Asthma Burden Report 2014

Puerto Rico Asthma Program

Puerto Rico Department of Health
Secretariat for Health Promotion
Division of Chronic Disease Control and Prevention

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Secretary of Health Message

Dear colleagues;

The Asthma Burden Report represents the Puerto Rico Asthma Program's purpose to expand asthma health indicators and to design, implement, and sustain an Asthma Epidemiological Surveillance System. The data used for this report came from both 2014 Behavioral Risk Factor Surveillance Survey and the 2011-2013 Asthma Call Back Survey conducted by the Office of the Behavioral Risk Factor Surveillance Survey, Puerto Rico Department of Health.

Asthma is one of the most common chronic disease in our population. The great social and economic burden makes asthma an important public health issue in Puerto Rico. The Asthma Epidemiological Surveillance System provides the data to monitor asthma trends and to identify areas of need related to asthma. To this extent, the Puerto Rico Asthma Program continues delivering strategies to address this chronic condition from a public health perspective in collaboration with governmental, non-profit, profit, and community based organizations to achieve our goal of reduce the mortality and morbidity due to this condition, and increase the quality of life of our population with asthma.

Sincerely,

Ana Ríus Armendáriz, MD
Puerto Rico Secretary of Health

Acknowledgements

This document was prepared by:

- Myribel H. Santiago Torres, MPH
  Biostatistician - Division for Control and Prevention of Chronic Diseases

Data analysis was provided by:

- Eliseo Acevedo-Díaz, MPH
  Biostatistician - Puerto Rico Asthma Project
- José Bartolomei-Díaz, MS, PhD
  Epidemiologist - Puerto Rico Asthma Project
- Jonathan Morales, MS
  Demographer – Auxiliary Secretariat for Planning and Development
- Marcos Felici, MPH
  Biostatistician – Tobacco Control Program

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- Wanda I. Hernández-Virella, MPH
  Coordinator - Puerto Rico Asthma Project

- Jessica Irizarry-Ramos, MS, PhD
  Director - Division for Control and Prevention of Chronic Diseases

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- Ruby Serrano-Rodríguez, MS, DrPH
  State Coordinator - BRFSS Office, Puerto Rico
  Epidemiology & Research Office

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Introduction

The Asthma Burden Report presents an updated point of view to the current condition of asthma in Puerto Rico. Not only intends to present the current prevalence of Asthma in Puerto Rico, but also the burden it represents to the population in terms of increased health services utilization and limited productivity and quality of life.

Asthma is a respiratory chronic disorder characterized by the inflammation of the airways. It currently affects more than 415,000 people living in Puerto Rico (BRFSS 2014 data). Since asthma is a chronic condition, it's important to monitor people with asthma to control their condition. This is can be achieved by self-management education, identification of triggers, and effective medical treatment (e.g. adjusting their medication according to their level of severity of their condition). Asthma control can be measured by monitoring different indicators such as visits to hospitals, to emergency rooms, unplanned physician visits, missed school/work days due to asthma symptoms, among others.

The standard asthma treatment is based on the guidelines provided by the National Asthma Education and Prevention Program (NAEPP guidelines). These guidelines have been used regularly to determine the level of control of the condition of asthma patients [1].

Objective

The objective of this report is to describe the distribution of asthma among Puerto Rican adults and children stratified by different socio-demographic characteristics, health care utilization, education on asthma management, risk factors and comorbidities. All these variables are available within the Behavioral Risk Factor Surveillance System (BRFSS) and Asthma Call Back Survey (ACBS) questionnaire.

Methods

Data Source

This report used data collected by the Puerto Rico Behavioral Risk Factor Surveillance System (BRFSS) and the Asthma Call Back Survey (ACBS) questionnaire. The ACBS is a product of the Center for Disease Control and Prevention's National Asthma Control Program (NACP) that was first implemented in 2006 by some US states. Puerto Rico became a participant of the ACBS in 2009, and has participated continuously since then. The ACBS is a phone interview for those participants of the BRFSS-core survey who reported being diagnosed with asthma. This interview takes from 5 to 15 minutes, depending of the current asthma status of the participant. The information is then matched with the core data set from the BRFSS survey.

The ACBS is an effort to measure the burden of asthma in the population living with the condition in terms of history of asthma, health care utilization, medication, comorbidities, among others. This questionnaire adds considerable depth to the existing body of asthma data addressing critical questions surrounding the health status and experience of persons with asthma.

In addition, this report includes analysis from the Utilization Database from Health Insurance Companies in Puerto Rico. This data was provided by the Secretariat for Planning and Development in the PR Department of Health. It includes data from claims related to visits to doctors' offices, emergency rooms and hospitalizations with any asthma diagnosis (ICD-9 = 493). This data is collected from both private and public health insurances covering the people of Puerto Rico.

Variables and methods

The results of this report are divided in the different topics mentioned above. For each of the indicators we will present, in a bar plot, the uncontrolled asthma prevalence with its 95% confidence interval, which is estimated using a complex weighting analysis. This report also presents the possibility or Odds Ratio (OR) of reporting current or uncontrolled asthma given other risk factors, and adjusting by potential confounding variables. This will help to have better understanding of the burden of the condition [1]. In addition, for each covariate, the weighted population estimate is included in each variable stratum.

Analysis and Results

Overall

Figure 1. Current Asthma Prevalence in Children shows the percentage of children with current asthma in Puerto Rico and the USA from 2005 through 2014. It is clear that in Puerto Rico there have been consistently higher percentages than in the US.

Figure 1. Current Asthma Prevalence in Children

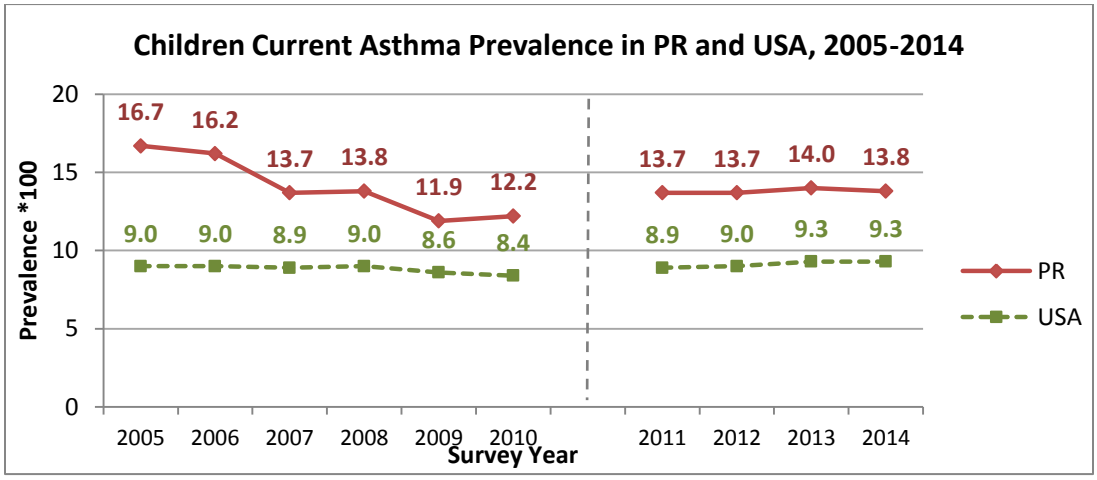
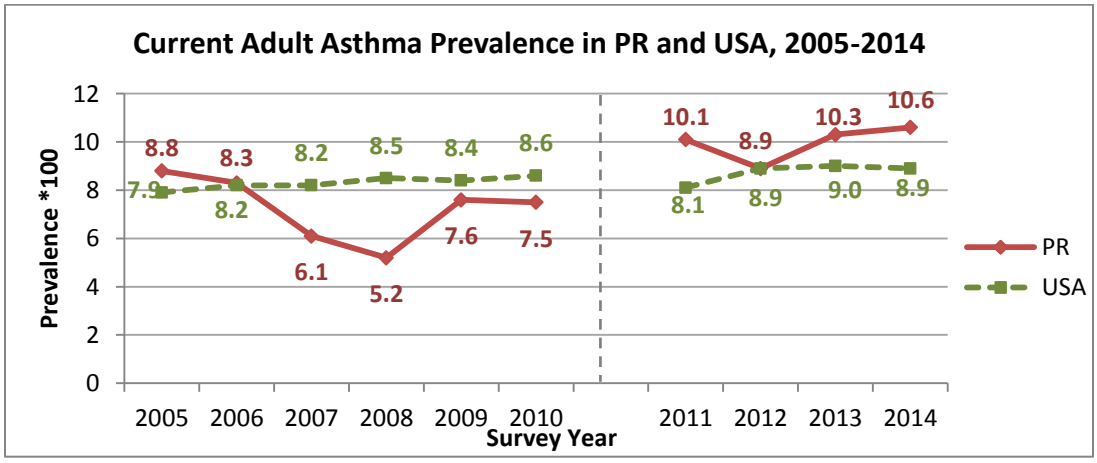


Figure 2. Current Asthma Prevalence Among Adults (Unadjusted) shows the Current Adult asthma prevalence in Puerto Rico and USA from 2005 to 2014. Although it is lower than the children's prevalence, it is higher than in the USA.

Figure 2. Current Asthma Prevalence Among Adults (Unadjusted)



Current adult Asthma Prevalence by Socio-demographic variables

Figure 3 shows that among adults with asthma, males had a lower current asthma percent, when compared to females.

Among sex groups, females had 2.30 times more possibility of reporting uncontrolled asthma when compared to males. This difference was significant (p-value < 0.05). For more details, see Table 1. Current Adult Asthma Prevalence in Puerto Rico, 2014

Figure 3. Current Adult Asthma Prevalence in Puerto Rico, by Gender 2014

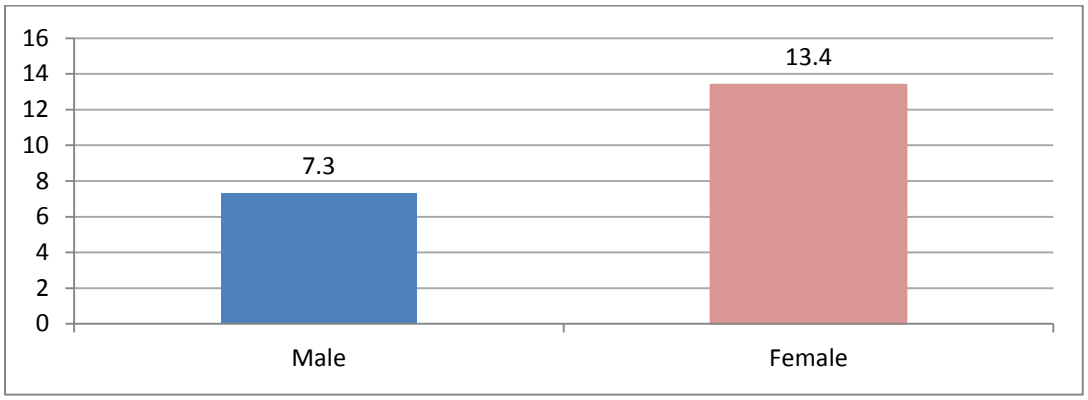


Table 1. Current Adult Asthma Prevalence in Puerto Rico, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Gender					
Male	7.3 (6.0-8.7)	96,754	1.00	0.00	1.00
Female	13.4 (12.1-14.8)	201,401	2.30	2.30	**<0.01**

As Figure 4 shows, adults in the age group of 55-64 years showed a higher prevalence of current asthma when compared to other age groups. However, Table 2 shows that adults between 35 and 44 years old have 14% more possibilities of reporting current asthma when compared to adults aged 18 to 24 years. This difference was not significant (p-value > 0.05). (See Table 2)

Figure 4. Current Asthma prevalence by Age Groups, 2014

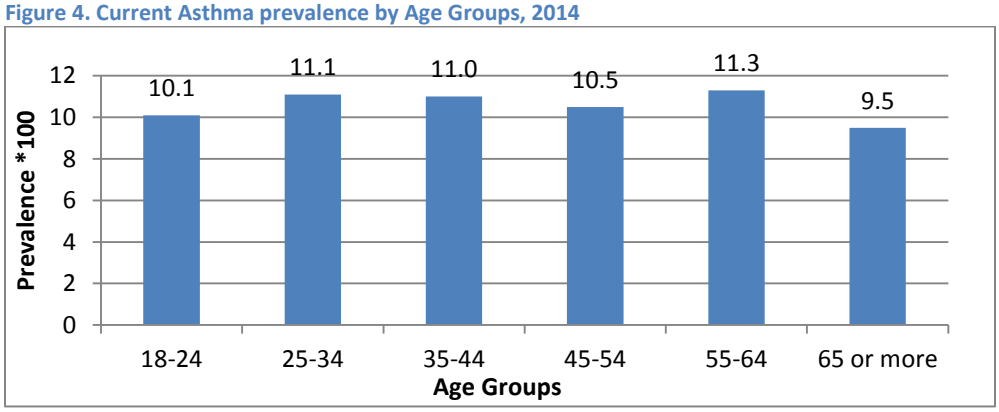
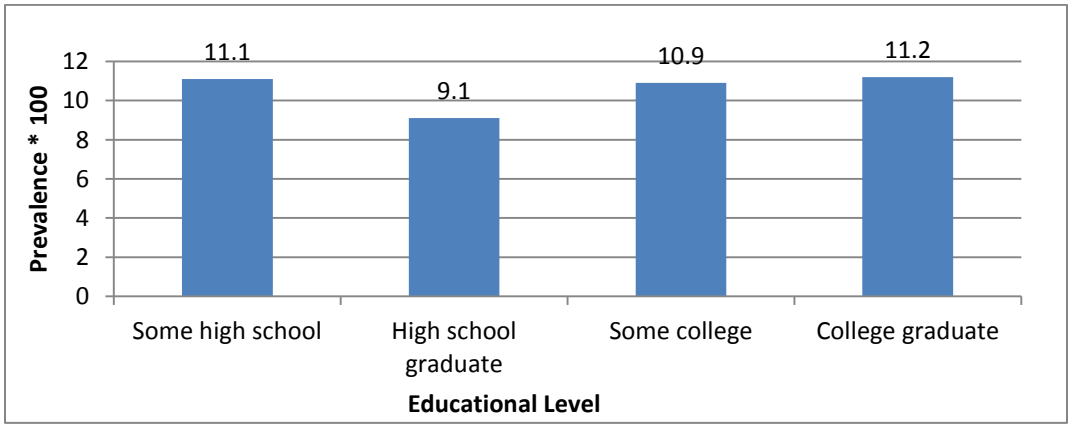


Table 2. Current Adult Asthma Prevalence by Age Group, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Age group					
18-24	10.1 (7.1-13.2)	38,262	1.00	0.00	1.00
25-34	11.1 (8.5-13.8)	53,617	1.05	0.29	0.86
35-44	11.0 (8.5-13.6)	52,550	1.14	0.30	0.66
45-54	10.5 (8.2-12.8)	50,575	0.93	0.30	0.81
55-64	11.3 (9.0- 13.7)	49,701	0.85	0.31	0.62
65 or more	9.5 (7.9-11.0)	53,449	0.70	0.35	0.33

When comparing by educational highest earned degree level, 11.2% of participants with current asthma were college graduates. This group showed the highest prevalence, as Figure 5 reflects.

Figure 5. Current Adult Asthma Prevalence by Education Level, 2014



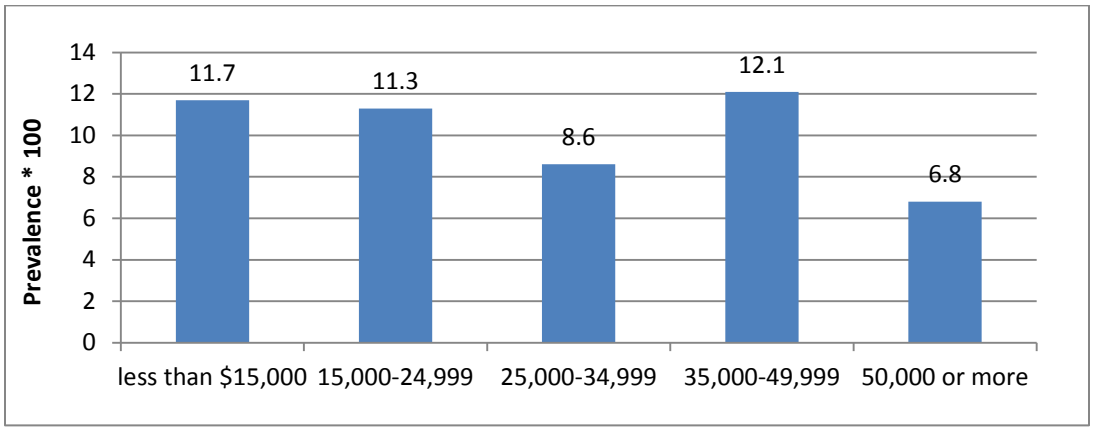
When stratifying by educational level, college graduates had 6% more possibility than participants who reported having less than high school (Table 3. Current asthma among adults by education level, 2014). This difference was not significant (p-value > 0.05).

