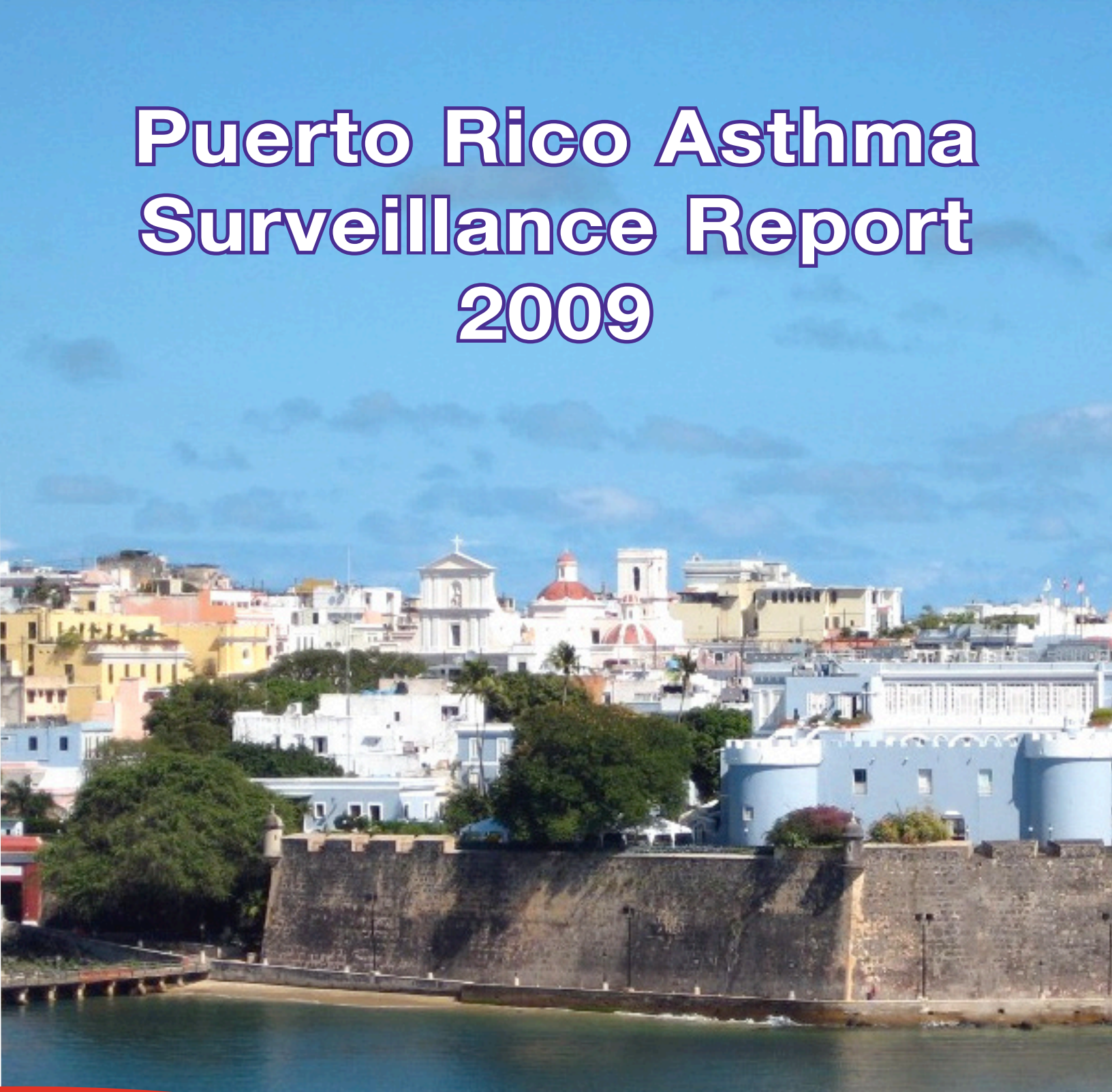
Puerto Rico Asthma Surveillance Report 2009



Puerto Rico Asthma Project
Puerto Rico Department of Health

Estado Libre Asociado de Puerto Rico
Departamento de Salud

Puerto Rico Asthma Project

Asthma Surveillance System

Puerto Rico Department of Health

Maternal, Child and Adolescent Health Division

Auxiliary Secretariat of Preventive Medicine, Integrated Services and Health Promotion

CACRC PR
Coalición de Asma y otras Condiciones Respiratorias Crónicas de Puerto Rico, Inc.

Puerto Rico Asthma Surveillance Report 2009

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Executive Summary

Dear colleagues;

Asthma is still an important health issue in Puerto Rico. Our population suffers from the highest asthma morbidity and mortality of all states and territories of the United States of America. To address this situation, the Puerto Rico Department of Health established the Puerto Rico Asthma Project subsidized by the Centers for Disease Control and Prevention (CDC). Through this project, the Puerto Rico Asthma Control Strategic Plan and the Asthma Surveillance System were developed with the collaboration of the Puerto Rico Asthma and Other Chronic Respiratory Diseases Coalition. The main goal is to reduce the asthma burden and improve the quality of life of the persons with asthma in Puerto Rico.

According to the Puerto Rico Behavioral Risk Factor Surveillance Survey (PR-BRFSS), the lifetime asthma prevalence in Puerto Rico continues to be significantly greater than in any other state or participating territory from 2000 to 2006.

Lifetime Prevalence:

Puerto Rico: 2000 (15.9%), 2001 (19.6%), 2002 (19.6%), 2003 (20.0%), 2004 (18.8%), 2005 (19.3%), 2006 (18.8%), 2007 (15.5)

United States: 2000 (10.5%), 2001 (11.2%), 2002 (11.8%), 2003 (11.9%), 2004 (13.3%), 2005 (12.5%), 2006 (13%), 2007 (13.1%)

The prevalence in females is significantly higher than in males.

Lifetime prevalence:

Females: 2000 (18.8%), 2001 (22.6%), 2002 (22.2%), 2003 (24.6%), 2004 (23.6%), 2005 (22.5%), 2006 (21.7%), 2007 (17.8%)

Males: 2000 (12.6%), 2001 (16.2%), 2002 (16.7%), 2003 (16.2%), 2004 (13.4%), 2005 (15.7%), 2006 (15.6%), 2007 (12.8%)

Executive Summary

Prevalence at the time of the survey (current):

Females: 2000 (9.4%), 2001 (12.2%), 2002 (14.0%), 2003 (14.1%), 2004 (8.6%), 2005 (12.2%), 2006 (10.4%), 2007 (8.0%)

Males: 2000 (5.4%), 2001 (6.5%), 2002 (8.8%), 2003 (7.0%), 2004 (3.5%), 2005 (4.9%), 2006 (5.9%), 2007 (3.9%)

According to the Office of Vital Statistics, in Puerto Rico, the standardized asthma mortality rate by age was persistently higher than the reported in the United States:

Puerto Rico, 2005: 28.0 deaths per million inhabitants.

United States, 2005: 15 deaths per million inhabitants.

- Asthma mortality rate in the age group of 55 years and older was 6.3 deaths per 100,000 individuals in 2006. This rate was consistently higher when compared to other age groups.
- A significant decrease in the asthma mortality rate was registered from 2000 to 2006.
- The risk of asthma mortality increases among those with older age.

This asthma surveillance report presents updated information about the morbidity and mortality due to asthma in Puerto Rico. The information will guide the efforts of the Puerto Rico Asthma Control Strategic Plan. This public health document also provides an understanding of the asthma burden in Puerto Rico and insight to develop research hypothesis and to plan intervention strategies. The use of this information is encouraged to reduce asthma morbidity and mortality on the island.

Sincerely,

Jaime Rivera-Dueño, MD
Puerto Rico Secretary of Health

Introduction

Asthma has been recognized as one of the major public health problems worldwide with enormous implications on quality of life and economy (Reed 2002; McFadden 2003). The guidelines for asthma diagnosis and management, define it as a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, particularly mast cells, eosinophils, neutrophils (especially in sudden onset, fatal exacerbations, occupational asthma, and patients who smoke), T lymphocytes, macrophages, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of coughing (particularly at night or early in the morning), wheezing, breathlessness, and chest tightness. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with clinical management and treatment. (NAEPP 2007). These multifactor perspectives of the disease makes it difficult to study the causes of asthma, its incidence, prevalence, mortality and the episodes of asthma attacks.

According to a report by the Centers for Disease Control and Prevention (CDC) (Moorman 2007), from 2000 to 2003 an annual average of 20 million persons in the United States had asthma. In Puerto Rico (PR), it has been previously documented a marked variation in terms of prevalence and death rates in contrast to other Hispanics groups within the US (Homa 2000). From 2000 to 2002, the lifetime and current asthma prevalence among Puerto Ricans was higher when compared the other 53 participants of the Behavioral Risk Factor Surveillance Survey (BRFSS). In addition, the age adjusted asthma mortality rate in Puerto Rico was constantly 2.5 times higher than the US rate throughout a twenty-year period (1980-2000). Most of the deaths due to asthma as the underlying cause were attributed to the population within the age of 50 years or older.

Introduction

In an effort to deal with asthma as a public health problem, in the year 2003 the PRDOH competed and obtained a grant from the Centers for Diseases and Control (CDC), to establish the Puerto Rico Asthma Project (PRAP). PRAP's main goal is to reduce the morbidity and mortality due to asthma in the Puerto Rican population. One of the main objectives of the PRAP was to develop, implement and sustain the Puerto Rico Asthma Surveillance System (PRSS) created to systematically collect, analyze, interpret and disseminate asthma outcome measures in order to facilitate the planning, implementation and evaluation of public health practices. As a result, PRSS has generated several reports and publications describing the morbidity, mortality, and utilization of health services related to asthma. This new report presents information on asthma prevalence trends from the year 2000 to 2007, and asthma deaths from the year 2000 to 2004. This updated surveillance report also presents other important asthma health outcomes and their distribution by socio-demographic variables. The report is intended to disseminate asthma related information to provide useful information in an effort to guide policies, interventions, and any asthma related activities.

1. Asthma Prevalence, Puerto Rico BRFSS

One of the methods to study the distribution and occurrence of a disease is to calculate the prevalence, as defined by the number of events of a given disease in a given population at a designated time (Last 2001). Asthma prevalence data was obtained via the PR-BRFSS. The BRFSS is a collaborative project of the CDC and U.S. states and territories. This health survey system is administered and supported by CDC's Behavioral Surveillance Branch, and its main objective is to collect uniform, state-specific data on preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases. The participants are composed by the adult population, 18 years of age or older living in households. The BRFSS was initiated in 1984, with 15 states collecting surveillance data on risk behaviors through monthly telephone interviews. The number of states participating in the survey increased, so that by 2001, 50 states, the District of Columbia, Guam, the Virgin Islands, and Puerto Rico were participating in the BRFSS. The Puerto Rico Department of Health (PRDOH), under a cooperative agreement with the CDC, first implemented the BRFSS in 1996. A validation process of all the questions to culturally adapt them is conducted every year (CDC, BRFSS 2006). The excellent efficiency and response rate of the PR-BRFSS was certified by the Council of American Survey Research Organization (CASRO) since they estimated a response rate for Puerto Rico in 2006 survey year of 73.7%, approximately.

In 2000, the PRDOH included core questions about asthma in the BRFSS . This was the first effort to begin to understand the asthma burden in Puerto Rico in order to plan and evaluate asthma public health programs and initiatives. Later on in 2005, data on childhood asthma was included in the survey. The asthma core includes the two base questions used to determine the lifetime asthma prevalence and the prevalence at the time of the survey (current).

1. Asthma Prevalence, Puerto Rico BRFSS

Lifetime prevalence refers to the affirmative response to the following question:

- Have you ever been told by a doctor, nurse or health professional that you have asthma?

Prevalence at the time of the survey refers to the affirmative response to the following questions:

- Have you ever been told by a doctor, nurse or health professional that you have asthma?
- Do you still have asthma?

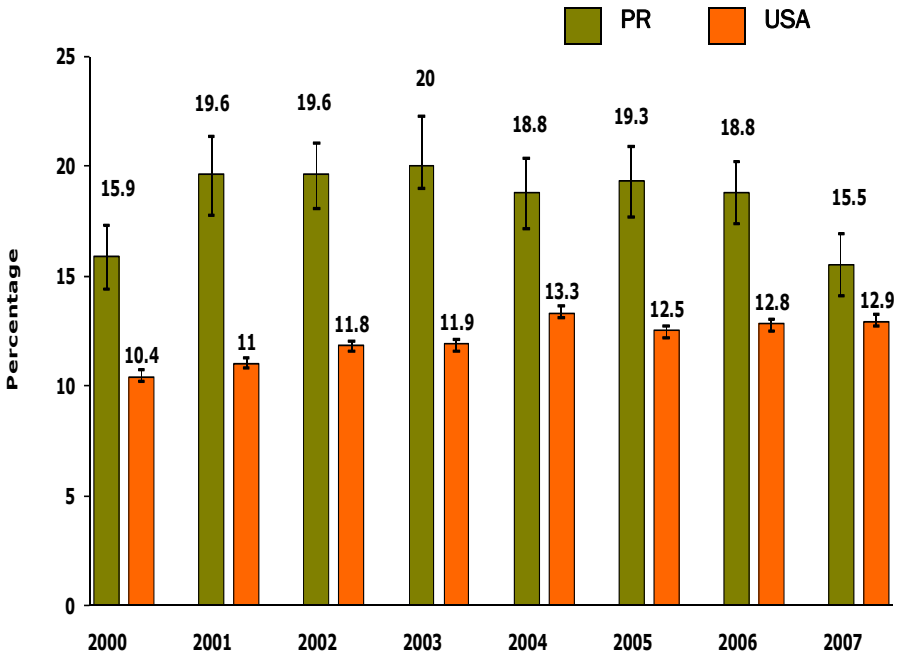
The lifetime asthma prevalence intends to obtain all the individuals who at some time in their lives have been diagnosed with this condition. On the other hand, the prevalence at the time of the survey is any individual who at the time of the survey answered that he/she was having asthma symptoms which were diagnosed by a doctor, nurse or other health professional. In this section, figures with estimates and 95% Confidence Intervals are included. In addition, the lifetime and current asthma prevalence is described by certain socio-demographic characteristics (age, gender, education, and income) of the Puerto Rican population.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

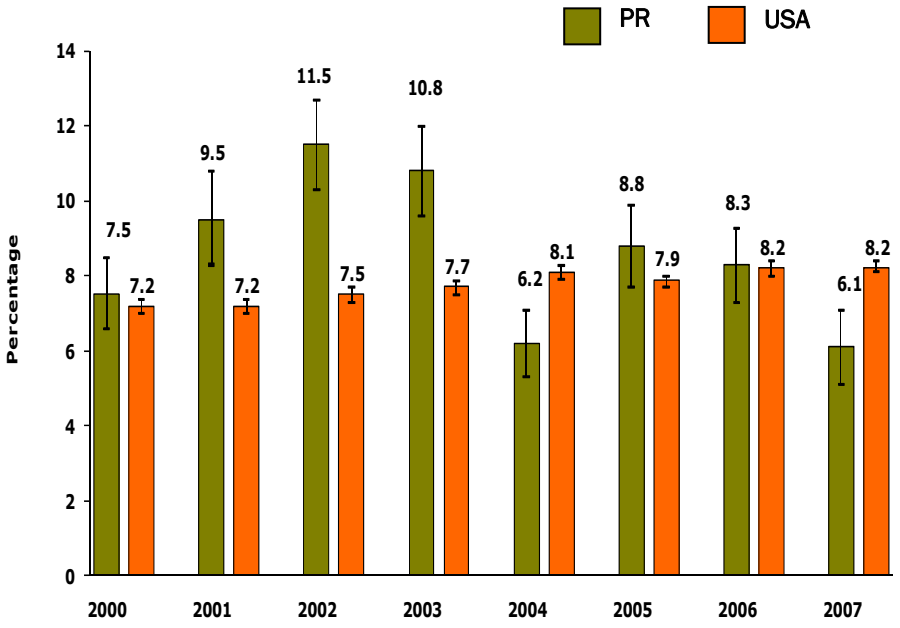
- During 2007, an estimated 439,773 Puerto Ricans reported being diagnosed with asthma at some time in their lives by a health care professional.
- As showed in Figure 1.1, the lifetime asthma prevalence in Puerto Rico was significantly higher than the USA prevalence during the 8 year of survey.
- A significant decline in lifetime asthma prevalence was observed in the year 2007 when compared with previous years (Figure 1.1)
- Approximately 172,651 Puerto Ricans were estimated to have asthma in the year 2007.
- A significantly lower current asthma prevalence was observed in PR compared with the USA prevalence during 2004 and 2007 (Figure 1.2).

Figure 1.1 Lifetime asthma prevalence Puerto Rico vs. USA, 2000-2007



Data Source: BRFSS 2000-2007. USA data exclude territories.

Figure 1.2 Current asthma prevalence, Puerto Rico vs. USA, 2000-2007



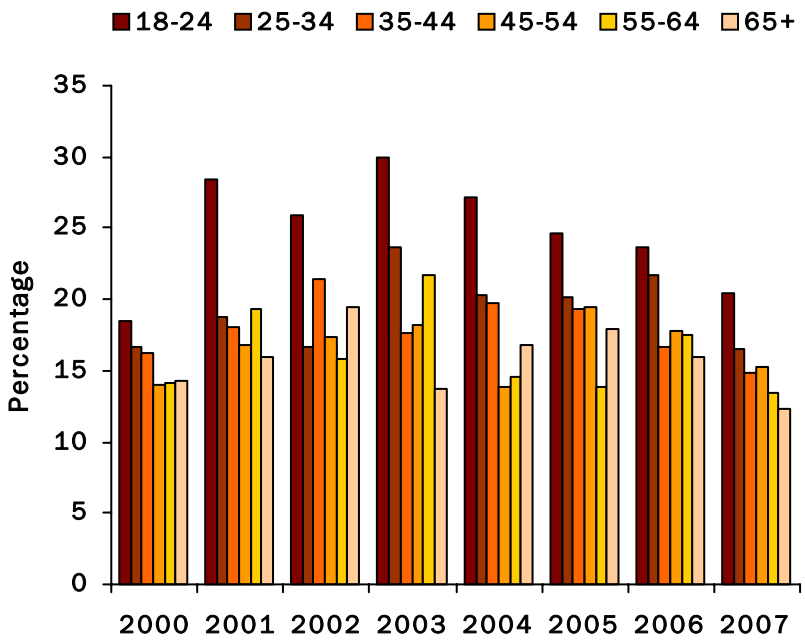
Data Source: BRFSS 2000-2007. USA data exclude territories.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- The lifetime asthma prevalence was statistically higher in the 18 to 24 age group compared to the 45 to 54 age group from 2001 2004.
- A monotonic pattern was observed between the years of survey across all age groups.

Figure 1.3 Lifetime asthma prevalence by year and age group Puerto Rico , 2000-2007



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Lifetime asthma prevalence and 95% confidence intervals by year and age group. Puerto Rico , 2000-2007

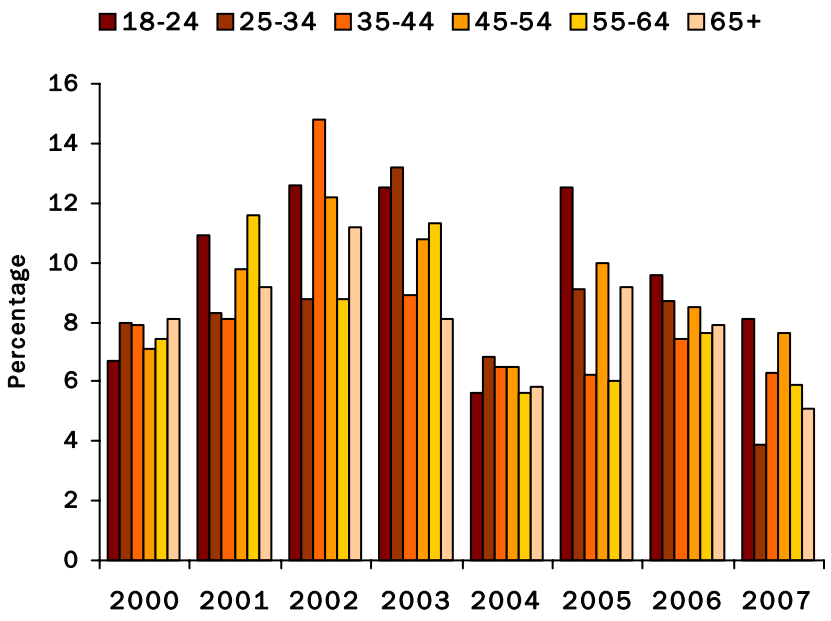
Age	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
18-24	18.5 (13.6-23.4)	28.4 (21.8-35.0)	25.9 (21.0-30.8)	30.0 (24.0-36.0)	27.2 (21.5-32.9)	24.7 (19.2-30.2)	23.6 (18.4-28.8)	20.4 (15.1-25.7)
25-34	16.6 (13.1-20.1)	18.8 (14.8-22.8)	16.6 (13.2-20.0)	23.7 (19.0-28.4)	20.3 (15.9-24.7)	20.2 (15.7-24.7)	21.7 (17.6-25.8)	16.5 (12.2-20.8)
35-44	16.3 (13.1-19.5)	18.0 (14.8-21.2)	21.4 (18.0-24.8)	17.6 (14.5-20.7)	19.8 (16.2-23.4)	19.3 (15.6-23.0)	16.7 (13.8-19.6)	14.8 (11.7-17.9)
45-54	14.0 (11.3-16.7)	16.8 (13.4-20.2)	17.4 (14.1-20.7)	18.2 (14.9-21.5)	13.9 (11.3-16.5)	19.5 (16.1-22.9)	17.8 (14.9-20.7)	15.3 (12.4-18.2)
55-64	14.2 (11.0-17.4)	19.3 (14.8-23.8)	15.8 (12.6-19.0)	21.7 (18.0-25.4)	14.5 (11.5-17.5)	13.9 (10.8-17.0)	17.5 (14.8-20.2	13.5 (11.1-15.9)
65+	14.3 (11.6-17.0)	15.9 (12.7-19.1)	19.4 (16.0-22.8)	13.7 (11.2-16.2)	16.8 (13.9-19.7)	17.9 (15.0-20.8)	15.9 (13.8-18.0)	12.3 (10.3-14.3)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- There is no specific age group more likely of having higher current asthma prevalence than other age groups across the years of survey.
- The highest prevalence was reported during the year 2002 in the 35 to 44 age group.

