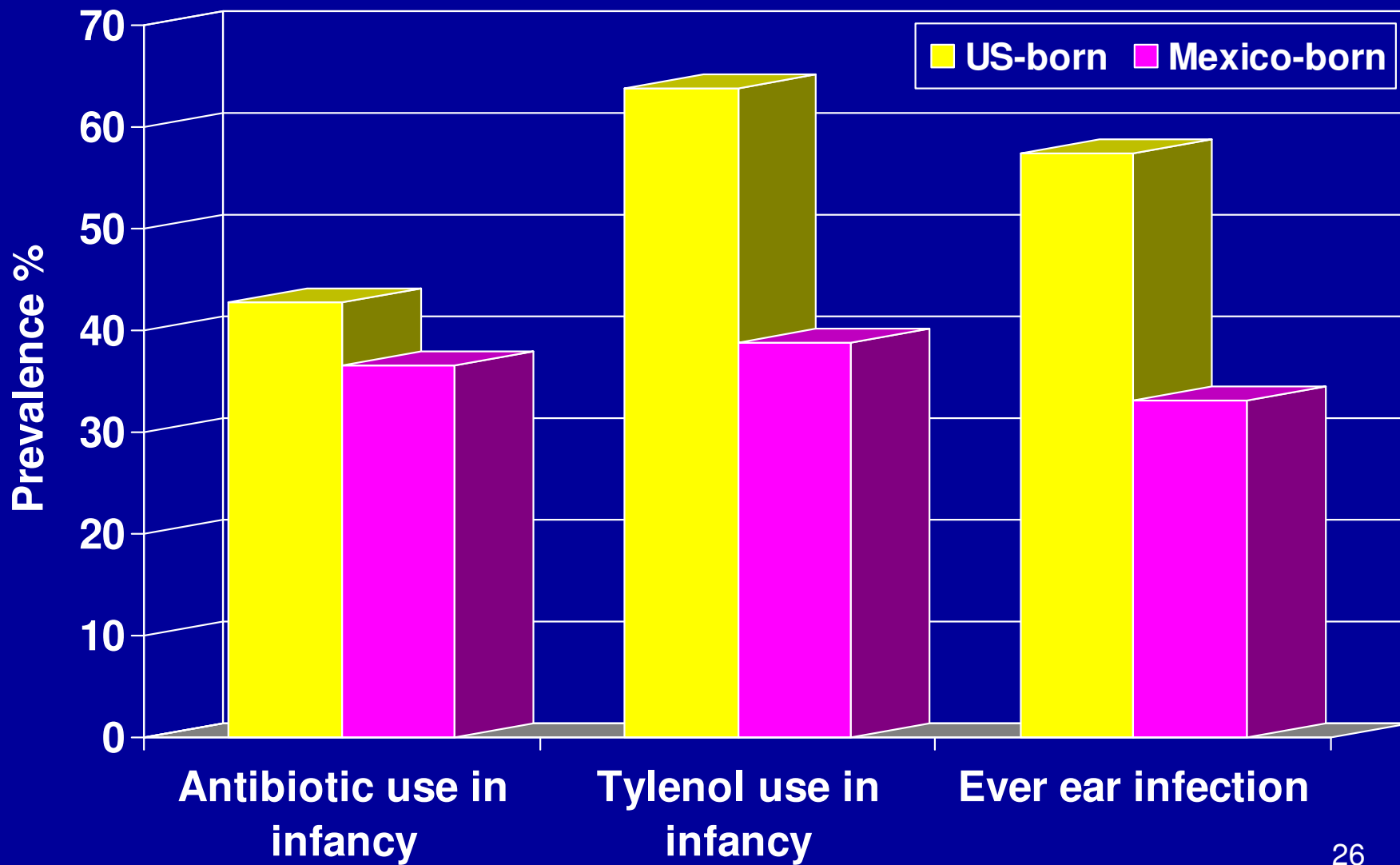


All comparisons are significant at  $p < 0.05$