Table 3. Current asthma among adults by education level, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Level of Education					
Some high school	11.1 (9.1-13.2)	85,136	1.00	0.00	1.00
High school graduate	9.1 (7.2-10.9)	67,554	0.76	0.17	0.13
Some college	10.9 (9.0-12.9)	51,522	0.93	0.18	0.73
College graduate	11.2 (9.4-13.0)	92,635	1.06	0.19	0.74

Figure 6 shows that among adults with asthma, hose with annual income between $35,000 and $49,999 reported current asthma percent higher than the other annual income groups.

Figure 6. Current Adult Asthma Prevalence by Annual Income, 2014



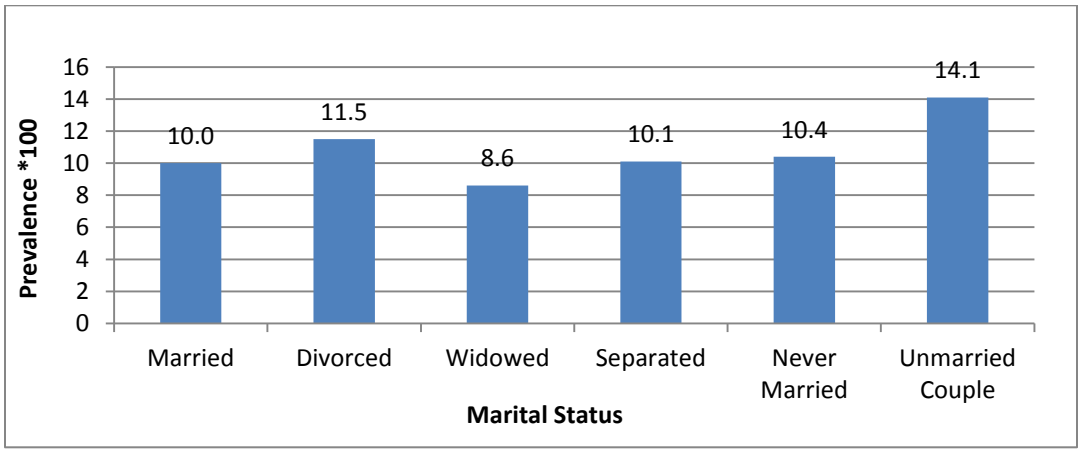
When stratifying by respondent's annual income participants in the group earning between $35,000 and $49,999 showed 14% more possibility than participants who reported annual income lower than $15,000 (Table 4). This difference was not significant (p-value > 0.05).

Table 4. Current Adult Asthma by Annual Income, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Annual Income					
less than $15,000	11.7 (10.0-13.3)	134,338	1.00	0.00	1.00
15,000-24,999	11.3 (9.2-13.5)	63,810	1.01	0.15	0.92
25,000-34,999	8.6 (5.6-11.6)	18,746	0.80	0.23	0.34
35,000-49,999	12.1 (8.2-16.1)	21,892	1.17	0.23	0.50
50,000 or more	6.8 (3.7-9.9)	12,376	0.64	0.30	0.14

Respondents who reported living as an unmarried couple showed the highest prevalence of current asthma, as seen in Figure 7.

Figure 7. Current Asthma Prevalence by Marital Status, 2014



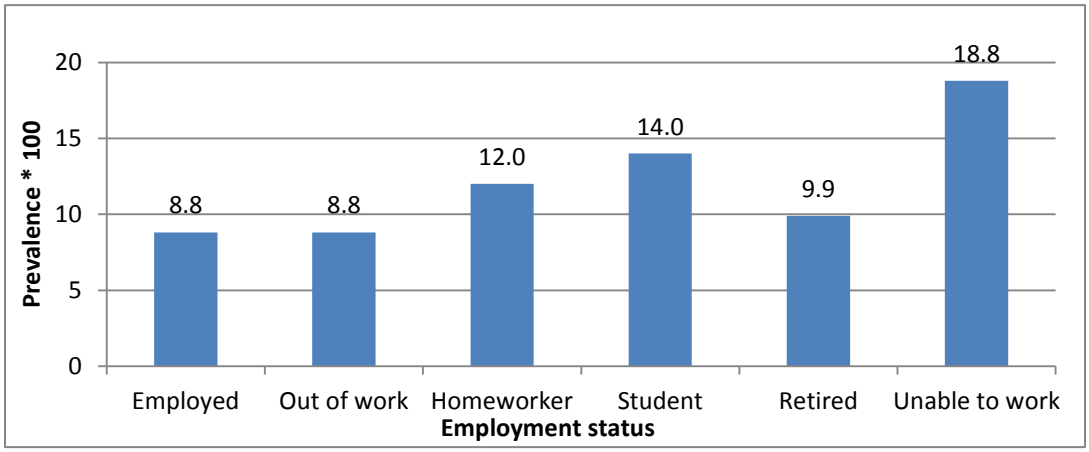
In comparison with married participants, those living as unmarried couples had 34% more possibilities of reporting current asthma. This difference was not significant (p-value > 0.05) as seen in Table 5.

Table 5. Current Asthma Prevalence by Marital Status, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Marital Status					
Married	10.0 (8.6-11.3)	105,968	1.00	0.00	1.00
Divorced	11.5 (8.7-14.3)	40,878	0.94	0.18	0.73
Widowed	8.6 (6.2-11.0)	23,903	0.66	0.22	0.06
Separated	10.1 (5.8-14.5)	13,415	0.85	0.28	0.57
Never Married	10.4 (8.3-12.5)	72,459	1.06	0.18	0.73
Unmarried Couple	14.1 (10.1-18.0)	37,846	1.34	0.21	0.17

According to Figure 8, participants classified as unable to work presented a prevalence of 18.8% of current asthma, followed by students and homeworkers with 14.0% and 12% respectively.

Figure 8. Current Adult Asthma by Employment Status, 2014



As data from Table 6 states, adults who reported being unable to work, had 3.18 times the possibility of reporting current asthma than adults who reported being employed. This difference was statistically significant (p-value <0.05). When comparing the group of students to those employed, students had 1.84 times the possibility of having current asthma than the employed group. The difference, however, was no significant (p-value >0.05).

Table 6. Prevalence of Asthma by Employment Status, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Employment Status					
Employed	8.8 (7.3-10.3)	97,120	1.00	0.00	1.00
Out of work	8.8 (6.0-11.5)	25,822	0.97	0.23	0.89
Homeworker	12.0 (9.6-14.3)	58,495	1.18	0.19	0.37
Student	14.0 (9.1-19.0)	25,693	1.84	0.32	0.06
Retired	9.9 (8.1-11.6)	51,227	1.66	0.22	0.02
Unable to work	18.8 (14.4-23.3)	38,223	3.18	0.22	0.00

Current Children Asthma Prevalence by Socio-demographic Variables

Children younger than 18 years old showed a higher asthma prevalence (13.8%) than adults (10.6%). As seen in Figure 9 males had a slightly higher prevalence than females. However, females had 1.36 times the possibility of having current asthma. This difference is not significant (p-value >0.05), as shown in Table 7.

Figure 9. Current Asthma Prevalence Among Children by Gender, 2014

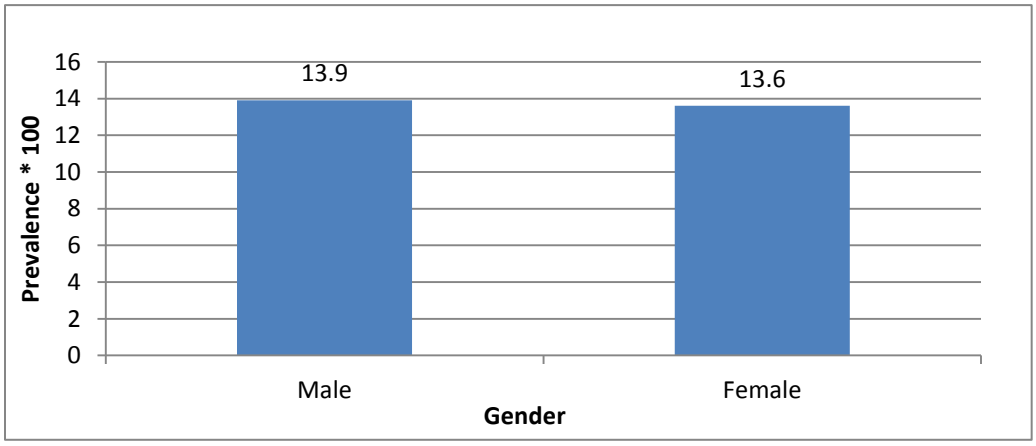


Table 7. Current Asthma Prevalence Among Children by Gender, 2014

Variables	Prevalence	OR	OR(SE)	p-value
Gender				
Male	13.9 (10.9-16.9)	1.00	0.00	1.00
Female	13.6 (10.5-16.7)	1.36	0.33	0.34

Figure 10 shows that the group of children between 5 and 9 years old had a prevalence of 20.1%. This group had 1.89 the possibility of reporting current asthma when compared to the group of children 4 years old and younger. This difference was not significant (p-value > 0.05) as shown in

Table 8.

Figure 10. Current Asthma Prevalence Among Children by Age Group, 2014

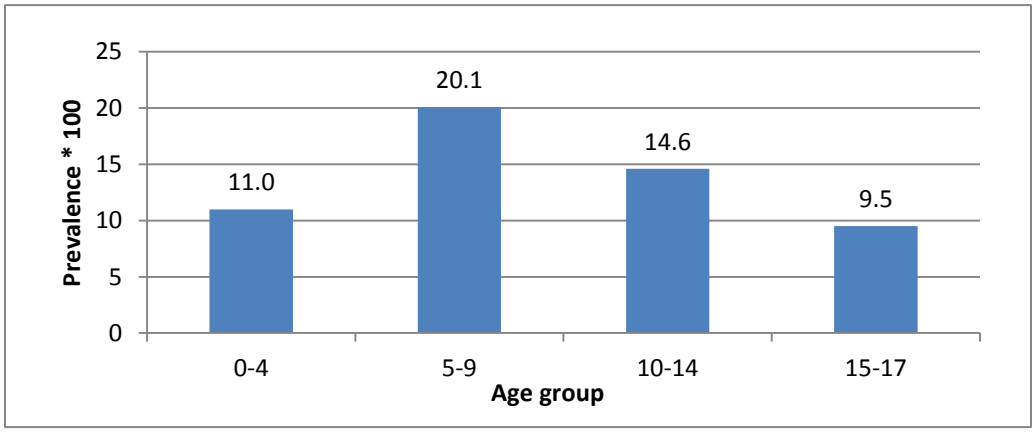


Table 8. Current Asthma Prevalence Among Children by Age Group, 2014

Variables	Prevalence	OR	OR(SE)	p-value
Age group				
0-4	11.0 (6.8-15.2)	1.00	0.00	1.00
5-9	20.1 (14.6-25.5)	1.89	0.48	0.18
10-14	14.6 (10.9-18.4)	0.74	0.45	0.52
15-17	9.5 (5.9-13.0)	0.45	0.49	0.11

When data is stratified by regions as shown in Figure 11, Bayamón and Caguas have the highest prevalence, with 20.8% and 17.0% of children with current asthma, respectively. Children in the Caguas region had 1.41 times the possibilities of reporting current asthma than those in the Aguadilla region. More information of the rest of the regions can be found in Table 9, below.

Figure 11. Current Asthma Prevalence Among Children by Health Region, 2014

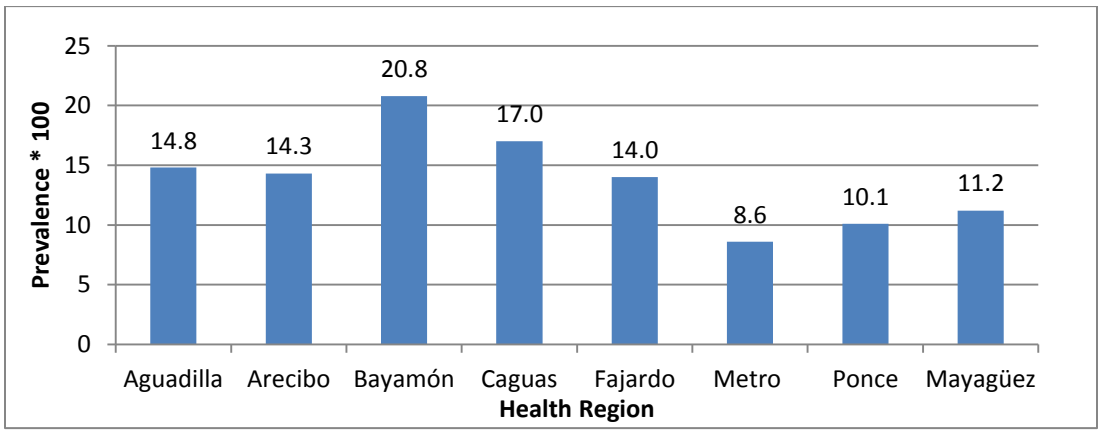
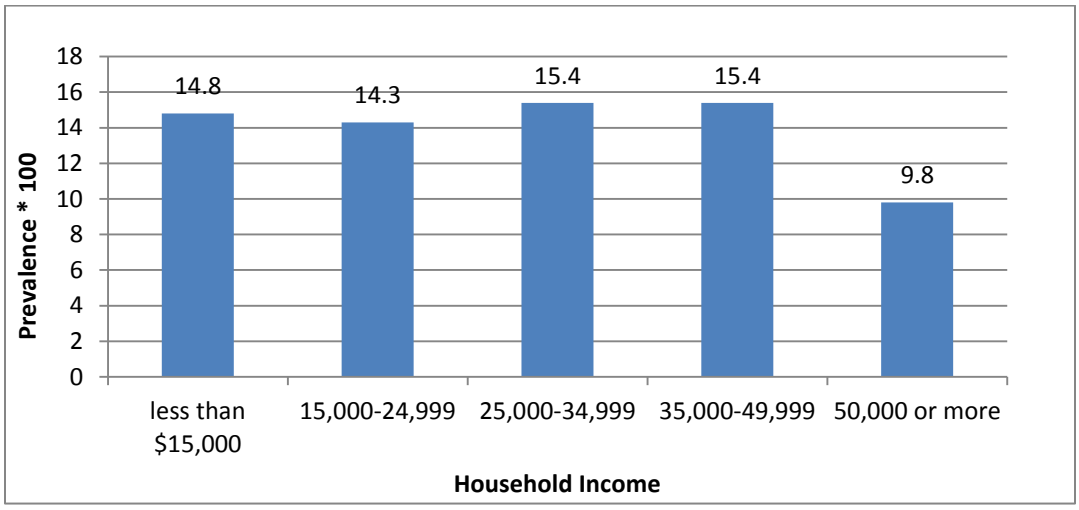


Table 9. Current Asthma Prevalence Among Children by Health Region, 2014

Variables	Prevalence	OR	OR(SE)	p-value
Health Region				
Aguadilla	14.8 (6.9-22.8)	1.00	0.00	1.00
Arecibo	14.3 (8.3-20.2)	0.54	0.77	0.43
Bayamón	20.8 (14.2-27.5)	0.68	0.74	0.61
Caguas	17.0 (11.6-22.3)	1.41	0.74	0.64
Fajardo	14.0 (3.9-24.2)	0.56	0.91	0.52
Metro	8.6 (4.9-12.2)	0.34	0.76	0.16
Ponce	10.1 (4.2-16.0)	0.86	0.79	0.85
Mayagüez	11.2 (5.7-16.7)	0.51	0.81	0.42

Figure 12 shows the current asthma prevalence among children by respondent's household annual income. The groups of respondents who reported annual income of $25,000 - $34,999, and $35,000 - $49,999 both had a prevalence of 15.4% of children with current asthma.

Figure 12. Current Asthma Prevalence Among Children by Respondent's Household Income, 2014



Children living in households with annual income of $50,000 or more have 1.35 times the possibility of reporting current asthma than children living in households with annual income lower than $15,000. Further details in Table 10.