Figure 1.4 Current asthma prevalence by year and age group Puerto Rico, 2000-2007



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Current asthma prevalence and 95% confidence intervals by year and age group. Puerto Rico , 2000-2007

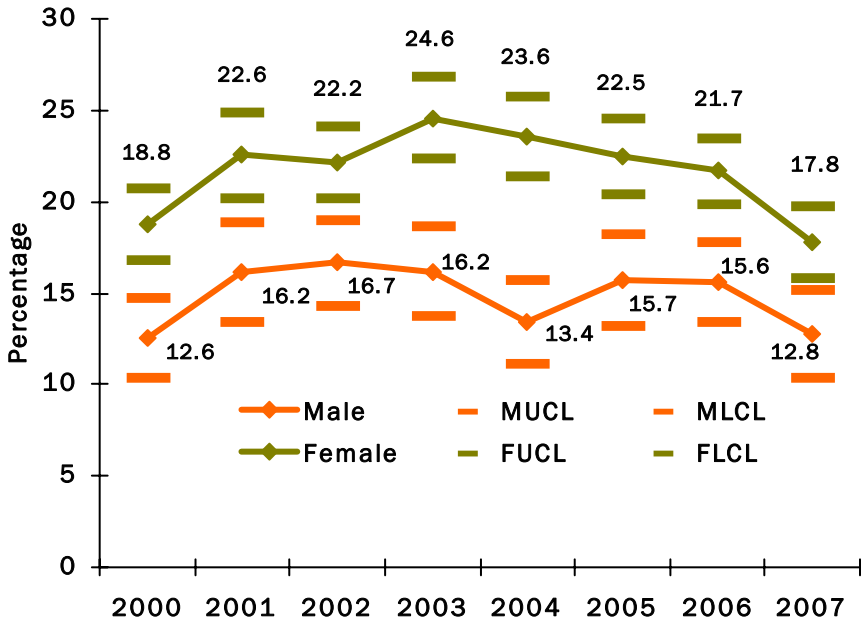
Age	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
18-24	6.7 (4.0-9.4)	10.9 (6.4-15.4)	12.6 (9.0-16.2)	12.5 (8.3-16.7)	5.6 (2.9-8.3)	12.5 (8.3-16.7)	9.6 (5.8-13.4)	8.1 (4.6-11.6)
25-34	8.0 (5.5-10.5)	8.3 (5.9-10.7)	8.8 (6.2-11.4)	13.2 (9.6-16.8)	6.8 (4.2-9.4)	9.1 (6.1-12.1)	8.7 (6.1-11.3)	3.9 (1.9-5.9)
35-44	7.9 (5.6-10.2)	8.1 (5.8-10.4)	14.8 (11.8-17.8)	8.9 (6.6-11.2)	6.5 (4.4-8.6)	6.2 (4.3-8.1)	7.4 (5.4-9.4)	6.3 (4.1-8.5)
45-54	7.1 (5.1-9.1)	9.8 (7.1-12.5)	12.2 (9.5-14.9)	10.8 (8.2-13.4)	6.5 (4.6-8.4)	10.0 (7.6-12.4)	8.5 (6.4-10.6)	7.6 (5.4-9.8)
55-64	7.4 (5.0-9.8)	11.6 (7.7-15.5)	8.8 (6.3-11.3)	11.3 (8.7-13.9)	5.6 (3.8-7.4)	6.0 (4.1-7.9)	7.6 (5.7-9.5)	5.9 (4.3-7.5)
65+	8.1 (6.1-10.1)	9.2 (6.9-11.5)	11.2 (8.7-13.7)	8.1 (6.2-10.0)	5.8 (3.9-7.7)	9.2 (7.1-11.3)	7.9 (6.3-9.5)	5.1 (3.9-6.3)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

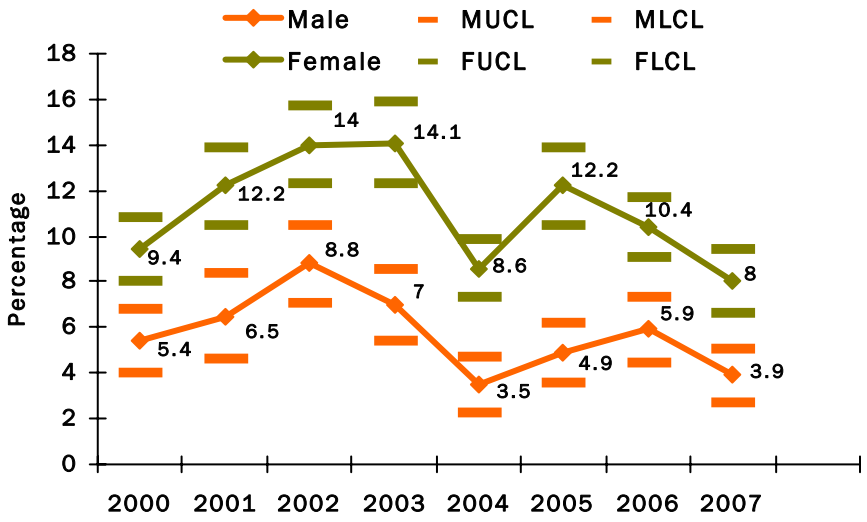
- Figures 1.5 and 1.6 show that the lifetime and current asthma prevalence was significantly higher for females than males constantly across the years.
- The patterns in lifetime and current asthma prevalence evidence a disparity in asthma morbidity by gender, where females were more affected than males.

Figure 1.5 Lifetime asthma prevalence by gender, Puerto Rico 2000-2007



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.6 Current asthma prevalence by gender, Puerto Rico 2000-2007



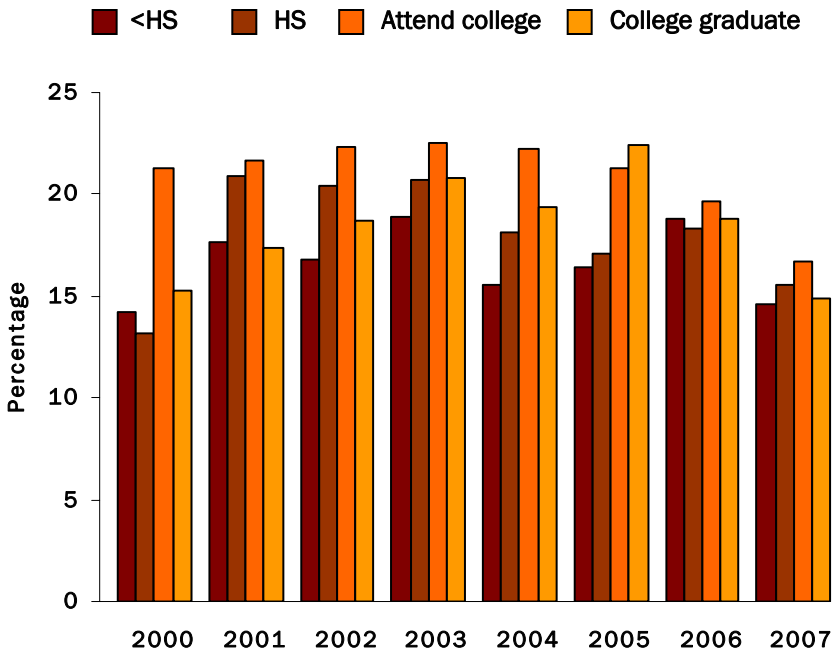
Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- In 2000 and 2004 the lifetime asthma prevalence was significantly higher among persons who attended college when compared to persons without high school diploma.
- A statistically significant decrease was identified in the lifetime asthma prevalence in college graduates between 2005 and 2007.

Figure 1.7 Lifetime asthma prevalence by year and educational level Puerto Rico, 2000-2007



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Lifetime asthma prevalence and 95% confidence intervals by year and educational level in Puerto Rico , 2000-2007

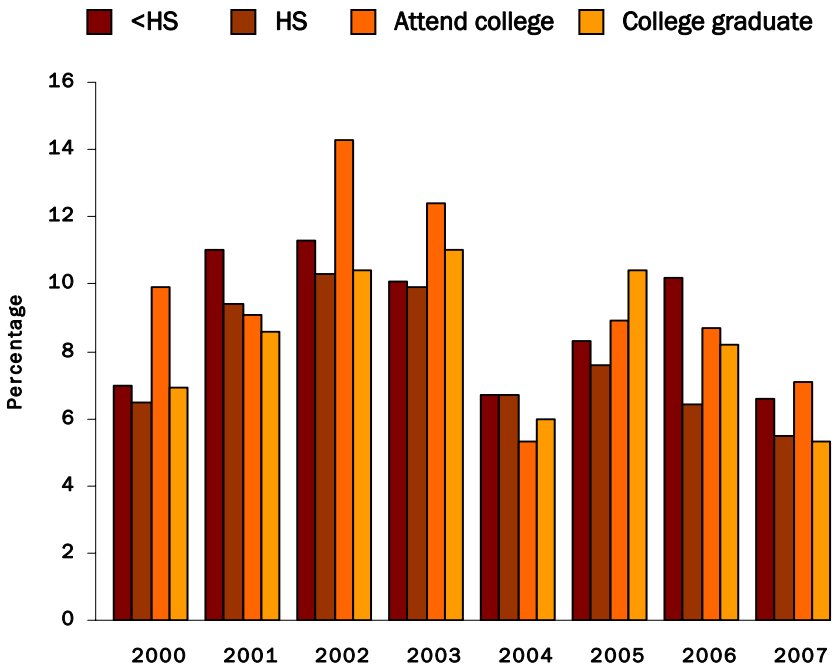
Educational level	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
<High school	14.2 (11.8-16.6)	17.7 (20.3-15.1)	16.8 (14.2-19.4)	18.9 (16.1-21.7)	15.6 (13.2-18.0)	16.4 (13.7-19.1)	18.8 (16.5-21.1)	14.6 (12.1-117.1)
High school	13.2 (10.8-15.6)	20.9 (17.0-24.8)	20.4 (17.3-23.5)	20.7 (17.2-24.2)	18.1 (15.0-21.2)	17.1 (14.2-20.0)	18.3 (15.4-21.2)	15.6 (1.2.7-18.5)
Attend college	21.3 (17.7-24.9)	21.7 (17.7-25.7)	22.3 (19.0-25.6)	22.5 (18.9-26.1)	22.2 (18.5-25.9)	21.3 (17.6-25.0)	19.3 (16.4-23.0)	16.7 (13.4-20.0)
College grad	15.3 (12.1-18.3)	17.4 (14.1-20.7)	18.7 (15.6-21.8)	20.8 (17.4-24.2)	19.4 (16.1-22.7)	22.4 (19.0-25.8)	18.8 (16.1-21.5)	14.9 (12.4-17.4)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- No differences in current asthma prevalence were identified within the educational level by year of survey.
- A significant decline in current asthma prevalence was observed between 2002 and 2007 in persons with high school diploma, in persons with at least 1 to 3 years of college, and in college graduates.

Figure 1.8 Current asthma prevalence by year and educational level Puerto Rico, 2000-2007



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Current asthma prevalence and 95% confidence intervals by year and educational level in Puerto Rico , 2000-2007

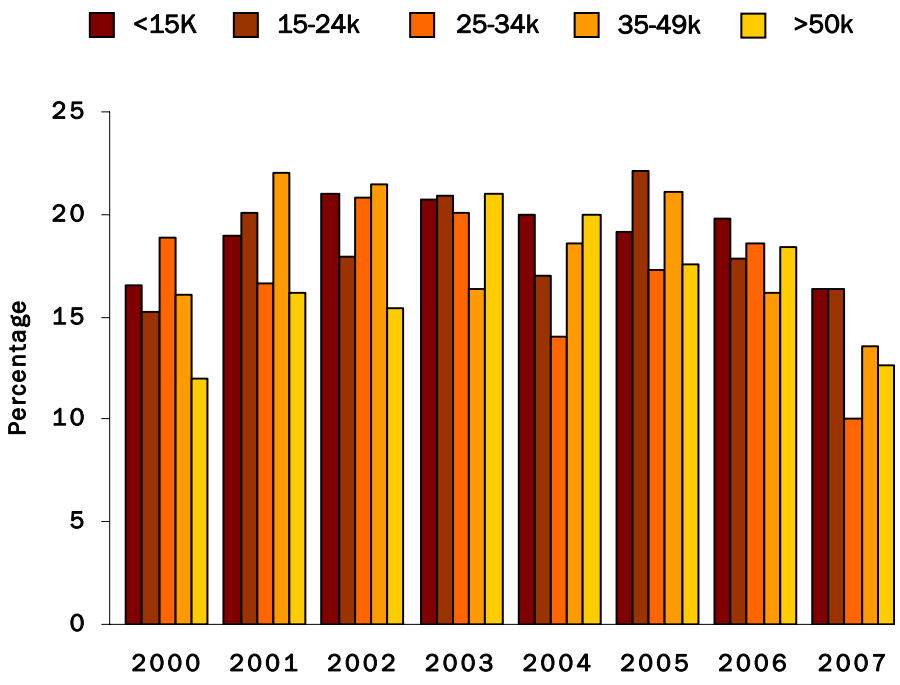
Educational level	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
<High school	7.0 (5.6-8.4)	11.0 (8.9-13.1)	11.3 (9.1-13.5)	10.1 (8.0-12.2)	6.7 (5.0-8.4)	8.3 (6.5-10.1)	10.2 (8.4-12.0)	6.6 (5.0-8.2)
High school	6.5 (4.8-8.2)	9.4 (6.7-12.1)	10.3 (8.1-12.5)	9.9 (7.6-12.2)	6.7 (4.8-8.6)	7.6 (5.7-9.5)	6.4 (4.6-8.2)	5.5 (3.7-7.3)
Attend college	9.9 (7.3-12.5)	9.1 (6.3-11.9)	14.3 (11.5-17.1)	12.4 (9.6-15.2)	5.3 (3.5-7.1)	8.9 (6.5-11.3)	8.7 (6.4-11.0)	7.1 (4.9-9.3)
College grad	6.9 (4.7-9.1)	8.6 (6.3-10.9)	10.4 (8.1-12.7)	11.0 (8.5-13.5)	6.0 (4.8-7.8)	10.4 (7.9-12.9)	8.2 (6.3-10.1)	5.3 (6.7-3.9)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- No differences in lifetime asthma prevalence were identified by annual income. The results suggested that no disparity in lifetime asthma prevalence has been identified by income levels in the eight years of survey.

Figure 1.9 Lifetime asthma prevalence by income, Puerto Rico



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Lifetime asthma prevalence and 95% confidence intervals by year by income in Puerto Rico , 2000-2007

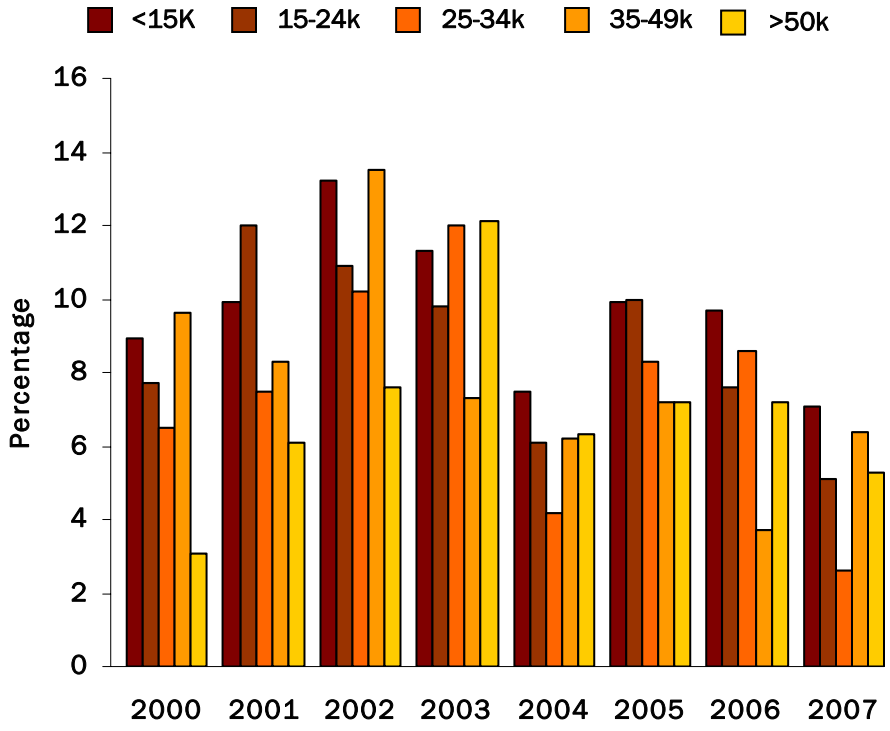
Age	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
<15k	16.5 (14.5-18.4)	19.0 (16.6-21.3)	21.0 (18.6-23.3)	20.7 (18.2-23.2)	20.0 (17.6-22.4)	19.1 (16.7-21.5)	19.8 (17.6-22.0)	16.4 (14.0-18.8)
15k to 24k	15.2 (12.0-18.3)	20.1 (16.1-24.0)	17.9 (14.7-21.0)	20.9 (17.5-24.3)	17.0 (13.4-20.3)	22.1 (18.4-25.8)	17.8 (14.9-20.7)	16.4 (13.1-19.7)
25k to 34k	18.9 (12.9-24.9)	16.6 (10.9-22.2)	20.8 (15.9-25.7)	20.1 (15.1-25.1)	14.0 (9.7-18.3)	17.3 (12.5-22.1)	18.6 (14.1-23.1)	10.0 (6.1-13.9)
35k to 49k	16.1 (8.2-23.9)	22.0 (14.1-29.8)	21.5 (15.0-27.9)	16.4 (10.2-22.6)	18.6 (12.0-25.2)	21.1 (14.9-27.3)	16.2 (11.6-20.8)	13.6 (9.1-18.1)
>50k	12.0 (4.5-19.4)	16.2 (8.1-24.2)	15.4 (9.7-21.0)	21.0 (14.5-27.5)	20.0 (14.0-27.4)	17.6 (11.7-23.5)	18.4 (13.4-23.4)	12.6 (8.5-16.7)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- No specific income group holds constantly a higher current asthma prevalence during the survey period.
- Significant differences in current asthma prevalence across the years were observed in the income group of <15K between 2002 and 2007; in the 15-24k income group in the same years; and in the 35-49k between 2003 and 2007.

Figure 1.10 Current asthma prevalence by income, Puerto Rico 2000-2007.



