PUERTO RICO ASTHMA Surveillance System Report 2018-2021

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DEPARTAMENTO DE SALUD

GOBIERNO DE PUERTO RICO

Puerto Rico Asthma Program

Puerto Rico Asthma Surveillance System Report 2018-2021

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Executive summary

This report produced by the Asthma Program of the Health Promotion Division of the Auxiliary Secretariat of Family Health, Integrated Services and Health Promotion of the Department of Health of Puerto Rico presents epidemiological information regarding the prevalence, mortality, visits to the emergency department, and hospitalizations for asthma in the period of 2018 to 2021. Through this, it is intended to provide the updated epidemiological profile of this disease in Puerto Rico. The epidemiologic measures discussed throughout this report include the crude prevalence of lifetime and current asthma. In addition, the crude prevalence of uncontrolled asthma in people with current asthma.[1] In terms of asthma-related health care: the crude emergency department visits and the asthma hospitalizations rate as the first diagnosis claimed to all the public and most private health insurers. Finally, the crude and age-adjusted asthma mortality rate.[1]

- **Lifetime and current asthma**
  - Adults aged 18 years or older:
    - For 2020, the crude prevalence of lifetime asthma among adults was 16.52% (95% CI: 14.92, 18.24), and for current asthma was 10.39% (95% CI: 8.98, 11.99).[2] This means that about 1 out of 6 adults had lifetime asthma, and 1 out of 10 had current asthma.[2]
    - For lifetime asthma, people with 18 to 24 years of age (18.26%; 95% CI: 14.34, 22.97) presented the highest prevalence for 2020. Also, females (18.60%; 95% CI: 16.55, 20.84) and those who belonged to the Arecibo health region (23.75%; 95% CI: 16.53, 32.87).[2]

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[1]Refer to "Appendix 2. Methodology" for more information.

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

        - For current asthma, adults with 55 to 64 years of age (11.93%; 95% CI: 9.48, 14.91) appeared to have the highest prevalence for 2020. In addition, females (12.17%; 95% CI: 10.35, 14.26) and those who belonged to the Arecibo health region (17.28%; 95% CI: 10.37, 27.37).[2]
    - Children and adolescents from 0 to 17 years:
        - The crude prevalence of lifetime asthma among children and adolescents for 2018-2020 was 20.69% (95% CI: 19.27, 22.18), and for current asthma was 12.18% (95% CI: 11.04, 13.42).[2] This means that about 1 out of 5 children and adolescents had lifetime asthma, and 1 out of 8 had current asthma.[2]
        - For lifetime asthma, children of 5 to 9 years of age (25.29%; 95% CI: 22.27, 28.58) presented the highest prevalence for the 2018-2020 period. Also, boys (22.92%; 95% CI: 20.86, 25.12) and who belonged to the Arecibo health region (28.57%; 95% CI: 24.39, 33.38).[2]
        - For current asthma, children of 5 to 9 years of age (15.95%; 95% CI: 13.50, 18.75) appeared to have the highest prevalence for the 2018-2020 period. In addition, boys (12.68%; 95% CI: 11.10, 14.45) and who belonged to the Arecibo health region (18.10%; 95% CI: 14.57, 22.25).[2]
- **Uncontrolled asthma in people with current asthma**
    - Adults aged 18 years or older:
        - For the 2018-2020 period, 59.58% (95% CI: 54.17, 64.77) of adults with current asthma had uncontrolled asthma.[2] This represents that about 3 out of 5 adults with current asthma had their asthma uncontrolled.[2]

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

        - In terms of age, adults with 65 years or older (68.85%; 95% CI: 58.81, 77.38) appeared to have the highest prevalence of uncontrolled asthma for the 2018-2020 period. In addition, from the point of view of the sociodemographic characteristics of sex, males (64.66%; 95% CI: 53.90, 74.11) presented the highest prevalence for that period.[2]
    - Children and adolescents from 0 to 17 years:
        - For the 2018-2020 period, 40.94% (95% CI: 30.92, 51.77) of the children and adolescents with current asthma had uncontrolled asthma.[2,3]This represents that about 2 out of 5 children and adolescents with current asthma had their asthma uncontrolled.[2,3]
        - Regarding the age, children of 0 to 9 years of age (49.55%; 95% CI: 34.93, 64.25) presented the highest prevalence of uncontrolled asthma for the 2018-2020 period.[3] Also, from the point of view of the sociodemographic characteristics of sex, boys (44.33%; 95% CI: 30.85, 58.70) appeared to have the highest prevalence for that period.[2,3]
- **Asthma emergency department visits**
    - Children and adults of all ages:
        - The crude rate of emergency department visits for asthma as the first diagnosis for 2021 in children and adults claimed to all the public and most private health insurers was 85.34 (95% CI: 84.33, 86.34) emergency department visits claimed per 10,000 persons.[2,4]

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[3]"Caution should be taken when interpreting the measures discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

[4]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables.

        - For age group, the rate for 2021 was higher for individuals aged 80 to 84 years (148.23 [95% CI: 140.73, 155.74] emergency department visits claimed per 10,000 of that age group).[4] Also, the rate appeared to be higher for females (88.55 [95% CI: 87.15, 89.96] emergency department visits claimed per 10,000 females) and the Caguas health region (107.86 [95% CI: 105.05, 110.68] per 10,000 persons from that region).[2,4]

- **Asthma hospitalizations**
    - Children and adults of all ages:
        - The crude rate of hospitalizations for asthma as the first diagnosis for 2021 in children and adults claimed to all the public and most private health insurers was 20.71 (95% CI: 20.22, 21.21) hospitalizations claimed per 10,000 persons.[2,4]
        - For age group, the rate for 2021 was higher for individuals under 5 years (90.01 [95% CI: 84.26, 95.75] hospitalizations claimed per 10,000 persons of that age group).[4] In addition, the rate appeared to be higher for females (22.36 [95% CI: 21.65, 23.07] hospitalizations claimed per 10,000 females) and the Arecibo health region (36.28 [95% CI: 34.43, 38.12] per 10,000 persons from that region).[2,4]
- **Asthma mortality**
    - Children and adults of all ages:
        - The crude mortality rate for 2021 was 26.04 (95% CI: 20.51, 31.58) deaths per 1,000,000 persons.[2] Also, the age-adjusted asthma mortality rate for that year was 16.05 (95% CI: 12.64, 19.47) deaths per 1,000,000 persons (Standard population: United States 2000).

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[4]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables.

- In terms of age, the rate for 2021 was higher individuals with 65 years or older (79.68 [95% CI: 59.35, 100.01] deaths per 1,000,000 of that age group). In addition, from the point of view of the sociodemographic characteristics of sex, females (26.18 [95% CI: 18.53, 33.83] deaths per 1,000,000 females) presented the highest rate for that year.[2]

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Introduction

According to the World Health Organization (WHO, 2022), asthma is considered one of the main chronic diseases affecting pediatric and adult populations. In addition, it is "...the most common chronic disease among children" (WHO, 2022, Key facts section, para. 1). This lung-type disease causes difficulty in getting air in and out of the lungs because the airways often become inflamed (swollen). The most common symptoms of this disease are wheezing, frequent coughing, shortness of breath, and tightness in the chest (American Lung Association [ALA], 2022; 2023). Also, the severity of this disease is classified as intermittent, persistent mild, persistent moderate, and persistent severe (National Heart, Lung, and Blood Institute [NHLBI], 2007).

It is important to emphasize that asthma, being chronic disease, cannot be cured, but it can be controlled. For this reason, it is necessary to follow the treatment indicated by the physician since, if it is not treated, it can be serious and even end up causing death (ALA, 2022; 2023). In other words, if the person diagnosed with asthma follows the appropriate treatment, this will result in fewer emergency department visits, hospitalizations, and mortality.

According to the "GBD 2019 Diseases and Injuries Collaborators" (2020), for the year 2019, it was estimated that 262 (95% CI: 224, 309) million people of all ages had asthma worldwide. In addition, around 455,000 deaths occurred during that same year from this disease (WHO, 2022). For the United States, according to the Centers for Disease Control and Prevention (CDC, 2015), the crude median prevalence of current asthma for 2020 in adults 18 years and older was 9.6% (all states and D.C.). This means that around 12 out of 125 people for that year had current asthma. In addition, for that same year, there were 4,145 deaths from asthma, and the crude mortality rate for that same year was 1.3 deaths (95% CI: 1.2, 1.3) per 100,000 people, which means that around 1 death from this disease occurred per 100,000 people (CDC, 2023a).

In the case of Puerto Rico, this report will present epidemiological information regarding the prevalence, visits to the emergency department, hospitalizations, and mortality for this disease. In addition, it will present the report's main objective, a discussion of the results, a general conclusion, the references used, the tables with all the results, and the methodology.

Main objective

The main objective of this report is to provide an update on the burden that asthma represents in terms of prevalence, emergency department visits, and hospitalizations, and mortality in the Puerto Rican population. This will allow the identification of vulnerable groups in which the efforts of the services related to managing and controlling this disease can be directed.

Results

The epidemiologic measures discussed throughout this report include the crude prevalence of lifetime and current asthma. In addition, the crude prevalence of uncontrolled asthma in people with current asthma. In terms of asthma-related health care: the crude emergency department visits and the asthma hospitalizations rate as the first diagnosis claimed to all the public and most private health insurers. Finally, the crude and age-adjusted asthma mortality rate **(Table 1).**

Lifetime and current asthma

Behavioral Risk Factor Surveillance System (BRFSS)

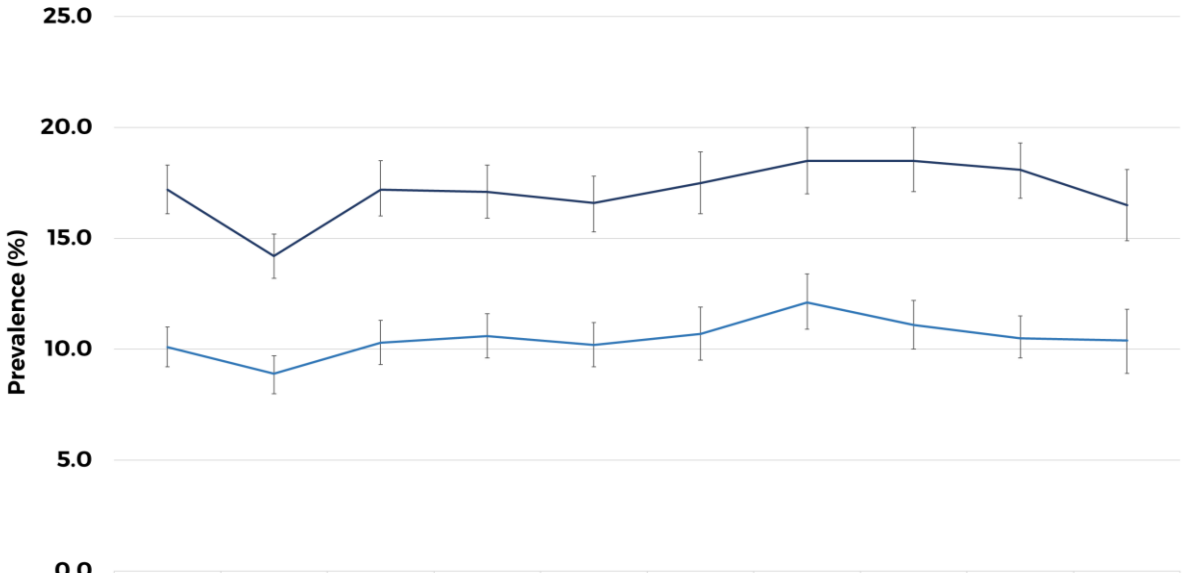
2018-2020

Lifetime and current asthma

Trends in the crude prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020

Regarding the crude prevalence of lifetime and current asthma among adults 18 years or older from 2011 to 2020 in Puerto Rico, it was observed that the prevalence was usually greater than 16.0% for lifetime asthma and greater than 10.0% for current asthma, except for the year 2012 where the results reflected certain changes in the survey methodology made in 2011 due to the change in the weighting methodology and the addition of participants who responded by cell phone (CDC, 2022d; 2022e) **(Figure 1).**[2]

Figure 1. *Trends in the crude prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020.*[1]



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
—PR-Lifetime	17.2	14.2	17.2	17.1	16.6	17.5	18.5	18.5	18.1	16.5
—PR-Current	10.1	8.9	10.3	10.6	10.2	10.7	12.1	11.1	10.5	10.4

[1]***Notes***. PR = Puerto Rico. Data source: Behavioral Risk Factor Surveillance System (BRFSS) and Centers for Disease Control and Prevention (CDC, 2022d). The total sample for all the years (n) for Puerto Rico lifetime = 56,359, and Puerto Rico current = 56,348.

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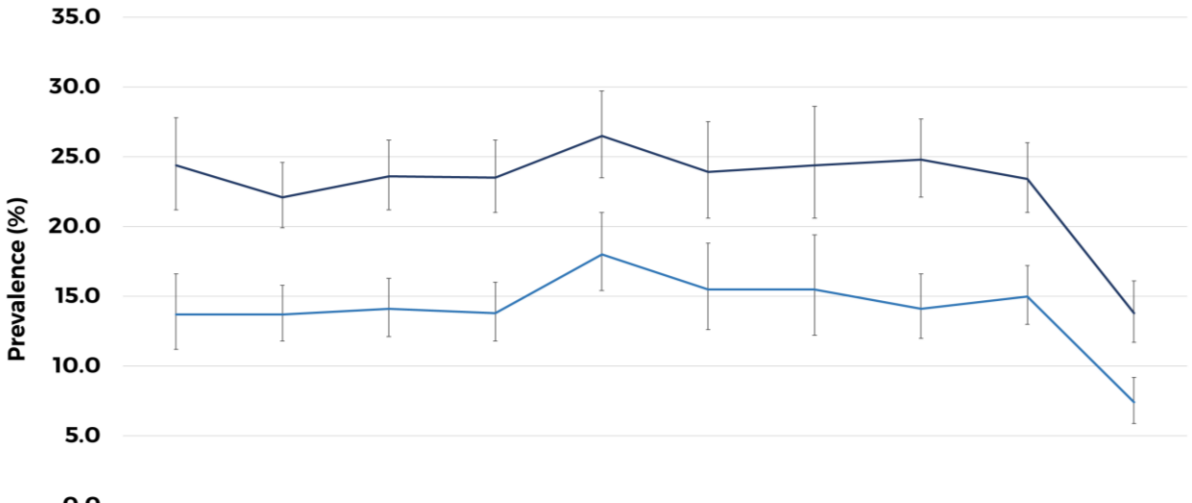
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Trends in the crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico for 2011-2020

In terms of the crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years from 2011 to 2020 in Puerto Rico, it was observed that the prevalence was usually greater than 22.0% for lifetime asthma and greater than 13.0% for current asthma, except for the year 2020. This could be because "thirty-two states, DC, and Puerto Rico were unable to close out their 2020 sample by December 31, 2020 and continued data collection into early 2021" (CDC, 2021b p. 3; 2022d). Also, another possible factor that could support this was the COVID-19 pandemic **(Figure 2).**[2]

Figure 2. *Trends in the crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico for 2011-2020.*[1]



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
—PR-Lifetime	24.4	22.1	23.6	23.5	26.5	23.9	24.4	24.8	23.4	13.8
—PR-Current	13.7	13.7	14.1	13.8	18.0	15.5	15.5	14.1	15.0	7.4

[1]***Notes***. PR = Puerto Rico. Data source: Behavioral Risk Factor Surveillance System (BRFSS) and Centers for Disease Control and Prevention (CDC, 2022d). The total sample for all the years (n) for Puerto Rico lifetime = 13,218, and Puerto Rico current = 13,208.