Table 10. Current Asthma Prevalence Among Children by Respondent's Household Income, 2014

Variables	Prevalence	OR	OR(SE)	p-value

Household Income				
less than $15,000	14.8 (6.9-22.8)	1.00	0.00	1.00
15,000-24,999	14.3 (8.3-20.2)	0.76	0.40	0.50
25,000-34,999	15.4 (8.9-22.0)	1.09	0.64	0.88
35,000-49,999	15.4 (8.8-22.2)	0.87	0.58	0.81
50,000 or more	9.8 (4.5-15.0)	1.35	0.69	0.66

When analyzing by respondent's marital status, children living with married parents or parents who were an unmarried couple, had the highest prevalence of asthma (15.9% and 15.5%, respectively), as shown in

Figure 13. Prevalence of Current Children Asthma by Respondent's Marital Status, 2014

Interestingly, as Table 11 presents, children living with a widowed parent had 2.47 times the possibility of having current asthma than children living with married parents. This difference is not statistically significant (p-value >0.05), however.

Figure 13. Prevalence of Current Children Asthma by Respondent's Marital Status, 2014

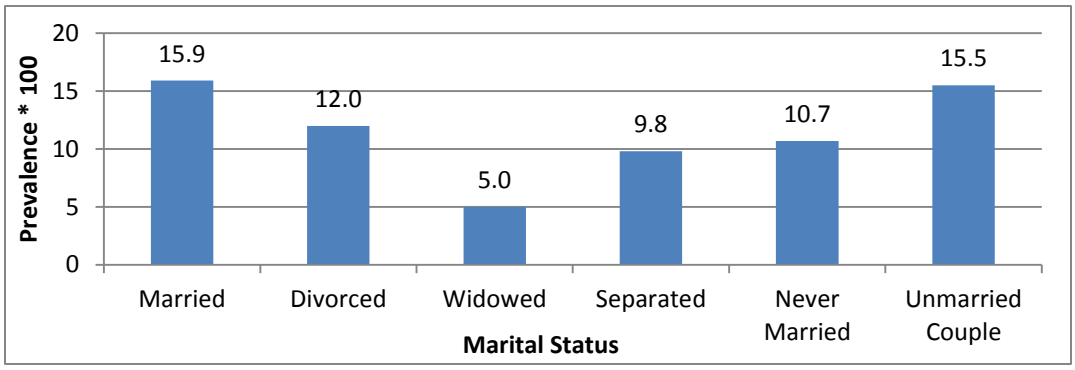


Table 11. Prevalence of Current Children Asthma by Respondent's Marital Status, 2014

Variables	Prevalence	OR	OR(SE)	p-value
Marital Status				
Married	15.9 (12.5-19.3)	1.00	0.00	1.00
Divorced	12.0 (6.3-17.8)	1.19	0.55	0.75
Widowed	5.0 (0.0-11.0)	2.47	1.18	0.44
Separated	9.8 (1.3-18.4)	2.12	0.73	0.30
Never Married	10.7 (6.7-14.8)	0.76	0.48	0.58
Unmarried Couple	15.5 (9.5-21.5)	0.97	0.46	0.95

When analyzing by respondent's employment status, children living with parents unable to work, had the highest prevalence of asthma (23.3%), as shown in Figure 14. Interestingly, as

Table 12 presents, children living with a parent who reported as a student had 2.26 times the possibility of having current asthma than children living with parents who were employed. This difference is not statistically significant (p-value >0.05).

Figure 14. Current Children's Asthma Prevalence by Respondent's Employment Status, 2014

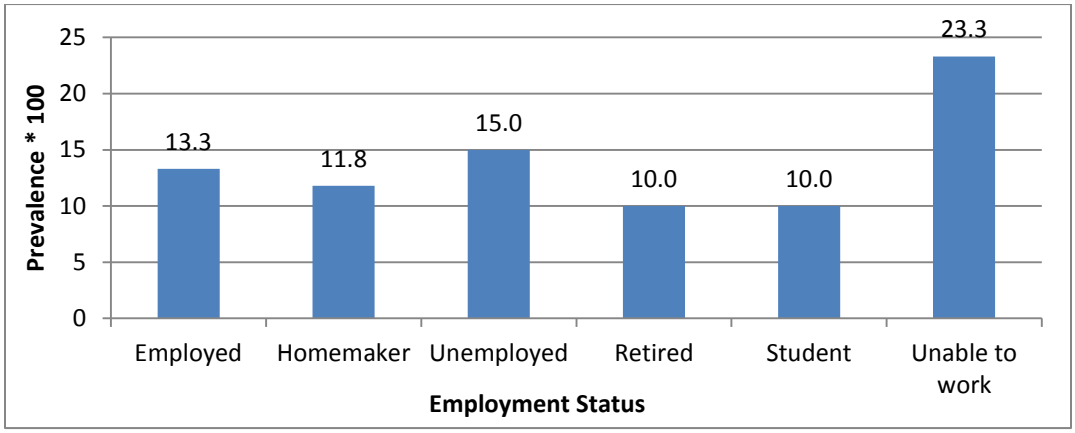


Table 12. Current Children's Asthma Prevalence by Respondent's Employment Status, 2014

Variables	Prevalence	OR	OR(SE)	p-value
Employment Status				
Employed	13.3 (10.4-16.2)	1.00	0.00	1.00
Homemaker	11.8 (6.4-17.2)	0.83	0.54	0.73
Unemployed	15.0 (10.0-20.0)	0.74	0.42	0.48
Retired	10.0 (3.3-16.7)	1.13	0.89	0.88
Student	10.0 (2.3-17.5)	2.26	0.76	0.28
Unable to work	23.3 (12.0-34.7)	1.28	0.60	0.68

Current Adult Asthma Prevalence by risk and comorbidity variables

Although the fundamental causes of asthma are not completely understood, it is important to understand the risk factors associated with the condition in order to control and avoid symptoms or attacks. [2]

This section presents current adult asthma prevalence by risks and comorbidities such as doing exercise or physical activity in the past 30 days, Body Mass Index, smoking status, diabetes diagnosis, or having any other chronic condition.

It is useful to explain the following terms according to BRFSS survey:

- Diabetes does not include gestational, borderline or pre-diabetes.
- COPD stands for chronic obstructive pulmonary disease, which includes emphysema and chronic bronchitis. COPD makes breathing difficult and tends to get worse over time.
- Depression includes ever being told one has a "depressive disorder (including depression, major depression, dysthymia, or minor depression)".
- Obesity is defined as having a body mass index of 30 or higher, based on the respondent's self-reported height and weight.
- Smoking is defined as having smoked at least 100 cigarettes in a lifetime and currently smoking some days or every day.

Physical Activity or Exercise in the past 30 days

Participants who reported no participation in any physical activity or exercise in the last 30 days had a prevalence of 12.5% of current asthma as Figure 15 shows. This group had 25% more possibilities of having current asthma than participants who reported having participated in physical activities such as running, calisthenics, golf, gardening or walking for exercise in the past 30 days. Further information can be seen in Table 13.

Figure 15. Prevalence of Asthma by Exercise, 2014

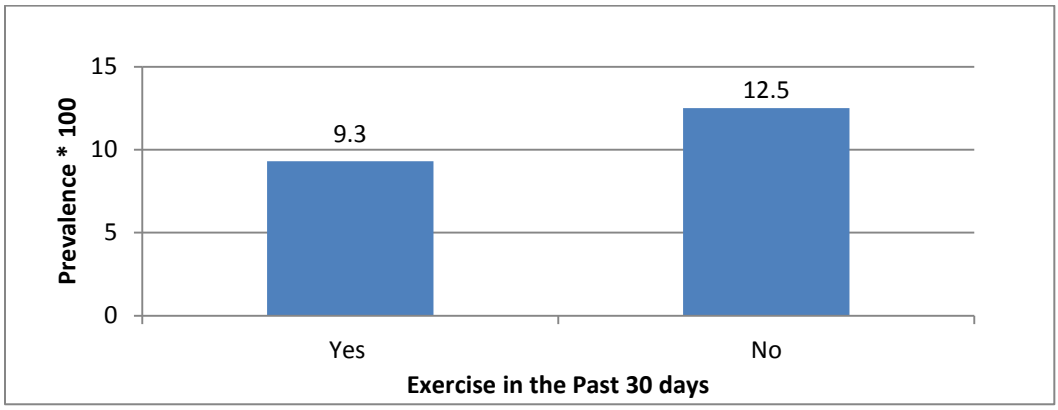


Table 13. Prevalence of Asthma by Exercise, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Exercise					
Yes	9.3 (8.1-10.5)	155,283	1.00	0.00	1.00
No	12.5 (10.8-14.1)	142,872	1.25	0.12	0.06

Body Mass Index

Body Mass Index (BMI) is a key index for relating weight to height. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to BMI rather than the traditional height/weight charts. BRFSS has categorized BMI into four categories as follow:

- Underweight: a BMI lower than 18.50
- Normal weight: a BMI between 18.50 and 25.00
- Over weight: a BMI between 25.00 and 30.00
- Obese: a BMI over 30.00

Figure 16 presents current adult asthma prevalence by BMI classification. The group classified as obese had a prevalence of 16.6%. Also, as presented in Table 14, this group has 6.22 times the possibility of reporting current asthma than the group classified as underweight. The group classified as overweight has 3.37 times the possibility of reporting current asthma than those underweight. Both differences are statistically significant (p-value < 0.05).

Figure 16. Prevalence of Current Adult Asthma by BMI Classification, 2014

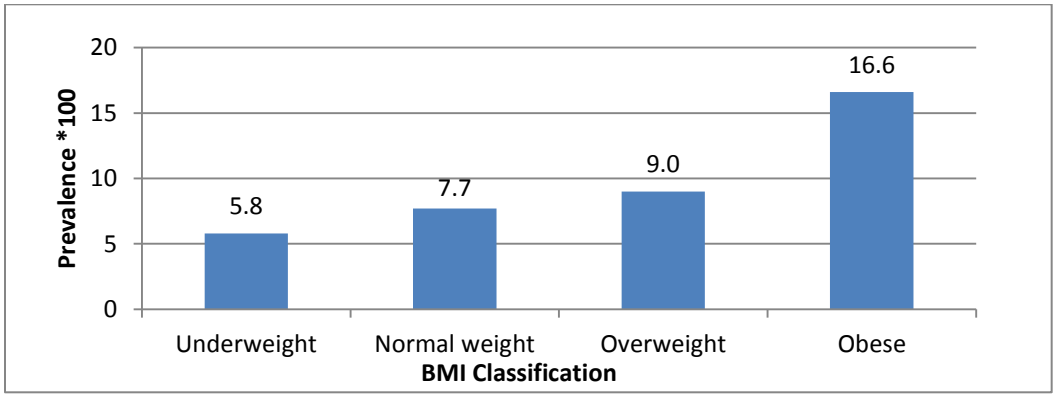


Table 14. Prevalence of Asthma by BMI Classification, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
BMI					
Underweight	5.8 (1.4-10.1)	3,428	1.00	0.00	1.00
Normal weight	7.7 (6.1-9.3)	65,679	2.64	0.54	0.07
Overweight	9.0 (7.5-10.5)	90,514	3.37	0.53	0.02
Obese	16.6 (14.4-18.8)	125,914	6.22	0.53	< 0.001

Smoking

It is known that smoking harms the body in many ways, especially the respiratory system. The airways in a person with asthma are very sensitive and can react to various "triggers". Tobacco

smoke is a powerful asthma trigger. As presented in Figure 17, smokers have a higher prevalence (12.5%) than non-smokers. And as Table 15 states, smokers have 48% more possibilities than non-smokers of reporting current asthma. This difference is statistically significant (p-value = 0.04).

Figure 17. Prevalence of Current Adult Asthma by Smoking Status, 2014

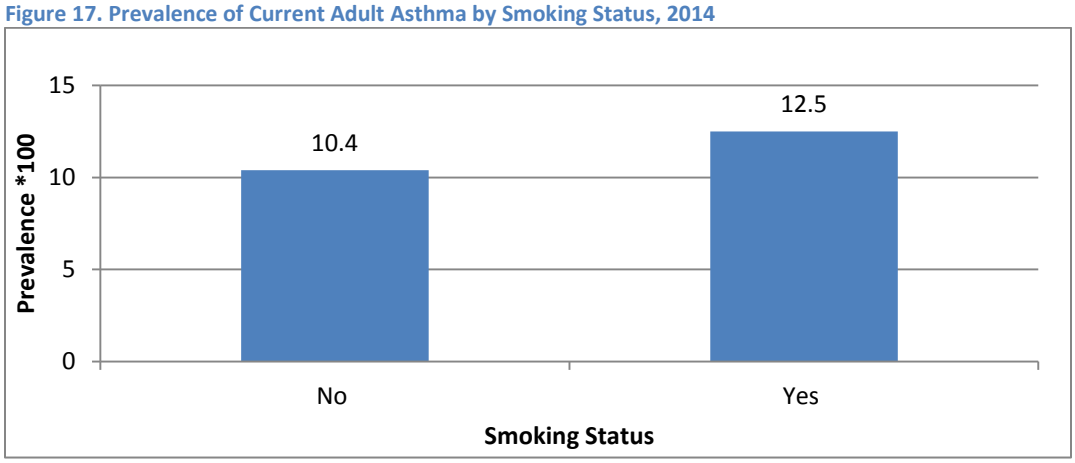


Table 15. Prevalence of Current Adult Asthma by Smoking Status, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Smoker					
No	10.4 (9.4-11.4)	254,947	1.00	0.00	1.00
Yes	12.5 (9.2-15.9)	39,103	1.48	0.19	0.04

Diabetes diagnosis

It is known that individuals with diabetes are at increased risk of several pulmonary conditions, including asthma. This increased risk may be a consequence of declining lung function in patients with diabetes. Chronic complications of diabetes include a number of pathological changes that involve blood vessels, nerves, the skin, and the retina of the eye. The lung is also a target organ for diabetic microangiopathy in patients with both type 1 and type 2 diabetes, and decrements in lung function have been reported among patients with diabetes. The group of participants with diabetes had a prevalence of current asthma of 14.2% (Figure 18). This group had 48% more possibilities of reporting current asthma than the group without the diagnosis. This difference is statistically significant (p-value = 0.04), as presented in Table 16.

Figure 18. Prevalence of Current Adult Asthma by Diabetes Diagnosis, 2014

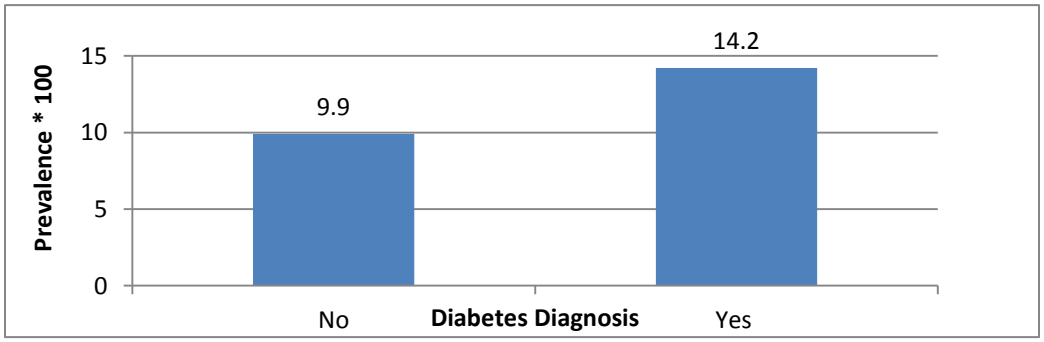


Table 16. Prevalence of Current Adult Asthma by Diabetes Diagnosis, 2014

Variables	Prevalence	Number	OR	OR(SE)	p-value
Diabetes Diagnosis					
No	9.9 (8.8-10.9)	234,379	1.00	0.00	1.00
Yes	14.2 (11.7-16.7)	62,801	1.48	0.19	0.04

Adults with asthma may have other chronic health conditions or risk factors. Additional health conditions may create barriers to physical or social activity, which can cause further declines in health status. Figure 19 shows that people who reported at least one other chronic condition had a prevalence of current asthma of 15.0%. This group had 2.24 times the possibility of reporting current asthma than people without any other chronic condition (

Table 17).