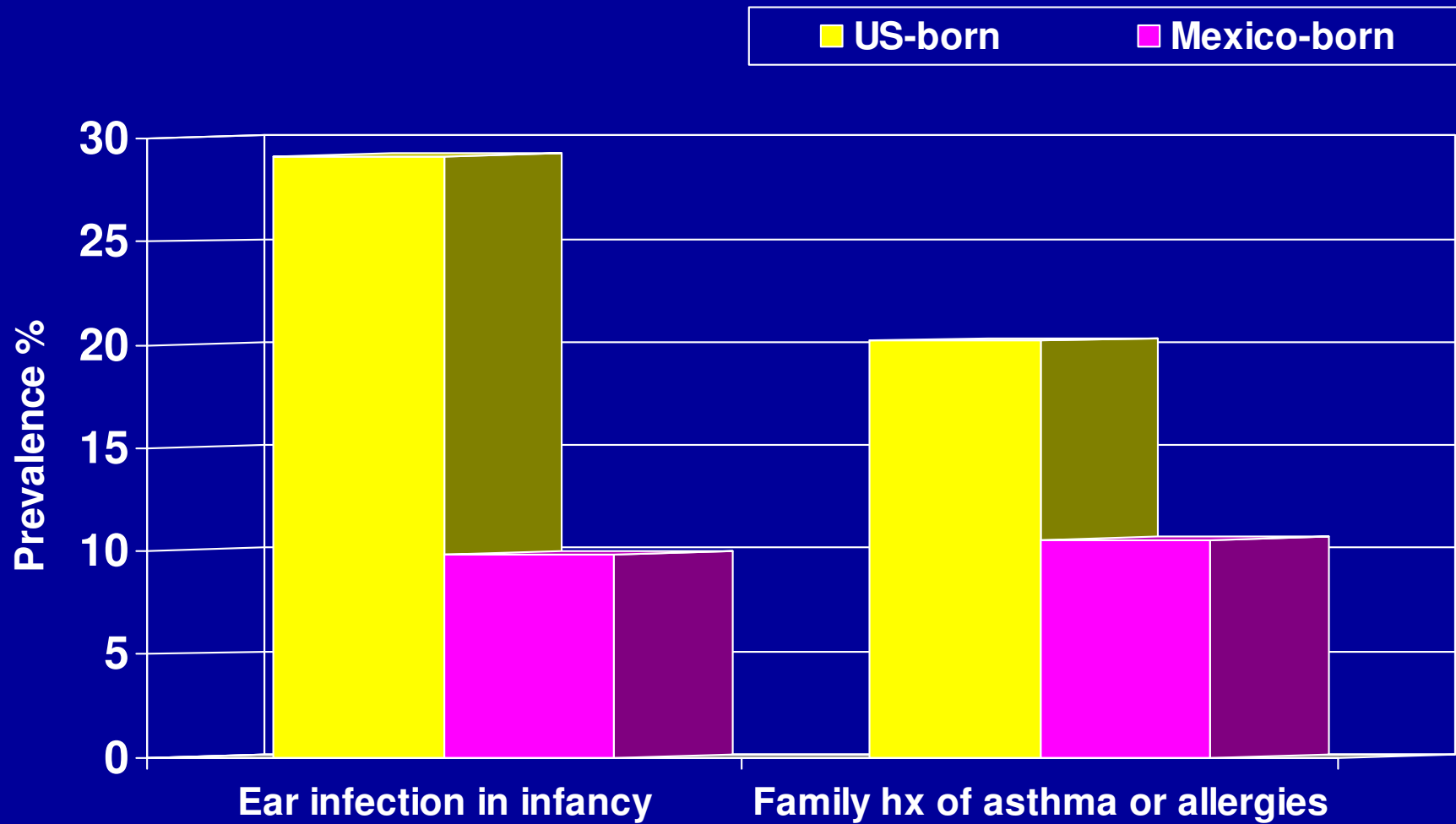
# Exposure to Animals/pets by Country of Birth