Data Source: BRFSS 2000-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Current asthma prevalence and 95% confidence intervals by year by income in Puerto Rico , 2000-2007

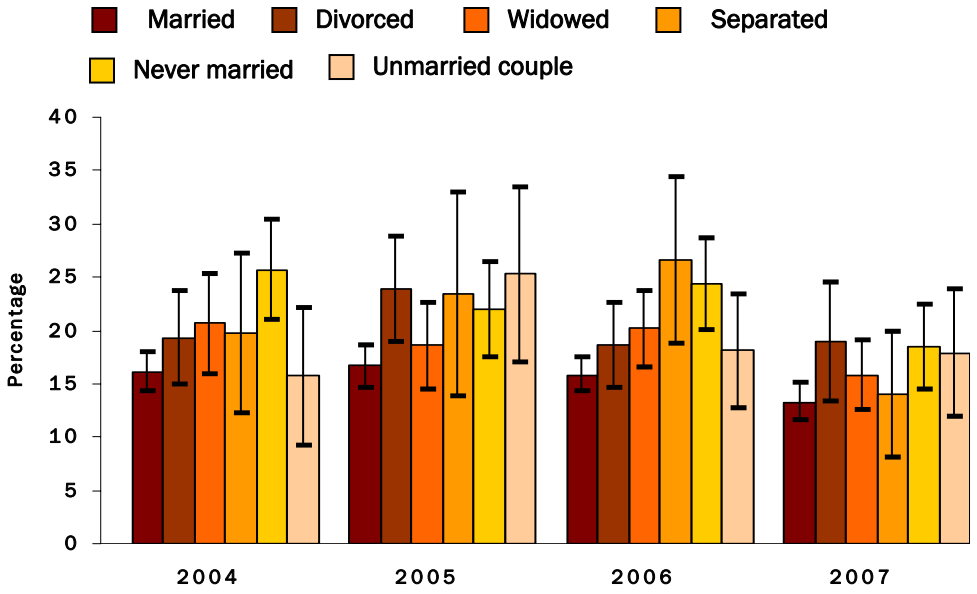
Age	2000 % (95% CI)	2001 % (95% CI)	2002 % (95% CI)	2003 % (95% CI)	2004 % (95% CI)	2005 % (95% CI)	2006 % (95% CI)	2007 % (95% CI)
<15k	8.9 (7.5-10.3)	9.9 (8.3-11.5)	13.2 (11.3-15.1)	11.3 (9.4-13.2)	7.5 (5.9-9.1)	9.9 (8.2-11.6)	9.7 (8.1-11.3)	7.1 (5.5-8.7)
15k to 24k	7.7 (5.4-10.0)	12.0 (8.4-15.6)	10.9 (8.4-13.4)	9.8 (7.6-12.0)	6.1 (4.2-8.0)	10.0 (7.5-12.5)	7.6 (5.8-9.4)	5.1 (3.5-6.7)
25k to 34k	6.5 (3.4-9.6)	7.5 (4.0-11.0)	10.2 (6.8-13.6)	12.0 (7.8-16.2)	4.2 (2.0-6.4)	8.3 (5.1-11.5)	8.6 (5.0-12.2)	2.6 (1.0-4.2)
35k to 49k	9.6 (3.3-15.9)	8.3 (3.9-12.7)	13.5 (8.0-19.0)	7.3 (3.0-11.6)	6.2 (2.9-9.5)	7.2 (3.5-10.9)	3.7 (1.6-5.8)	6.4 (3.1-9.7)
>50k	3.1 (0.0-6.6)	6.1 (1.4-10.8)	7.6 (3.5-11.7)	12.1 (7.0-17.2)	6.3 (2.3-10.3)	7.2 (3.0-11.4)	7.2 (3.6-10.8)	5.3 (2.6-8.0)

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

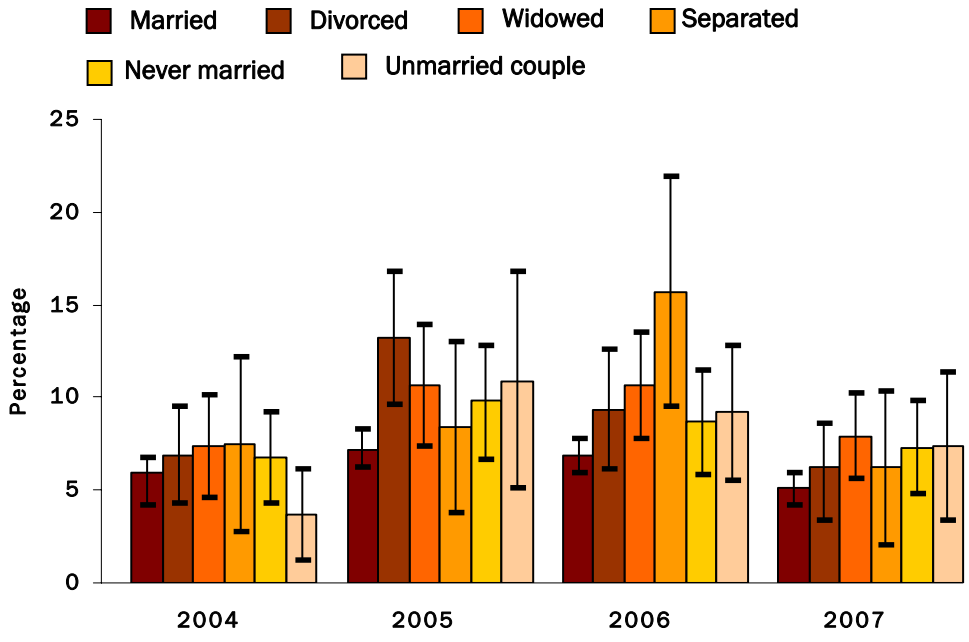
- In 2004 and 2006, a significantly higher lifetime asthma prevalence was identified in persons never married than in married participants (Figure 1.11).
- The lifetime asthma prevalence distribution by marital status categories didn't change through the years of survey (Figure 1.11).
- During 2005, divorced Puerto Ricans reported a significantly higher current asthma prevalence than those who reported being married (Figure 1.12).
- Current asthma prevalence significantly decreased in divorced persons from 2005 to 2007 (Figure 1.12).

Figure 1.11 Lifetime asthma prevalence by marital status, Puerto Rico 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.12 Current asthma prevalence by marital status, Puerto Rico 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

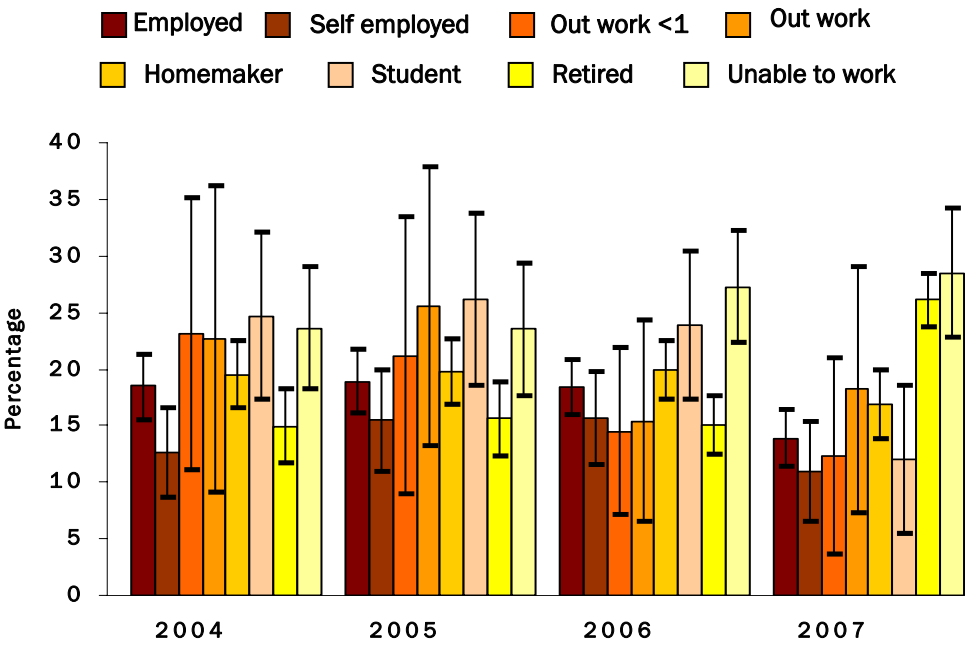
1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- Significant differences were identified in year 2004 for people unable to work compared with self employed; in 2006 for unable to work compared with employed, self employed and retired; in 2007 for unable to work and retired compared with employed, self employed, out of work, home maker and student (Figure 1.13).

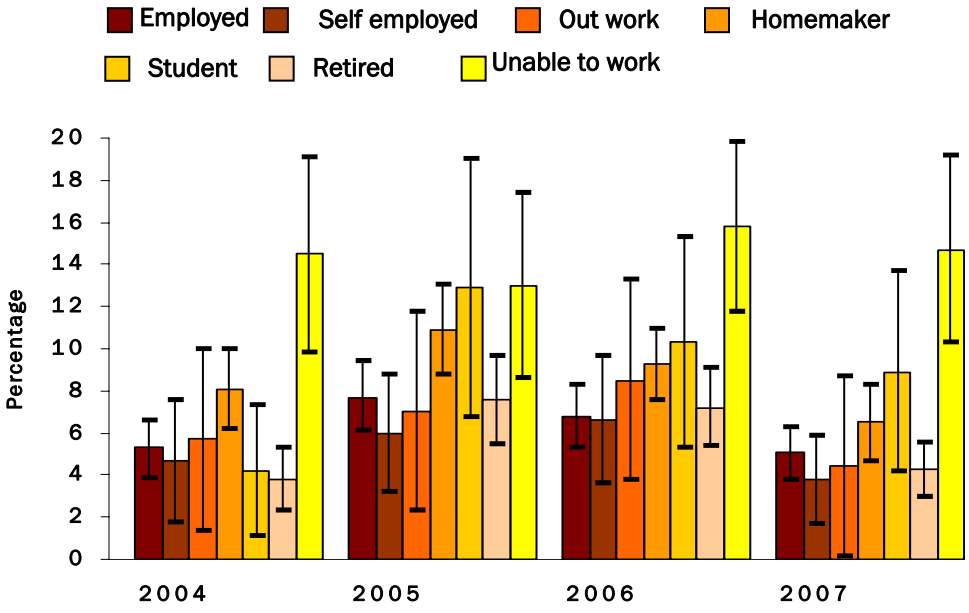
- In 2004, 2006 and 2007 the current asthma prevalence was higher in those reporting not being able to work than in those reporting other employment status. (Figure 1.14).

Figure 1.13 Lifetime asthma prevalence by employment status, Puerto Rico 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.1.4 Current asthma prevalence by employment status, Puerto Rico 2004-2007



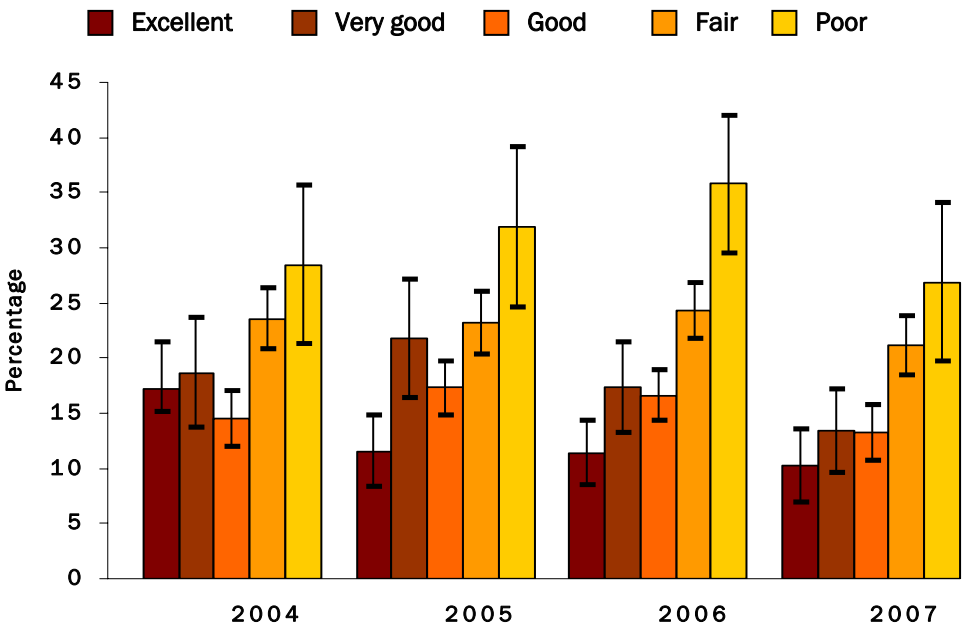
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

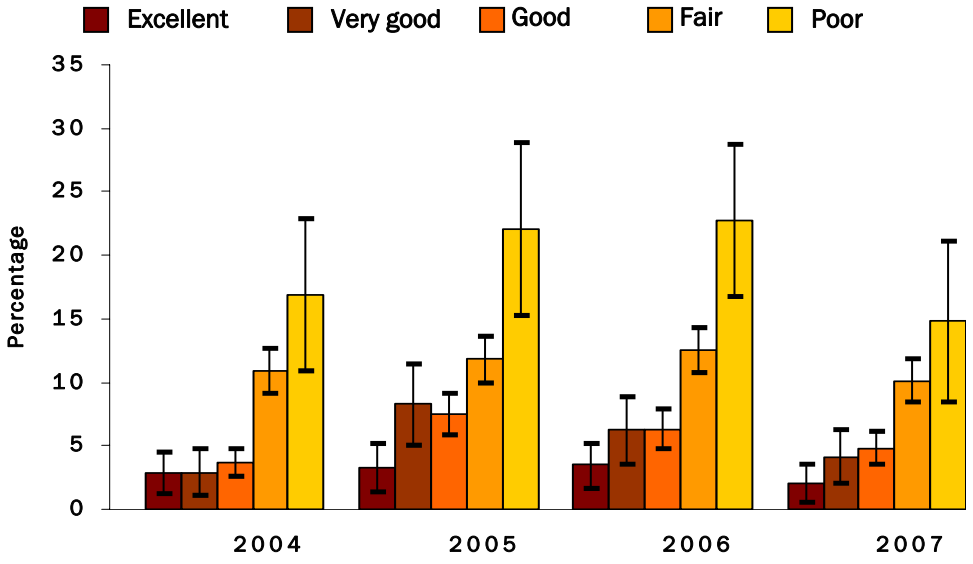
- From 2004 to 2007, the lifetime asthma prevalence was significantly higher in those that considered their health poor than those who considered it good (Figure 1.15).
- The lifetime asthma prevalence among adults that reported excellent health status, decreased significantly from 17.2% in 2004 to 10.3% in 2007 (Figure 1.15).
- During 2004, 2006 and, 2007, current asthma was significantly higher in adults that considered their general health fair or poor than in adults that considered their general health excellent, very good or good (Figure 1.16).

Figure 1.15 Lifetime asthma prevalence by general health perception, Puerto Rico, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.16 Current asthma prevalence by general health perception, Puerto Rico, 2004-2007



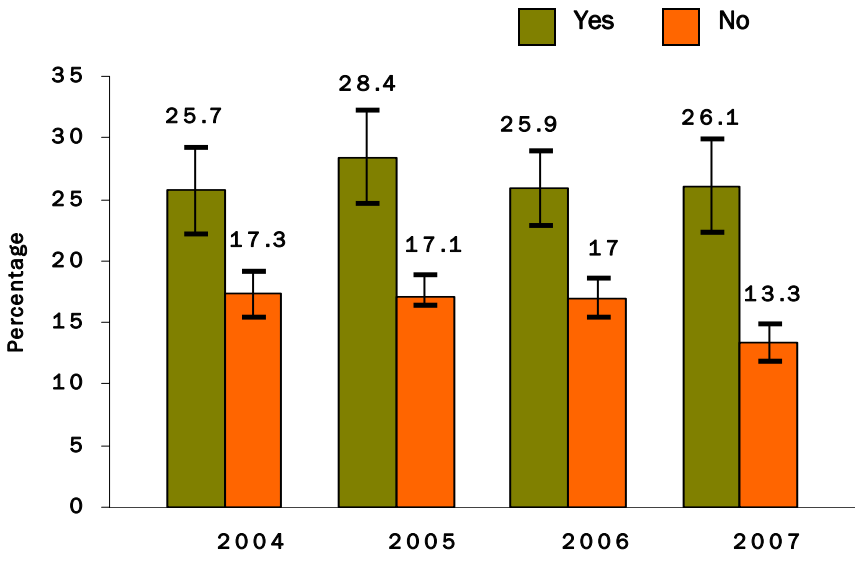
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

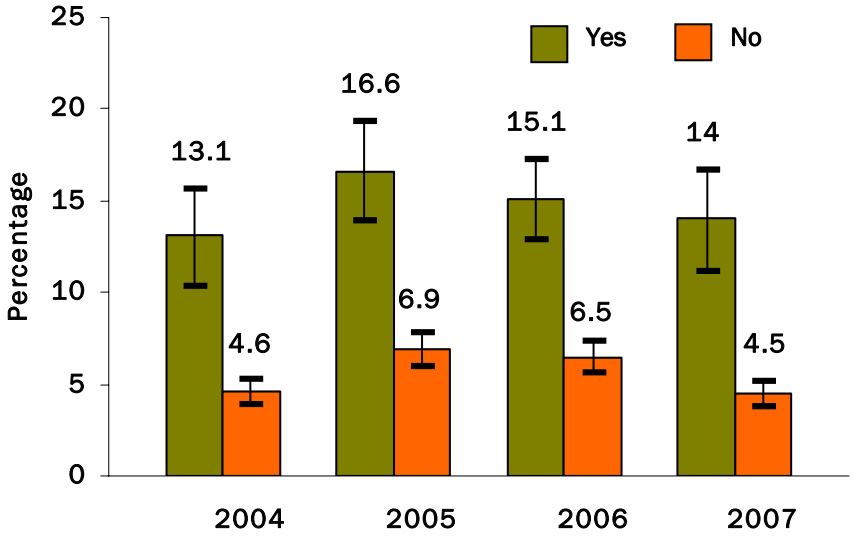
- From 2004 to 2007, adults that responded being limited in any activities due to physical, mental, or emotional problems had significantly higher lifetime asthma prevalence (Figure 1.17).
- The lifetime asthma prevalence in persons that responded "no" to being limited in any activity, decreased significantly from 2006 to 2007 (Figure 1.17).
- Significantly higher current asthma prevalence was observed in adults that responded to being limited in any activities due to physical, mental, or emotional problems during the four year period (Figure 1.18).

Figure 1.17 Lifetime asthma prevalence by activity limitation due to physical, mental, or emotional problems, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.18 Current asthma prevalence by activity limitation due to physical, mental, or emotional problems, 2004-2007



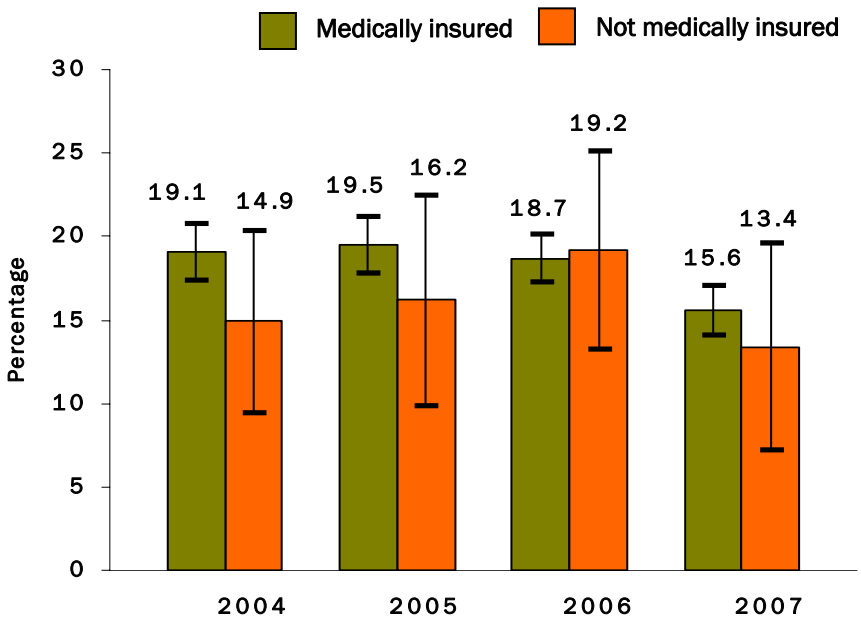
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

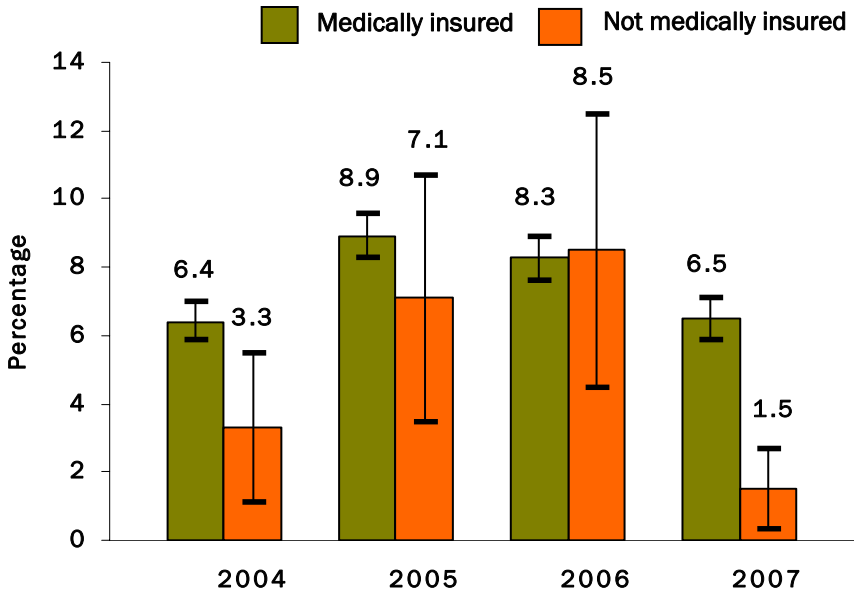
- The lifetime asthma prevalence in adults did not differ by medically insured status from 2004 to 2007. Nevertheless, both groups had high asthma prevalence (Figure 1.19).
- The current asthma prevalence in insured adults was significantly higher than in the not medically insured group in the years 2004 and 2007 (Figure 1.20).
- A significant decrease in current asthma between 2006 and 2007 is observed in medically insured individuals (Figure 1.20).
- In 2007, 3,801 adults with asthma in Puerto Rico did not have any kind of health coverage.