Figure 19. Prevalence of Current Adult Asthma by Co-occurring Chronic Conditions, 2014

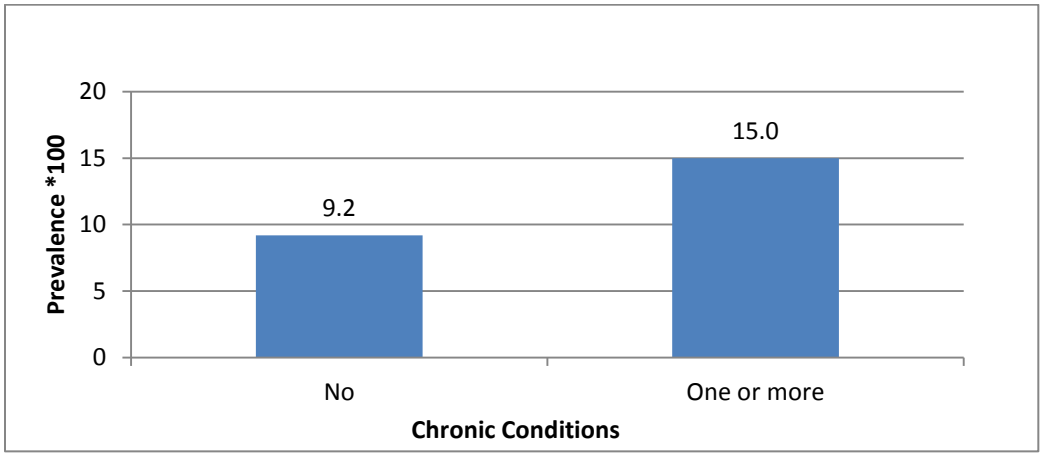


Table 17. Prevalence of Current Adult Asthma by Other Comorbidities, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Any Chronic Condition					
No	9.2 (8.1-10.2)	197,035	1.00	0.00	1.00
One or more	15.0 (12.8-17.2)	101,120	2.24	0.19	<0.001

Adults with Uncontrolled Asthma

Health measures

Self-reported asthma control status was obtained using an algorithm developed by the National Heart, Lung, and Blood Institute Expert Panel Report-3 (EPR-3), Guidelines for the Diagnosis and Management of Asthma. The algorithm was designed to take into account the levels of symptoms (frequency and duration), nighttime awakenings, and lung function measures (FEV1 and PEF). Due to limitations with this survey is not possible to include interference with normal activity and lung function part of the EPR-3 algorithm.

The Asthma Control variable has three (3) categories: “Well Controlled”, “Not controlled”, and “Very Poorly Controlled”. The level of control was established by taking the most severe level among the components that define asthma control. For example a person classified as “Well Controlled” in both symptoms and nighttime awakenings, and “Not Well Controlled” in SABA usage, will result in “overall” asthma control classified as “Not Well Controlled”. A diagram that represents this structure is present in Table 18.

For the purpose of the prevalence and probability analysis of this report, the three levels in the control variable have been categorized in two. Participants who were classified as “Not Well Controlled” and “Very Poorly Controlled” were merged into one category named “Uncontrolled”. The other category remained as “Well Controlled” [1].

Table 18 Categorization of asthma control

Element	Well Controlled	Uncontrolled	
		Not Well Controlled	Very Poorly Controlled
Symptom	8 days or less in past 30 days	More than 8 days in the past 30 days, but not through the day	Every day in the past 30 days and throughout the day
Nighttime awakenings	2 times or less in the past 30 days	Between 3 and 12 times in the past 30 days	13 times or more in the past 30 days
Rescue medication mean use	0.29 uses or less per day	Between 0.29 and 2.00 uses per day	2.00 or more uses per day

Figure 20. Prevalence of Uncontrolled Asthma by Age Groups, 2011-2013 states that more than half of patients aged 35 and older were classified 'Uncontrolled', while only 3 out of 10 of patients between 18 and 34 years old. Table 19 shows that people between 35 and 64 years old had 3.69 times the possibility of being classified as having uncontrolled asthma than that of people between 18 and 34 years. People 65 and over had 2.72 times this possibility when compared to the group aged 18 to 34 years. This difference is statistically significant (p-value < 0.05).

Figure 20. Prevalence of Uncontrolled Asthma by Age Groups, 2011-2013

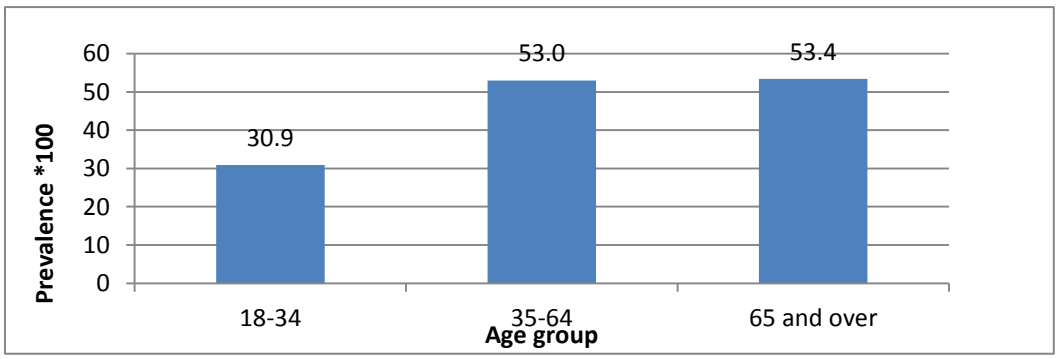


Table 19. Prevalence of Uncontrolled Asthma by Age Groups, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Age group					
18-34	30.9(20.7-41.1)	75,832	1.00	0.00	1.00
35-64	53.0(47.0-58.9)	121,690	3.69	0.41	0.00
65 and over	53.4(47.0-59.8)	49,741	2.72	0.49	0.04

Nearly half adults with asthma were classified as Uncontrolled as shown in Figure 21. Prevalence of Uncontrolled Asthma by Gender, 2011-2013, women had 23% less possibility of having asthma uncontrolled than men (Table 20).

Figure 21. Prevalence of Uncontrolled Asthma by Gender, 2011-2013

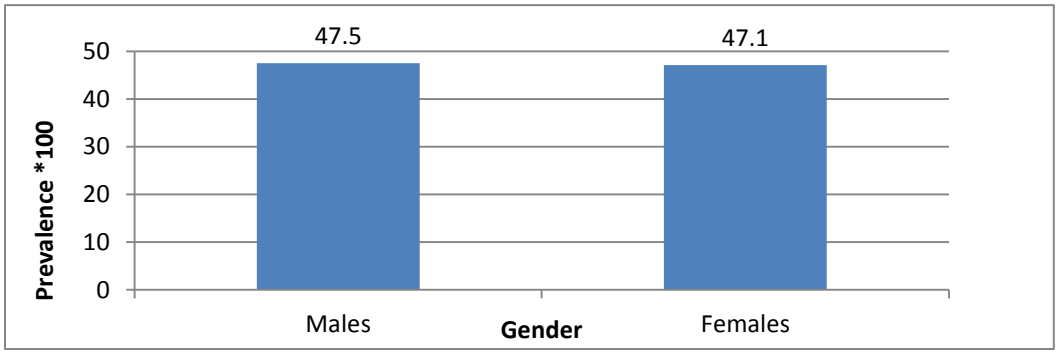


Table 20. Prevalence of Uncontrolled Asthma by Gender, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Gender					
Males	47.5(38.4-56.6)	78,931	1.00	0.00	1.00
Females	47.1(42.1-52.2)	168,332	0.77	0.26	0.32

As educational level increases, the prevalence of uncontrolled asthma decreases. Figure 22 shows that adults with less than high school diploma had a prevalence of 56.9% of uncontrolled asthma. As can be seen from Table 21, college graduates have 55% less chances of having uncontrolled asthma compared to the group with less than high school diploma. This difference is statistically significant (p-value = 0.04).

Figure 22. Prevalence of Uncontrolled Asthma by Educational Level, 2011-2013

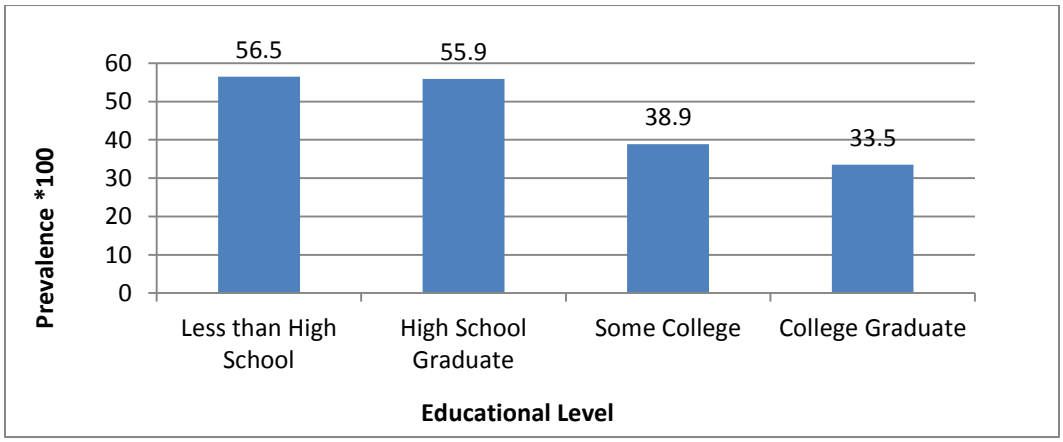


Table 21. Prevalence of Uncontrolled Asthma by Educational Level, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Educational Level					
Less than High School	56.5(48.7-64.3)	78,436	1.00	0.00	1.00
High School Graduate	55.9(45.9-65.9)	52,807	1.04	0.29	0.87
Some College	38.9(30.4-47.5)	68,092	0.59	0.31	0.09
College Graduate	33.5(24.8-42.2)	47,729	0.45	0.38	0.04

As household annual income increases, the prevalence of uncontrolled asthma also decreases. Figure 23 shows that adults earning less than $25,000 had a prevalence of 49.3% of uncontrolled asthma. As can be seen from Table 22, participants reporting an annual household income of $50,000 or more have 9% less chances of having uncontrolled asthma compared to the group with less than $25,000. This difference, however, is not statistically significant (p-value > 0.05).

Figure 23. Prevalence of Uncontrolled Asthma by Household Annual Income, 2011-2013

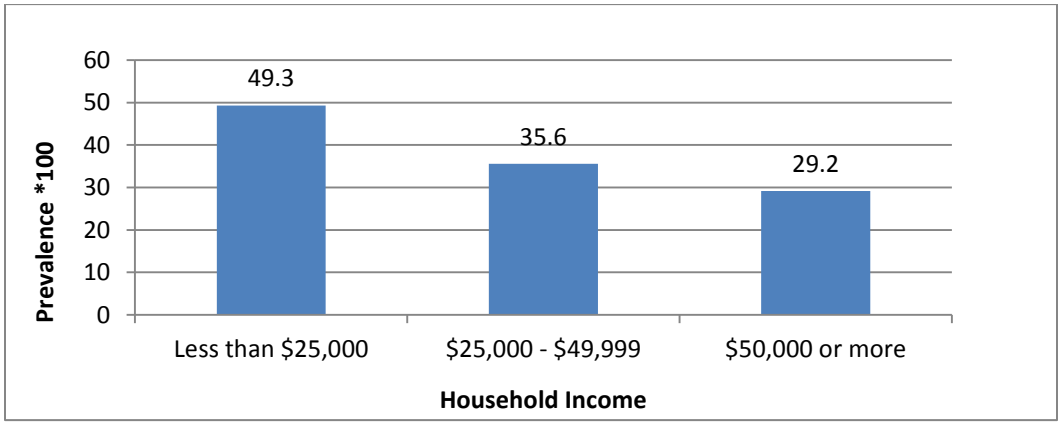


Table 22. Prevalence of Uncontrolled Asthma by Household Annual Income, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Household Income					
Less than $25,000	49.3(44.0-54.6)	170,747	1.00	0.00	1.00
$25,000 - $49,999	35.6(22.5-48.6)	24,000	1.04	0.38	0.91
$50,000 or more	29.2(10.3-48.1)	13,179	0.91	0.46	0.85

Figure 24 shows that widows and adults living separated from their spouses had a prevalence of 60.5% and 61.5%, respectively, of uncontrolled asthma. As can be seen from Table 23,

participants who were never married had 1.48 times the possibilities of reporting uncontrolled asthma compared to the group of married participants. This difference, however, is not statistically significant (p-value > 0.05).

Figure 24. Prevalence of Uncontrolled Asthma by Marital Status, 2011-2013

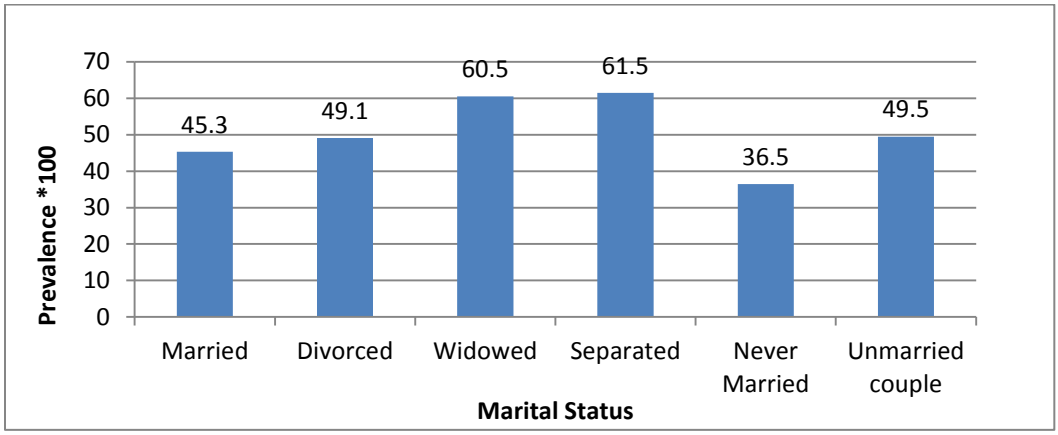


Table 23. Prevalence of Uncontrolled Asthma by Marital Status, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Marital Status					
Married	45.3(38.9-51.7)	90,789	1.00	0.00	1.00
Divorced	49.1(36.4-61.7)	36,813	0.93	0.28	0.79
Widowed	60.5(50.7-70.3)	29,801	1.38	0.28	0.25
Separated	61.5(43.7-79.4)	14,706	0.98	0.46	0.96
Never Married	36.5(25.5-47.4)	54,708	1.49	0.40	0.32
Unmarried couple	49.5(31.2-67.8)	20,278	1.38	0.46	0.47

Figure 25 shows that unemployed asthma patients had a prevalence of 65.7% of uncontrolled asthma. As can be seen from Table 24, this group had 3.89 times the possibilities of reporting uncontrolled asthma when compared to the group of employed. This difference is statistically significant (p-value < 0.05).

Figure 25. Prevalence of Uncontrolled Asthma by Employment Status, 2011-2013

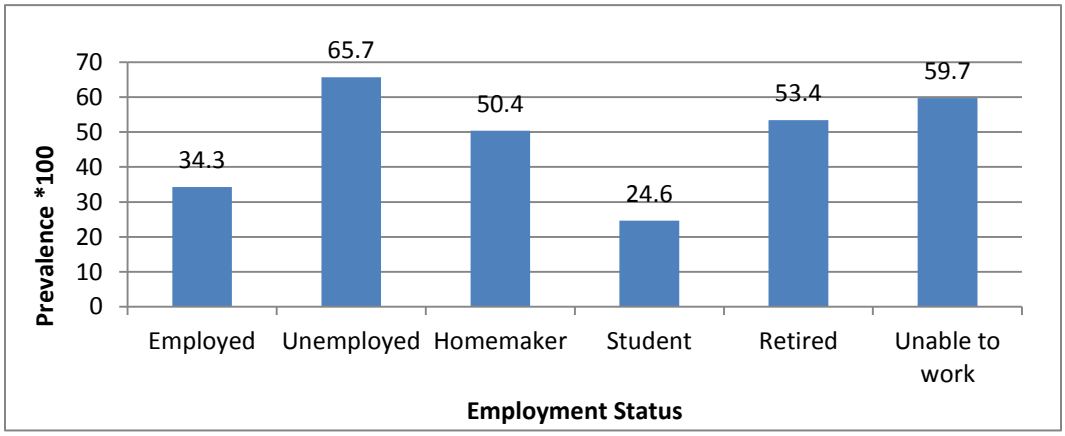


Table 24. Prevalence of Uncontrolled Asthma by Employment Status, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Employment Status					
Employed	34.3(25.1-43.5)	73,829	1.00	0.00	1.00
Unemployed	65.7(47.7-83.6)	20,832	3.89	0.48	<0.001
Homemaker	50.4(42.2-58.7)	61,005	1.17	0.35	0.64
Student	24.6(9.2-40.1)	22,344	0.92	0.69	0.91
Retired	53.4(45.7-61.1)	38,610	1.55	0.33	0.18
Unable to work	59.7(48.5-70.8)	30,645	1.75	0.35	0.11

Barriers to Health Care Access

Figure 26 shows that asthma patients unable to afford a doctor had a prevalence of 66.8% of uncontrolled asthma. Those able to afford a doctor had 62% less possibilities of reporting uncontrolled asthma than those unable to afford a doctor. This difference is statistically significant (p-value < 0.05). More details in Table 25.