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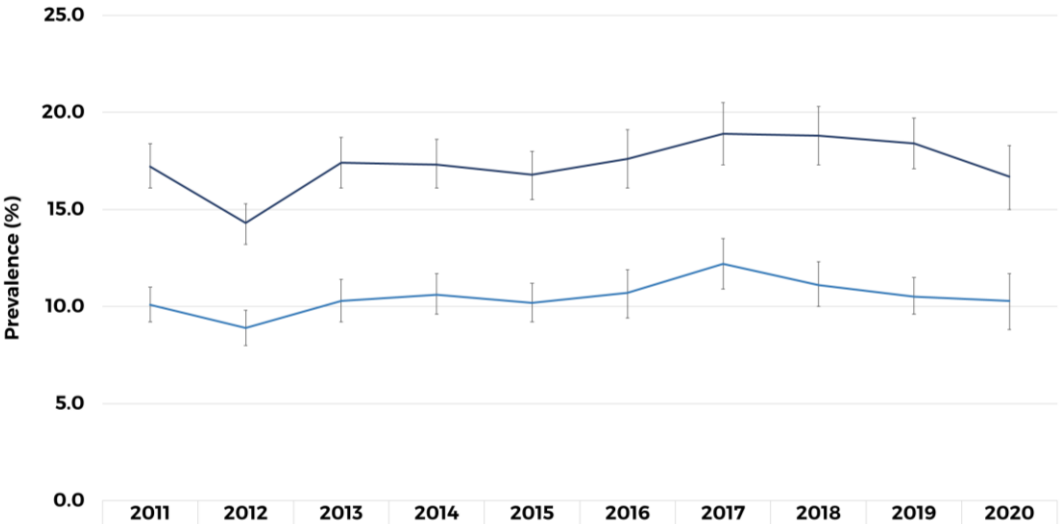
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Trends in the age-adjusted prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020

Regarding the age-adjusted prevalence (Standard population: United States 2000) of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020, it was observed that the prevalence was usually greater than 16.0% for lifetime asthma and greater than 10.0% for current asthma, except for the year 2012 where the results reflected certain changes in the survey methodology made in 2011 due to the change in the weighting methodology and the addition of participants who responded by cell phone (CDC, 2015; 2022e) **(Figure 3).**

Figure 3. *Trends in the age-adjusted prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020.*[1]



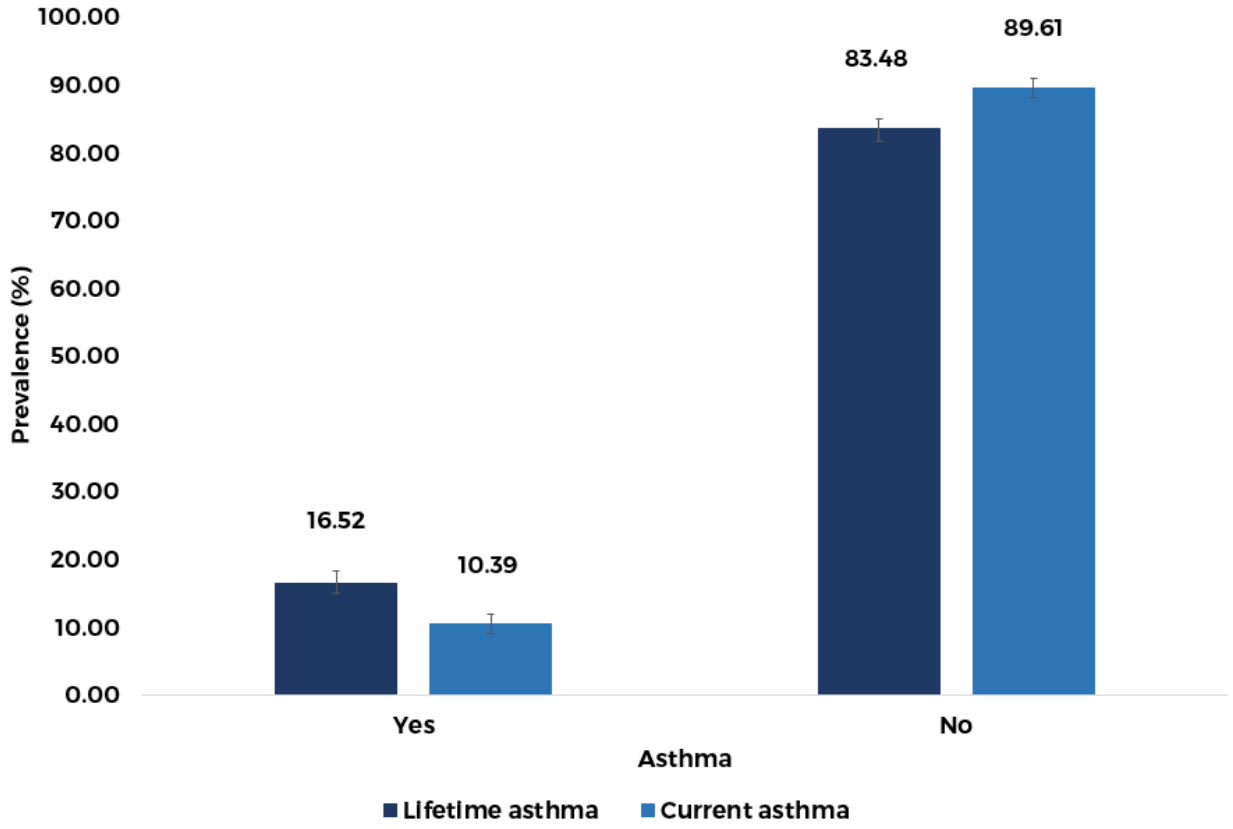
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PR-Lifetime (age-adjusted)	17.2	14.3	17.4	17.3	16.8	17.6	18.9	18.8	18.4	16.7
PR-Current (age-adjusted)	10.1	8.9	10.3	10.6	10.2	10.7	12.2	11.1	10.5	10.3

[1]***Notes.*** PR = Puerto Rico. Data source: Behavioral Risk Factor Surveillance System (BRFSS) and Centers for Disease Control and Prevention (CDC, 2015). Standard population: United States 2000. The total sample for all the years (n) for Puerto Rico lifetime (age-adjusted) = 9,616, and Puerto Rico current (age-adjusted) = 5,937.

Crude prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2020

For 2020, the crude prevalence of lifetime asthma among adults aged 18 years or older was 16.52% (95% CI: 14.92, 18.24), and for current asthma was 10.39% (95% CI: 8.98, 11.99).[2] This means that about 1 out of 6 adults had lifetime asthma, and 1 out of 10 had current asthma **(Table 2; Figure 4).**[2]

Figure 4. *Crude prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma yes = 825, lifetime asthma no = 4,111, current asthma yes = 515, and current asthma no = 4,421. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

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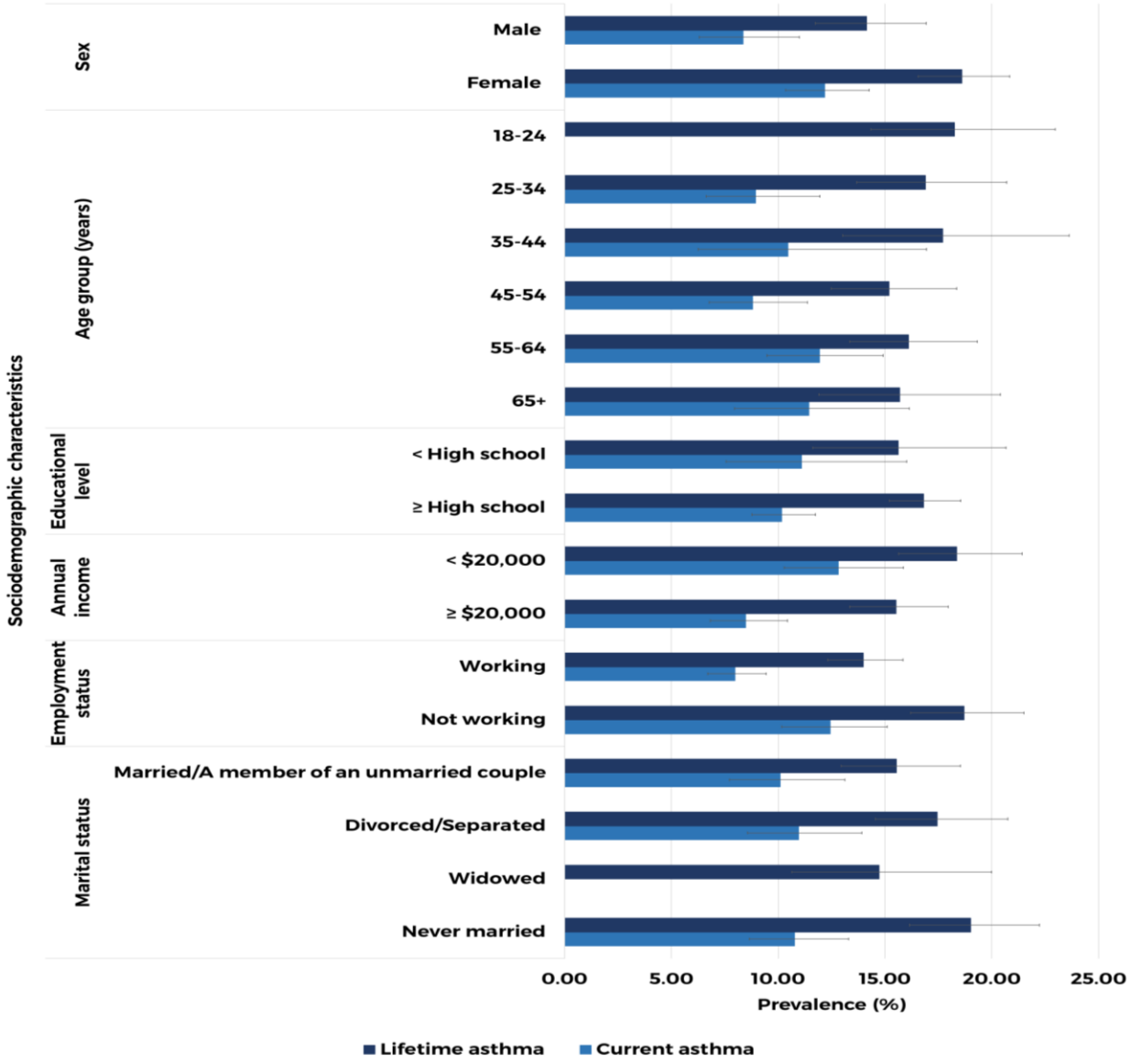
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

In terms of the sociodemographic characteristics for lifetime asthma among adults aged 18 years or older, people 18 to 24 years of age (18.26%; 95% CI: 14.34, 22.97) presented the highest prevalence for 2020. Also, females (18.60%; 95% CI: 16.55, 20.84), individuals with a high school education level or more (16.80%; 95% CI: 15.20, 18.54), persons with an annual income less than $20,000 (18.35%; 95% CI: 15.63, 21.43), who do not work (18.71%; 95% CI: 16.21, 21.50), who were not married (19.01%; 95% CI: 16.16, 22.24), and who belonged to the Arecibo health region (23.75%; 95% CI: 16.53, 32.87) appeared to have the highest prevalence for that year **(Table 3; Figure 5; Figure 6).**[2]

For current asthma among adults, people with 55 to 64 years of age (11.93%; 95% CI: 9.48, 14.91) presented the highest prevalence for 2020. In addition, females (12.17%; 95% CI: 10.35, 14.26), individuals with an education level less than high school (11.10%; 95% CI: 7.57, 16.01), persons with an annual income less than $20,000 (12.82%; 95% CI: 10.29, 15.86), who do not work (12.43%; 95% CI: 10.16, 15.11), who were divorced or separated (10.96%; 95% CI: 8.56, 13.92), and who belonged to the Arecibo health region (17.28%; 95% CI: 10.37, 27.37) appeared to have the highest prevalence for that year **(Table 6; Figure 5; Figure 7).**[2]

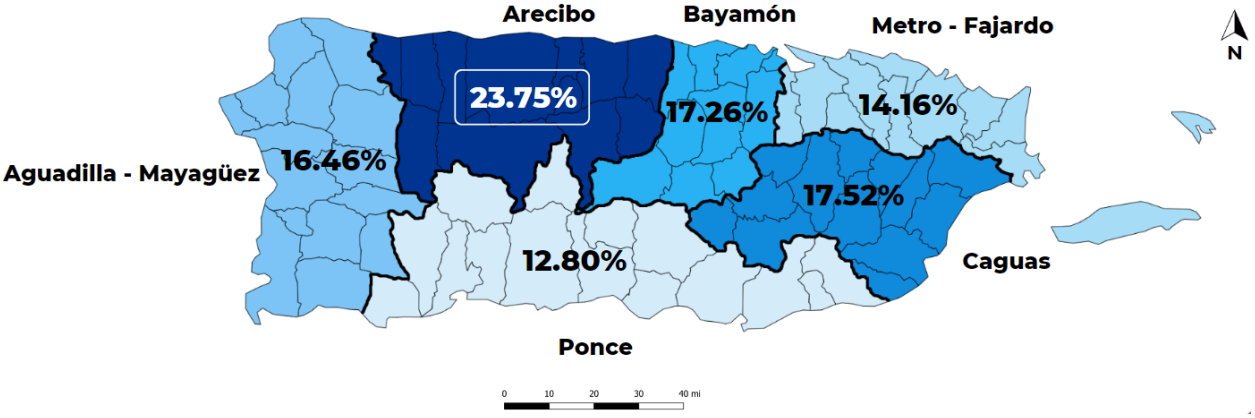
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 5. *Prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico by sociodemographic characteristics for 2020.*[1]



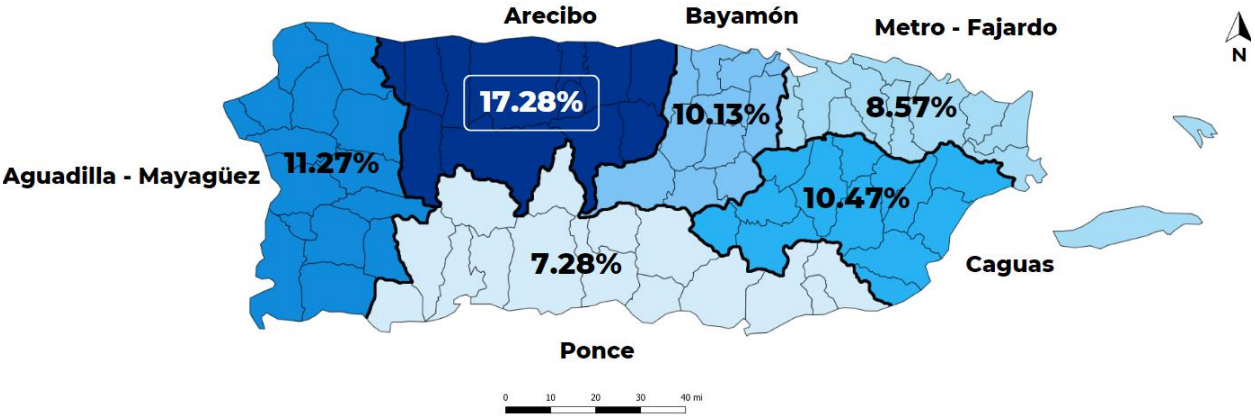
[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma sex = 825, age group = 825, educational level = 823, annual income = 671, employment status = 823, and marital status = 822; current asthma sex = 515, age group = 471, educational level = 513, annual income = 418, employment status = 514, and marital status = 471. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of current asthma was not presented for the widowed and the age group 18-24 years, according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). <High school = Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). ≥ High school = Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). < $20,000 = Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). ≥20,000 = Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. Working = Employed for wages and self-employed. Not working = Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020).