Figure 1.19 Lifetime asthma prevalence by been medically insured with any kind of health coverage, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.20 Current asthma prevalence by been medically insured with any kind of health coverage, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

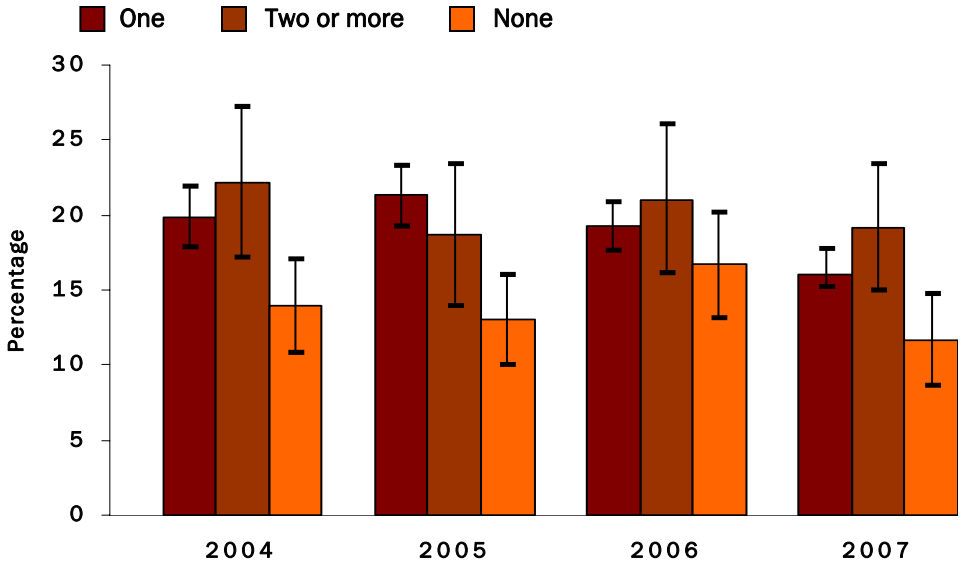
1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

- Adults without a personal doctor or health care provider showed lower lifetime and current asthma prevalence. Not all observations were significantly different (Figures 1.21 and 1.22).

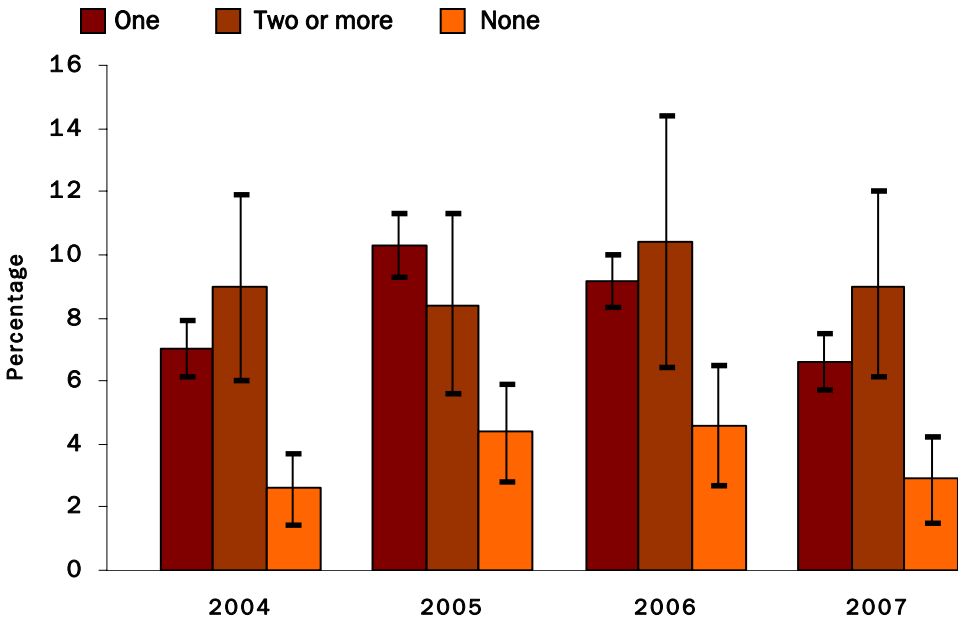
- The lifetime and current asthma prevalence patterns among the mentioned categories did not change across the years of study (Figures 1.21 and 1.22).

Figure 1.21 Lifetime asthma prevalence by having a personal doctor or health care provider, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.22 Current asthma prevalence by having a personal doctor or health care provider, 2004-2007



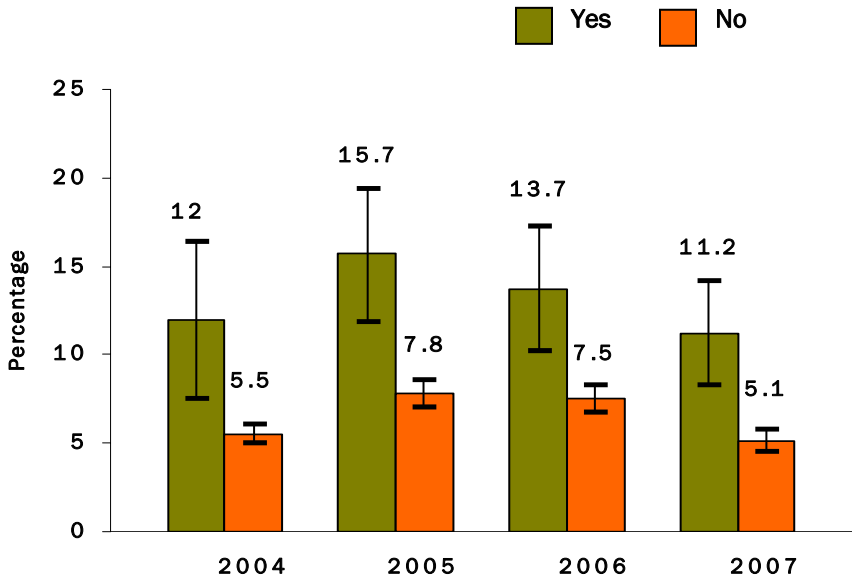
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

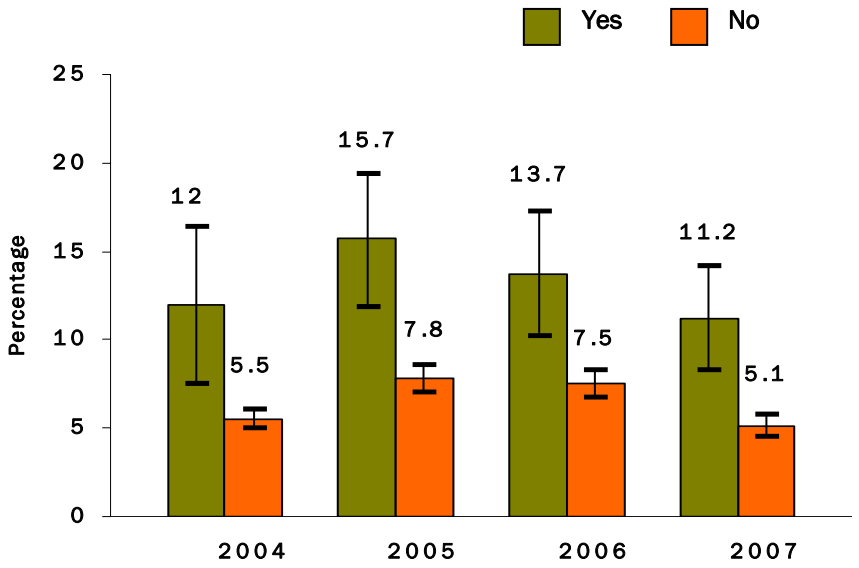
- During 2004 to 2007, adults that could not see a doctor because of the cost were more likely to have been diagnosed with asthma some time in their life than their counterparts. Nonetheless, this observation was statistically significant only in the year 2005 (Figure 1.23).
- Between 2006 and 2007 a significant decrease in the lifetime asthma prevalence was observed in adults who didn't have cost limitation to access a doctor (Figure 1.23).
- The current asthma prevalence in persons that couldn't see a doctor because of the cost, was constant and higher for all years of survey. All differences were statistically significant (Figure 1.24).

Figure 1.23 Lifetime asthma prevalence by participants that could not see a doctor because of the cost any time during the past 12 months, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.24 Current asthma prevalence by participants that could not see a doctor because of the cost any time during the past 12 months, 2004-2007



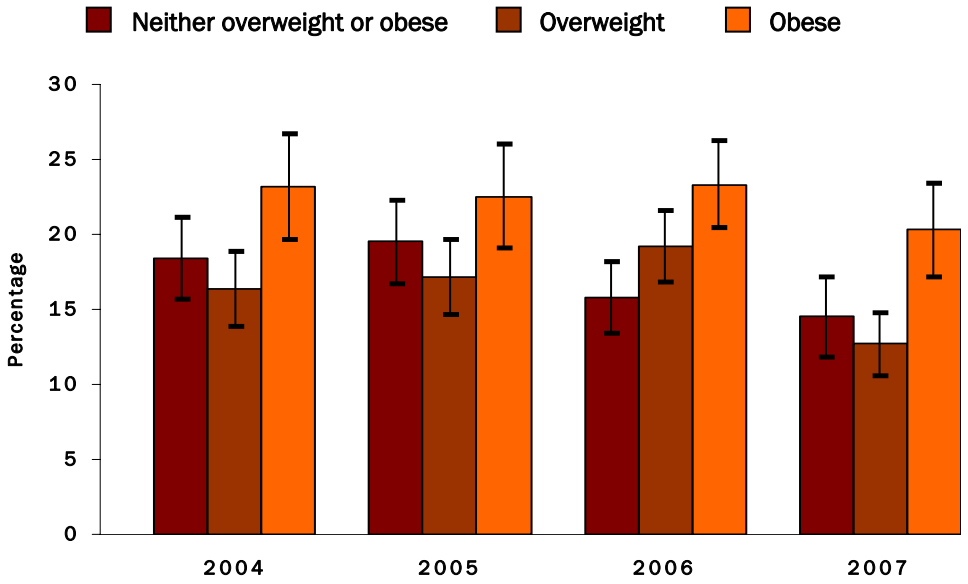
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

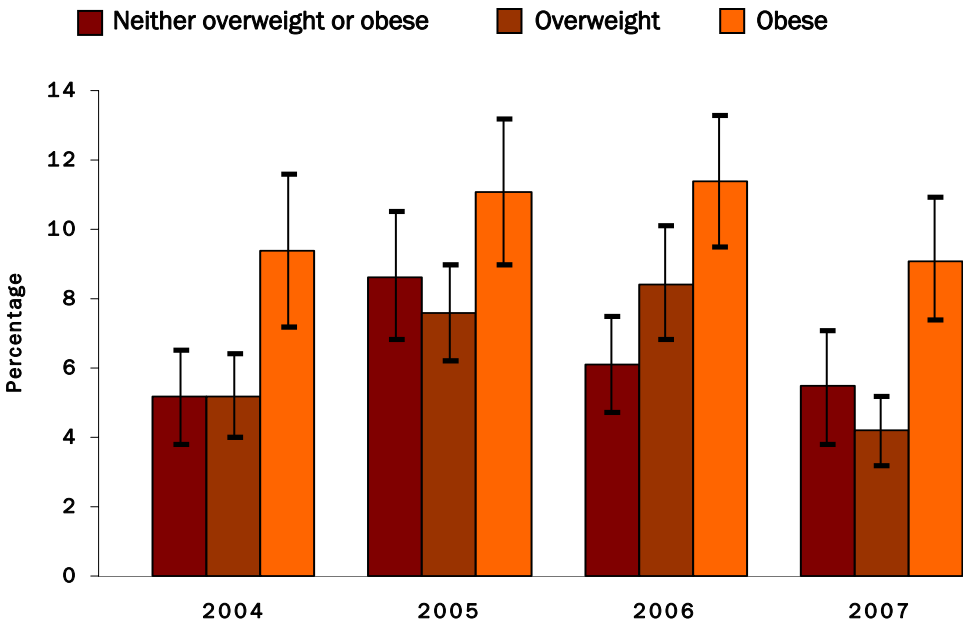
- Obese adults showed significantly higher asthma prevalence than overweight adults during 2004 and 2007.
- In 2006, obese adults showed significantly higher lifetime asthma prevalence than adults neither overweight or obese (Figure 1.25).
- In 2004, 2006 and 2007 current asthma prevalence was significantly higher in obese adults compared with adults neither overweight or obese (Figure 1.26).
- From 2006 to 2007, a significant decrease of asthma prevalence was registered in overweight adults.

Figure 1.25 Lifetime asthma prevalence by body mass index, Puerto Rico 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

Figure 1.26 Current asthma prevalence by body mass index, Puerto Rico 2004-2007



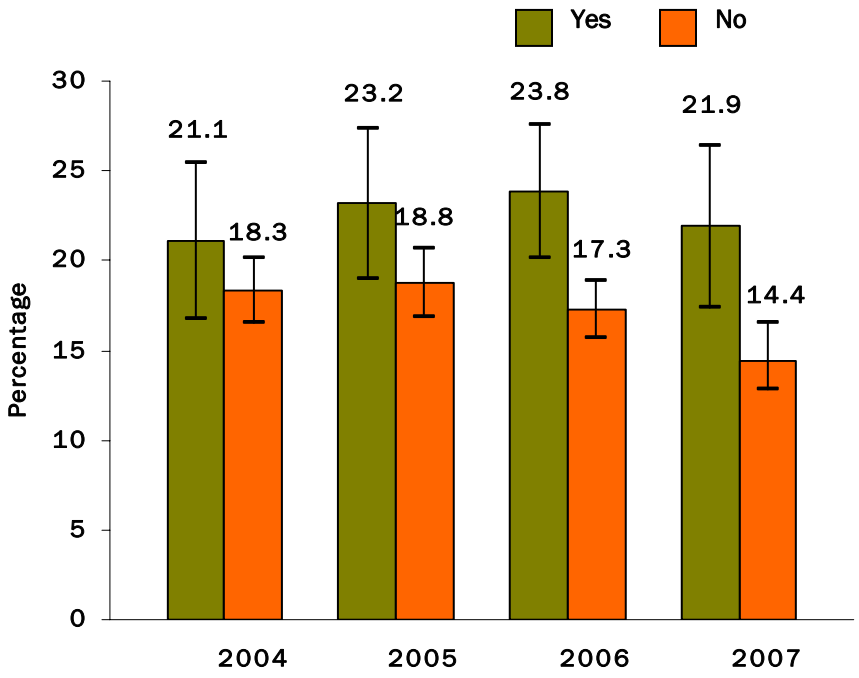
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

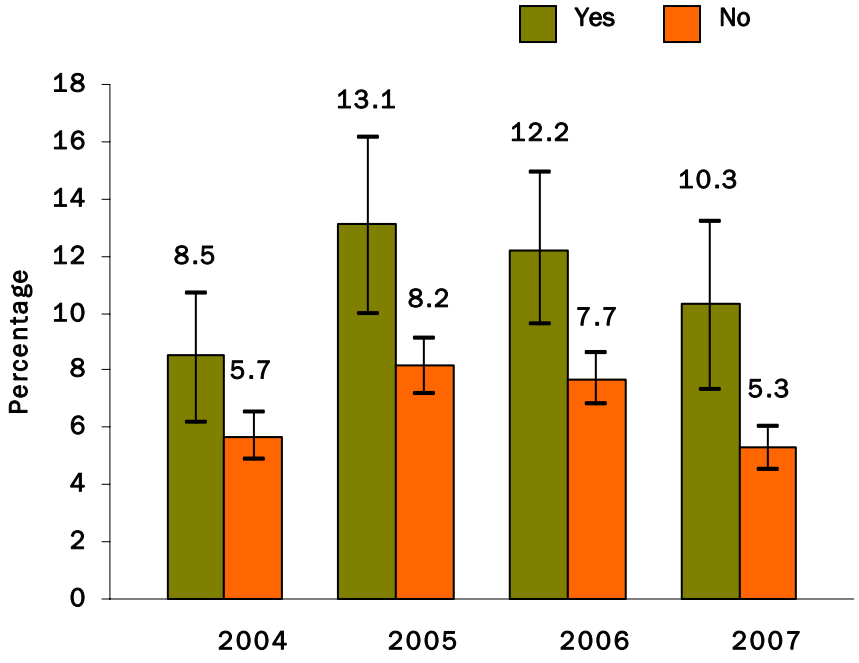
- Adults who received a pneumonia shot had higher lifetime asthma prevalence in 2006 and 2007 than those who never received a shot (Figure 1.27).
- Current asthma prevalence was constantly higher among adults that received a pneumonia shot (Figure 1.28).
- The current asthma prevalence in participants that reported never having received a pneumonia shot decreased between 2005 and 2007 (Figure 1.28).

Figure 1.27 Lifetime asthma prevalence by ever having a pneumonia shot, 2004-2007



Data Source: BRFSS 2004-2007.

Figure 1.28 Current asthma prevalence by ever having a pneumonia shot , 2004-2007



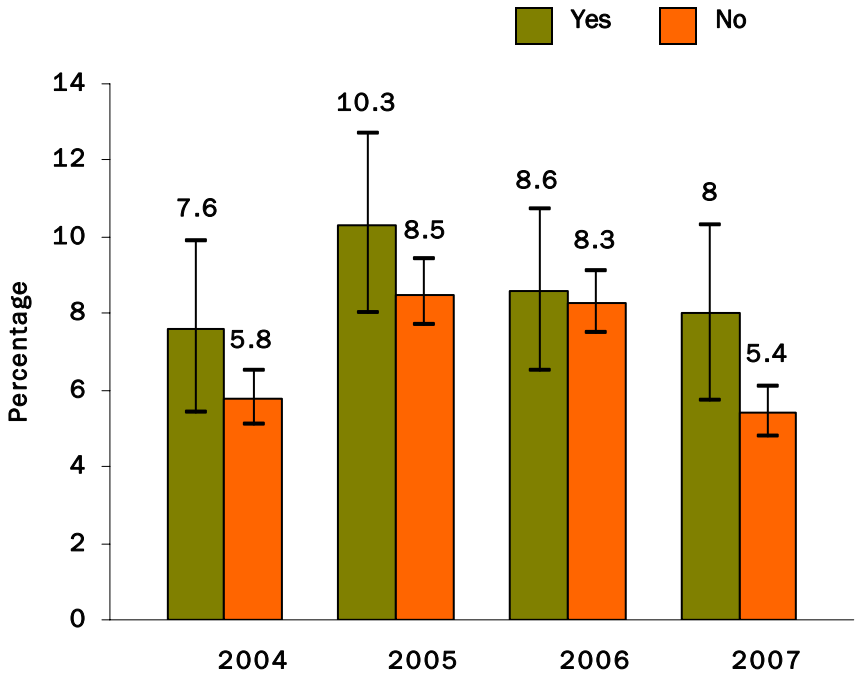
Data Source: BRFSS 2004-2007.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

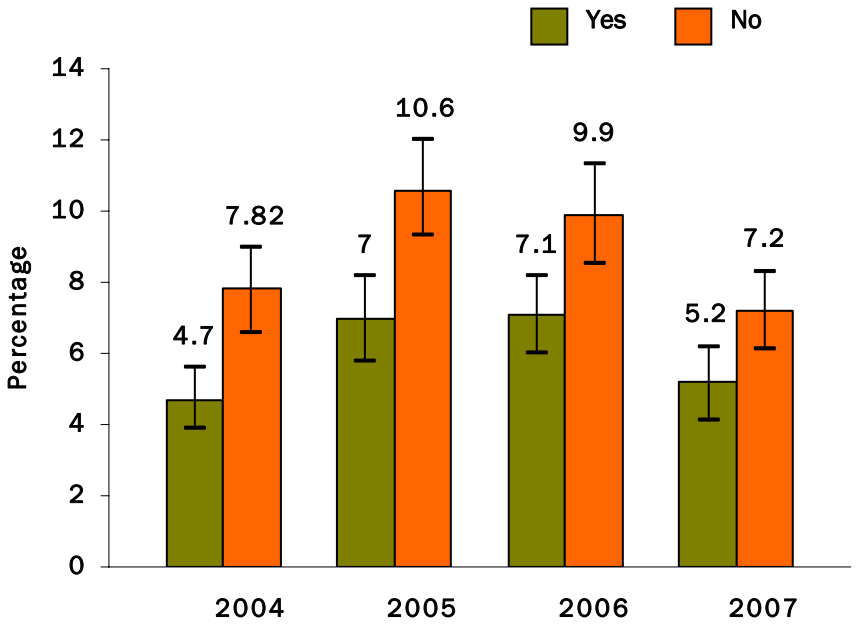
- The current asthma prevalence in adults that reported receiving a flu shot during the past 12 months, did not differ statistically in any year of survey when compared to those who did not receive the shot (Figure 1.29).
- The current asthma prevalence in participants that report not receiving a flu shot, decreased between 2005 and 2007. Adults who received the flu shot maintained a stable pattern through the years(Figure 1.29).
- Adults that participated in any physical activity or exercise were more likely to have a lower current asthma prevalence than those who did not participate in any physical activity (Figure 1.30).