Figure 26. Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford a Doctor, 2011-2013

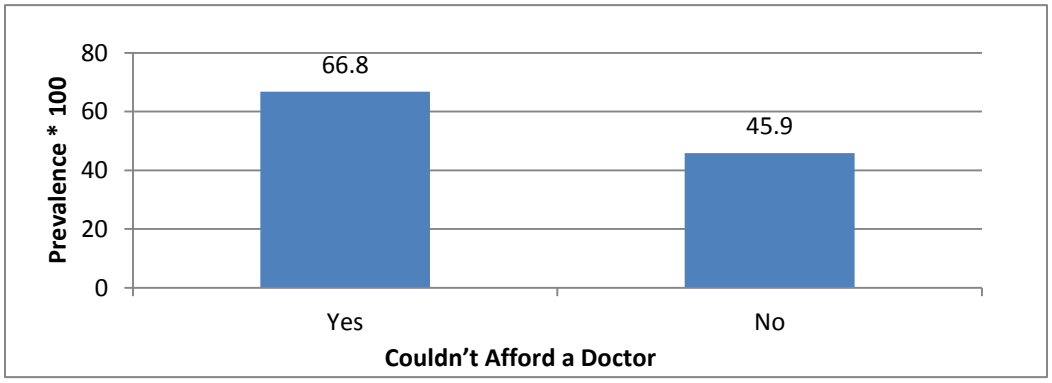


Table 25. Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford a Doctor, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Couldn't Afford a Doctor					
Yes	66.8 (53.4-80.2)	21,636	1.00	0.00	1.00
No	45.9 (41.2-50.7)	188,724	0.38	0.32	0.00

Figure 27 shows that asthma patients unable to afford an asthma specialist had a prevalence of 64.4% of uncontrolled asthma. Those able to afford an asthma specialist had 60% less possibilities of reporting uncontrolled asthma than those unable to afford one. This difference is statistically significant (p-value < 0.05). More details in

Table 26.

Figure 27. Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford an Asthma Specialist, 2011-2013

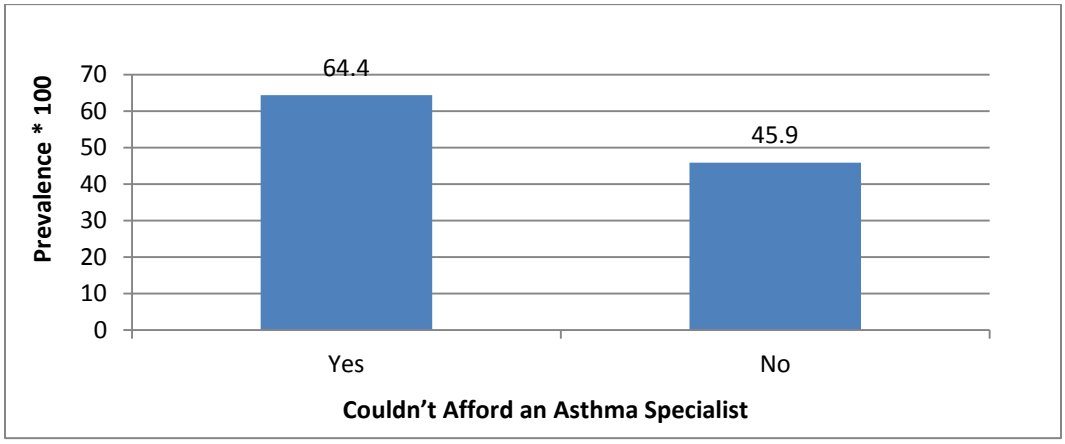


Table 26. Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford an Asthma Specialist, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Couldn't Afford an Asthma Specialist					
Yes	64.4 (48.9-79.8)	22,599	1.00	0.00	1.00
No	45.9 (41.2-50.6)	187,492	0.40	0.33	<0.001

Figure 28 shows that asthma patients who are able to afford asthma medications had a prevalence of 51.4% of uncontrolled asthma. This group had 8% more possibilities of reporting uncontrolled asthma than those unable to afford medication. This difference is not statistically significant (p-value > 0.05). More details in Table 27.

Figure 28 Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford Asthma Medications, 2011-2013

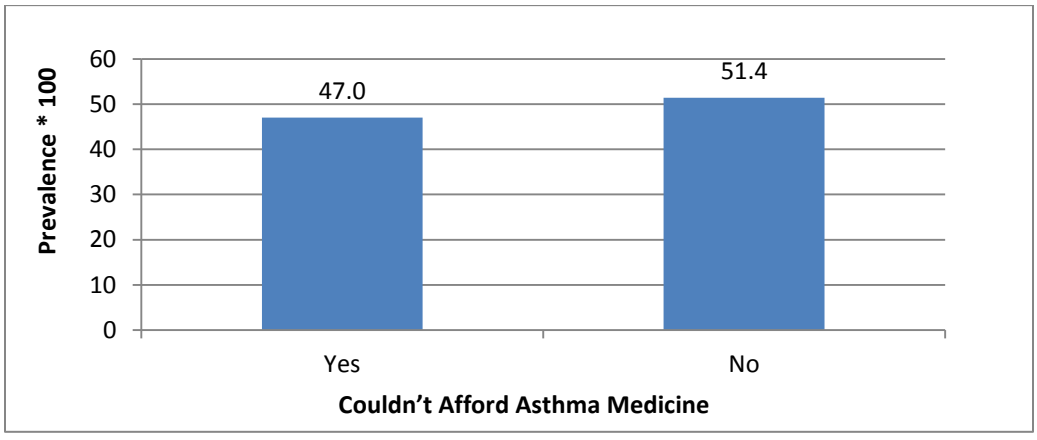


Table 27. Prevalence of Uncontrolled Asthma Among Adult Patients Unable to Afford Asthma Medications, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Couldn't Afford Asthma Medications					
Yes	47.0 (42.4-51.5)	230,816	1.00	0.00	1.00
No	51.4 (28.8-74.0)	16,447	1.08	0.58	0.88

Knowledge and Management of Asthma Symptoms

Figure 29 shows that asthma patients who are unable to recognize asthma symptoms had a prevalence of 54.7% of uncontrolled asthma. Those unable to recognize asthma symptoms had 78% more possibilities of reporting uncontrolled asthma than those who could. This difference is statistically significant (p-value = 0.02). More details in Table 28.

Figure 29. Uncontrolled Adult Asthma Prevalence Among Patients Who Could Recognize Asthma Symptoms, 2011-2013

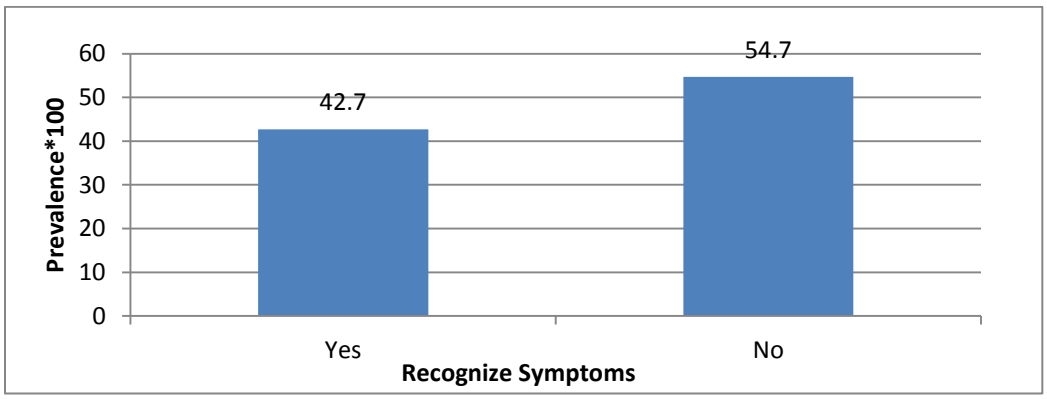


Table 28. Uncontrolled Asthma Prevalence Among Adult Patients Who Could Recognize Asthma Symptoms, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Recognize Symptoms					
Yes	42.7 (36.8-48.6)	134,095	1.00	0.00	1.00
No	54.7 (47.8-61.6)	106,703	1.78	0.25	0.02

Figure 30 shows that asthma patients who didn't know what to do during an asthma attack had a prevalence of 50.8% of uncontrolled asthma. This group had 32% (OR=1.32) more possibilities of reporting uncontrolled asthma than those who know what to do during an asthma attack. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 29.

Figure 30. Prevalence of Uncontrolled Asthma by Their Knowledge of What to do During an Asthma Attack, 2011-2013

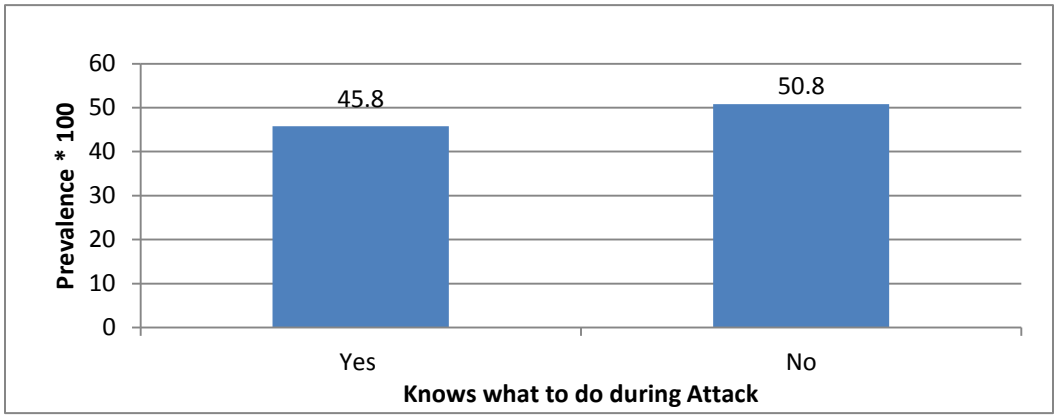


Table 29. Prevalence of Uncontrolled Asthma by Their Knowledge of What to do During an Asthma Attack, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Knows what to do during Attack					
Yes	45.8 (40.0-51.6)	136,686	1.00	0.00	1.00
No	50.8 (43.5-58.1)	98,620	1.32	0.23	0.22

Figure 31 shows that asthma patients with knowledge of peak flow usage had a prevalence of 52.8% of uncontrolled asthma. The group without knowledge of peak flow had 30% (OR = 0.70) less possibilities of reporting uncontrolled asthma than those with knowledge of peak flow usage. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 30.

Figure 31. Prevalence of Uncontrolled Asthma by Their Knowledge of Peak Flow Usage, 2011-2013

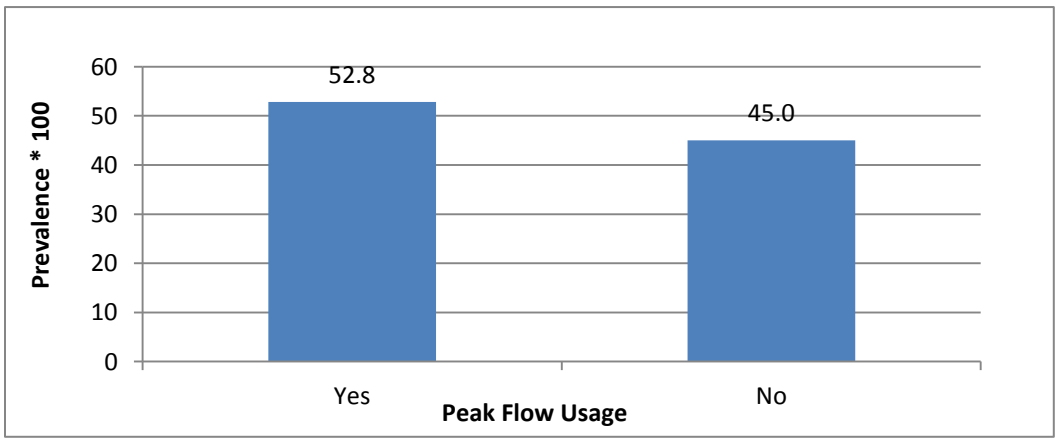


Table 30. Prevalence of Uncontrolled Asthma by Their Knowledge of Peak Flow Usage, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Peak Flow Usage					
Yes	52.8 (44.7-60.9)	64,385	1.00	0.00	1.00
No	45.0 (39.5-50.4)	176,578	0.70	0.23	0.12

Asthma patients who use their asthma action plan had a prevalence of 50.7% of uncontrolled asthma (Figure 32). The group who did not use their asthma action plan had 21% less possibilities (OR= 0.79) of reporting uncontrolled asthma than those who use their asthma action plan. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 31.

Figure 32. Prevalence of Uncontrolled Asthma Among Adult Patients by Their Use of Asthma Action Plan, 2011-2013

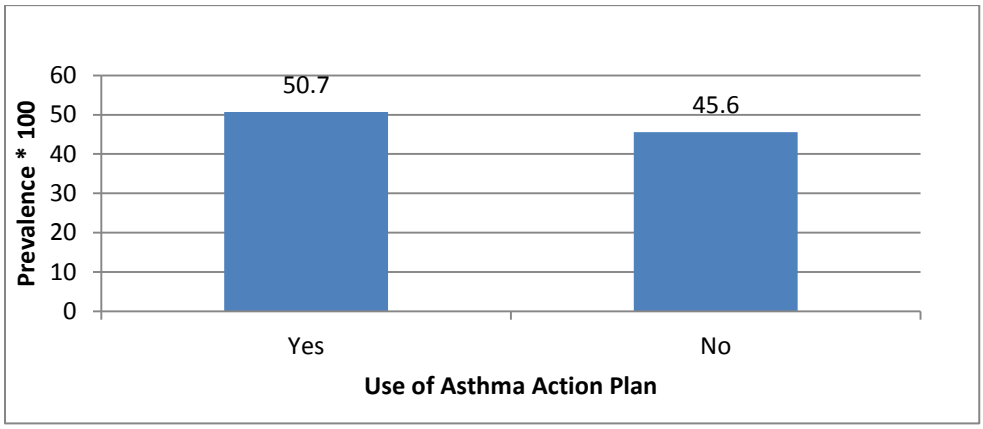


Table 31. Prevalence of Uncontrolled Asthma Among Adult Patients by Their Use of Asthma Action Plan, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Use of Asthma Action Plan					
Yes	50.7 (42.4-59.1)	73,905	1.00	0.00	1.00
No	45.6 (40.2-51.1)	165,972	0.79	0.24	0.34

Asthma patients who have taken a class on asthma management had a prevalence of 48.3% of uncontrolled asthma (

Figure 33). The group who have not taken a class on asthma management had 18% less possibilities of reporting uncontrolled asthma than those who have taken a class on asthma

management. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 32 .

Figure 33. Prevalence of Uncontrolled Asthma Among Adult Patients by Having Taken a Class on Asthma Management, 2011-2013

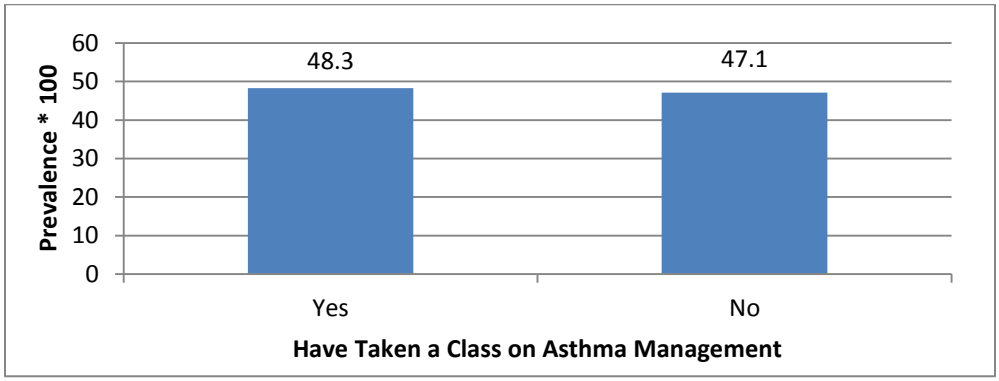


Table 32. Prevalence of Uncontrolled Asthma Among Adult Patients by Having Taken a Class On Asthma Management, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Have Taken a Class on Asthma Management					
Yes	48.3 (33.4-63.2)	25,022	1.00	0.00	1.00
No	47.1 (42.4-51.8)	222,208	0.82	0.33	0.56

Uncontrolled Asthma among adults by risk and comorbidity variables, 2011-2013

Asthma patients who reported having chronic obstructive pulmonary disease had a prevalence of 76.5% of uncontrolled asthma (Figure 34). The group who reported not having COPD had 72% less possibilities of reporting uncontrolled asthma than those with COPD. This difference, however, is statistically significant (p-value < 0.005). More details in Table 33.