Figure 6. *Prevalence of lifetime asthma among adults aged 18 years or older in Puerto Rico by health region for 2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). Total sample = 813. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Figure 7. *Prevalence of current asthma among adults aged 18 years or older in Puerto Rico by health region for 2020.*[1]

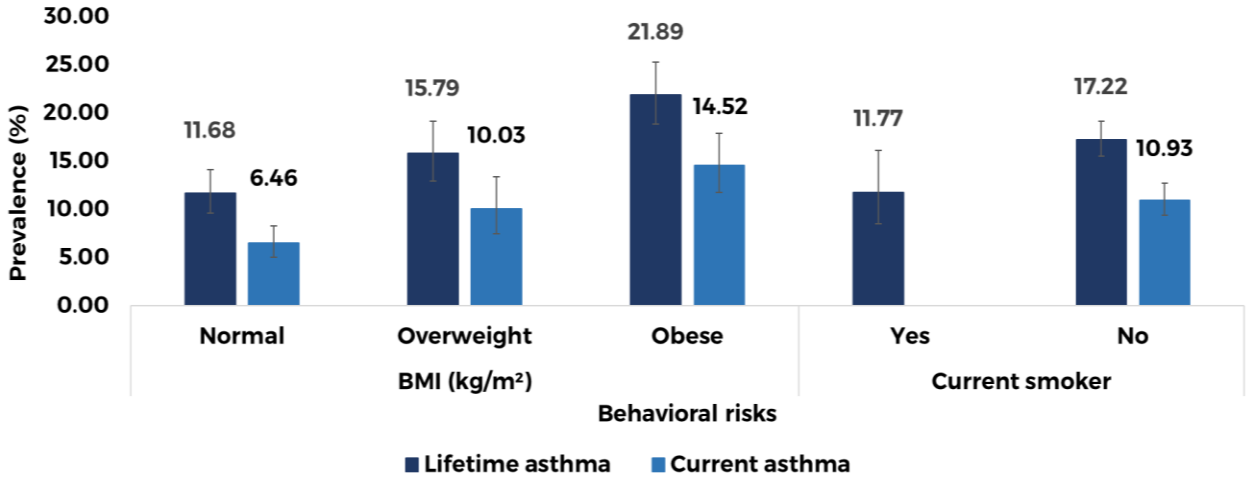


[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). Total sample = 507. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

From the point of view of the behavioral risks for lifetime asthma among adults aged 18 years or older, individuals who were obese according to CDC (2022c) Body Mass Index (BMI) categories (21.89%; 95% CI: 18.84, 25.28) and who were not current smokers (17.22%; 95% CI: 15.48, 19.10) presented the highest prevalence for 2020 **(Table 4; Figure 8).**[2]

For current asthma among adults, individuals who were obese according to CDC (2022c) Body Mass Index (BMI) categories (14.52%; 95% CI: 11.71, 17.87) and who were not current smokers (10.93%; 95% CI: 9.38, 12.70) appeared to have the highest prevalence for 2020 **(Table 7; Figure 8).**[2]

Figure 8. *Prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico by behavioral risks for 2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. The total sample for lifetime asthma BMI = 766, current smoker = 821; current asthma BMI = 475, current smoker = 475. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of lifetime and current asthma was not presented for the underweight, and current asthma for the current smoker who answered "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Underweight = below 18.5 kg/m^2. Normal = 18.5 - 24.9 kg/m^2. Overweight = 25.0 - 29.9 kg/m^2. Obesity = 30.0 kg/m2 and above (CDC, 2022c).

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Regarding comorbidities for lifetime asthma among adults aged 18 years or older, people with diabetes (21.97%; 95% CI: 16.61, 28.48), who suffered a myocardial infarction (27.46%; 95% CI: 18.58, 38.59), coronary heart disease or angina (31.18%; 95% CI: 24.05, 39.34), other cancer (22.58%; 95% CI: 12.44, 37.44), chronic obstructive pulmonary disease (COPD), emphysema or chronic bronchitis (53.75%; 95% CI: 46.17, 61.15), arthritis, gout, lupus, or fibromyalgia (21.85%; 95% CI: 17.95, 26.31), depression (28.29%; 95% CI: 24.05, 32.96), and one or more chronic diseases (22.89%; 95% CI: 19.96, 26.12) appeared to have the highest prevalence for 2020.[2] In addition, 16.34% (95% CI: 14.73, 18.08) who did not suffer a stroke, 16.46% (95% CI: 14.86, 18.19) who did not have skin cancer, and 16.28% (95% CI: 14.65, 18.05) who did not have kidney disease presented lifetime asthma **(Table 5; Figure 9; Figure 10).[2]**

For current asthma among adults, people with diabetes (15.94%; 95% CI: 11.00, 22.54), who suffered a myocardial infarction (21.72%; 95% CI: 14.29, 31.58), coronary heart disease or angina (20.95%; 95% CI: 15.16, 28.22), COPD, emphysema, or chronic bronchitis (38.54%; 95% CI: 31.58, 46.00), arthritis, gout, lupus, or fibromyalgia (15.96%; 95% CI: 12.43, 20.24), depression (20.30%; 95% CI: 16.68, 24.46), and one or more chronic diseases (16.10%; 95% CI: 13.39, 19.22) appeared to have the highest prevalence for 2020.[2] Also, 10.32% (95% CI: 8.90, 11.94) who did not suffer a stroke, 10.34% (95% CI: 8.92, 11.95) who did not have skin cancer, 9.74% (95% CI: 8.46, 11.20) who did not have other cancer, and 10.09% (95% CI: 8.66, 11.74) who did not have kidney disease presented current asthma **(Table 8; Figure 9; Figure 10).[2]**

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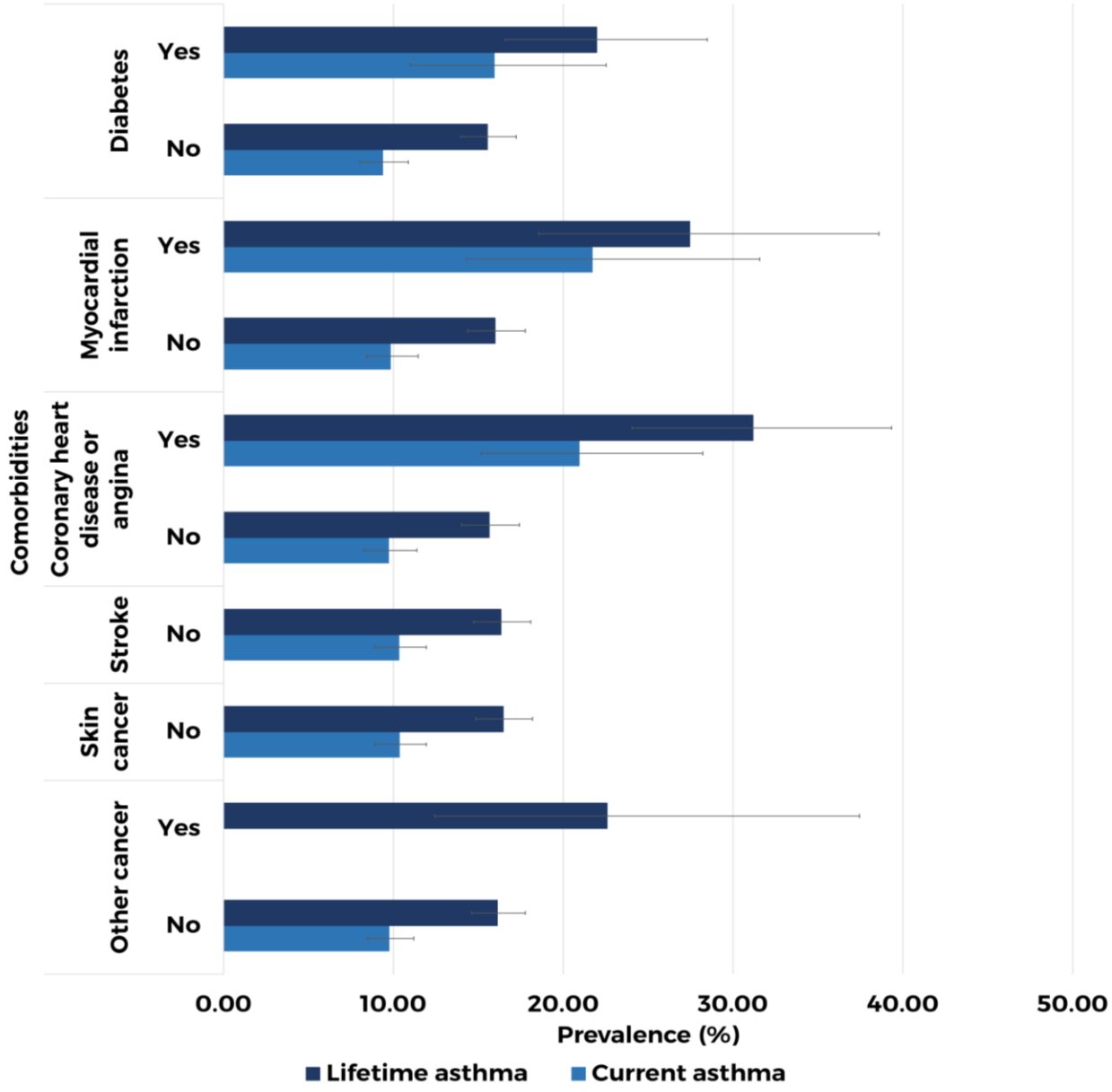
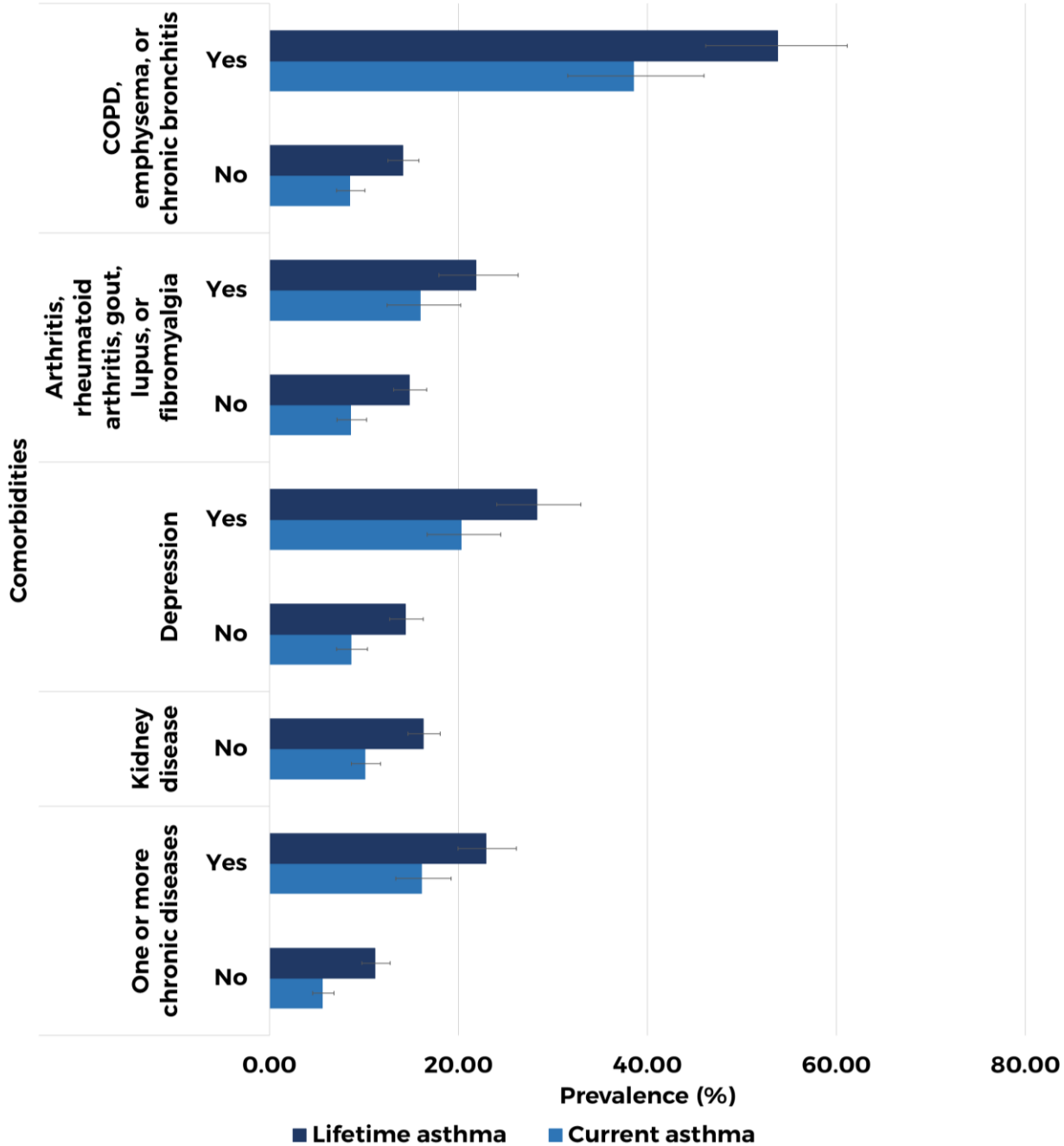
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 9. *Prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico by comorbidities for 2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma diabetes = 824, myocardial infarction = 822, coronary heart disease or angina = 821, stroke = 798, skin cancer = 812, and other cancer = 822; current asthma diabetes = 514, myocardial infarction = 512, coronary heart disease or angina = 511, stroke = 500, skin cancer = 504, and other cancer = 465. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of lifetime and current asthma was not presented for stroke and skin cancer who answered "Yes", and current asthma for other cancer who answered "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6).