Figure 1.29 Current asthma prevalence by having a flu shot during the past 12 months, 2004-2007



Data Source: BRFSS 2004-2007.

Figure 1.30 Current asthma prevalence by physical activities or exercise, 2004-2007



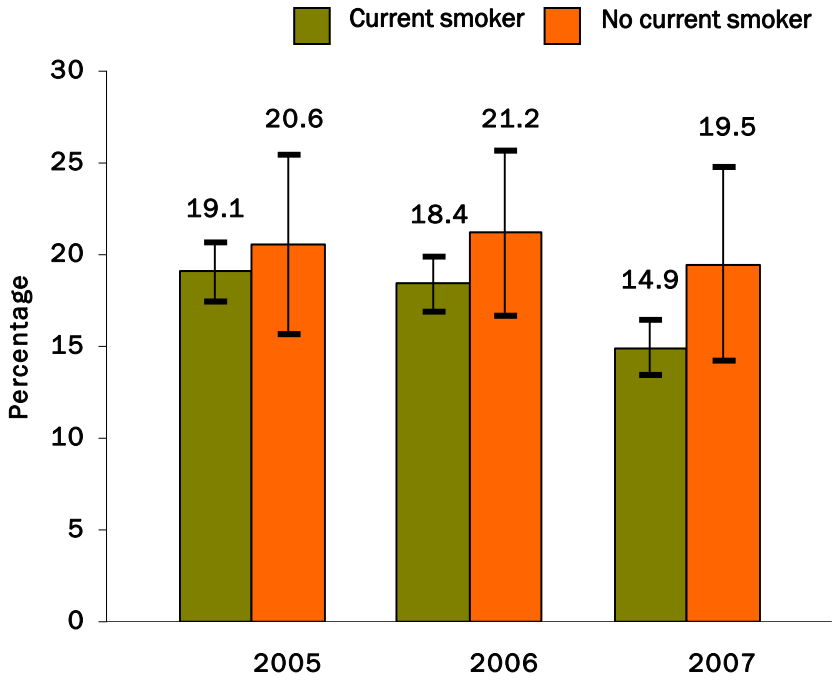
Data Source: BRFSS 2004-2007.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

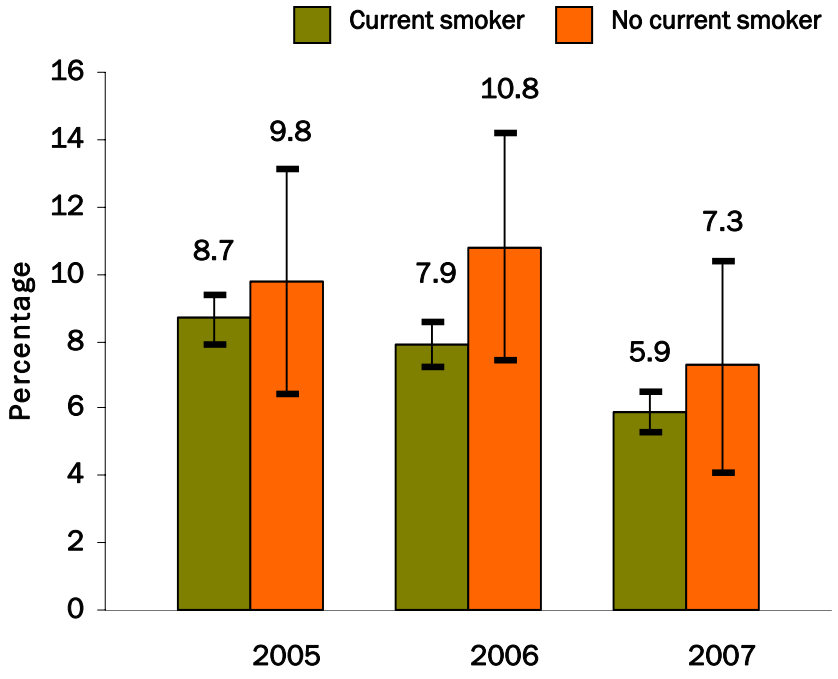
- No significant difference in lifetime and current asthma prevalence was observed between current smokers and non smokers, from 2005 to 2007 (Figures 1.31 and 1.32).
- In 2007, the lifetime and current asthma prevalence in current smokers significantly decreased when compared to the 2005 and 2006 prevalence (Figures 1.31 and 1.32).

Figure 1.31 Lifetime asthma prevalence by smoking status, 2005-2007



Data Source: BRFSS 2005-2007.

Figure 1.32 Current asthma prevalence by smoking status , 2005-2007



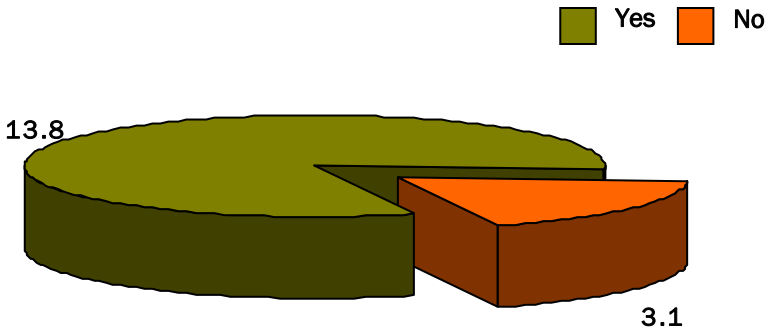
Data Source: BRFSS 2004-2007.

1.1 Asthma Prevalence, Puerto Rico BRFSS

Asthma in adults

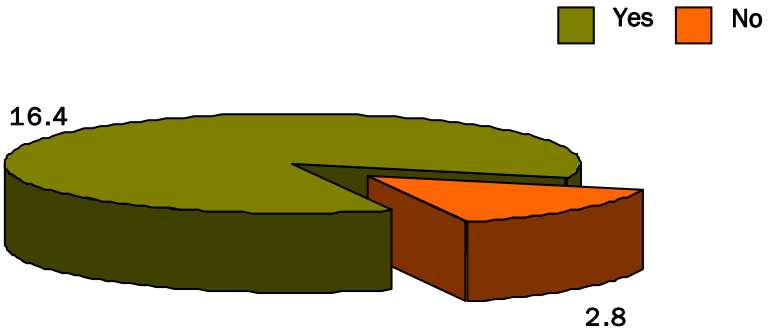
- In 2004, the current asthma prevalence was significantly higher in participants that had illness or symptoms they think were caused by something in the air inside a home, office, or other building like dust, mold and chemicals (Figure 1.33).
- In 2004, the current asthma prevalence was higher in participants that had illness or symptoms they think were caused by pollution in the outdoors like smog, automobile exhaust and chemicals (Figure 1.34).

Figure 1.33 Current asthma prevalence by illness or symptoms that you think was caused by something in the air during the past 12 months, 2004



Data Source: BRFSS 2004

Figure 1.34 Current asthma prevalence by illness or symptoms that you think was caused by outdoor pollution in the past 12 months, 2004



Data Source: BRFSS 2004

Environmental Factors	UCI for Yes	Yes	LCI for Yes	UCI for No	No	LCI for No
Current asthma prevalence by illness or symptoms that you think was caused by something in the air	15.8	13.8	11.9	3.9	3.1	2.4
Current asthma prevalence by illness or symptoms that you think was caused by outdoor pollution	18.7	16.4	14.1	3.4	2.8	2.2

UCI: Upper Confidence Interval; LCI: Lower Confidence Interval

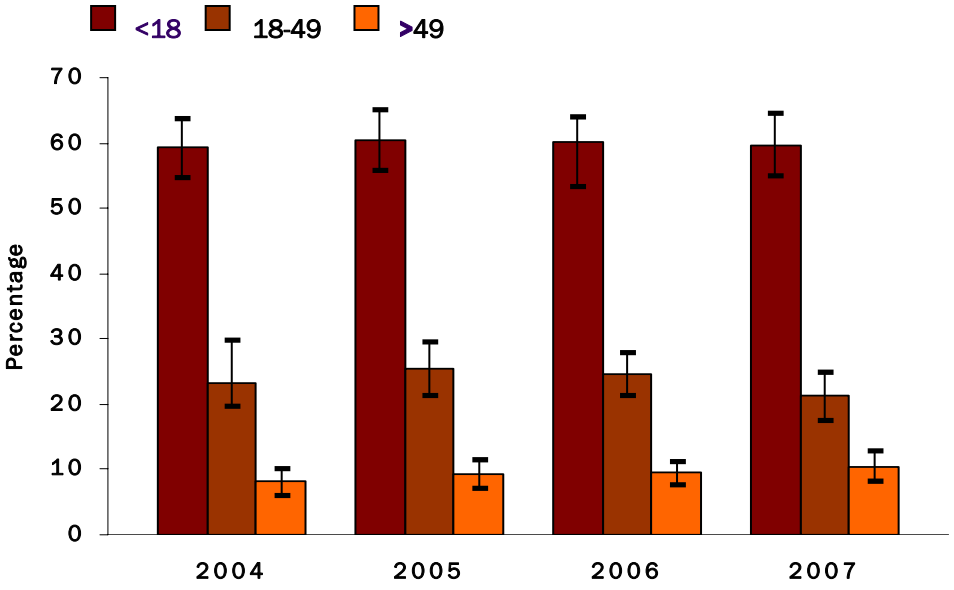
1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma Module

- From 2004 to 2007, 60 percent of the participants reported that they were told they had asthma within the first 17 years of life. The observation was statistically significant higher when compared with the 18-49 and above 49 age groups (Figure 1.35).

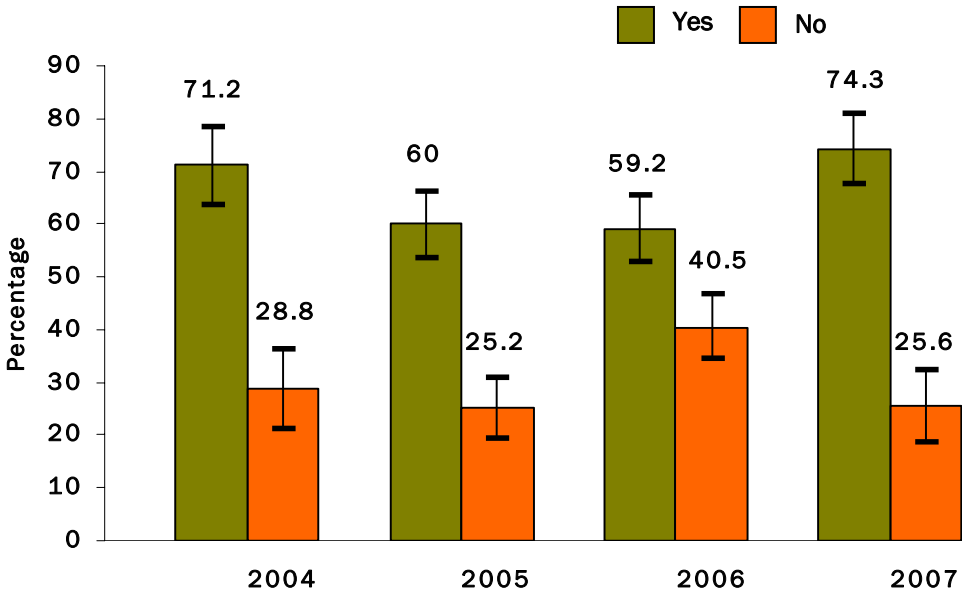
- From 2004 to 2007, approximately 60 to 70 percent of the adults with current asthma had reported at least one episode of an asthma attack during the last 12 months (Figure 1.36).

Figure 1.35 Age when first told by a doctor, nurse or health professional that you have asthma, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older diagnosed with asthma any time in their life.

Figure 1.36 Episode of asthma attack during the last 12 months, 2004-2007



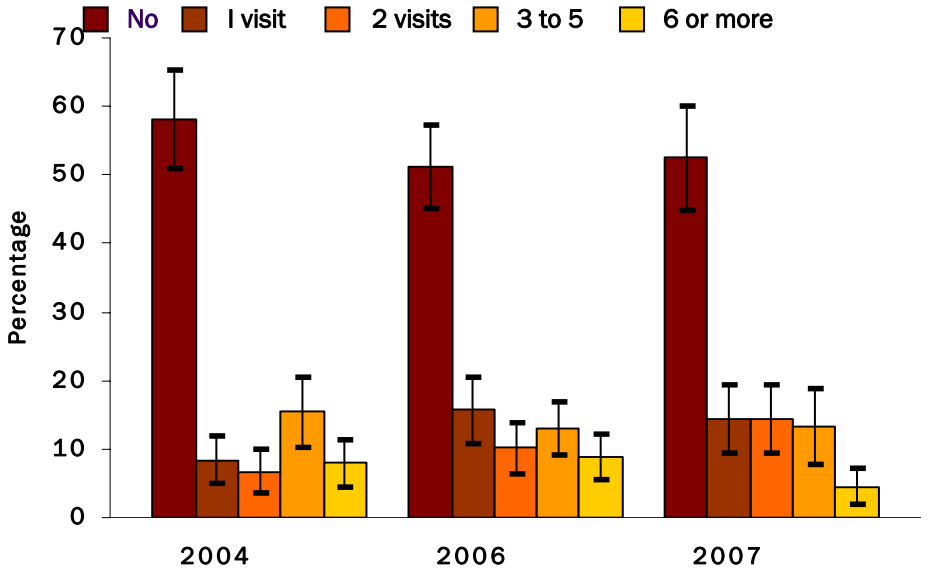
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma Module

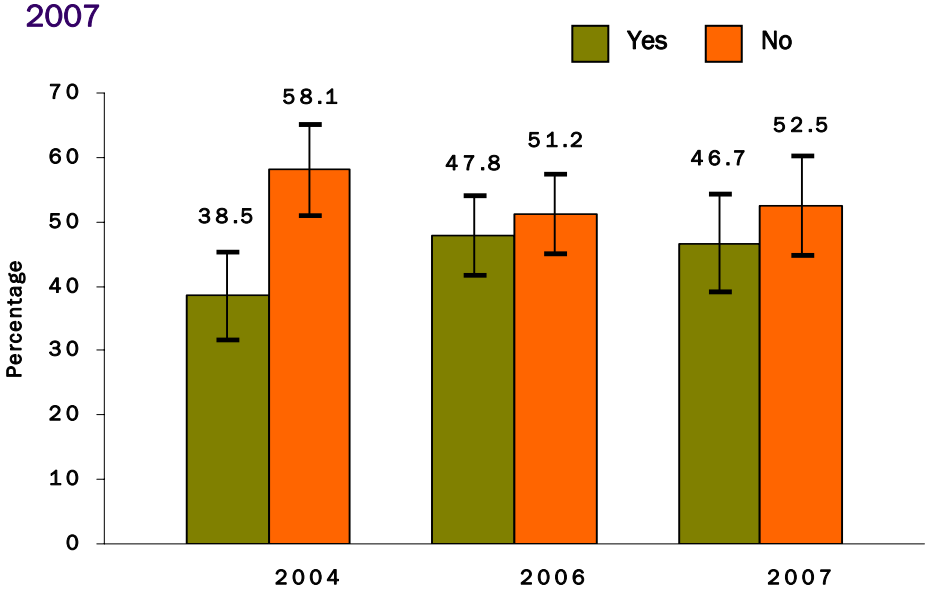
- Not having visited to a doctor, nurse or other health professional for urgent treatment was significantly more likely than having visited one (Figure 1.37).
- Within those who attended a doctor, nurse or other health professional for urgent treatment, approximately 18% reported making 3 to 5 visits, and 10% reported making 6 or more visits in one year (Figure 1.37).
- Between 2004 and 2007, approximately 47% of the population with current asthma reported having visited a doctor, nurse or other health professional for urgent treatment due to asthma during the last 12 months of the year of survey (Figure 1.38).

Figure 1.37 Visit to a doctor, nurse or other health professional for urgent treatment due to asthma during the last 12 months, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.38 Visit to a doctor, nurse or other health professional for urgent treatment due to asthma during the last 12 months, 2004-2007



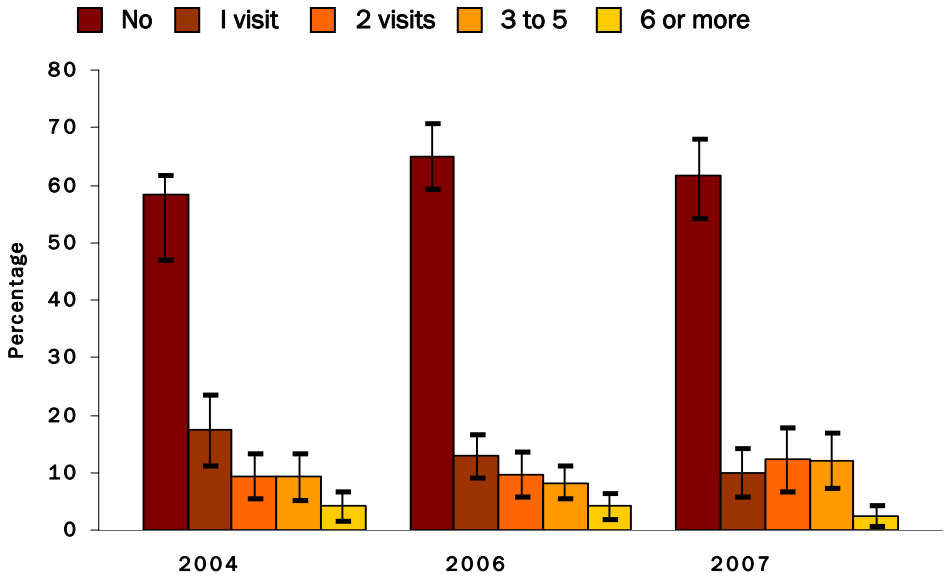
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma Module

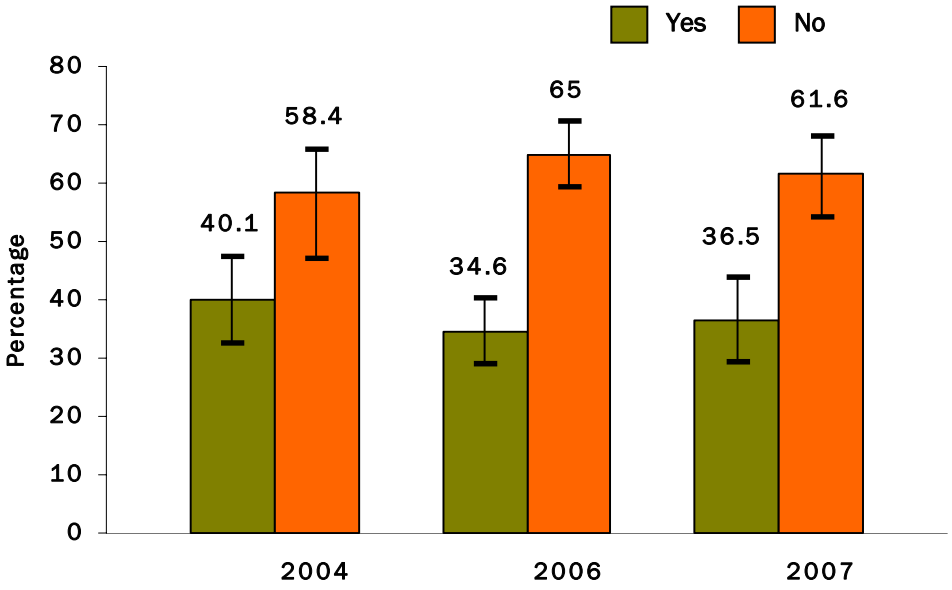
- Not having made an emergency room (ER) visit was significantly more likely than having made one (Figure 1.39).
- Within those who attended ER, 14% reported having 3 visits or more in one year (Figure 1.39).
- Between 2004 and 2007, approximately 40 % of the population with current asthma had an emergency room visit due to asthma during the last 12 months of the year of survey (Figure 1.40).