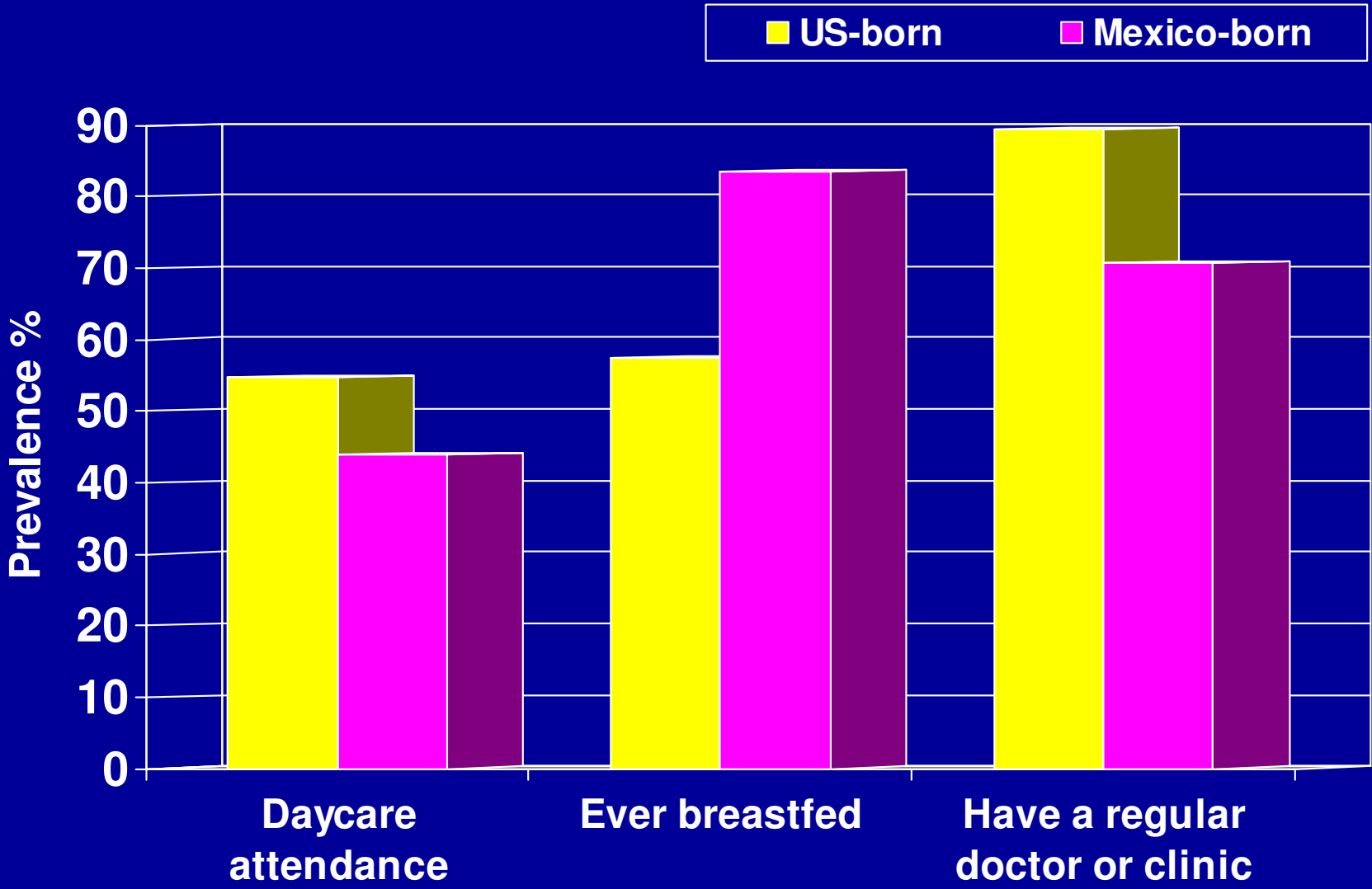
# Other Covariates by Country of Birth



# Other Covariates by Country of Birth (Cont'd)



# Other Covariates by Country of Birth (Cont'd)



# Prevalence of Asthma by Age at Immigration in Mexico-born Participants

	N	% Asthma	p-value
<b>Age at immigration</b>			
< 2 years	204	6.86	0.0535
≥ 2 years	653	3.68	