Figure 10. *Prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico by other comorbidities for 2020.*[1]

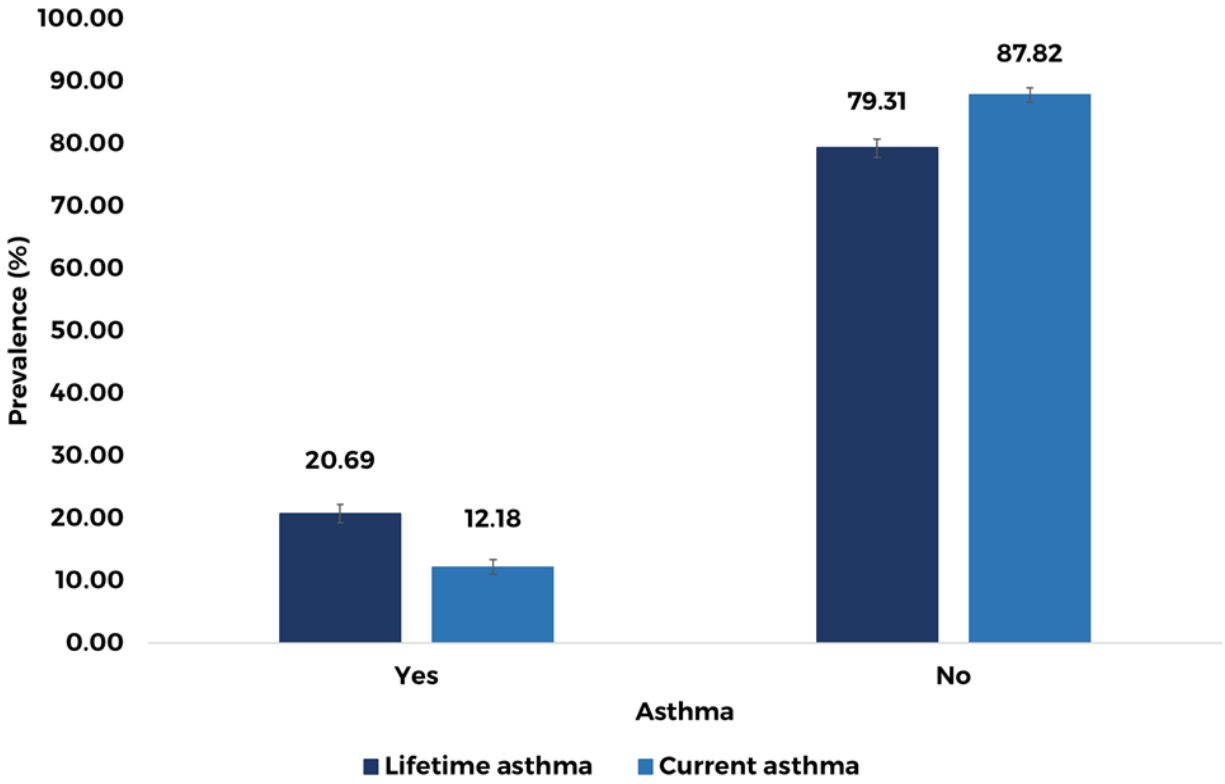


[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). COPD = Chronic obstructive pulmonary disease. The total sample for COPD, emphysema, or chronic bronchitis = 821, arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia = 817, depression = 824, kidney disease = 777, and one or more chronic diseases = 825; current asthma COPD, emphysema, or chronic bronchitis = 511, arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia = 510, depression = 515, kidney disease = 477, and one or more chronic diseases = 515. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of lifetime and current asthma was not presented for kidney disease who answered "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). One or more chronic diseases = At least one of the following chronic diseases: diabetes, myocardial infarction, coronary heart disease or angina, stroke, skin cancer, other cancer, COPD, emphysema, or chronic bronchitis, arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia, and kidney disease.

Crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020

For 2018-2020, the crude prevalence of lifetime asthma among children and adolescents from 0 to 17 years was 20.69% (95% CI: 19.27, 22.18), and for current asthma was 12.18% (95% CI: 11.04, 13.42).[2] This means that about 1 out of 5 children and adolescents had lifetime asthma, and 1 out of 8 had current asthma **(Table 9; Figure 11).[2]**

Figure 11. *Crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020.*[1]



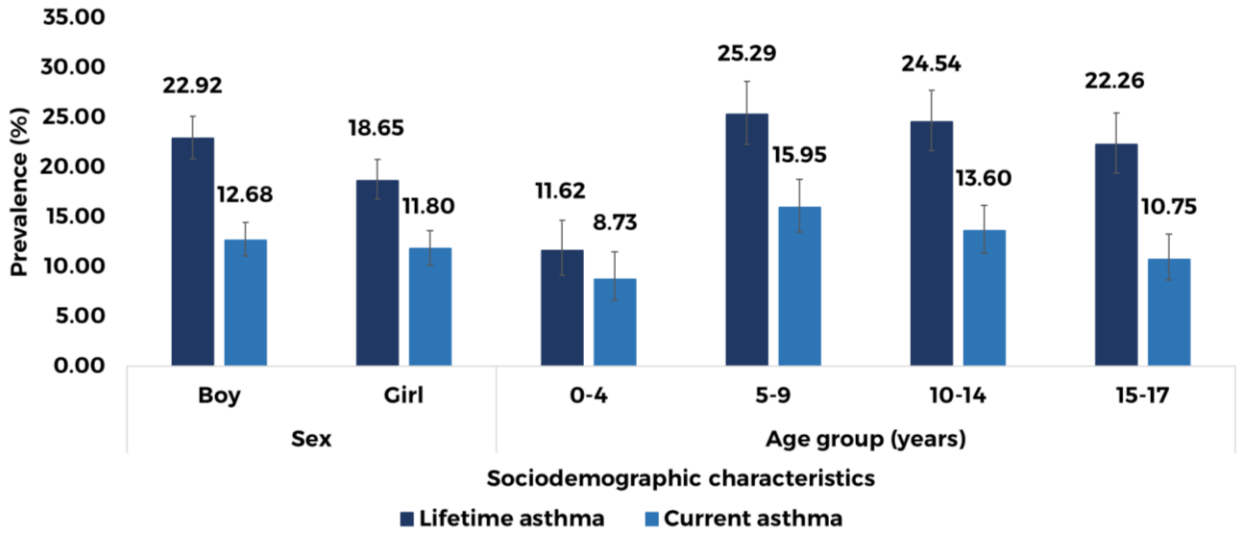
[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma yes = 804, lifetime asthma no = 2,980, current asthma yes = 462, and current asthma no = 3,319. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

In terms of the sociodemographic characteristics for lifetime asthma among children and adolescents from 0 to 17 years, children of 5 to 9 years of age (25.29%; 95% CI: 22.27, 28.58) presented the highest prevalence for the period of 2018-2020.[2] Also, boys (22.92%; 95% CI: 20.86, 25.12) and who belonged to the Arecibo health region (28.57%; 95% CI: 24.39, 33.38) **(Table 10; Figure 12; Figure 13).[2]**

For current asthma among children and adolescents, children of 5 to 9 years of age (15.95%; 95% CI: 13.50, 18.75) appeared to have the highest prevalence for the 2018-2020 period.[2] In addition, boys (12.68%; 95% CI: 11.10, 14.45) and who belonged to the Arecibo health region (18.10%; 95% CI: 14.57, 22.25) **(Table 13; Figure 12; Figure 14).[2]**

Figure 12. *Prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics for 2018-2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma sex = 800, age group = 765; current asthma sex = 461, age group = 439. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

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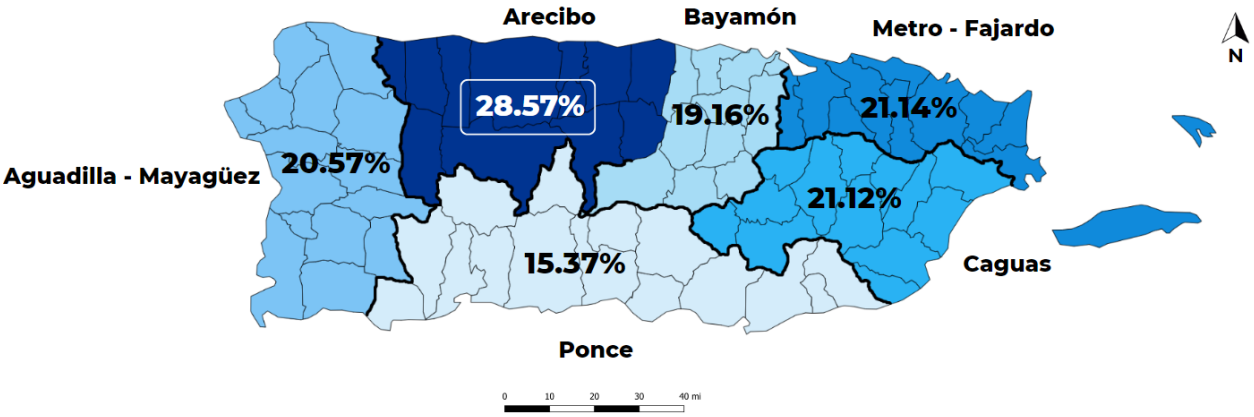
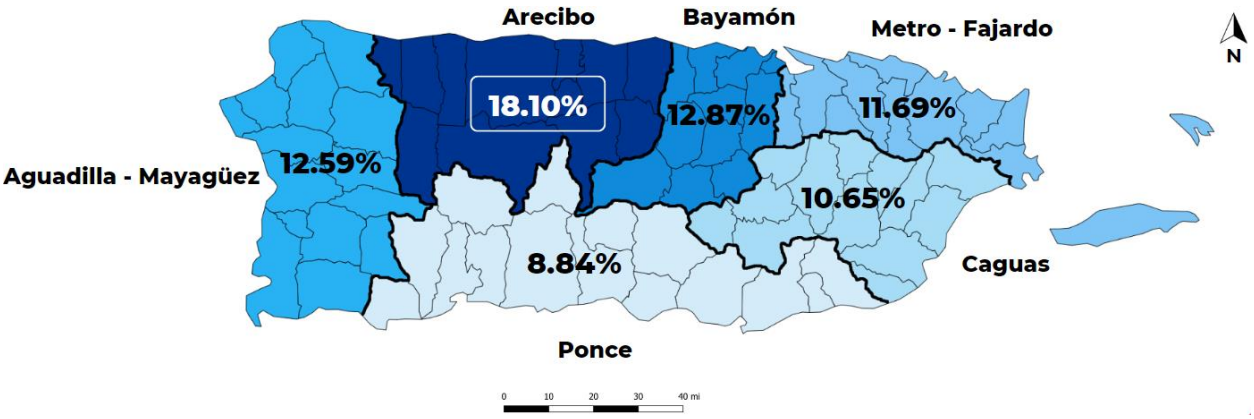
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 13. *Prevalence of lifetime asthma among children and adolescents from 0 to 17 years in Puerto Rico by health region for 2018-2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). Total sample = 793. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Figure 14. *Prevalence of current asthma among children and adolescents from 0 to 17 years in Puerto Rico by health region for 2018-2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). Total sample = 456. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

From the point of view of the sociodemographic characteristics of the parents or caregivers, those with 35 to 44 years of age (22.72%; 95% CI: 20.30, 25.34) presented the highest prevalence for lifetime asthma for the 2018-2020 period. Also, the children and adolescents from 0 to 17 years of age whose parents were the ones who answered the questions (21.24%; 95% CI: 19.67, 22.89), were female (28.95%; 95% CI: 25.63, 32.52), had an education level less than high school (22.65%; 95% CI: 17.14, 29.31), with an annual income less than $20,000 (23.44%; 95% CI: 21.27, 25.75), who do not work (22.12%; 95% CI: 19.86, 24.57), and who were divorced or separated (28.55%; 95% CI: 24.49, 32.99) appeared to have the highest prevalence for lifetime asthma in that period **(Table 11; Figure 15).**[2]

Regarding the sociodemographic characteristics of the parents or caregivers, those with 35 to 44 years of age (13.78%; 95% CI: 11.79, 16.04) presented the highest prevalence for current asthma for the 2018-2020 period. In addition, the children and adolescents whose parents were the ones who answered the questions (12.39%; 95% CI: 11.14, 13.76), were female (16.53%; 95% CI: 13.84, 19.63), had an annual income less than $20,000 (14.44%; 95% CI: 12.66, 16.42), who do not work (13.47%; 95% CI: 11.63, 15.55), and who were divorced or separated (17.56%; 95% CI: 14.19, 21.54) appeared to have the highest prevalence for current asthma in that period.[2] Also, 12.16% (95% CI: 10.99, 13.44) of children and adolescents whose parents or caregivers had an educational level of high school or more had current asthma **(Table 14; Figure 15).**[2]