Figure 1.39 Emergency room visits due to asthma during the last 12 months, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.40 Emergency room visits due to asthma during the last 12 months, 2004-2007



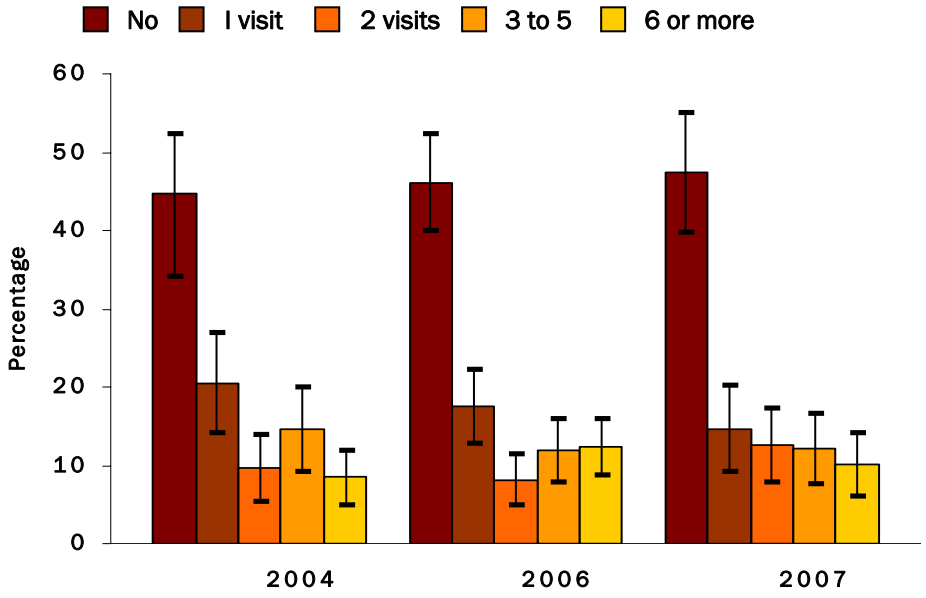
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma Module

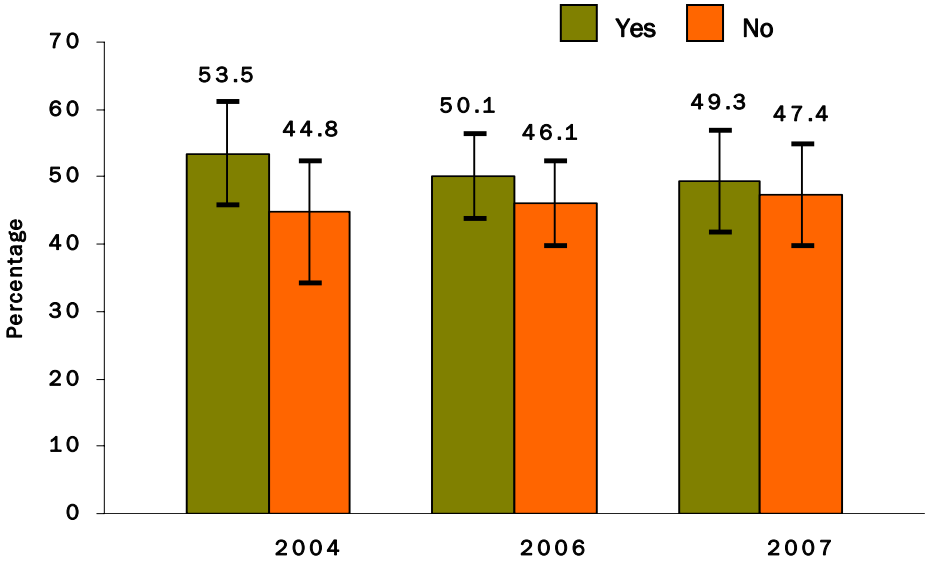
- Not having made a visit to a doctor, nurse or other health professional for routine check-up was significantly more likely than having made one or more visits (Figure 1.41)
- Within those who attended a doctor, nurse or other health professional for a routine check up, 10% reported having 6 visits or more in one year (Figure 1.41).
- Between 2004 and 2007, approximately 50 percent of the current asthma population reported having at least one visit a doctor, nurse or other health professional for a routine check up during the last 12 months (Figure 1.42).

Figure 1.41 Visit to a doctor, nurse or other health professional for a routine check up during the last 12 months, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.42 Visit to a doctor, nurse or other health professional for a routine check up during the last 12 months, 2004-2007



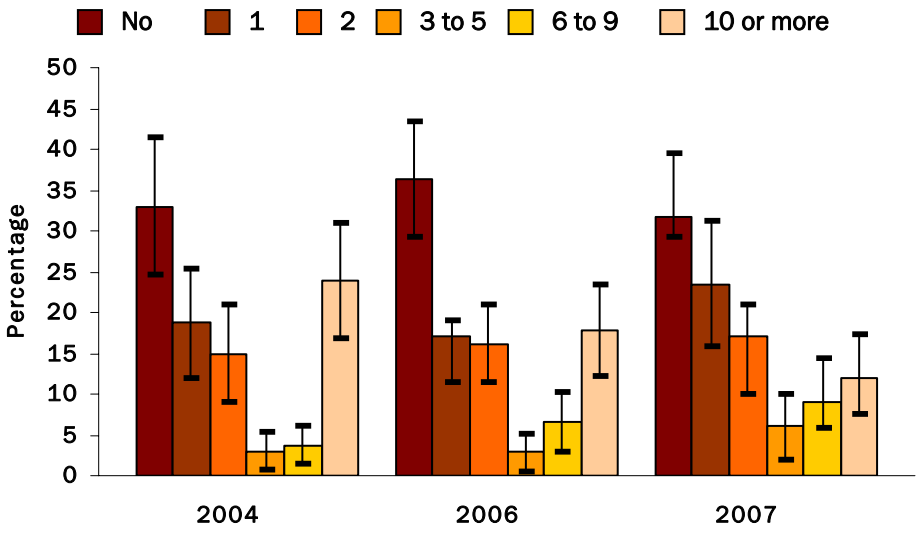
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma module

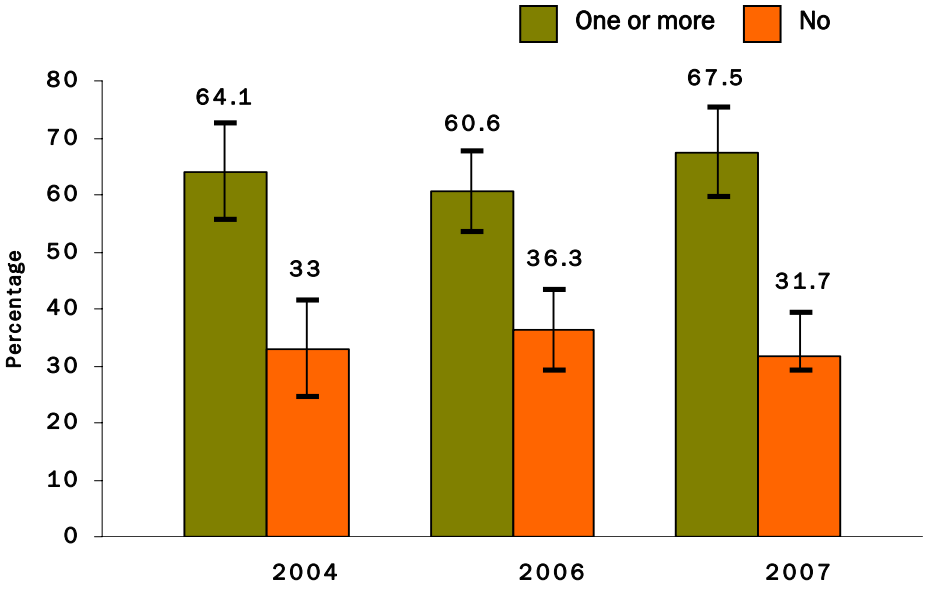
- In 2006, among adults with asthma a significantly high proportion (36.6%) responded not having any asthma symptoms during the last 30 days (Figure 1.43).
- In 2004 and 2006, the proportion of the participants with current asthma that experienced asthma symptoms that made it difficult to sleep 10 days or more was significantly higher than those who reported having 3 to 5 or 6 to 9 days with difficulty to sleep during the last 30 days (Figure 1.43).
- It is estimated that approximately 124,444 adults with current asthma experienced difficulty to sleep due to asthma symptoms in the last 30 days.

Figure 1.43 Total of days that symptoms of asthma make it difficult to sleep during the last 30 days, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.44 Total of days that symptoms of asthma make it difficult to sleep during the last 30 days, 2004-2007



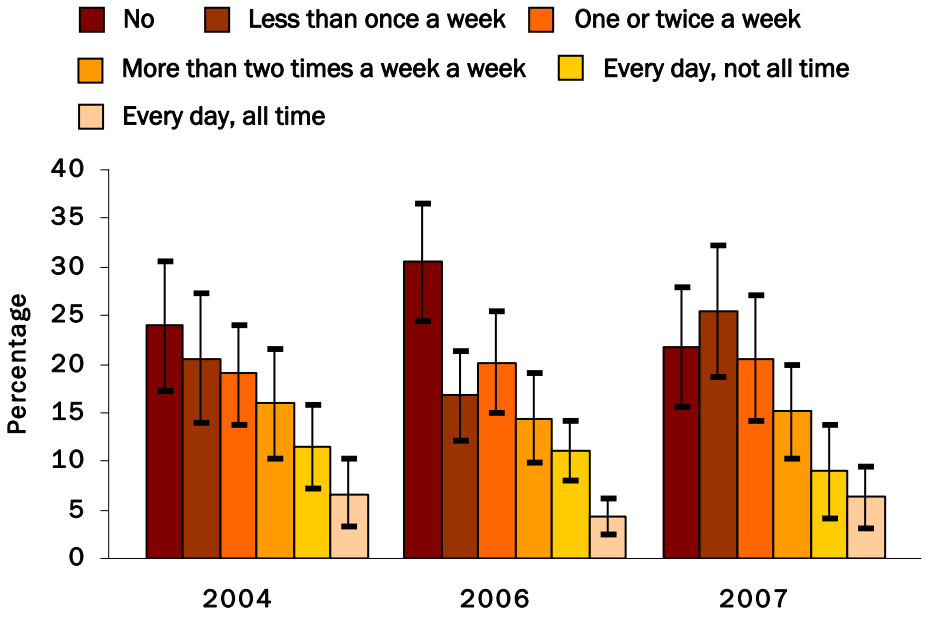
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma module

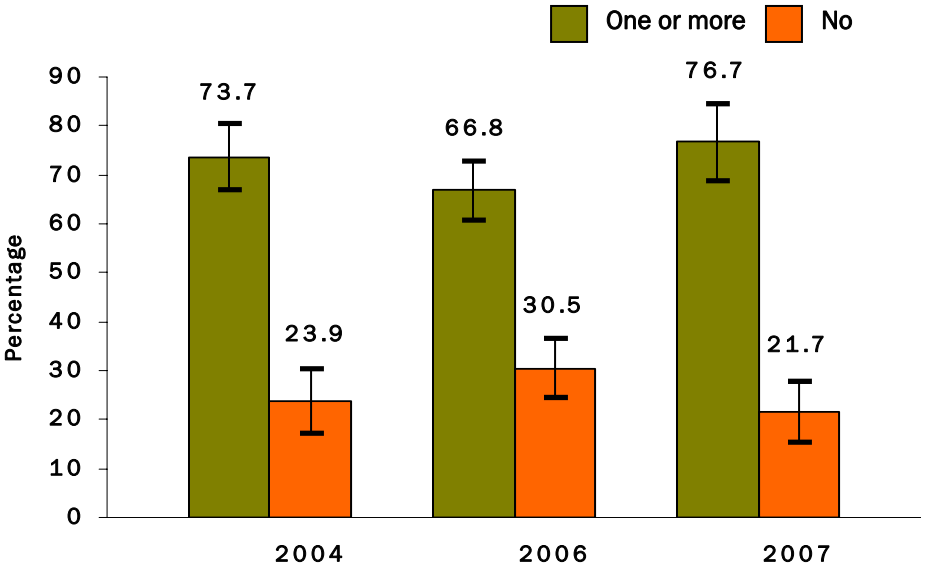
- A similar pattern in the proportion of every category of days with asthma symptoms was observed from 2004 to 2006 (Figure 1.45).
- During 2006, of the estimated 235,626 adults with current asthma in Puerto Rico, 36,286 experienced asthma symptoms every day during the last 30 days.
- Between 2004 and 2007, approximately 73 % of the population with current asthma experienced at least one symptom of asthma during the last 30 days (Figure 1.46).

Figure 1.45 Total of days with any asthma symptoms during the last 30 days, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.46 Total of days with any asthma symptoms during the last 30 days, 2004-2007



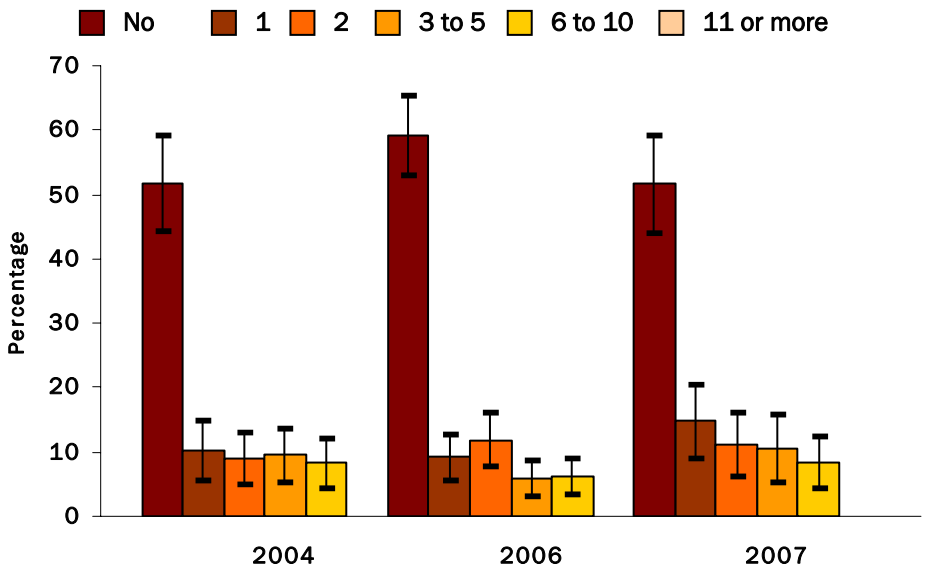
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma module

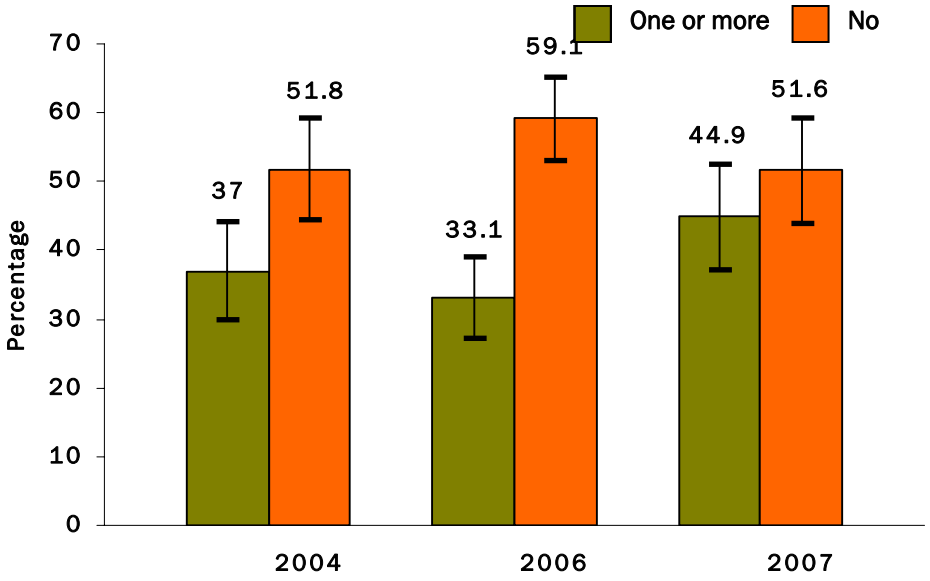
- 50% of the adults with current asthma reported not being able to carry out their usual activities due to asthma during a 12 month period (Figure 1.47).
- 16% of the adults with current asthma could not work or carry out usual activities for 6 days or more because of asthma during a one year period (Figure 1.47).
- Some of the study participants reported a total count of days of activity limitation due to asthma as high as 150 days or more .
- During 2007, approximately 77,520 adults with current asthma were unable to carry out usual activities because of asthma during a one year period.

Figure 1.47 Total of days unable to work or carry out usual activities because of asthma in the last 12 months, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.48 Total of days unable to work or carry out usual activities because of asthma in the last 12 months, 2004-2007



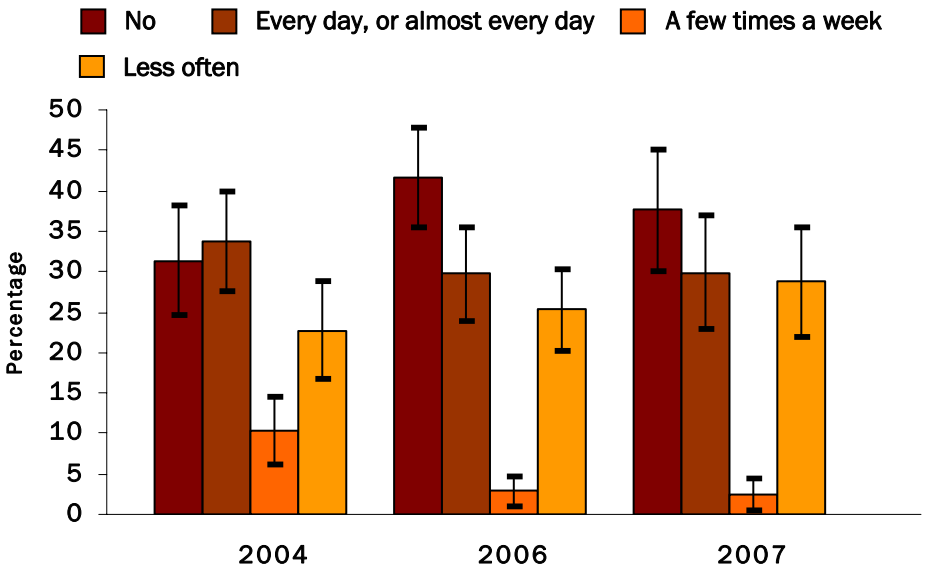
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma module

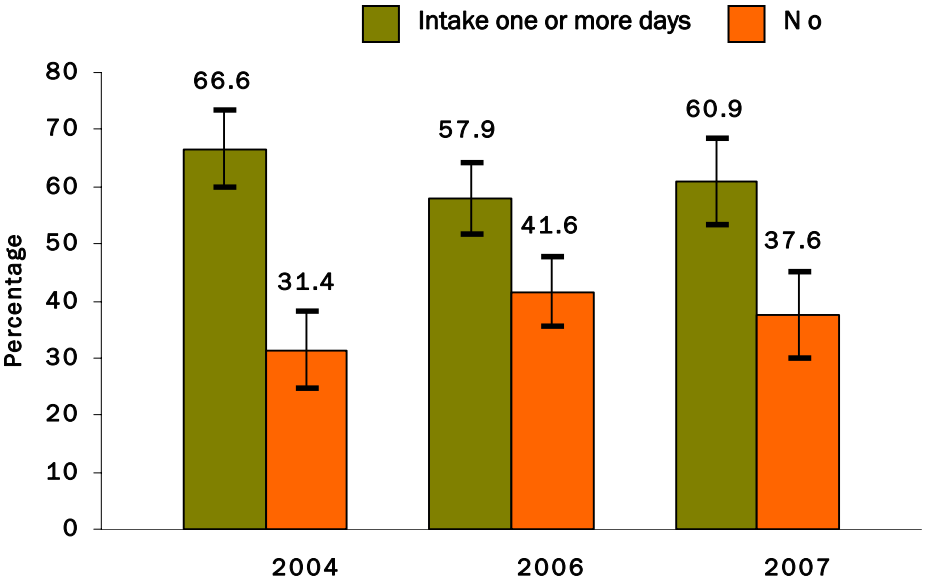
- From 2004 to 2006 a significant decrease was observed in the proportion of adults with current asthma that took asthma medication to prevent an attack from occurring (Figure 1.49).
- During the years of survey, approximately 62.4% of the adults with current asthma did not take asthma prescribed medications or took them less often to prevent an attack from occurring in a period of 30 days (Figure 1.49).
- In 2007, 64,916 adults with current asthma did not take any prescribed asthma medication to prevent an attack.