# Prevalence of Asthma by Length of Residence in the US\*

	N	% Asthma	p-value
<b>Length of residence in the US</b>			
<b>≥ 10 years</b>	<b>169</b>	<b>8.28</b>	<b>0.0535</b>
<b>&lt; 10 years</b>	<b>278</b>	<b>3.96</b>	

\* In Mexico-born participants age 11 years or older

# Adjusted Associations of Asthma with Country of Birth

	OR*	95% CI
<b>Country of birth (US vs. Mexico)</b>	<b>2.41</b>	<b>1.51-3.84</b>
<b>Family history of asthma or allergies</b>	<b>3.56</b>	<b>2.32-5.45</b>
<b>Exposure to any animals/pets during pregnancy</b>	<b>2.00</b>	<b>1.23-3.24</b>
<b>History of ear infection in infancy</b>	<b>1.91</b>	<b>1.24-2.94</b>

In participants whose surveys were completed in Spanish (n=1788)

\* Model is also adjusted for age, gender, and having a regular doctor or clinic

# Associations of Asthma with Country of Birth and Age at Immigration

	Crude		Adjusted*	
	OR	95% CI	OR	95% CI
<b>US-born</b>	<b>2.78</b>	<b>1.65-4.68</b>	<b>3.06</b>	<b>1.80-5.21</b>
<b>Mexico-born moved to the US &lt; 2 yrs of age</b>	<b>2.08</b>	<b>1.00-4.34</b>	<b>1.93</b>	<b>0.91-4.09</b>
<b>Mexico-born moved to the US at <math>\geq</math> 2 yrs of age</b>	<b>1</b>		<b>1</b>	

In participants whose surveys were completed in Spanish (n=1733).

\* Adjusted for age (3 categories), sex, exposure to animals during pregnancy, regular clinic or doctor, history of ear infection in infancy, and family hx of asthma or allergies

# Associations of Asthma with Country of Birth and Length of Residence in the US

	Crude		Adjusted*	
	OR	95% CI	OR	95% CI
<b>US-born</b>	<b>2.33</b>	<b>1.09-5.01</b>	<b>2.22</b>	<b>0.99-4.96</b>
<b>Mexico-born lived ≥ 10 yrs in the US</b>	<b>2.08</b>	<b>0.89-4.87</b>	<b>2.03</b>	<b>0.83-4.97</b>
<b>Mexico-born lived &lt; 10 yrs in the US</b>	<b>1</b>		<b>1</b>	

In Participants age 11 years or older whose surveys were completed in Spanish (n=741)

\* Adjusted for age (cont), sex, exposure to animals during pregnancy, regular clinic or doctor, hx of ear infection in infancy, and family hx of asthma or allergies

# Discussion

- Higher risk of asthma in US-born than in Mexico-born
- Long term immigrants had an increased risk of asthma
- Immigrating at a younger age increased the risk of asthma
- Associations independent of covariates
- Substantial variations in environmental exposures among MA by country of birth

## Discussion (Cont'd)

- Confirm and add to existing literature
- Consistent with previous studies on Mexican Americans
- Point to Importance of childhood environment
- Cumulative effect of exposures to environmental risk factors
- Gradual reduction of protective factors

# Discussion-Alternative Explanations

- Detection bias
- Linguistic differences
- Covariates not examined in this study?
- Assessment of covariates-room for improvement?

# Discussion-Limitations

- Cross-sectional studies-a causal link could not be established
- Parental recall-recall bias
- No means of confirming the diagnosis
  - Self-report of asthma diagnosis:
    - Extensively used
    - Validated in several regions of the world
- Small sample sizes in some analyses

# Strengths

- Broad assessment of a wide variety of environmental factors
- Relatively large sample size
- Relatively high response rate

# Implications

- Migrant studies and disease etiology
- Factors related to health outcomes in migrant and non-migrant populations
  - define causal pathways
- Identify subgroups of Mexican Americans in the US who could be at an increased risk of asthma.
- Should guide and improve prevention programs
- Highlight the need for prospective studies

**Thank You**

Questions