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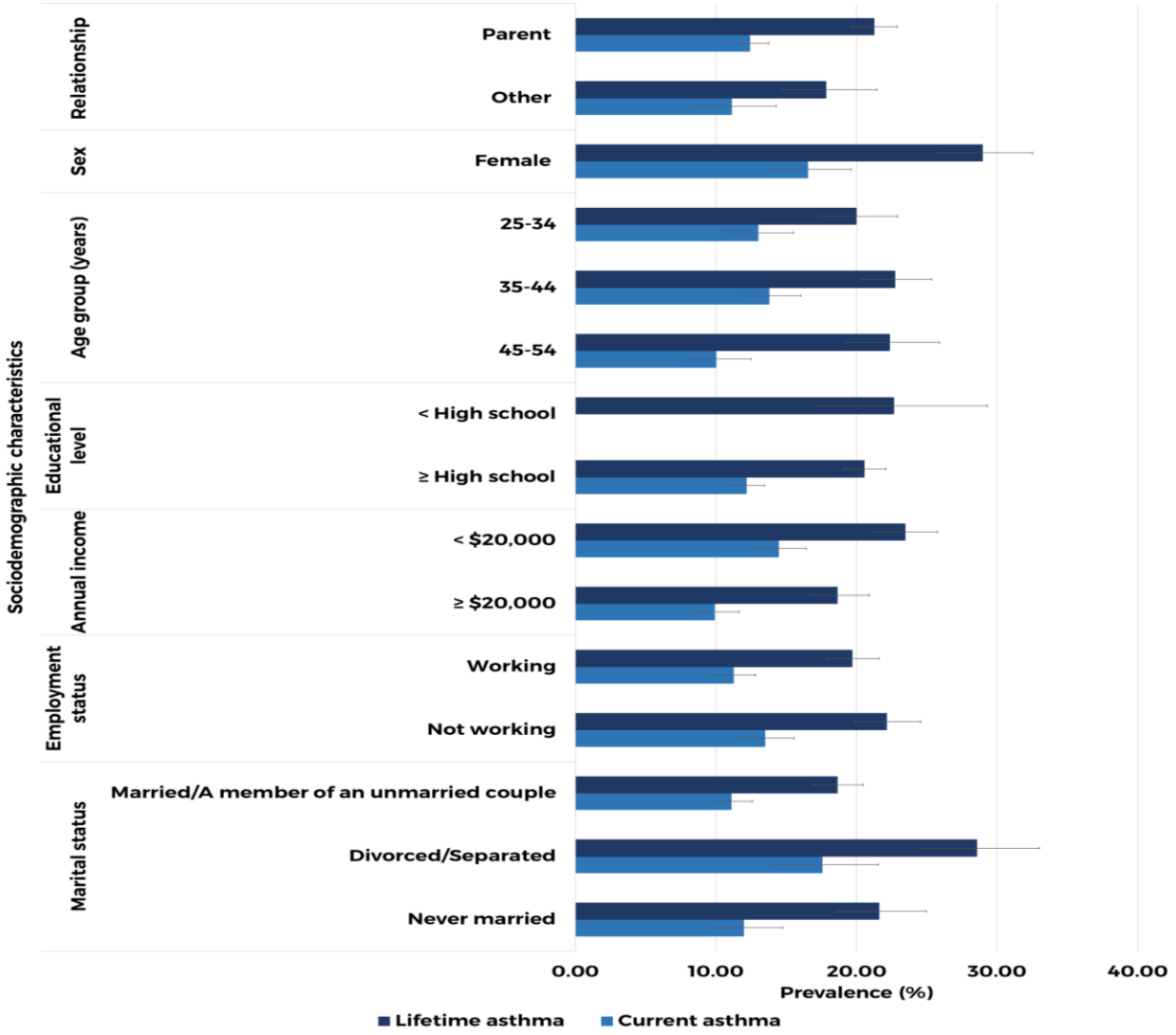
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 15. *Prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics of the parents or caregivers for 2018-2020.*[1]

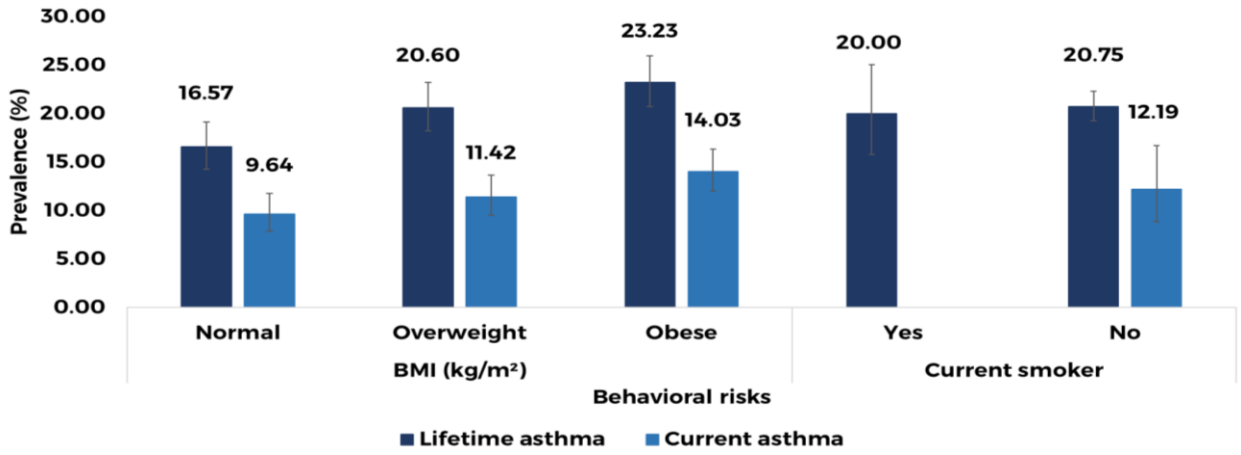


[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). The total sample for lifetime asthma relationship = 803, sex = 248, age group = 690, educational level = 804, annual income = 731, employment status = 803, and marital status = 786; current asthma relationship = 461, sex = 136, age group = 398, educational level = 433, annual income = 420, employment status = 461, and marital status = 451. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of current and lifetime asthma was not presented for males, age groups 18-24, 55-64 and 65+ years, widowed, and current asthma for < high school according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Other = Grandparent, foster parent or guardian, sibling, and other relative. <High school = Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). ≥ High school = Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). < $20,000 = Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). ≥20,000 = Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. Working = Employed for wages and self-employed. Not working = Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020).

In terms of the behavioral risks of the parents or caregivers, the children and adolescents from 0 to 17 years of age whose parents or caregivers were obese according to CDC (2022c) Body Mass Index (BMI) categories (23.23%; 95% CI: 20.72, 25.94) and who were not current smokers (20.75%; 95% CI: 19.26, 22.32) appeared to have the highest prevalence for lifetime asthma for the 2018-2020 period **(Table 12; Figure 16).**[2]

Regarding the behavioral risks of the parents or caregivers, the children and adolescents whose parents or caregivers were obese according to CDC (2022c) Body Mass Index (BMI) categories (14.03%; 95% CI: 12.03, 16.31) presented the highest prevalence for current asthma for the 2018-2020 period. Also, 12.19% (95% CI: 8.87, 16.68) of the children whose parents or caregivers were not current smokers had current asthma **(Table 15; Figure 16).**[2]

Figure 16. *Prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico by behavioral risks of the parents or caregivers for 2018-2020.*[1]



[1]***Notes.*** Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. The total sample for lifetime asthma BMI = 761, current smoker = 803; current asthma BMI = 432, current smoker = 420. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of lifetime and current asthma was not presented for the underweight, and current asthma for the current smoker who answered "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Underweight = below 18.5 kg/m^2. Normal = 18.5 - 24.9 kg/m^2. Overweight = 25.0 - 29.9 kg/m^2. Obesity = 30.0 kg/m2 and above (CDC, 2022c).

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Uncontrolled asthma in people with current asthma

BRFSS Asthma Call-back Survey

(ACBS)

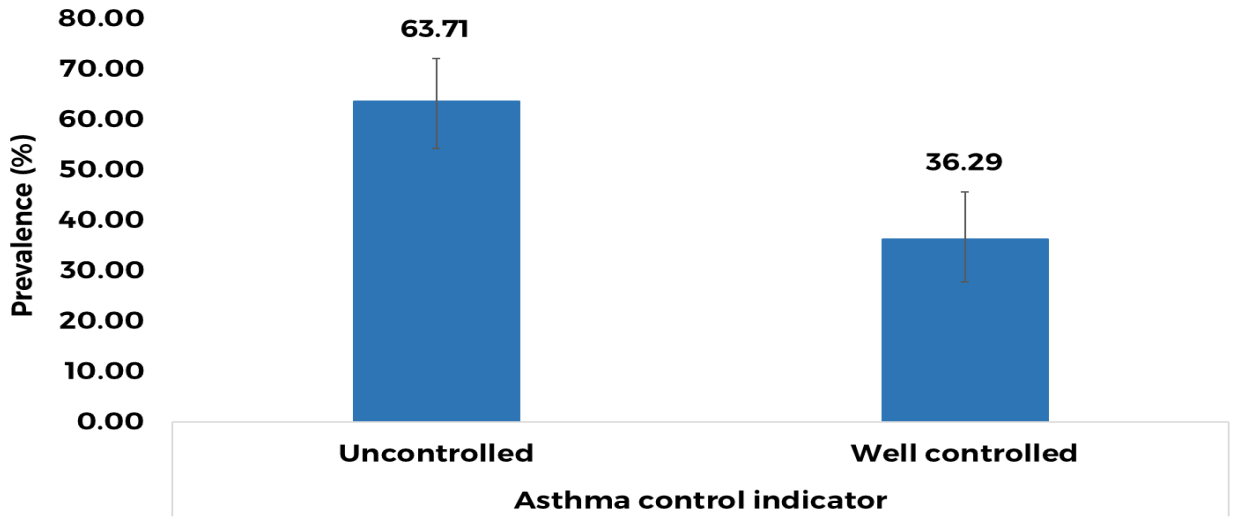
2018-2020

Uncontrolled asthma in people with current asthma

Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018, 2019, and 2020

By the year 2018, 63.71% (95% CI: 54.29, 72.18) of adults 18 years and older with current asthma had uncontrolled asthma, for 2019, 67.05% (95% CI: 57.82, 75.14), and for 2020, 47.97% (95% CI: 37.79, 58.31) **(Table 16; Table 17; Table 18; Figure 17; Figure 18; Figure 19).**[2] This represents that about 3 out of 5 adults with current asthma had uncontrolled asthma by 2018, 2 out of 3 by 2019, and 1 out of 2 by 2020.[2] It is important to highlight that the indicator for asthma control was based on the following components: daytime symptoms, nighttime awakening symptoms, inhaler use (SABA), nebulizer use (SABA), and activity limitation. In addition, the extreme limitation category was used for the indicator, but for the creation of the component tables it was combined with some limitation under any limitation category.

Figure 17. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for asthma control = 204. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

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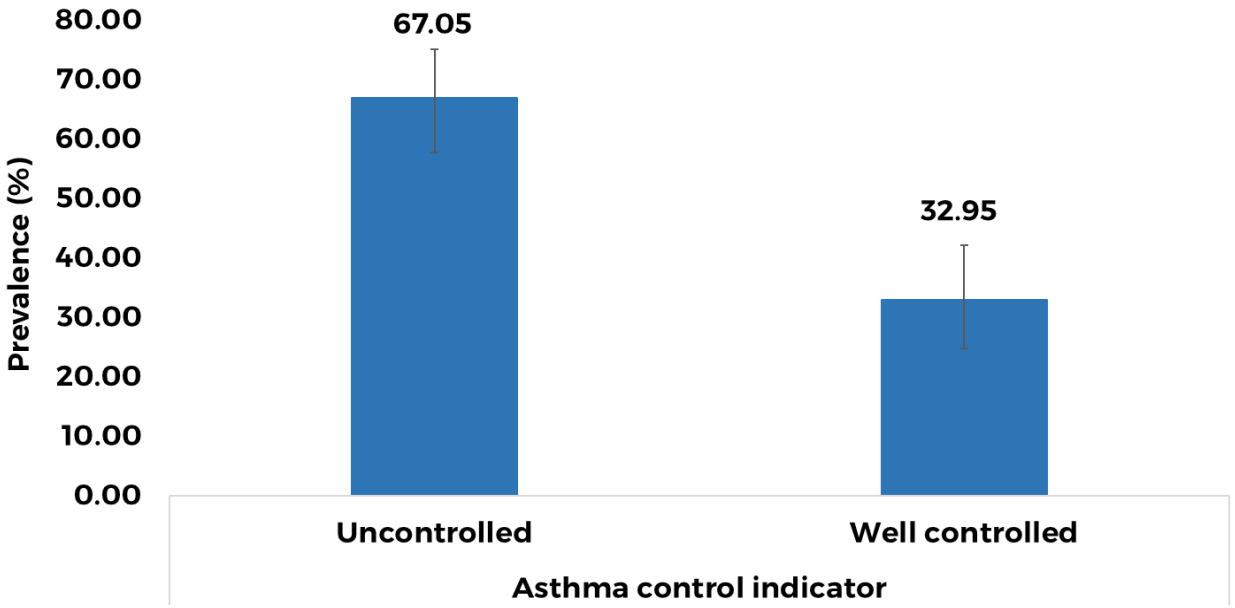
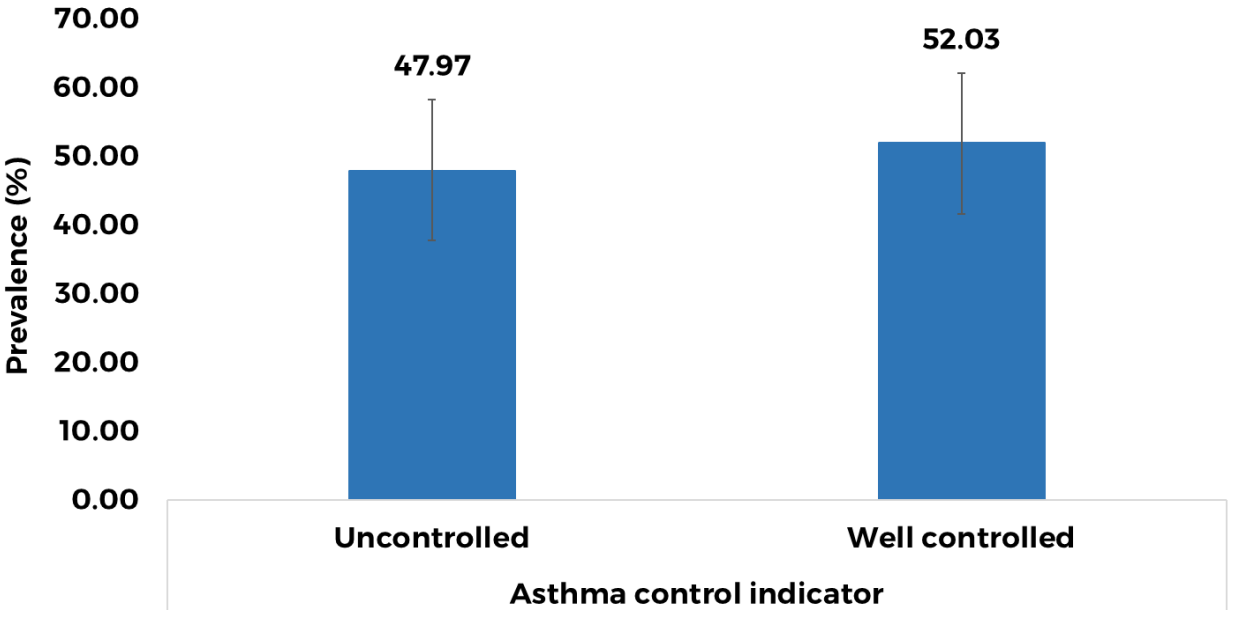
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 18. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2019.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for asthma control = 186. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Figure 19. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2020.*[1]