Figure 1.49 Intake of prescribed asthma medication to prevent an attack from occurring during the last 30 days, 2004-2007



Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

Figure 1.50 Intake of prescribed asthma medication to prevent an attack from occurring during the last 30 days, 2004-2007



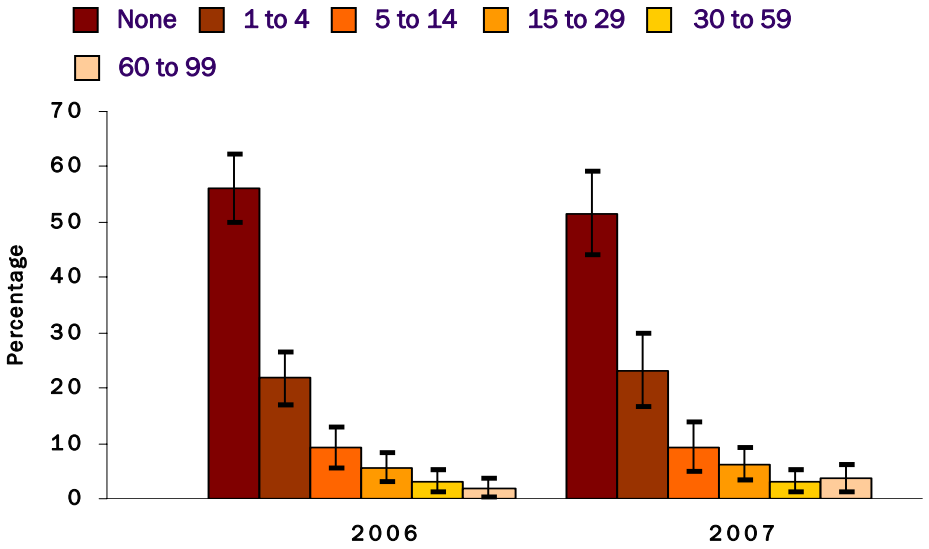
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2005.

1.2 Asthma Prevalence, Puerto Rico BRFSS

Asthma module

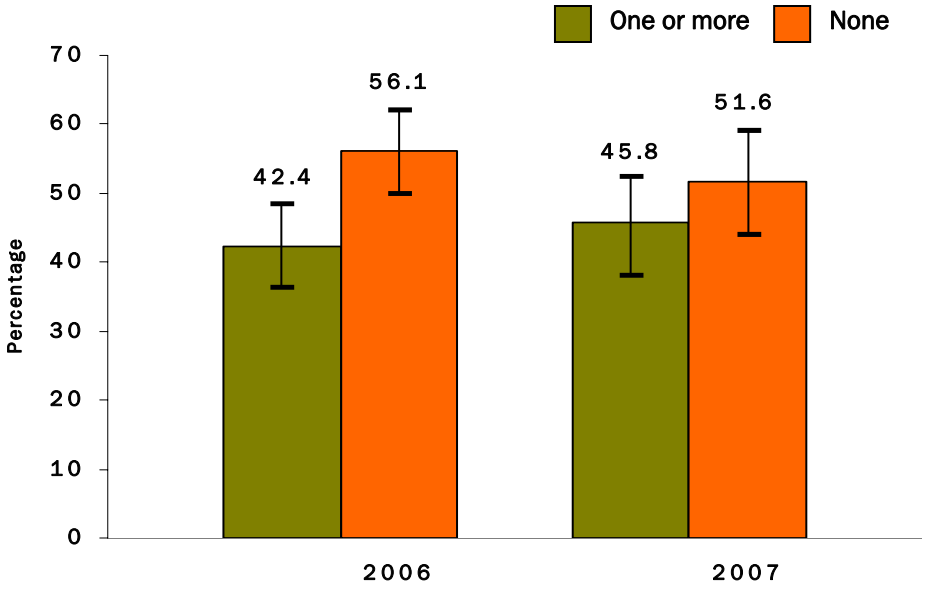
- In 2006 and 2007 approximately 55% of the adults with current asthma did not take any prescribed inhaler to stop an asthma attack in a 30 day period (Figure 1.51).
- 5.1 to 6.9 % of the adults with current asthma took 30 to 99 times a prescribed inhaler to stop an attack. In 2006 2 study participants reported an intake of 100 times or more (Figure 1.51).
- Approximately 180,050 adults with current asthma used a prescribed inhaler to stop an attack during a 30 day period.

Figure 1.51 Intake of prescribed asthma inhaler to stop an attack during the last 30 days, 2004-2007



Data Source: BRFSS 2006-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2004 and 2005.

Figure 1.52 Intake of prescribed asthma inhaler to stop an attack during the last 30 days, 2004-2007



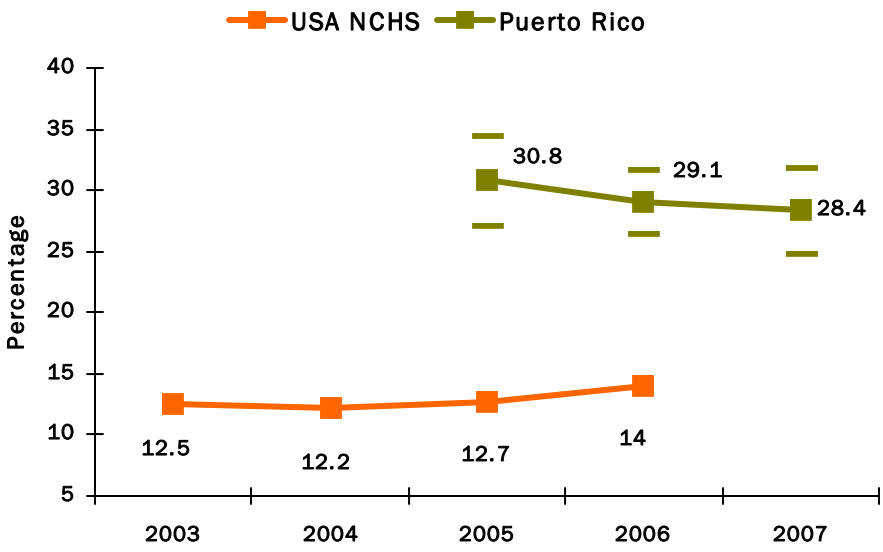
Data Source: BRFSS 2004-2007. Denominator= Weighted population of persons living in Puerto Rico 18 years or older with current asthma. Data not available for 2004 and 2005.

1.3 Asthma Prevalence, Puerto Rico BRFSS

Asthma in children

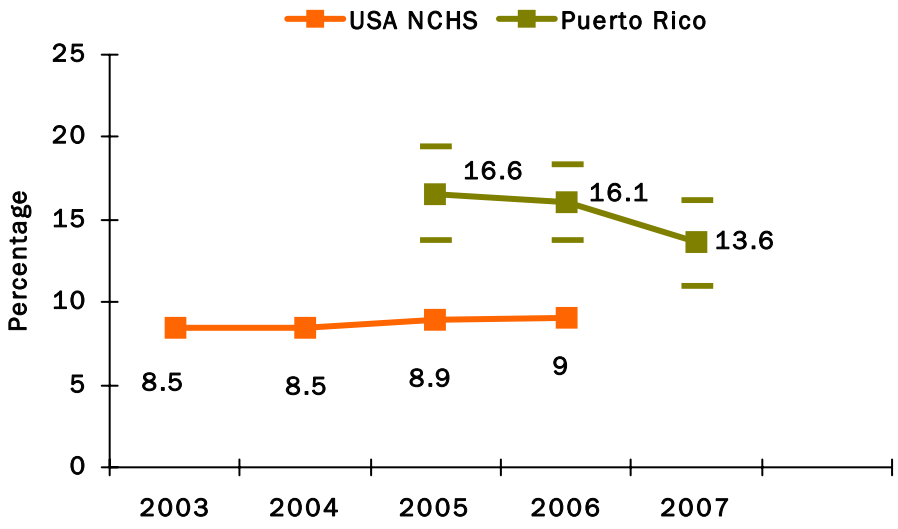
- Approximately, 29 of every 100 Puerto Rican children (<18 age) have been diagnosed with asthma by a health professional.
- Approximately, 14 of every of every 100 Puerto Rican children (<18 age) currently suffers from asthma (Figure 1.53).
- The lifetime and current asthma prevalence seems to be higher in children in Puerto Rico than in children in the US .
- In the year 2007, Puerto Ricans had 2.2 times higher lifetime asthma prevalence and 1.5 times higher current asthma prevalence than their US counterparts.

Figure 1.53 Lifetime childhood asthma prevalence PR vs. USA, 2003-2007



Puerto Rico data Source: BRFSS 2005-2007. US data source: National Survey of Children's Health 2003-2006. No data available for Children US prevalence confidence intervals.

Figure 1.54 Current childhood asthma prevalence by gender, Puerto Rico vs. USA, 2003-2007



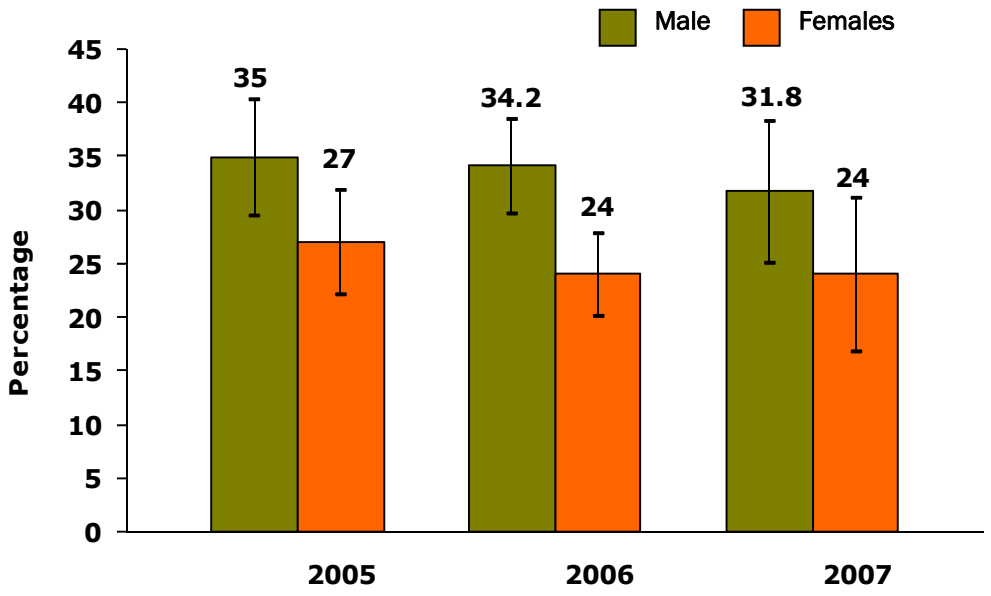
Puerto Rico data Source: BRFSS 2005-2007. US data source: National Survey of Children's Health 2003-2006. No data available for Children US prevalence confidence intervals.

1.3 Asthma Prevalence, Puerto Rico BRFSS

Asthma in children

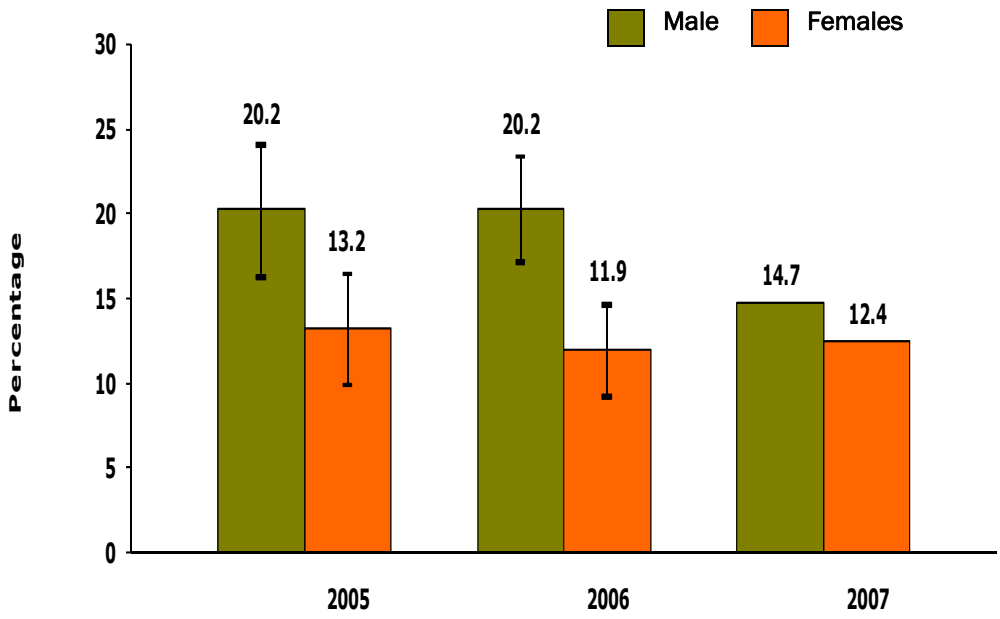
- Lifetime and current childhood asthma prevalence was higher in males than in females during 2006.
- This observation changed when they turned 18 years or older where females had higher prevalence.
- Approximately, 33 % of children with lifetime asthma prevalence are males.
- Approximately, 20 %of children with current asthma prevalence are males.

Figure 1.55 Lifetime childhood asthma prevalence by gender, Puerto Rico 2005-2007



Puerto Rico data Source: BRFSS 2005-2007

Figure 1.56 Current childhood asthma prevalence by gender, Puerto Rico 2005-2007



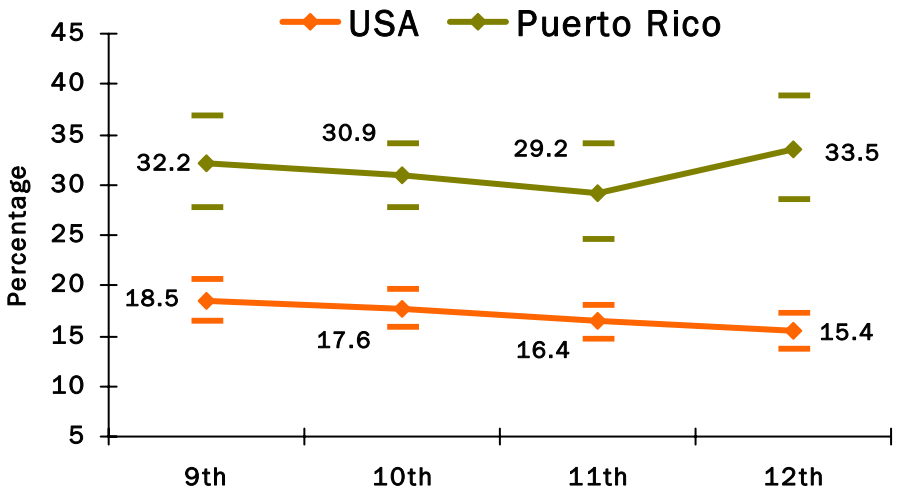
Data Source: BRFSS 2005-2007. No CI's available for 2007.

1.3 Asthma Prevalence, Puerto Rico BRFSS

Asthma in children

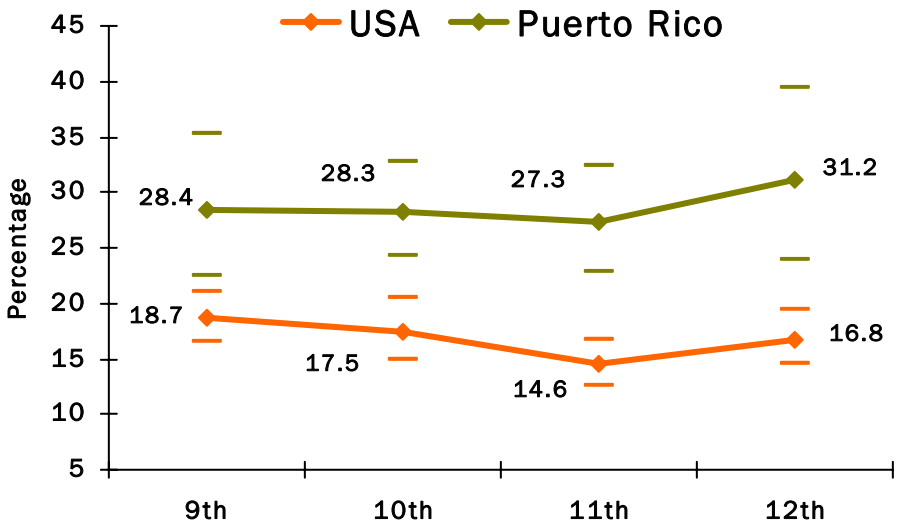
- Lifetime childhood asthma prevalence in males is significantly higher in Puerto Rico than USA (Figure 1.57).
- Lifetime childhood asthma prevalence in females is significantly higher in Puerto Rico than in USA (Figure 1.58).

Figure 1.57 Lifetime childhood asthma prevalence in males by school grade, Puerto Rico & USA 2005



Data Source: YBRFSS 2005.

Figure 1.58 Lifetime childhood asthma prevalence in females by school grade, Puerto Rico & USA 2005



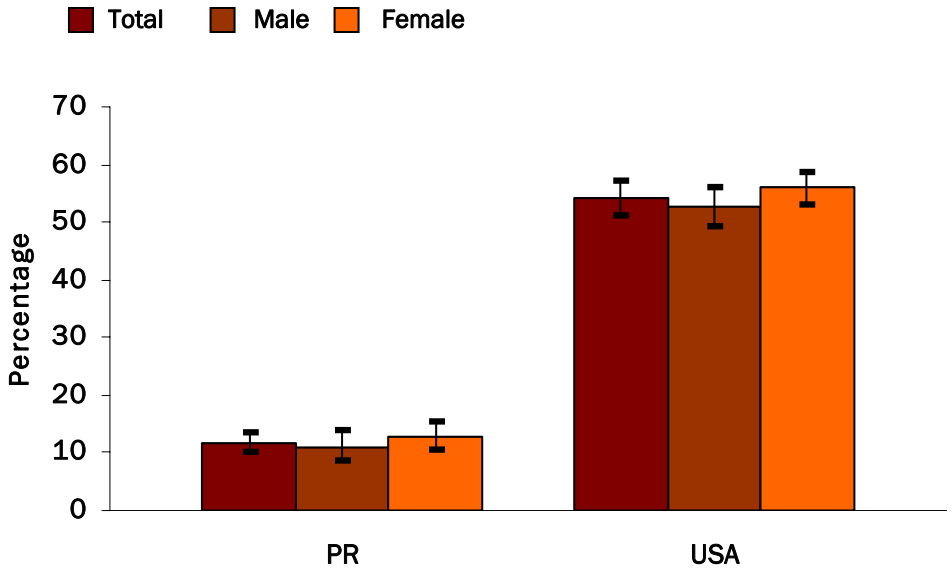
Data Source: YBRFSS 2005.