Figure 34. Prevalence of Uncontrolled Asthma by Chronic Obstructive Pulmonary Disease, 2011-2013

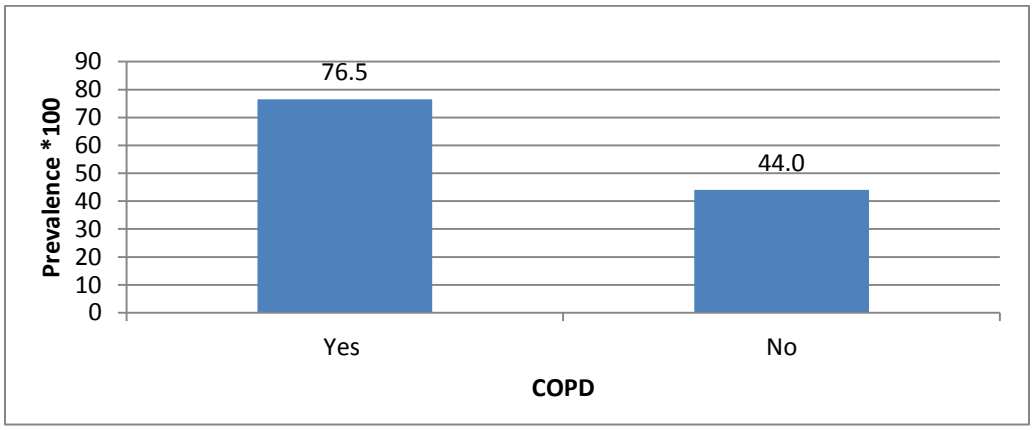


Table 33. Uncontrolled Asthma by Chronic Obstructive Pulmonary Disease, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
COPD					
Yes	76.5(67.4-85.5)	19,651	1.00	0.00	1.00
No	44(39.2-48.9)	223,306	0.28	0.33	< 0.005

Asthma patients who reported having emphysema had a prevalence of 61.6% of uncontrolled asthma (Figure 35). The group who reported not having emphysema had 45% less possibilities of reporting uncontrolled asthma than those with emphysema. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 34.

Figure 35. Prevalence of Uncontrolled Asthma by Emphysema, 2011-2013

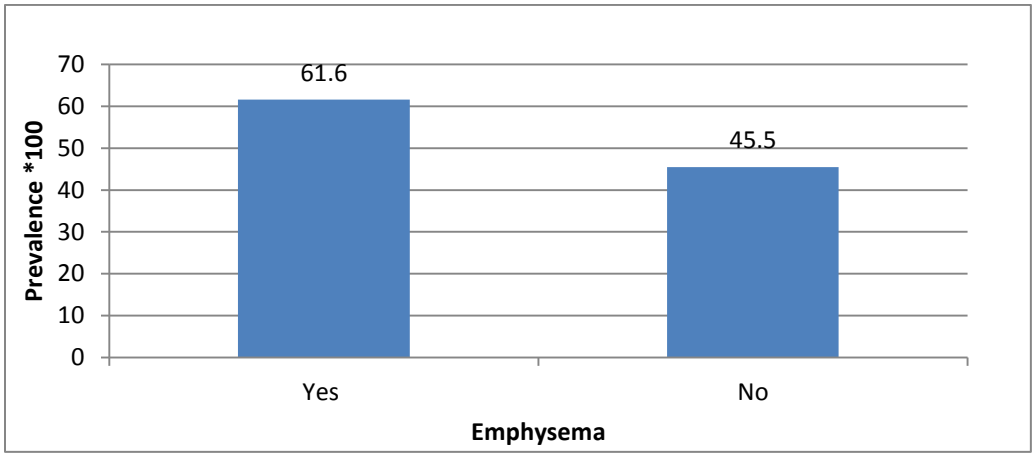


Table 34. Prevalence of Uncontrolled Asthma by Emphysema, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Emphysema					
Yes	61.6(48.4-74.9)	17,747	1.00	0.00	1.00
No	45.5(40.6-50.4)	224,967	0.54	0.33	0.07

Asthma patients who reported having bronchitis had a prevalence of 56.1% of uncontrolled asthma (Figure 36). The group who reported not having bronchitis had 32% less possibilities of reporting uncontrolled asthma than those with bronchitis. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 35.

Figure 36. Prevalence of Uncontrolled Asthma by Bronchitis, 2011-2013

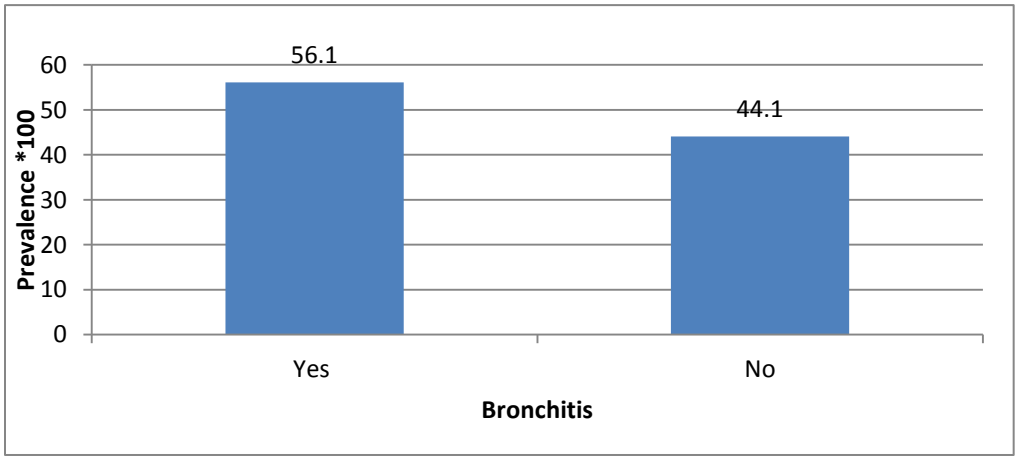


Table 35. Prevalence of Uncontrolled Asthma by Bronchitis, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Bronchitis					
Yes	56.1(47.6-64.6)	50,926	1.00	0.00	1.00
No	44.1(38.9-49.4)	195,748	0.68	0.21	0.08

Figure 37 show that asthma patients with depression had a prevalence of 54.0% of uncontrolled asthma. The group without depression had 4% more possibilities of reporting uncontrolled asthma than those without depression. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 36.

Figure 37. Prevalence of Uncontrolled Asthma by Depression, 2011-2013

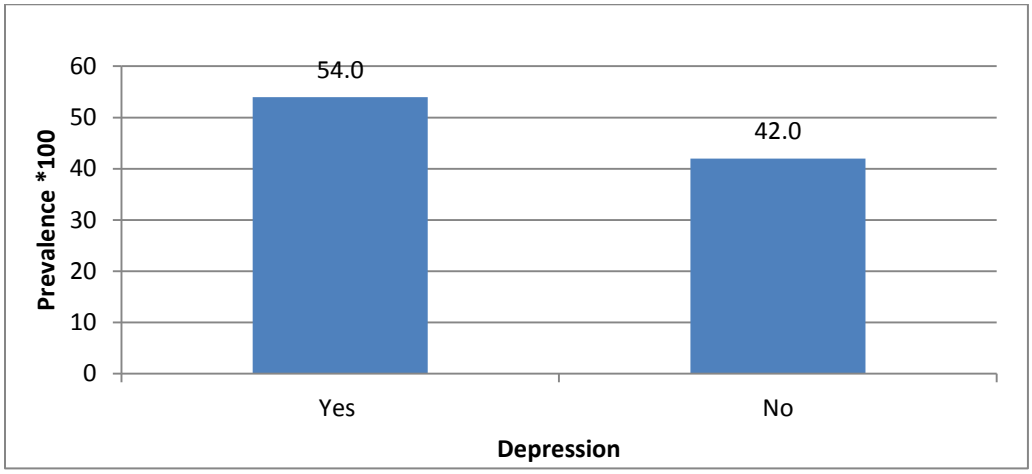


Table 36. Prevalence of Uncontrolled Asthma by Depression, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Depression					
Yes	54(47.3-60.6)	92,167	1.00	0.00	1.00
No	42(35.9-48)	153,998	1.04	0.20	0.81

Figure 38 show that asthma patients who are obese had a prevalence of 50.3% of uncontrolled asthma. The group with obesity had 20% less possibilities (OR=0.80) of reporting uncontrolled asthma than those with normal weight. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 37.

Figure 38. Prevalence of Uncontrolled Asthma by Body Mass Index, 2011-2013

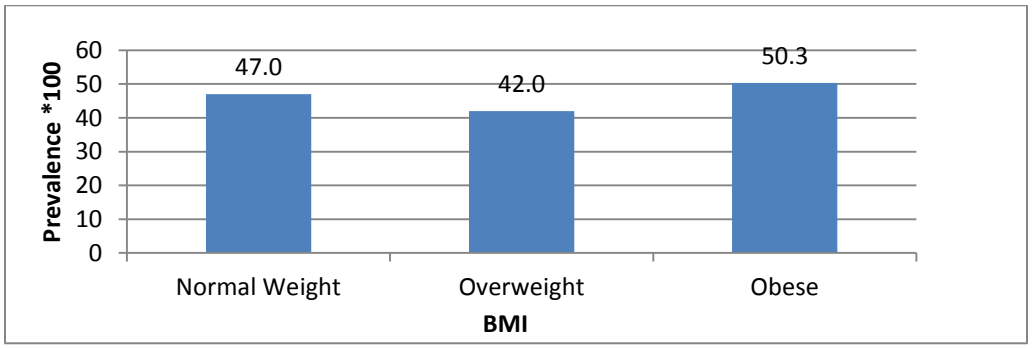


Table 37. Prevalence of Uncontrolled Asthma by Body Mass Index, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
BMI					
Normal Weight	47.0(38.3-55.8)	66,741	1.00	0.00	1.00
Overweight	42.0(33.8-50.1)	75,874	0.80	0.26	0.40
Obese	50.3(43.3-57.3)	98,248	0.93	0.26	0.80

Figure 39 shows that asthma patients who reported being smokers had a prevalence of 51.0% of uncontrolled asthma. The group of non-smokers had 27% less possibilities of reporting uncontrolled asthma than smokers. This difference, however, is not statistically significant (p-value > 0.05). More details in Table 38.

Figure 39. Prevalence of Uncontrolled Asthma by Smoking Status, 2011-2013

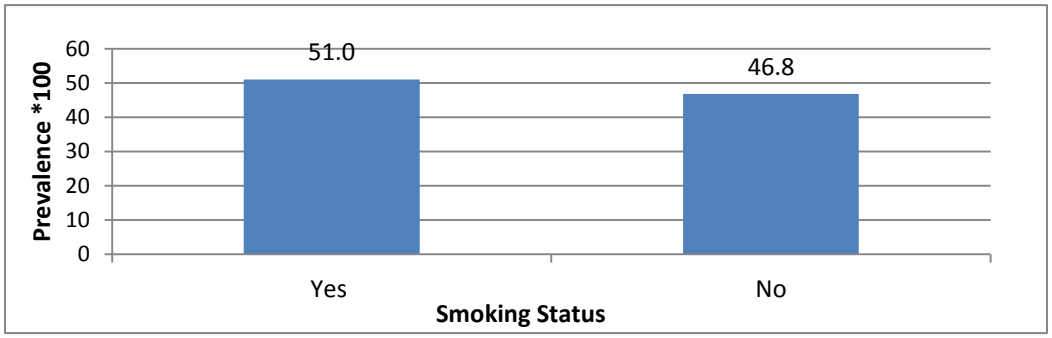


Table 38. Prevalence of Uncontrolled Asthma by Smoking Status, 2011-2013

Variables	Prevalence	Number	OR	OR(SE)	p-value
Smoking Status					
Yes	51(35.6-66.3)	26,892	1.00	0.00	1.00
No	46.8(42.1-51.5)	220,293	0.83	0.32	0.57

Expense in Asthma Control in Puerto Rico

According to utilization data from PR DOH, the total expense in 2013 for Chronic Lower Respiratory Diseases (CLRD), in which asthma is grouped, reached $152,647,938.00. Of these, 77% was covered by health insurances and 23% was covered by the insured person. On average, people with CLRD spent $740 (females spent $820.24 and males spent $623.47). People between 55 and 59 years old spent an average of $1,021 due to CLRD. In addition, PR DOH has reported a total of 168,818 asthma-related hospitalizations due to asthma; while there were 95,827 visits to the ER in 2013. Also, the PR DOH reported that, due to asthma, there were approximately 753,054 visits to Physician's Office.

Health Services Utilization, 2013

Visits to hospitals, to emergency rooms and doctors' offices may be an indicator of asthma severity in the population. The PR Department of Health's Auxiliary Secretariat of Planning and Development uses data from the 2013 Health Insurance Utilization database to help understand how people with asthma are accessing health services. Table 39 shows the number of claims made presenting at least one asthma diagnosis (ICD-09, 493), by health regions and type of encounter.

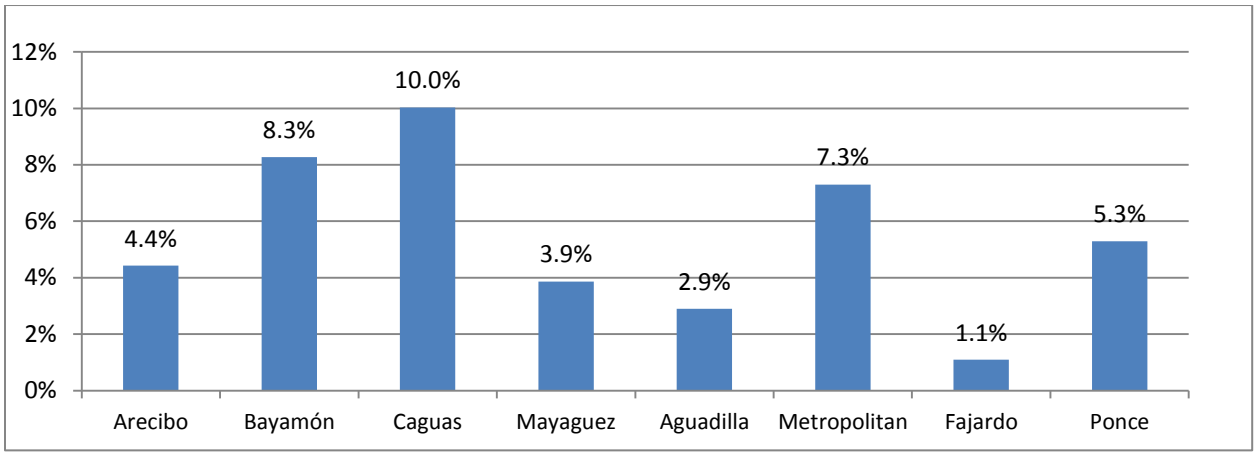
Table 39. Medical Claims due to Asthma in 2013

Health Region	Place of Service		
	Hospital	Emergency Room	Physician's Office and

					Other Outpatient Services	
Arecibo	7,474	4.4%	4,407	4.6%	93,691	12.4%
Bayamón	13,961	8.3%	6,519	6.8%	131,430	17.5%
Caguas	16,927	10.0%	11,044	11.5%	146,889	19.5%
Mayaguez	6,530	3.9%	3,974	4.1%	52,887	7.0%
Aguadilla	4,895	2.9%	2,224	2.3%	57,636	7.7%
Metropolitana	12,320	7.3%	5,155	5.4%	121,382	16.1%
Fajardo	1,852	1.1%	1,716	1.8%	21,387	2.8%
Ponce	8,930	5.3%	6,032	6.3%	64,129	8.5%
Out of Puerto Rico	216	0.1%	4	0.0%	875	0.1%
Unknown	95,713	56.7%	54,752	57.1%	62,748	8.3%
Total	**168,818**	**100.0%**	**95,827**	**100.0%**	**753,054**	**100.0%**

It is notable that more than half of Hospital and Emergency Room visits could not be assigned to any health region (56.7% and 57.1%, respectively). Figure 40 shows the distribution of hospital visits due to asthma by Region. This could affect the interpretation on deciding which Health Region have the highest asthma related health care utilization. One out of every ten visits to hospitals due to Asthma in 2013 was from the Caguas region.