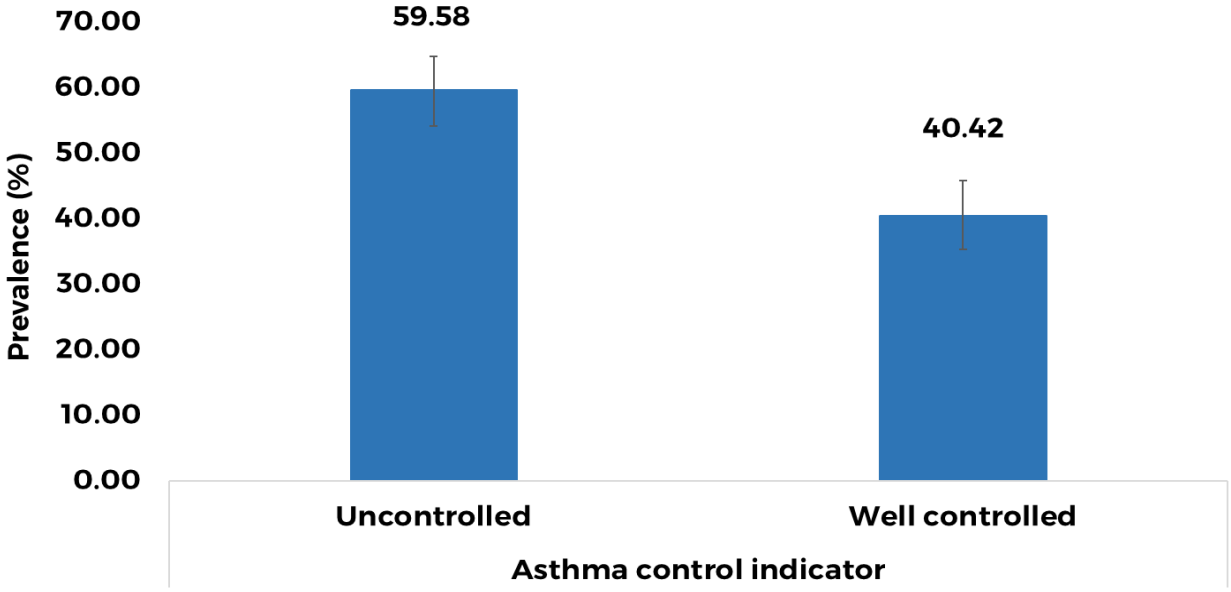


[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for asthma control = 222. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018-2020

For the 2018-2020 period, 59.58% (95% CI: 54.17, 64.77) of adults 18 years and older with current asthma had uncontrolled asthma.[2] This represents that about 3 out of 5 adults with current asthma had their asthma uncontrolled **(Table 19; Figure 20).**[2]

Figure 20. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018-2020.*[1]



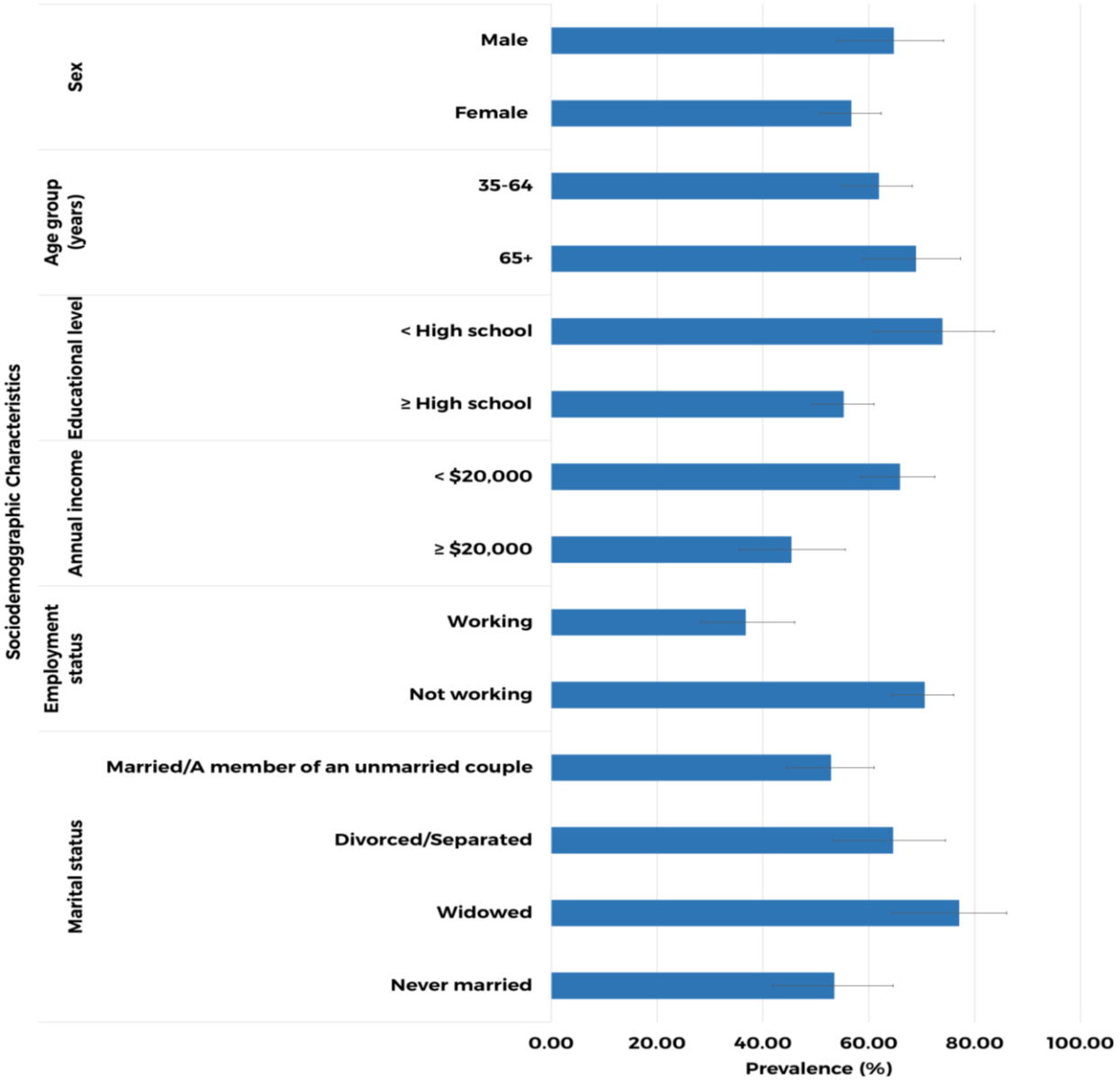
[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for asthma control = 612. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

In terms of the sociodemographic characteristics among adults aged 18 years or older with current asthma, adults with 65 years or older (68.85%; 95% CI: 58.81, 77.38) presented the highest prevalence of uncontrolled asthma for the 2018-2020 period. Also, males (64.66%; 95% CI: 53.90, 74.11), individuals with an education level less than high school (73.82%; 95% CI: 60.88, 83.63), persons with an annual income less than $20,000 (65.82%; 95% CI: 58.46, 72.50), who do not work (70.48%; 95% CI: 64.22, 76.06), and were widows (77.01%; 95% CI: 64.48, 86.08) appeared to have the highest prevalence of uncontrolled asthma for that period **(Table 20; Figure 21).**[2]

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 21. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by sociodemographic characteristics for 2018-2020.*[1]



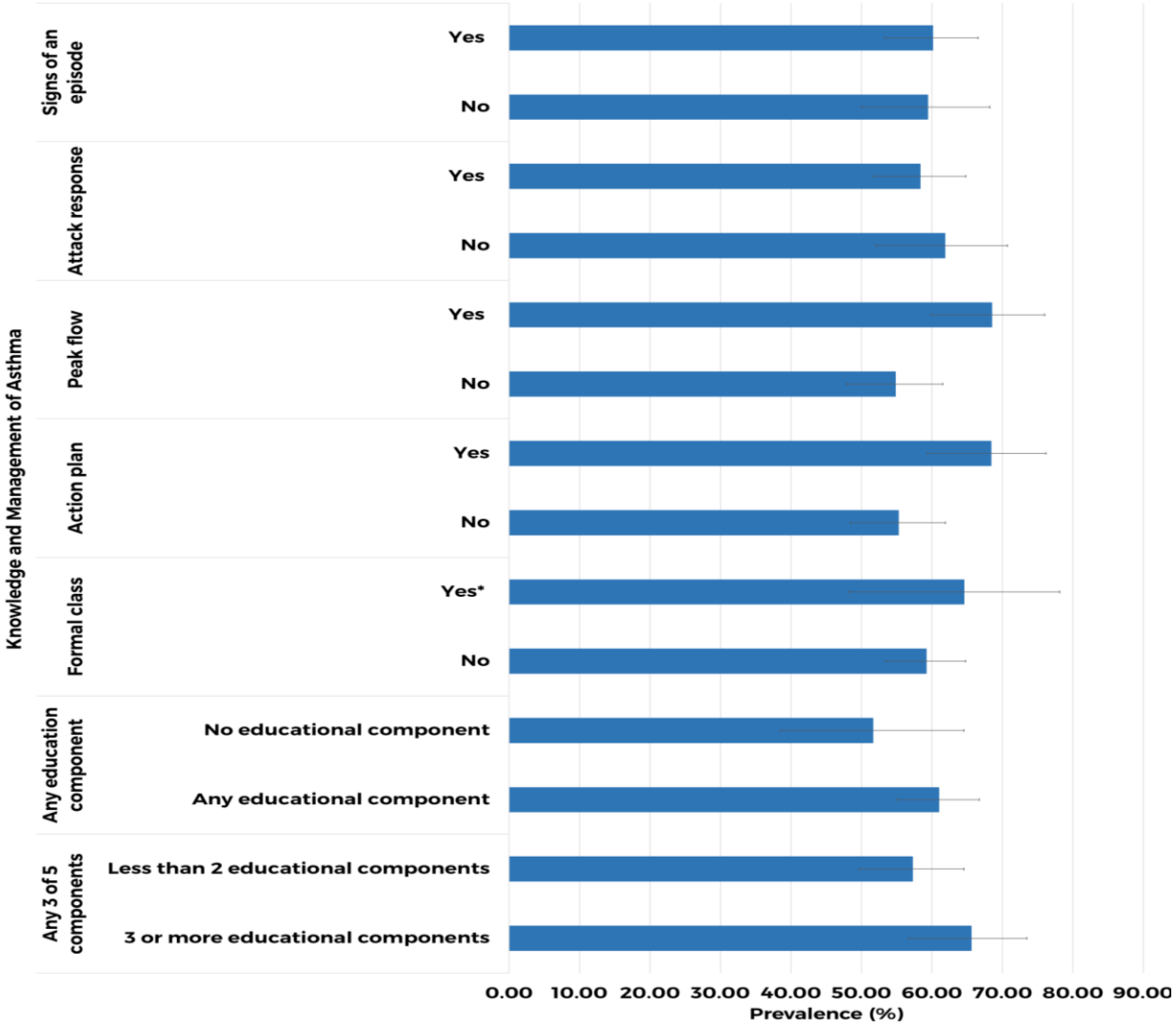
[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for sex = 349, age group = 304, educational level = 348, annual income = 296, employment status = 348, and marital status = 349. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of uncontrolled asthma was not presented for the age group 18-34 years, according to the analytical recommendations of the BRFSS (CDC, 2021, p. 6). <High school = Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). ≥ High school = Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). < $20,000 = Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). ≥20,000 = Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. Working = Employed for wages and self-employed. Not working = Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020).

Regarding the knowledge and management of asthma among adults aged 18 years or older with current asthma, individuals who were ever taught by a doctor or other health professional how to recognize the early signs or symptoms of an asthma episode (60.09%; 95% CI: 53.30, 66.52), how to use a peak flow meter to adjust their daily medications (68.48%; 95% CI: 59.88, 75.98), and were not taught what to do during an asthma episode or attack (61.85%; 95% CI: 52.10, 70.73) presented the highest prevalence of uncontrolled asthma for the period of 2018-2020 **(Table 21; Figure 22).**[2]

In addition, those who the doctor or other health professional provided an asthma action plan (68.36%; 95% CI: 59.37, 76.17), took a course or class on how to manage their asthma (64.55%; 95% CI: 48.14, 78.12), had some educational component (61.00%; 95% CI: 55.02, 66.68), and 3 or more educational components (signs of an episode, attack response, peak flow, action plan or former class) (65.56%; 95% CI: 56.72, 73.44) appeared to have a high prevalence for that period **(Table 21; Figure 22).**[2] Nevertheless, caution should be taken when interpreting the measure "took a course or class on how to manage their asthma" because the frequency was less than 50. Still, the estimate was presented following CDC recommendations because the relative standard error was less than 30% (CDC, 2022b).

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 22. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by knowledge and management of asthma for 2018-2020.*[1]

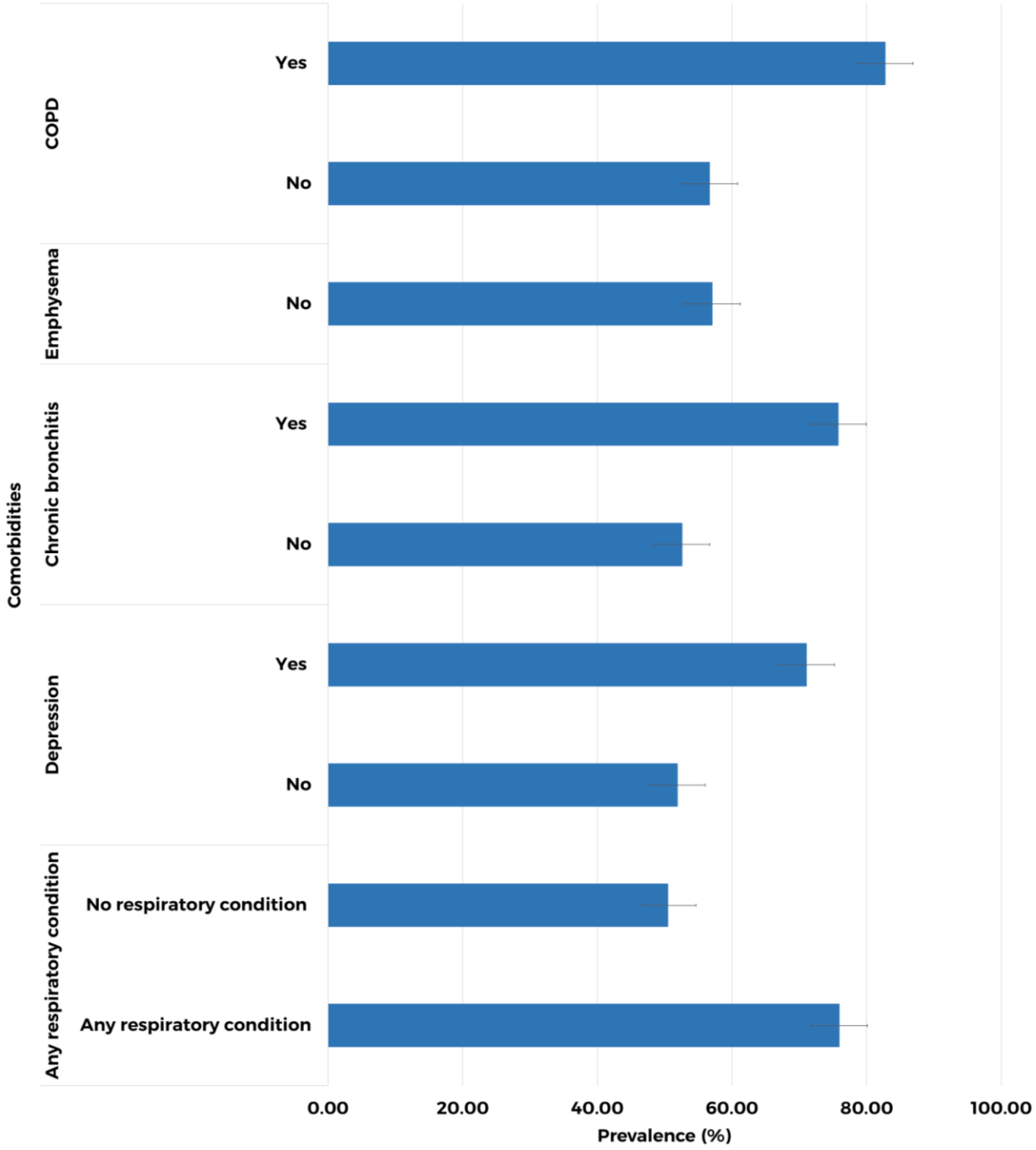


[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for signs of an episode = 342, attack response = 336, peak flow = 338, action plan = 339, formal class = 349, any education component = 341, and any 3 of 5 components = 318. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. Signs of an episode = Responded to the question: "Has a doctor or other health professional ever taught you how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020a, p. 14). Attack response = Responded to the question: "Has a doctor or other health professional ever taught you what to do during an asthma episode or attack?" (CDC, 2020a, p. 14). Peak flow = Responded to the question: "Has a doctor or other health professional ever taught you how to use a peak flow meter to adjust your daily medications?" (CDC, 2020a, p. 14). Action plan = Responded to the question: "Has a doctor or other health professional EVER given you an asthma action plan?" (CDC, 2020a, p. 15). Formal class = Responded to the question: "Have you ever taken a course or class on how to manage your asthma?" (CDC, 2020a, p. 15). Any education component = This calculated variable combines the questions related to asthma education into one variable, indicating a positive response in any of the five questions. Any 3 of 5 components = This calculated variable combines the five questions related to asthma education into one variable indicating a positive response to any 3 or more of the questions. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