1.3 Asthma Prevalence, Puerto Rico BRFSS

Asthma in children

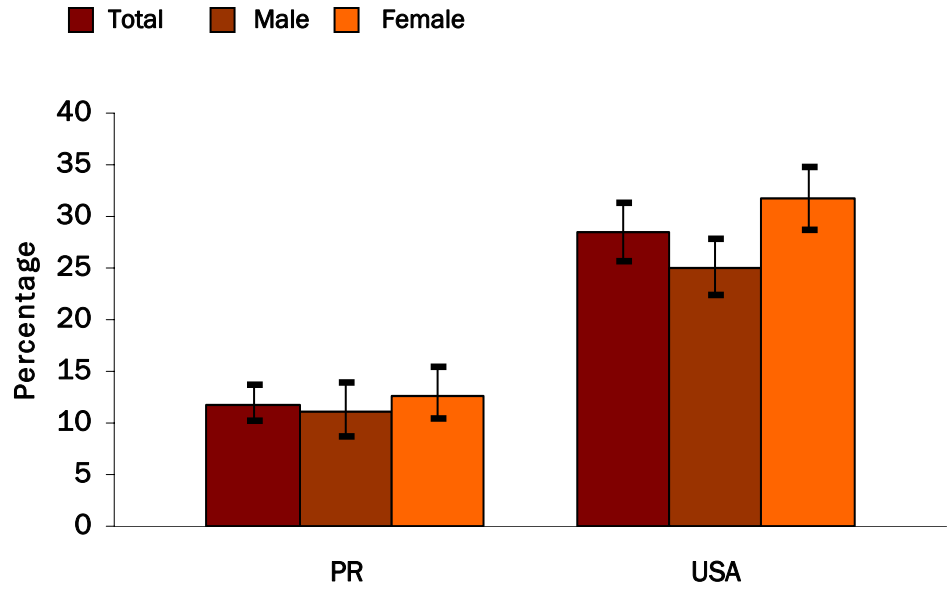
- The lifetime and current prevalence of tobacco use are significantly lower in students in Puerto Rico than in students in USA (Figures 1.59 and 1.60).

Figure 1.59 Lifetime prevalence of tobacco use in students by gender, Puerto Rico & USA, 2005



Data Source: YBRFSS 2005. Have you ever tried cigarette smoking, eve one or two puff ?

Figure 1.60 Current prevalence of tobacco use in students by gender, Puerto Rico & USA, 2005



Data Source: YBRFSS 2005. Have you smoked cigarettes; smoked cigars, cigarillos, or little cigars; or used chewing tobacco, snuff, or dip on at least 1 day during the prior 30 days?

2. Asthma Mortality, Puerto Rico

Asthma mortality data was obtained through the Vital Statistics Office at the PRDOH. This office obtains its information from the Puerto Rico Demographic Registry (PRDR). The PRDR, established in 1885, has the legal responsibility to safeguard vital documents (births, deaths, marriages and divorces) for the population of Puerto Rico.

To survey asthma mortality, we define a mortality case as any non-institutionalized person whose death certificate or record lists asthma as the primary diagnosis of death for all ages between the years 2001 and 2006 in Puerto Rico. This definition is known as a probable case. The death certificate transcript includes date of death, date of birth, municipality of death, municipality of residence, marital status and educational level.

The International Diagnostic Codes (ICD) was used to select the asthma cases from the death certificates:

ICD-9 Code: 493.0-493.9 (1980-1998)

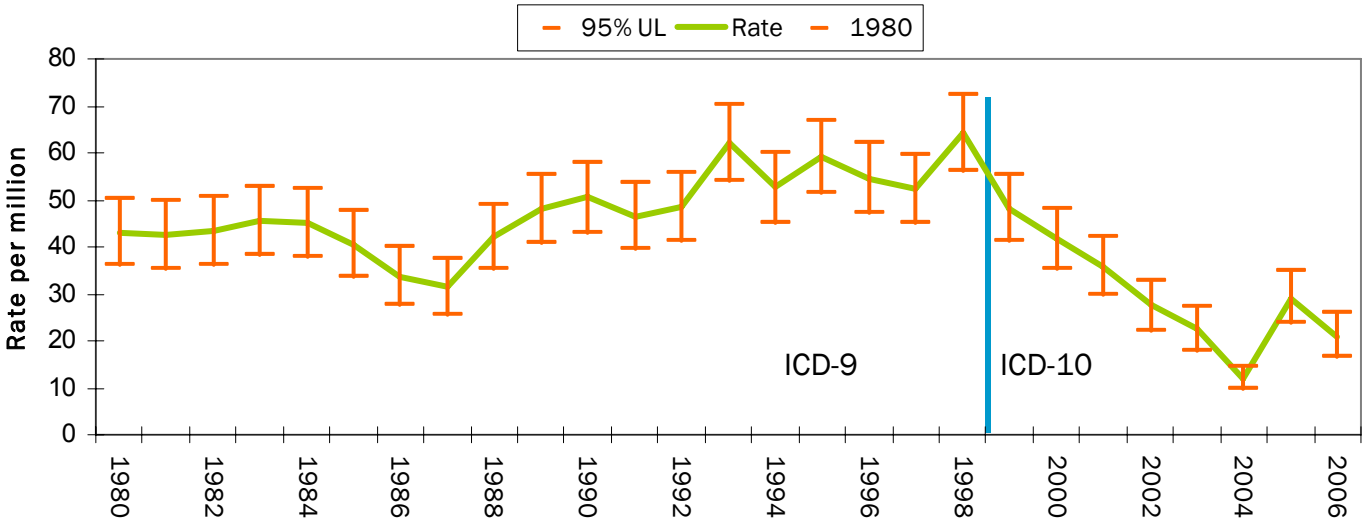
ICD-10-CM Codes: J45, J46. (1999-present)

Although we used the probable asthma case definition, surveillance case definitions for asthma mortality are classified into three categories (CDC, NCHS):

- Confirmed: there is no confirmed case classification for mortality data. Health departments are encouraged to evaluate the accuracy of this data.
- Probable: death certificates/records listing the asthma diagnostic code (ICD-9): 493.0-493.9; ICD-10-CM Codes: J45, J46 as the primary diagnosis.
- Possible: death certificates/records listing the asthma diagnostic code (ICD-9 Code: 493.0-493.9; ICD-10-CM Codes: J45, J46 as a contributing cause of death.

2. Asthma Mortality, Puerto Rico

Figure 2.1 Asthma crude mortality rate, Puerto Rico 1980-2006



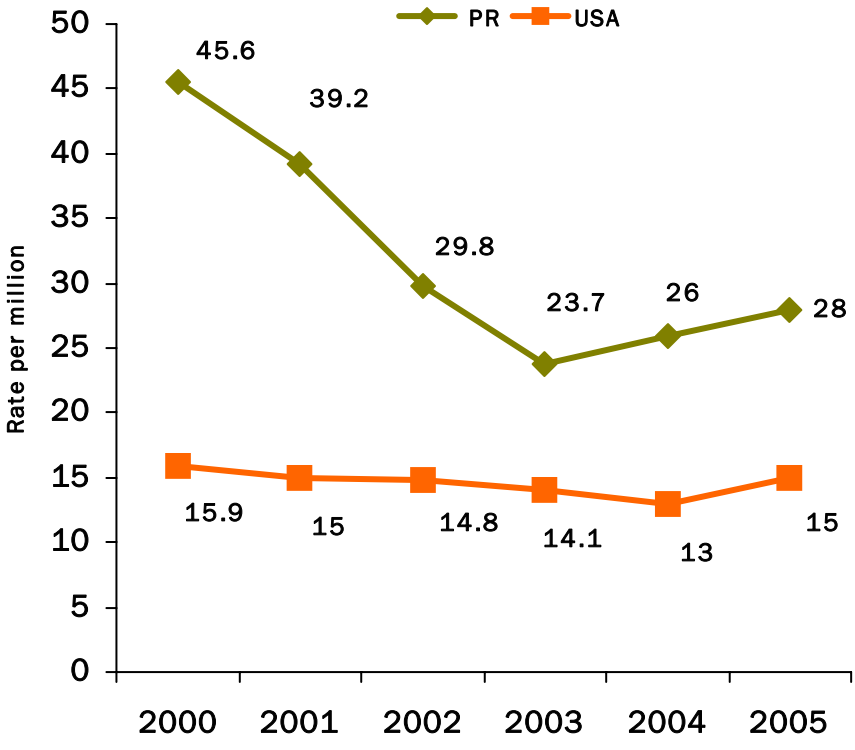
Data Source: Puerto Rico Demographic registry 1980-2006.

Asthma mortality

- The asthma crude mortality rate shows an erratic but increasing pattern from 1980 to 1998. After the implementation of the ICD-10, a decreasingly stable pattern was observed from 1999 to 2006. In 2005 the crude mortality increased compared to 2004.

- Although the risk of asthma deaths decreased from 2000 to 2006, the age adjusted mortality rate in Puerto Rico is still higher than in the US.

Figure 2.2 Age adjusted asthma mortality rate, Puerto Rico & USA, 2000-2005. Standard population USA 2000



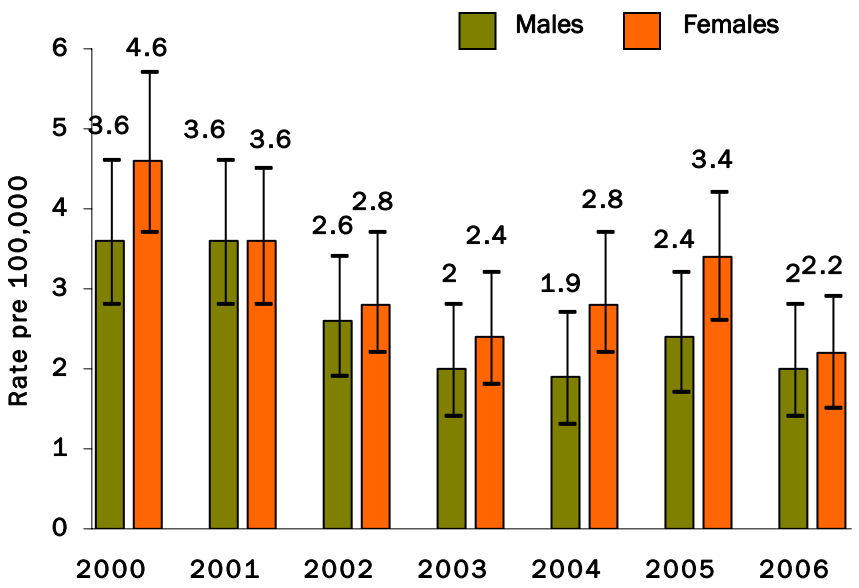
Data Source: Puerto Rico Demographic Registry 2000-2005.

2. Asthma Mortality, Puerto Rico

Asthma mortality

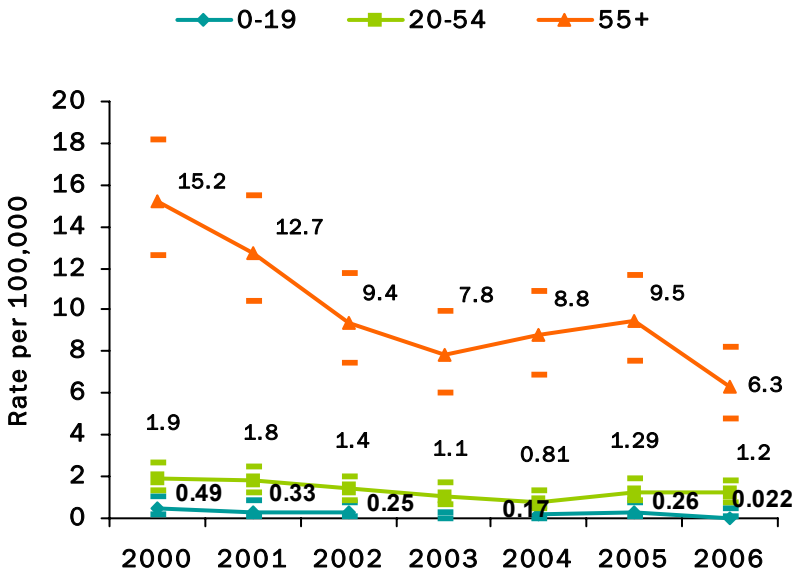
- No statistical differences were foundin asthma mortality for males and females.
- The asthma mortality rate in females for 2003 and 2006 was lower than the mortality rate for 2001.
- The age group of 55 years and older presented higher risk of asthma mortality than the 0-19 and 20 to 54 age groups.

Figure 2.3 Asthma mortality by gender, Puerto Rico 2000-2006



Data Source: Puerto Rico Demographic Registry 2000-2006. Mortality data corresponding to 2006 is preliminary.

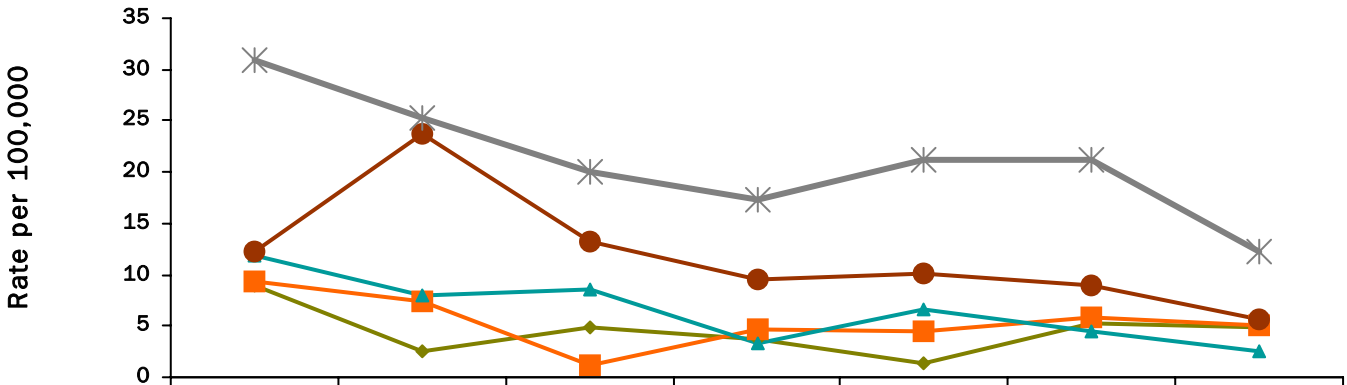
Figure 2.4 Asthma mortality rates by year and age group, Puerto Rico 2000-2006



Data Source: Puerto Rico Demographic Registry 2000-2006. Mortality data corresponding to 2006 is preliminary.

2. Asthma Mortality, Puerto Rico

Figure 2.5 Asthma mortality rates by year and age group (55 to 59, 60 to 64, 65 to 69, 70 to 74 and 75 or more) , Puerto Rico 2000-2006



	2000	2001	2002	2003	2004	2005	2006
55-59	9	2.5	4.8	3.7	1.3	5.3	4.8
60-64	9.3	7.3	1.2	4.6	4.5	5.9	5.1
65-69	11.9	8	8.5	3.4	6.7	4.5	2.5
70-74	12.2	23.8	13.3	9.5	10.1	9	5.6
75+	30.9	25.3	20	17.4	21.2	21.1	12.3

Data Source: Puerto Rico Demographic Registry 2000-2006. Mortality data corresponding to 2006 is preliminary.

Asthma mortality

- The asthma mortality rate for the age group of 75 years or older was constantly higher than for the 55 to 74 age group, except for year 2001 were the rate was similar to the 70 to 74 age group.

Discussion:

Addressing the Asthma Burden in Puerto Rico

Discussion

This Asthma Surveillance Report reveals that asthma should continue to be considered a priority for the public health authorities. The burden of asthma is confirmed through the data presented. In Puerto Rico, approximately 160,000 children ages 0-17, and 173,000 adults aged 18 or more still endure this condition. The lifetime and current childhood asthma prevalence were approximately two times higher in Puerto Rico than in the United States. It has been documented that asthma is a disease that starts during the childhood (Skoner 2002). Our observations confirm this statement given that the BRFSS data shows that 60% of the adults with the disease were diagnosed before they were 18 years old. No specific group has been disproportionally affected with regards to asthma prevalence by educational level, annual income, or marital status. Nevertheless, adult women were constantly more likely to have current asthma than adult men. Ford stated that, an important information that helps describe the impact of asthma, is general health perception. (Ford 2003) Higher current asthma prevalence in Puerto Rico was reported in persons that perceived their health as fair or poor than adults that considered their health as good, very good or excellent. Also, the proportion of adults with current asthma was higher in those that reported to have activity limitations due to physical, mental or health problems. Disparities in health care access were perceived in view of the fact that 3,800 adults with asthma did not have any kind of coverage, four percent of the adults with current asthma did not have a person they thought as a personal doctor or health care provider, and a higher asthma prevalence was observed in adults that could not see a doctor because of the cost compared to those that could see a doctor.

Data from the PR-BRFSS asthma module showed that most of the adults were not well managed. Consequently, the majority of the people diagnosed with asthma lived with an uncontrolled condition. Our statements are substantiated by the fact that approximately 60% to 70% reported an episode of an asthma attack, 47% visited a doctor for urgent treatment, and 40% visited ER due to asthma during a 12 month period. 50% visited a doctor, nurse or other health professional for a routine check-up in a year. In 2007, approximately 117,000 Puerto Ricans had at least one day with difficulty to sleep in a period of 30 days. From these, 15,538 had 6 to 9 days and 20,718 had 10 days or more with difficulty to sleep. In addition, approximately 136,000 Puerto Ricans that still had asthma experienced an asthma symptom related to the condition during a period of 30 days, and 26,415 of them experienced it everyday. It was estimated that 89,087 Puerto Ricans were unable to work or carry out the usual activities due to asthma during a 12 month period. Also, during a period of 30 days, approximately 64,744

Discussion

Puerto Ricans that still had asthma did not use prescribed medication to prevent an asthma attack, and 53,694 used it just a few times a week or less often. 79,074 Puerto Ricans used at least once a prescribed medication to stop an attack due to asthma in a period of 30 days, and 22,787used them at least five times or more. Finally, asthma mortality has been continuously decreasing after the changes in coding and classification of the International Code of Diseases since the year 2000. Nevertheless, Puerto Rico has two times higher asthma mortality rate than the USA.

Despite advancements in the study of the epidemiology of asthma and the availability of guidelines to diagnose and treat this condition, the population with asthma in Puerto Rico still have an uncontrolled condition with a future poor prognosis. The scenario described above uncovers the need of a change in the health care system to improve services, management, and methods for population awareness and education. Efforts to deal with the public health situation described should be in accordance with the 2007 NAEPP Guidelines and should focus on preventing symptoms related to asthma, maintaining normal levels of pulmonary function, maintaining normal levels of physical activity, and preventing school absenteeism.

The statistics presented in this report have been used to sustain important public health initiatives such as: continuous education to physicians, nurses and other allied health professionals in adequate asthma management; education to patients regarding self-care ; and public policy to improve the access to quality of care for asthma. Progress has been made in understanding the epidemiology of asthma in Puerto Rico. Now, efforts should continue to target the identified factors responsible of disparities as a way to reduce morbidity and mortality associated to this condition in Puerto Rico.

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Appendix 1:

Technical Notes:

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984. The Puerto Rico Department of Health, under a cooperative agreement with the CDC, first implemented the BRFSS in 1996. During 2006-2007, according to the Council of American Survey Research Organization (CASRO), the response rate for Puerto Rico in 2006 survey year was 73.7%, approximately. The sample of the Puerto Rico–BRFSS is representative of the non-institutionalized 18 year old adults' households population. In Section 1.1, the lifetime and current asthma prevalence were described using the core questionnaire variables related to demographics, quality of life, health care access, tobacco use, immunization, disability. Section 1.2 describes the asthma management and control in adults that responded currently having asthma through the variables included in the Adult Asthma History Module. The childhood asthma is described in Section 3, using data from the state added questions of the Childhood Asthma Module. Prevalence and 95% confidence intervals were calculated with the statistical program R (Version 2.8) (R Foundation 2008) and the Survey Package (Lumey 2008), specialized in complex sample survey designs. For more information on BRFSS go to http://www.cdc.gov/brfss/index.htm .

Mortality Data

Mortality rates were calculated using the data provided by the Vital Statistics Office of the Puerto Rico Department of Health from 1980 to 2006. The data from the year 2006 is preliminary. Section 2, describes the trends in mortality in terms of crude mortality rate, adjusted mortality rate, and crude rate by demographic variables such as gender and age. Age-adjusted mortality rates statistical process' were applied to the death rates from Puerto Rico and from United States (CDC Wonder) to permit the comparison of communities with different age structures. Rates and adjusted rates and 95% confidence intervals were calculated with the statistical program R (Version 2.8) (R Foundation 2008) and Epitools Package (Aragon 2007), specialized in analytical tools for epidemiology.

Appendix 2:

Abbreviations:

AO #248: Administrative Order number 248.

BRFSS: Behavioral Risk Factor Surveillance System

ER: Emergency Room.

CD-9: The international Code of Disease 9th revision.

CD-10: The international Code of Disease 10th revision.

NCHS: National Center for Health Statistics

PR: Puerto Rico

PRAP: Puerto Rico Asthma Project

PRSS: Puerto Rico Asthma Surveillance System

PRDOH: Puerto Rico Department of Health

PRDR: Puerto Rico Demographic Registry

USA: United States of America

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