Figure 40. Visits to Hospitals due to Asthma, by Health Region, 2013



According to the PR Department of Health's Assistant Secretariat of Planning and Development, in 2013 there were a total of 168,818 visits to hospitals due to asthma. Figure 41 shows the breakdown of 2013 claims by age groups.

Figure 41. Hospital Visits due to Asthma in 2013

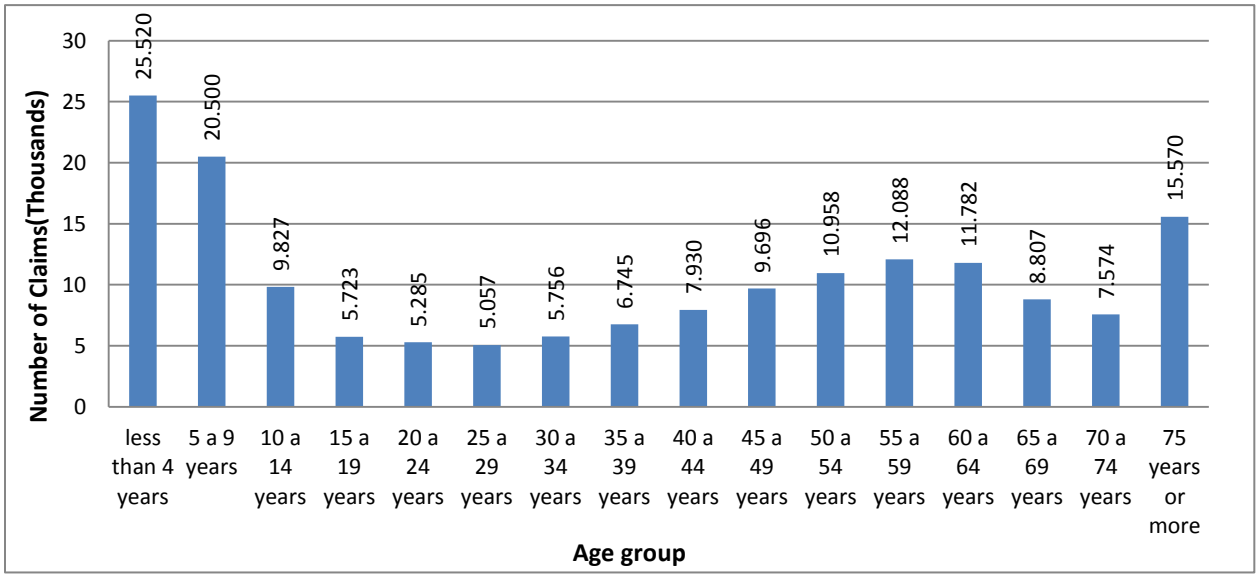


Table 40 shows the distribution of hospital visits due to asthma in 2013 by gender and age groups. There were a total of 168,818 visits to hospitals with at least one Asthma diagnosis. Of these 106,200 (62.9%) were made by females.

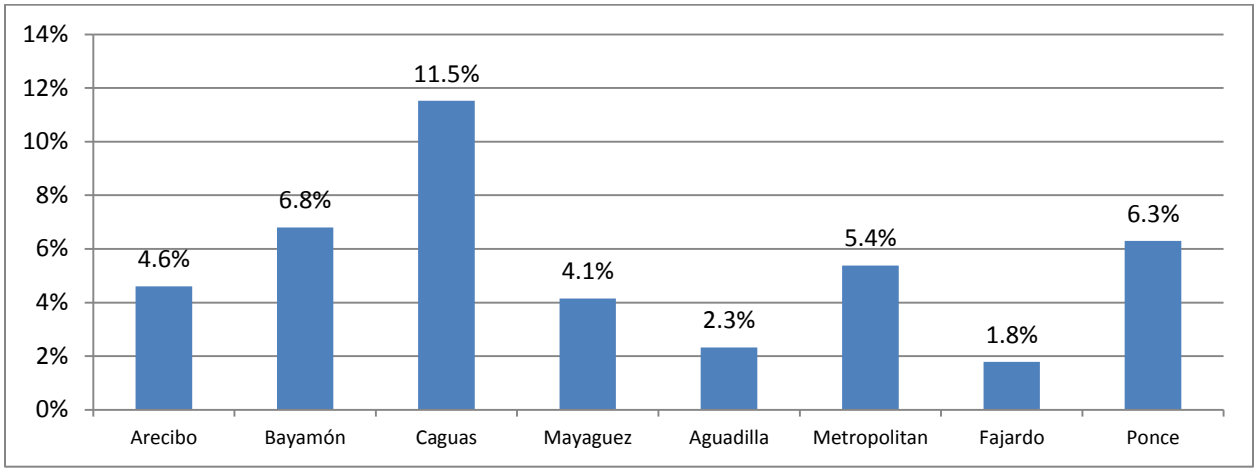
Table 40. Hospital Visits With at Least One Asthma Diagnosis (ICD-09, 493) in 2013, by gender and age groups

Age groups	Females	Males	Total
Younger than 4 years	10,201	15,319	25,520
5 to 9 years	8,859	11,641	20,500
10 to 14 years	4,315	5,512	9,827
15 to 19 years	3,313	2,410	5,723
20 to 24 years	3,537	1,748	5,285
25 to 29 years	3,612	1,445	5,057
30 to 34 years	4,165	1,591	5,756
35 to 39 years	5,181	1,564	6,745
40 to 44 years	6,137	1,793	7,930
45 to 49 years	7,364	2,332	9,696
50 to 54 years	8,318	2,640	10,958
55 to 59 years	9,562	2,526	12,088
60 to 64 years	9,012	2,770	11,782
65 to 69 years	6,507	2,300	8,807
70 to 74 years	5,308	2,266	7,574
75 years or more	10,809	4,761	15,570
Total	**106,200**	**62,618**	**168,818**

Visits to Emergency Rooms

Figure 42 presents the distribution of ER visits with at least one diagnosis of asthma (ICD-09, 493) by health regions. Similar to data from Figure 40, Caguas had the largest group of claims due to asthma (11.5%)

Figure 42. Visits to Emergency Rooms due to Asthma, by Health Region in 2013



According to the PR Department of Health's Assistant Secretariat of Planning and Development, in 2013 there were a total of 95,827 visits to emergency rooms due to asthma. Figure 43 shows the breakdown of 2013 claims by age groups.

Figure 43. Visits to Emergency Rooms due to Asthma, by Age Groups in 2013

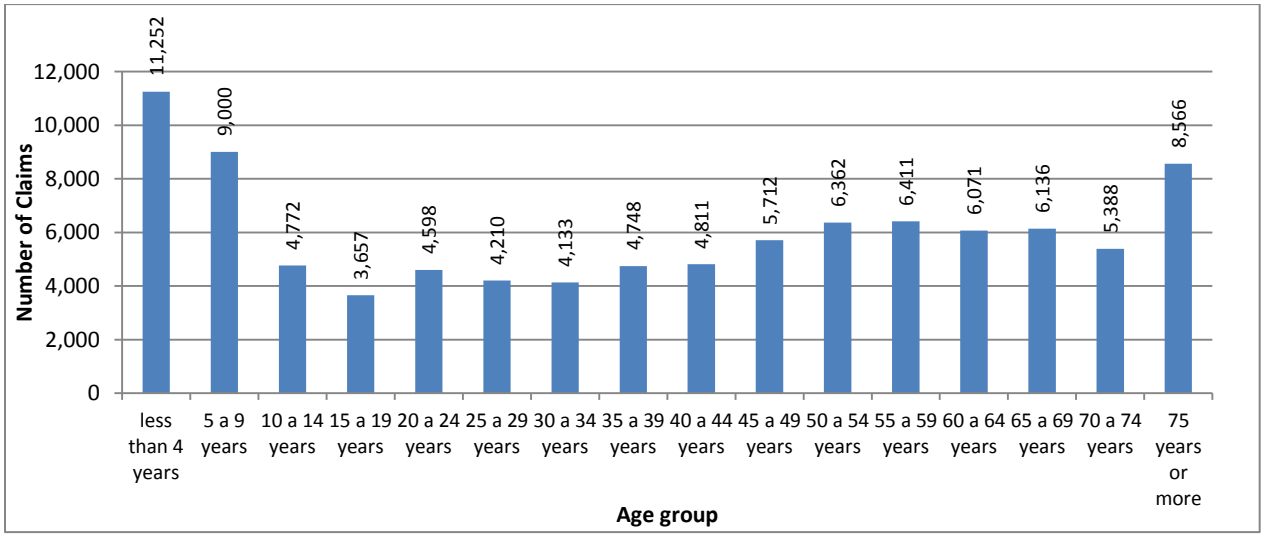


Table 41 shows the distribution of visits to emergency rooms due to asthma in 2013 by gender and age groups. There were a total of 95,827 visits to emergency rooms with at least one Asthma diagnosis. Of these 59,085 (61.7%) were made by females.

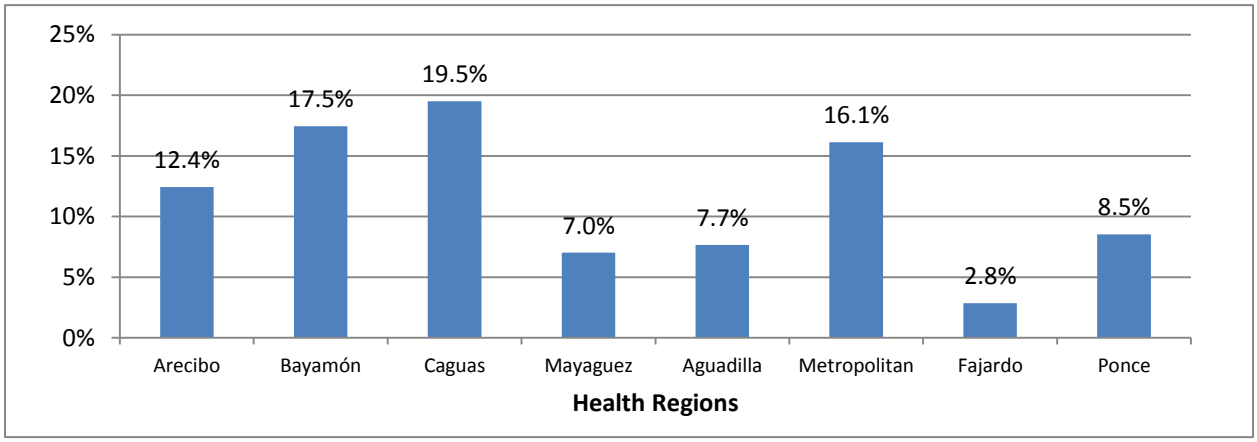
Table 41. Visits to emergency rooms due to Asthma, 2013

Age groups	Females	Males	Total
Younger than 4 years	4,211	7,041	11,252
5 to 9 years	3,656	5,344	9,000
10 to 14 years	2,074	2,698	4,772
15 to 19 years	2,285	1,372	3,657
20 to 24 years	3,041	1,557	4,598
25 to 29 years	2,975	1,235	4,210
30 to 34 years	2,891	1,242	4,133
35 to 39 years	3,440	1,308	4,748
40 to 44 years	3,559	1,252	4,811
45 to 49 years	4,021	1,691	5,712
50 to 54 years	4,691	1,671	6,362
55 to 59 years	4,548	1,863	6,411
60 to 64 years	4,313	1,758	6,071
65 to 69 years	4,132	2,004	6,136
70 to 74 years	3,549	1,839	5,388
75 years or more	5,699	2,867	8,566
Total	**59,085**	**36,742**	**95,827**

Visits to Physicians' Office and Outpatient Services

Figure 44 presents the distribution of visits to physicians' offices and other outpatient services with at least one diagnosis of asthma (ICD-09, 493) by health regions. Similar to data from Figure 40, Caguas had the largest group of these claims due to asthma (19.5%)

Figure 44. Visits to Physicians' Office and other outpatient services due to asthma, 2013



According to the PR Department of Health's Assistant Secretariat of Planning and Development, in 2013 there were a total of 753,054 visits to physicians' offices and other outpatient services due to asthma. Figure 45 shows the breakdown of this type of claims by age groups.

Figure 45. Visits to Physicians Office and other outpatient services due to asthma, 2013

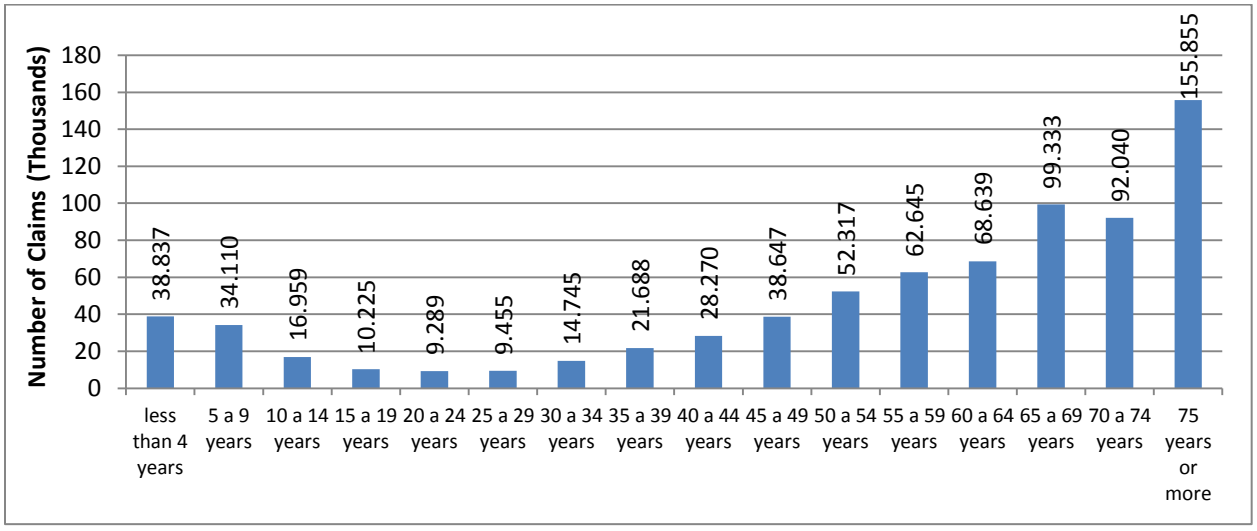


Table 42 shows the distribution of visits to physicians' offices and other outpatient services due to asthma in 2013 by gender and age groups. There were a total of 753,054 visits to physicians' offices and other outpatient services with at least one Asthma diagnosis. Of these 488,228 (64.8%) were made by females.

Table 42. Visits to Physicians' Office and Outpatient Services in 2013, by gender and age group

Age groups	Females	Males	Total
Younger than 4 years	16,238	22,599	38,837
5 to 9 years	15,219	18,891	34,110
10 to 14 years	7,127	9,832	16,959
15 to 19 years	5,682	4,543	10,225
20 to 24 years	5,689	3,600	9,289
25 to 29 years	6,097	3,358	9,455
30 to 34 years	9,884	4,861	14,745
35 to 39 years	14,552	7,136	21,688
40 to 44 years	18,633	9,637	28,270
45 to 49 years	25,583	13,064	38,647
50 to 54 years	35,704	16,613	52,317
55 to 59 years	43,323	19,322	62,645
60 to 64 years	47,195	21,444	68,639
65 to 69 years	68,329	31,004	99,333
70 to 74 years	62,850	29,190	92,040
75 years or more	106,123	49,732	155,855
Total	**488,228**	**264,826**	**753,054**

Remarks

Current asthma

In 2014, approximately 298,155 (10.6%) adults and 117,413 (13.8%) children reported current asthma. Among children, the difference in prevalence by gender is not significant (p-value = 0.34). The difference by gender in adults is significantly different (p-value < 0.001). Being an adult female represents 2.3 times the opportunity of reporting current asthma in Puerto Rico. When looking into other variables, children asthma did not show significant disparities in age, health region, or respondent's household annual income, marital or employment status.

Adult current asthma prevalence remained quite similar among age groups, being those between 55 and 64 years old the group with the highest prevalence (11.3%) more than one out of every ten participants reporting current asthma. Adults with annual income between $35,000 and $49,999 had 17% more possibility of reporting current asthma than people with less than $15,000 annual income. Unmarried couples with a prevalence of 14.1% had 34% (OR = 1.34) greater possibility of reporting current asthma than married couples. The Bayamón health region had the highest prevalence (12.8%) and the greatest possibility of reporting current asthma than the Aguadilla health region (OR = 1.37).