From the point of view of comorbidities and risk factors among adults aged 18 years or older with current asthma, people with COPD (82.72%; 95% CI: 68.64, 91.28), chronic bronchitis (75.76%; 95% CI: 66.26, 83.26), depression (71.05%; 95% CI: 63.42, 77.65), and had any respiratory condition (COPD, emphysema or chronic bronchitis) (75.93%; 95% CI: 67.76, 82.56) appeared to have the highest prevalence of uncontrolled asthma for the period of 2018-2020.[2] Also, it is important to highlight that 57.06% (95% CI: 51.43, 62.51) did not have emphysema, and 61.47% (95% CI: 53.72, 68.68) were obese according to CDC (2022c) BMI categories **(Table 22; Figure 23; Figure 24).[2]**

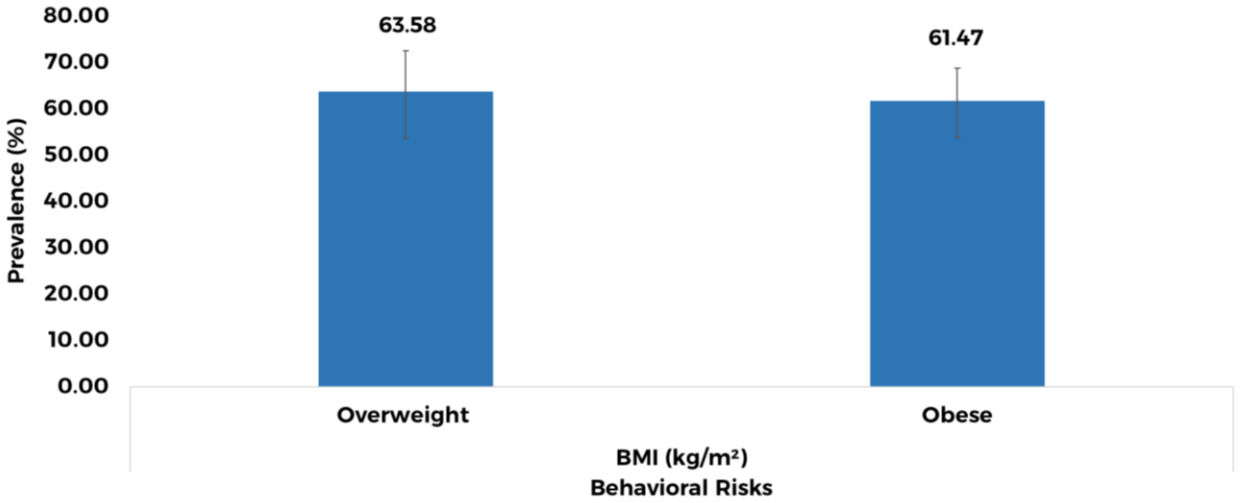
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 23. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by comorbidities for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). COPD = Chronic obstructive pulmonary disease. The total sample for COPD = 339, emphysema = 306, chronic bronchitis = 338, depression = 348, and any respiratory disease = 336. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of uncontrolled asthma was not presented for emphysema who answered "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Any respiratory disease = This calculated variable combines the respiratory conditions COPD, emphysema, and chronic bronchitis into one variable indicating a positive response in any of the three questions related to the conditions.

Figure 24. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by behavioral risks for 2018-2020.*[1]

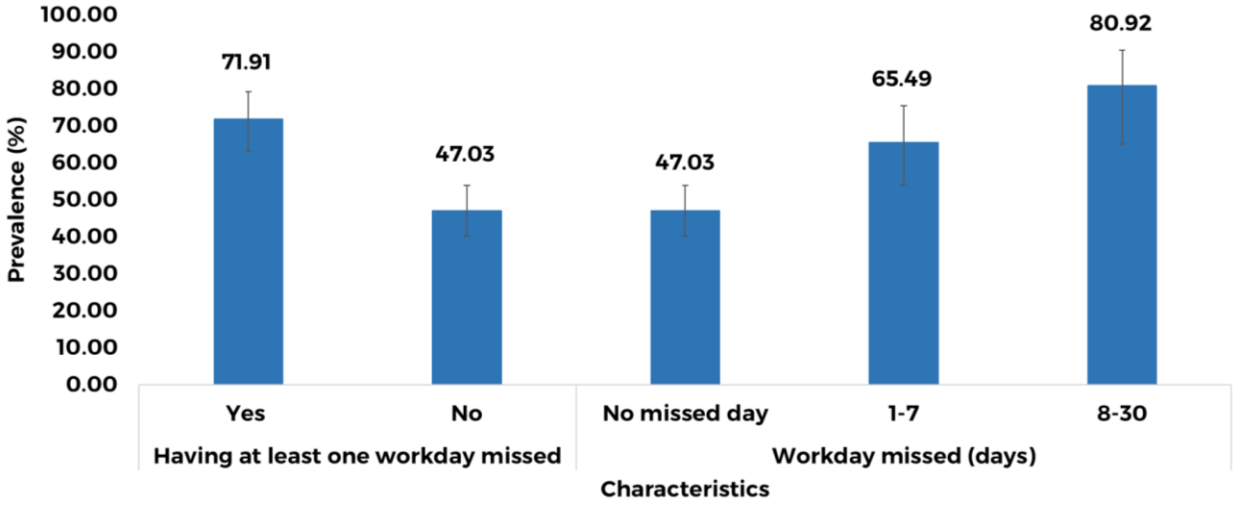


[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). BMI = Body Mass Index. The total sample for BMI = 282. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of uncontrolled asthma was not presented for the underweight and normal according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Underweight = below 18.5 kg/m^2. Normal = 18.5 - 24.9 kg/m^2. Overweight = 25.0 - 29.9 kg/m^2. Obesity = 30.0 kg/m2 and above (CDC, 2022c).

For the 2018-2020 period, 71.91% (95% CI: 63.25, 79.20) of adults 18 years and older with current asthma who had at least one missed workday and who missed 8 to 30 days (80.92%; 95% CI: 65.17, 90.58) had uncontrolled asthma **(Table 23; Figure 25).**[2] In addition, individuals who had an episode of an asthma attack in the past 12 months (73.73%; 95% CI: 65.55, 80.54) and who had one or more attacks in the past 3 months (81.80%; 95% CI: 72.82, 88.29) appeared to have the highest prevalence of uncontrolled asthma as did those who used their controller (76.80%; 95% CI: 69.76, 82.61) and rescue medications (83.95%; 95% CI: 78.32, 88.34) **(Table 24; Table 25; Figure 26; Figure 27).**[2]

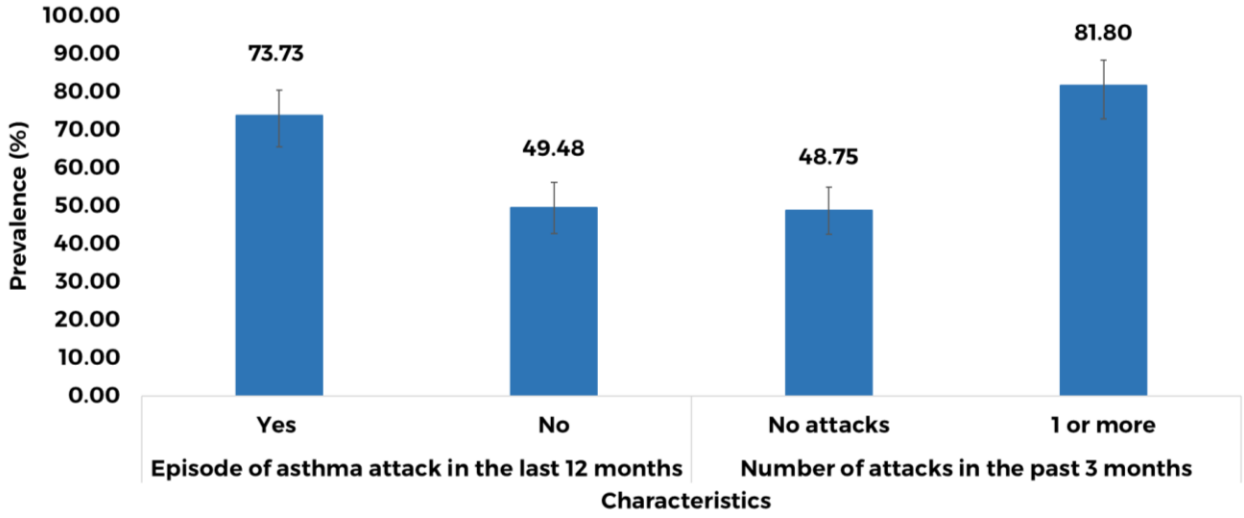
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 25. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by missed days at work for 2018-2020.*[1]



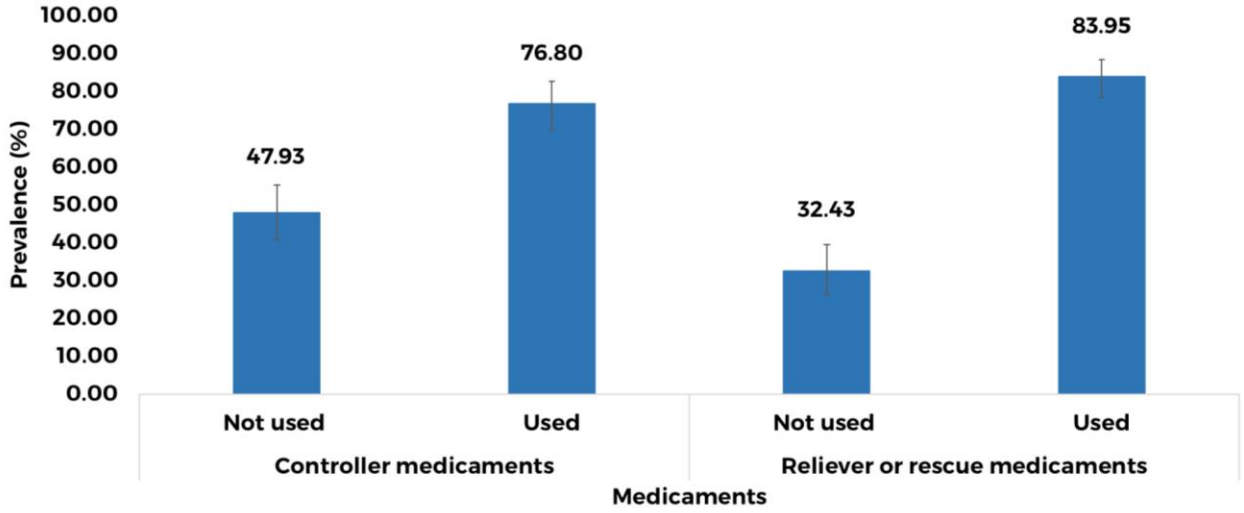
[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for having at least one workday missed = 305, and workday missed = 293. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of uncontrolled asthma was not presented for 31 or more days of workday missed according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6).

Figure 26. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by asthma attacks for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for an episode of an asthma attack in the last 12 months = 346, and the number of attacks in the past 3 months = 336. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Figure 27. *Prevalence of uncontrolled asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by type of medication for asthma used for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for controller medicaments = 349, and reliever or rescue medicaments = 349. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates.