When looking into other variables, adults who reported not engaged in physical activity had a prevalence of 12.5% of current asthma. This represents an increase of 25% in the possibilities of

reporting current asthma when compared to those engaged in physical activity (OR = 1.25). Taking into consideration increases in BMI, being obese (BMI > 30.0) represented 6.22 times the chance of reporting current asthma when compared to participants who reported a BMI lower than 18.5 (p-value < 0.001). Smokers also showed a 48% greater possibility (OR = 1.48) of current asthma than non-smokers (p-value = 0.04). Diabetics had a prevalence of 14.2%, thus having a 48% greater possibility of reporting current asthma than non-diabetics. People with at least one other chronic condition had a prevalence of 15.0%, which represents 2.24 times greater chance of current asthma than participants without any other condition.

Uncontrolled asthma

By 2011-2013, an estimated total of 140,000 (47%) of the adults with current asthma had their condition uncontrolled. Among the socio-demographic variables, we observed that females had 23% less possibility (OR = 0.77) of having uncontrolled asthma when compared to males. This difference was not significant (p-value = 0.32). Analyzing the annual household income, those in the income cluster between $25,000 $49,000 had 4% more possibility (OR = 1.04) of having uncontrolled asthma when compared with the reference group of less than $25,000. This difference was not significant (p-value = 0.91). Separated persons had the greatest prevalence of uncontrolled asthma (61.5%). When compared to married people, however, people who reported never being married had 1.49 times the possibility of having uncontrolled asthma. These differences are not statistically significant (p-value > 0.05). The unemployed had a prevalence of 65.7% of uncontrolled asthma. This group had 3.89 times the possibility of uncontrolled asthma than those who were employed (p-value < 0.001).

The present report addresses additional indicators such as those regarding asthma education and management. A 54.7% of asthma patients who reported not having been taught by a doctor or health care provider how to recognize an asthma attack, have an uncontrolled asthma. This represents 78% more chance (OR = 1.78) of uncontrolled asthma than those who were taught how to recognize the symptoms. Those who haven't been taught what to do during an asthma episode had a 32% greater possibility of having their asthma uncontrolled in contrast to those who have. A 52.8% of asthma patients that use a peak flow meter to adjust their asthma medication had their asthma uncontrolled. Although not significant, adults who have not received and use an asthma action plan have a 21% less possibility (OR= 0.79) of having their asthma uncontrolled when compared with those who don't use an asthma action plan. A 48.3% of asthma patients who have taken a class on Asthma Management have their condition uncontrolled, while 47.1% of those who haven't had their condition uncontrolled (p-value = 0.56).

Experiencing cost barrier to treat asthma can result in an increase of the possibility of having uncontrolled asthma. Patients who can afford a doctor had 62% less possibility of having uncontrolled asthma than those who were unable to afford a doctor. Among those unable to afford asthma specialist 64.4% had their asthma uncontrolled. Those able to afford an asthma specialist had 60% less chances (OR = 0.40) of having uncontrolled asthma than those unable. A 47.0% of people who were unable to afford asthma medicine had uncontrolled asthma. Those who were able had 51.4% prevalence of uncontrolled asthma. This difference is not statistically significant (p-value = 0.88).

Groups with specific comorbidities showed an increased prevalence of uncontrolled asthma. Participants without COPD had 72% less possibilities (OR = 0.28) of uncontrolled asthma when compared to those with this condition. Participants without emphysema had 46% less possibilities (OR = 0.54) of uncontrolled asthma when compared to those without emphysema. Patients without bronchitis have 32% less possibilities (OR = 0.68) of uncontrolled asthma when compared to those without bronchitis. As expected, non-smokers had 27% less possibilities (OR = 0.83) of having uncontrolled asthma than smokers.

The results shown in this report may establish asthma as a condition to be considered as top priority by the public health authorities and policy makers in Puerto Rico. This analysis contributes to increase the understanding of the burden of asthma in Puerto Rico. Advancements in the diagnosis and treatment of the condition have represented a considerable improvement in the past 20 years. However there is a lot of work ahead, since it remains an uncontrolled condition. The disclosed information is part of the effort of the Puerto Rico Asthma Project to provide an update of the state of asthma in our country. The report presents information that can aid in the development of public policy, guide changes in the health care system, monitor population asthma control, enhance educational material, and guide all efforts to target factors of disparities as a way of reducing morbidity and mortality associated with asthma in Puerto Rico.

Summary tables

In this section we present a set of summary tables of current asthma prevalence among adults, as well as children for 2014, and uncontrolled asthma among adults in Puerto Rico for the aggregated years 2011 and 2013. In the tables, we provide all the analysis conducted in this report for an easy and quick preparation of other documents or reference. For the interpretation of each result, please refer to the corresponding section in the document.

Current asthma

Table 43. Adult Current Asthma Summary Table

Variables	Prevalence	Number	OR	OR(SE)	p-value
Gender					
Male	7.3 (6.0-8.7)	96,754	1.00	0.00	1.00
Female	13.4 (12.1-14.8)	201,401	2.30	2.30	< 0.001
Age group					
18-24	10.1 (7.1-13.2)	38,262	1.00	0.00	1.00
25-34	11.1 (8.5-13.8)	53,617	1.05	0.29	0.86
35-44	11.0 (8.5-13.6)	52,550	1.14	0.30	0.66
45-54	10.5 (8.2-12.8)	50,575	0.93	0.30	0.81
55-64	11.3 (9.0- 13.7)	49,701	0.85	0.31	0.62
65 or more	9.5 (7.9-11.0)	53,449	0.70	0.35	0.33
Level of Education					
Some high school	11.1 (9.1-13.2)	85,136	1.00	0.00	1.00
High school graduate	9.1 (7.2-10.9)	67,554	0.76	0.17	0.13
Some college	10.9 (9.0-12.9)	51,522	0.93	0.18	0.73
College graduate	11.2 (9.4-13.0)	92,635	1.06	0.19	0.74
Annual Income					
less than $15,000	11.7 (10.0-13.3)	134,338	1.00	0.00	1.00
15,000-24,999	11.3 (9.2-13.5)	63,810	1.01	0.15	0.92
25,000-34,999	8.6 (5.6-11.6)	18,746	0.80	0.23	0.34
35,000-49,999	12.1 (8.2-16.1)	21,892	1.17	0.23	0.50
50,000 or more	6.8 (3.7-9.9)	12,376	0.64	0.30	0.14
Marital Status					
Married	10.0 (8.6-11.3)	105,968	1.00	0.00	1.00
Divorced	11.5 (8.7-14.3)	40,878	0.94	0.18	0.73
Widowed	8.6 (6.2-11.0)	23,903	0.66	0.22	0.06
Separated	10.1 (5.8-14.5)	13,415	0.85	0.28	0.57
Never Married	10.4 (8.3-12.5)	72,459	1.06	0.18	0.73
Unmarried Couple	14.1 (10.1-18.0)	37,846	1.34	0.21	0.17
Employment Status					
Employed	8.8 (7.3-10.3)	97,120	1.00	0.00	1.00
Out of work	8.8 (6.0-11.5)	25,822	0.97	0.23	0.89
Homeworker	12.0 (9.6-14.3)	58,495	1.18	0.19	0.37
Student	14.0 (9.1-19.0)	25,693	1.84	0.32	0.06
Retired	9.9 (8.1-11.6)	51,227	1.66	0.22	0.02
Unable to work	18.8 (14.4-23.3)	38,223	3.18	0.22	< 0.001
Health Region					
Aguadilla	9.9 (7.4-12.3)	44,211	1.00	0.00	1.00
Arecibo	11.1 (8.5-13.8)	39,328	1.11	0.21	0.61
Bayamón	12.8 (10.0-15.7)	51,586	1.37	0.21	0.13

Variables	Prevalence	Number	OR	OR(SE)	p-value
Caguas	10.9 (8.5-13.3)	50,376	1.17	0.21	0.44
Fajardo	8.2 (4.4-12.1)	8,140	0.79	0.32	0.47
Metro	11.6 (9.4-13.8)	64,804	1.26	0.20	0.25
Ponce	7.9 (5.6-10.2)	34,685	0.82	0.23	0.41
Mayagüez	10.6 (10.4-10.7)	26,248	0.84	0.02	< 0.001
Exercise					
Yes	9.3 (8.1-10.5)	155,283	1.00	0.00	1.00
No	12.5 (10.8-14.1)	142,872	1.25	0.12	0.06
BMI					
Underweight	5.8 (1.4-10.1)	3,428	1.00	0.00	1.00
Normal weight	7.7 (6.1-9.3)	65,679	2.64	0.54	0.07
Overweight	9.0 (7.5-10.5)	90,514	3.37	0.53	0.02
Obese	16.6 (14.4-18.8)	125,914	6.22	0.53	< 0.001
Smoker					
No	10.4 (9.4-11.4)	254,947	1.00	0.00	1.00
Yes	12.5 (9.2-15.9)	39,103	1.48	0.19	0.04
Diabetes Diagnosis					
No	9.9 (8.8-10.9)	234,379	1.00	0.00	1.00
Yes	14.2 (11.7-16.7)	62,801	1.48	0.19	0.04
Any Chronic Condition					
No	9.2 (8.1-10.2)	197,035	1.00	0.00	1.00
One or more	15.0 (12.8-17.2)	101,120	2.24	0.19	< 0.001

Table 44. Children Current Asthma Summary Table

Variables	Prevalence	OR	OR(SE)	p-value
Gender				
Male	13.9 (10.9-16.9)	1.00	0.00	1.00
Female	13.6 (10.5-16.7)	1.36	0.33	0.34
Age group				
0-4	11.0 (6.8-15.2)	1.00	0.00	1.00
5-9	20.1 (14.6-25.5)	1.89	0.48	0.18
10-14	14.6 (10.9-18.4)	0.74	0.45	0.52
15-17	9.5 (5.9-13.0)	0.45	0.49	0.11
Health Region				
Aguadilla	14.8 (6.9-22.8)	1.00	0.00	1.00
Arecibo	14.3 (8.3-20.2)	0.54	0.77	0.43
Bayamón	20.8 (14.2-27.5)	0.68	0.74	0.61
Caguas	17.0 (11.6-22.3)	1.41	0.74	0.64
Fajardo	14.0 (3.9-24.2)	0.56	0.91	0.52
Metro	8.6 (4.9-12.2)	0.34	0.76	0.16
Ponce	10.1 (4.2-16.0)	0.86	0.79	0.85
Mayagüez	11.2 (5.7-16.7)	0.51	0.81	0.42
Household Income				

Variables	Prevalence	OR	OR(SE)	p-value
less than $15,000	14.8 (6.9-22.8)	1.00	0.00	1.00
15,000-24,999	14.3 (8.3-20.2)	0.76	0.40	0.50
25,000-34,999	15.4 (8.9-22.0)	1.09	0.64	0.88
35,000-49,999	15.4 (8.8-22.2)	0.87	0.58	0.81
50,000 or more	9.8 (4.5-15.0)	1.35	0.69	0.66
Marital Status				
Married	15.9 (12.5-19.3)	1.00	0.00	1.00
Divorced	12.0 (6.3-17.8)	1.19	0.55	0.75
Widowed	5.0 (0.0-11.0)	2.47	1.18	0.44
Separated	9.8 (1.3-18.4)	2.12	0.73	0.30
Never Married	10.7 (6.7-14.8)	0.76	0.48	0.58
Unmarried Couple	15.5 (9.5-21.5)	0.97	0.46	0.95
Employment Status				
Employed	13.3 (10.4-16.2)	1.00	0.00	1.00
Homemaker	11.8 (6.4-17.2)	0.83	0.54	0.73
Unemployed	15.0 (10.0-20.0)	0.74	0.42	0.48
Retired	10.0 (3.3-16.7)	1.13	0.89	0.88
Student	10.0 (2.3-17.5)	2.26	0.76	0.28
Unable to work	23.3 (12.0-34.7)	1.28	0.60	0.68

Uncontrolled asthma

In this section we present a set of summary tables of uncontrolled asthma among adults in Puerto Rico for the aggregated years 2011-2013. In the tables, we provide all the analysis conduct in this report for an easy and quick preparation of other documents or reference. For the interpretation of each result, please refer to the corresponding section in the document.

Table 45. Uncontrolled Asthma Summary Tables

Variables	Prevalence	OR	OR(SE)	p-value
Age group				
18-34	30.9(20.7-41.1)	1.00	0.00	1.00
35-64	53.0(47.0-58.9)	3.69	0.41	0.00
65 and over	53.4(47.0-59.8)	2.72	0.49	0.04
Gender				
Males	47.5(38.4-56.6)	1.00	0.00	1.00
Females	47.1(42.1-52.2)	0.77	0.26	0.32
Educational Level				
Less than High School	56.5(48.7-64.3)	1.00	0.00	1.00
High School Graduate	55.9(45.9-65.9)	1.04	0.29	0.87
Some College	38.9(30.4-47.5)	0.59	0.31	0.09
College Graduate	33.5(24.8-42.2)	0.45	0.38	0.04
Household Income				

Variables	Prevalence	OR	OR(SE)	p-value
Less than $25,000	49.3(44.0-54.6)	1.00	0.00	1.00
$25,000 - $49,999	35.6(22.5-48.6)	1.04	0.38	0.91
$50,000 or more	29.2(10.3-48.1)	0.91	0.46	0.85
Marital Status				
Married	45.3(38.9-51.7)	1.00	0.00	1.00
Divorced	49.1(36.4-61.7)	0.93	0.28	0.79
Widowed	60.5(50.7-70.3)	1.38	0.28	0.25
Separated	61.5(43.7-79.4)	0.98	0.46	0.96
Never Married	36.5(25.5-47.4)	1.49	0.40	0.32
Unmarried couple	49.5(31.2-67.8)	1.38	0.46	0.47
Employment Status				
Employed	34.3(25.1-43.5)	1.00	0.00	1.00
Unemployed	65.7(47.7-83.6)	3.89	0.48	0.00
Homemaker	50.4(42.2-58.7)	1.17	0.35	0.64
Student	24.6(9.2-40.1)	0.92	0.69	0.91
Retired	53.4(45.7-61.1)	1.55	0.33	0.18
Unable to work	59.7(48.5-70.8)	1.75	0.35	0.11
Recognize Symptoms				
Yes	42.7 (36.8-48.6)	1.00	0.00	1.00
No	54.7 (47.8-61.6)	1.78	0.25	0.02
Knows what to do during Attack				
Yes	45.8 (40.0-51.6)	1.00	0.00	1.00
No	50.8 (43.5-58.1)	1.32	0.23	0.22
Peak Flow Usage				
Yes	52.8 (44.7-60.9)	1.00	0.00	1.00
No	45.0 (39.5-50.4)	0.7	0.23	0.12
Use of Asthma Action Plan				
Yes	50.7 (42.4-59.1)	1.00	0.00	1.00
No	45.6 (40.2-51.1)	0.79	0.24	0.34
Have taken a Class on Asthma Management				
Yes	48.3 (33.4-63.2)	1.00	0.00	1.00
No	47.1 (42.4-51.8)	0.82	0.33	0.56
Couldn't Afford a Doctor				
Yes	66.8 (53.4-80.2)	1.00	0.00	1.00
No	45.9 (41.2-50.7)	0.38	0.32	0.00
Couldn't Afford an Asthma Specialist				
Yes	64.4 (48.9-79.8)	1.00	0.00	1.00
No	45.9 (41.2-50.6)	0.40	0.33	0.00
Couldn't Afford Asthma Medicine				
Yes	47.0 (42.4-51.5)	1.00	0.00	1.00
No	51.4 (28.8-74.0)	1.08	0.58	0.88
COPD				

Variables	Prevalence	OR	OR(SE)	p-value
Yes	76.5(67.4-85.5)	1.00	0.00	1.00
No	44.0(39.2-48.9)	0.28	0.33	0.00
Emphysema				
Yes	61.6(48.4-74.9)	1.00	0.00	1.00
No	45.5(40.6-50.4)	0.54	0.33	0.07
Bronchitis				
Yes	56.1(47.6-64.6)	1.00	0.00	1.00
No	44.1(38.9-49.4)	0.68	0.21	0.08
Depression				
Yes	54.0(47.3-60.6)	1.00	0.00	1.00
No	42.0(35.9-48.0)	1.04	0.20	0.81
BMI				
Normal Weight	47.0(38.3-55.8)	1.00	0.00	1.00
Overweight	42.0(33.8-50.1)	0.80	0.26	0.40
Obese	50.3(43.3-57.3)	0.93	0.26	0.80
Smoking Status				
Yes	51.0(35.6-66.3)	1.00	0.00	1.00
No	46.8(42.1-51.5)	0.83	0.32	0.57

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