Crude prevalence of asthma control indicators in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020

For the 2018-2020 period, 40.94% (95% CI: 30.92, 51.77) of the children and adolescents from 0 to 17 years with current asthma had uncontrolled asthma.[2,3] This represents that about 2 out of 5 children and adolescents with current asthma had their asthma uncontrolled **(Table 26; Figure 28).**[2,3]

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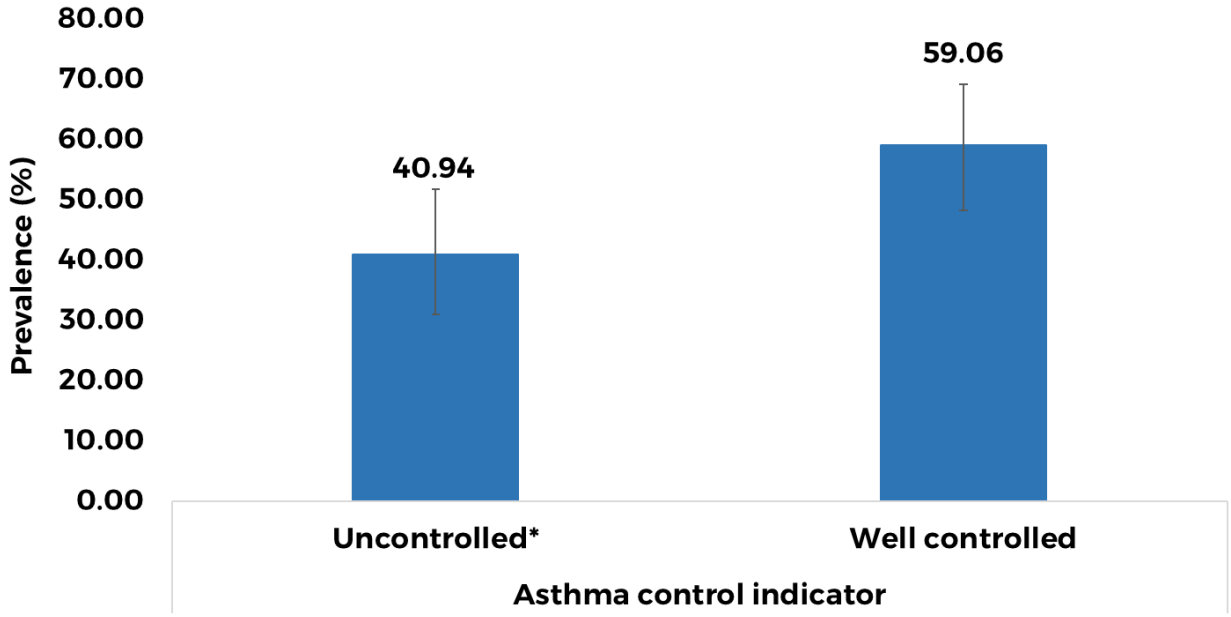
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[3]"Caution should be taken when interpreting the measures discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

Figure 28. *Crude prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for asthma control = 117. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Regarding the age, children of 0 to 9 years of age (49.55%; 95% CI: 34.93, 64.25) presented the highest prevalence of uncontrolled asthma for the 2018-2020 period.[3] Also, from the point of view of the sociodemographic characteristics of sex, boys (44.33%; 95% CI: 30.85, 58.70) appeared to have the highest prevalence for that period. **(Table 27; Figure 29).**[2,3]

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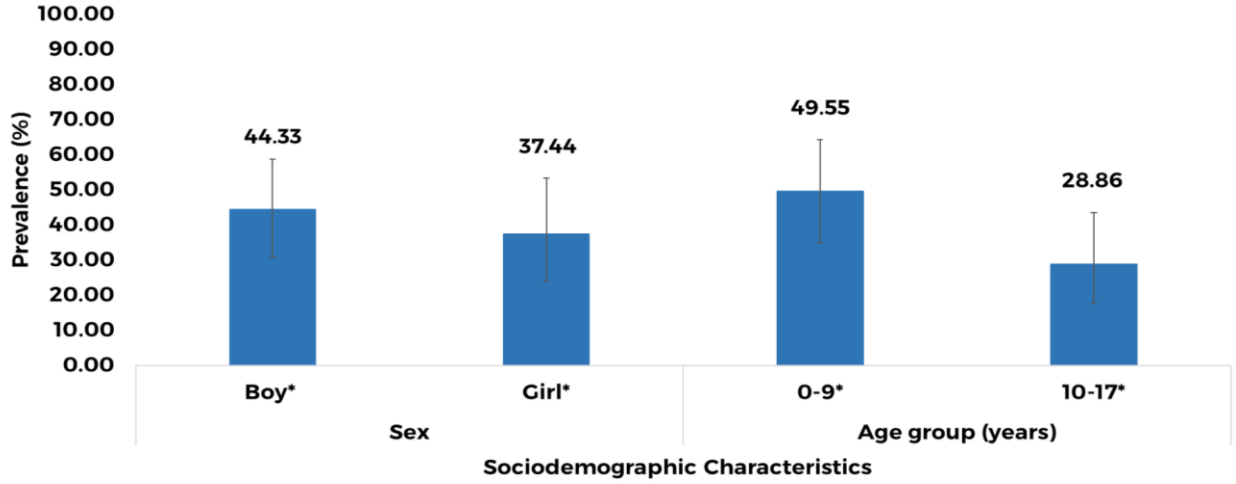
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[3]"Caution should be taken when interpreting the measures discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

Figure 29. *Prevalence of uncontrolled asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by sociodemographic characteristics for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for sex = 44, and age group = 44. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

In terms of the knowledge and management of asthma among children and adolescents from 0 to 17 years with current asthma, those who were never taught by a doctor or other health professional how to recognize the early signs or symptoms of an asthma episode (43.18%; 95% CI: 23.26, 65.58), what to do during an asthma episode or attack (54.36%; 95% CI: 36.01, 71.59), how to use a peak flow meter to adjust their daily medications (43.14%; 95% CI: 30.57, 56.66), and that never took a course or class on how to manage their asthma (41.54%; 95% CI: 30.85, 53.09) appeared to have the highest prevalence of uncontrolled asthma for the period of 2018-2020. In addition, those who the doctor or other health professional gave an asthma action plan (44.89%; 95% CI: 30.79, 59.86) **(Table 28; Figure 30).**[2,3]

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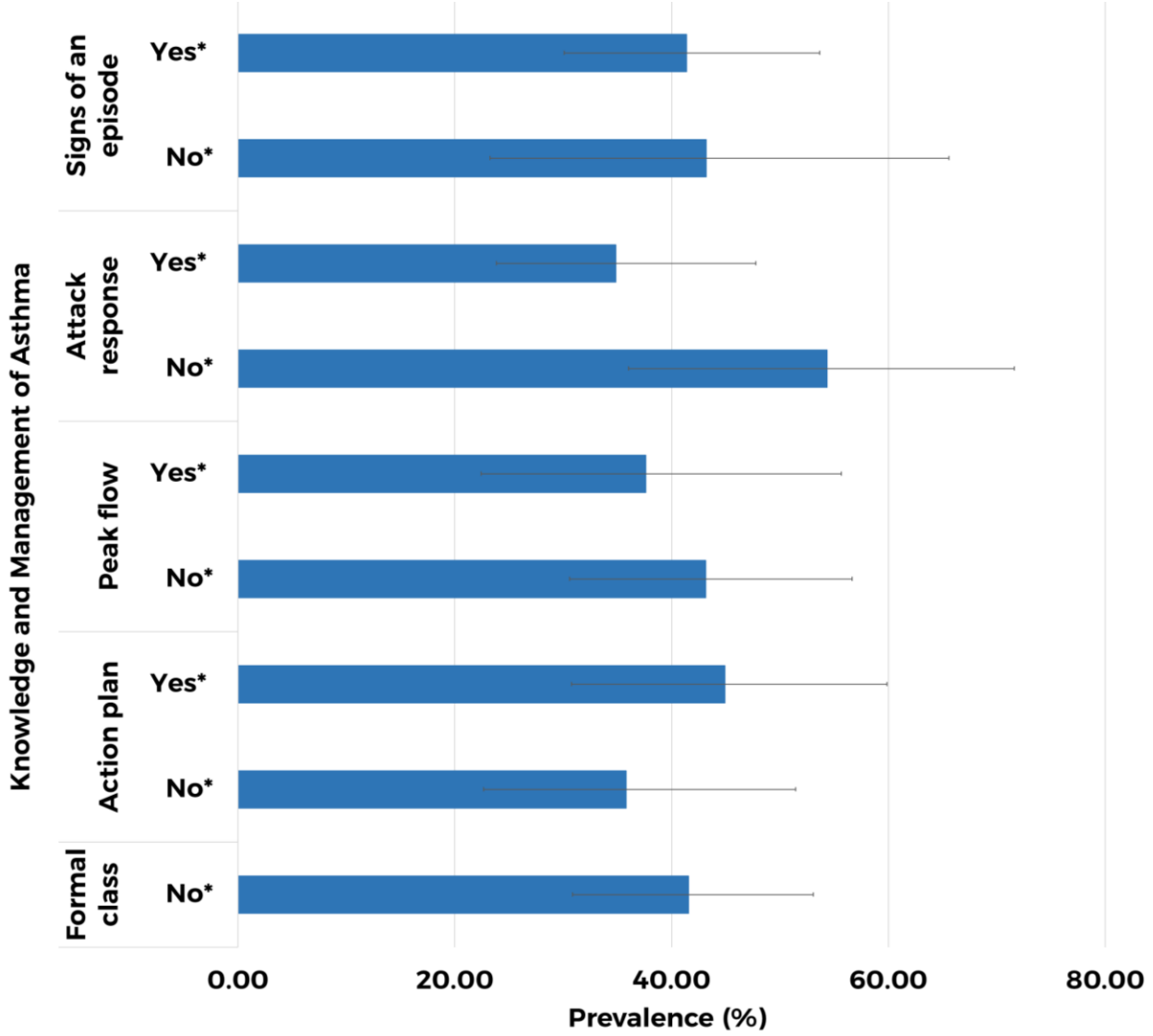
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[3]"Caution should be taken when interpreting the measures discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

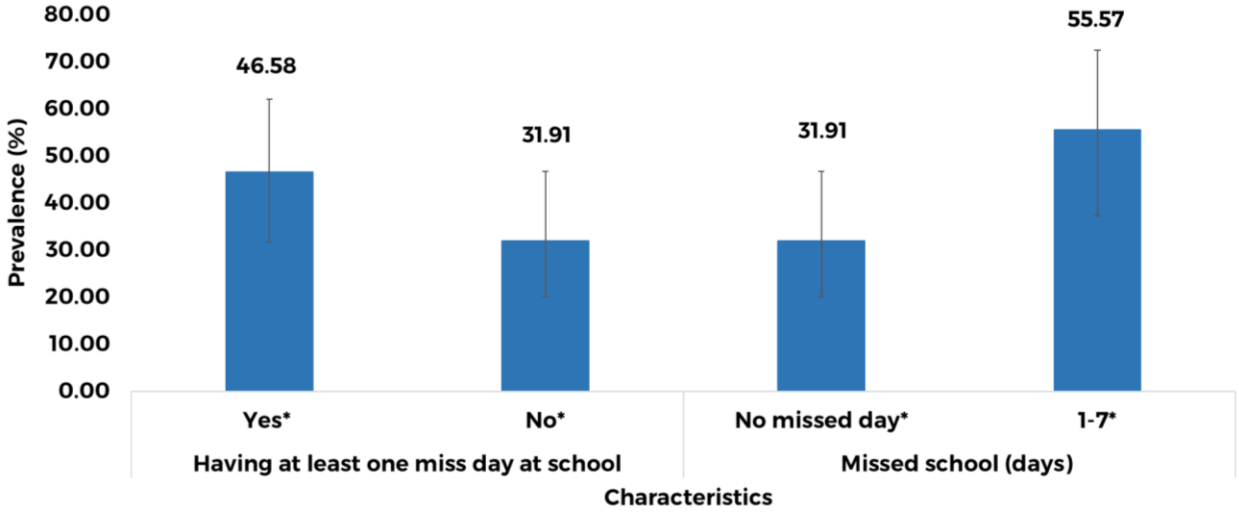
Figure 30. *Prevalence of uncontrolled asthma control among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by knowledge and management of asthma for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for signs of an episode = 44, attack response = 43, peak flow = 43, action plan = 42, and formal class = 39. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. The prevalence of uncontrolled asthma was not presented for the formal class "Yes" according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Signs of an episode = Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020b, p. 13). Attack response = Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} what to do during an asthma episode or attack?" (CDC, 2020b, p. 13). Peak flow = Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} how to use a peak flow meter to adjust his/her daily medications?" (CDC, 2020b, p. 13). Action plan = Responded to the question: "Has a doctor or other health professional EVER given you or {child's name} an asthma action plan?" (CDC, 2020b, p. 14). Formal class = Responded to the question: "Have you or {child's name} ever taken a course or class on how to manage {his/her} asthma?" (CDC, 2020b, p. 14). *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

For the 2018-2020 period, 46.58% (95% CI: 31.69, 62.09) of children and adolescents from 0 to 17 years with current asthma who had at least one missed workday and who missed 1 to 7 days (55.57%; 95% CI: 37.33, 72.43) had uncontrolled asthma **(Table 29; Figure 31).**[2,3] In addition, children who had an episode of an asthma attack in the past 12 months (45.22%; 95% CI: 27.63, 64.09) and who had one or more attacks in the past 3 months (46.28%; 95% CI: 25.77, 68.14) presented the highest prevalence of uncontrolled asthma **(Table 30; Figure 32).**[2,3]

Figure 31. *Prevalence of uncontrolled asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by missed days at school for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for having at least one missed day at school = 42, and missed school (days) = 36. The prevalence of uncontrolled asthma was not presented for 8-30 and 31 or more days of missed school according to the analytical recommendations of the BRFSS (CDC, 2021b, p. 6). Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

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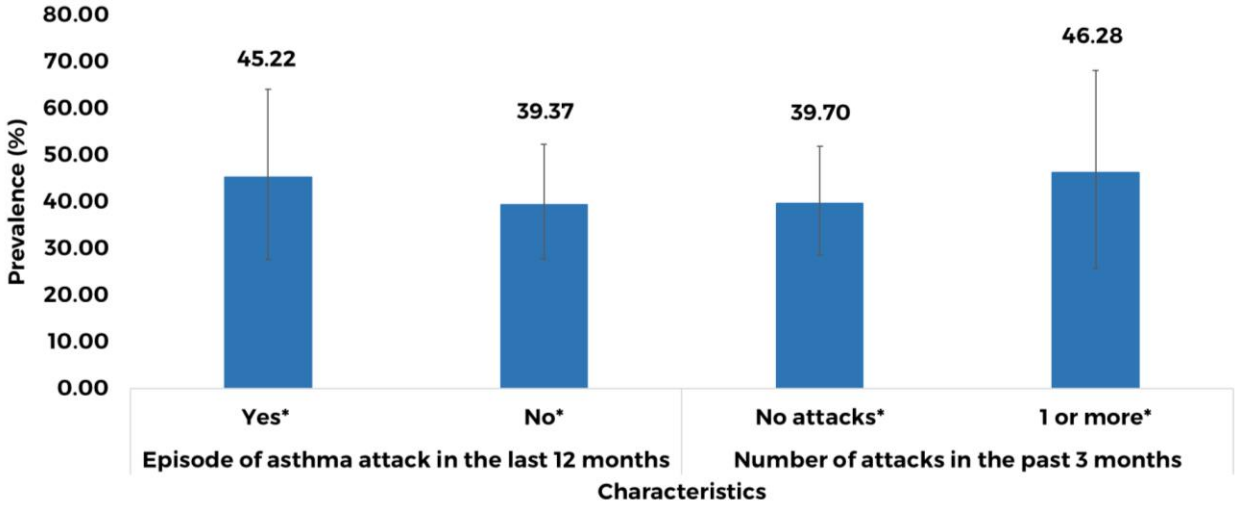
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[3]"Caution should be taken when interpreting the measures discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

Figure 32. *Prevalence of uncontrolled asthma control among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by asthma attacks for 2018-2020.*[1]



[1]***Notes.*** Data source: BRFSS Asthma Call-Back Survey (ACBS). The total sample for an episode of an asthma attack in the last 12 months = 44, and the number of attacks in the past 3 months = 44. Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Asthma emergency department visits

All the public and most private health insurers in Puerto Rico

2021

Asthma emergency department visits

Asthma emergency department visits as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico for 2021

For 2021, the cost of emergency department visits for asthma as the first diagnosis claimed to all the public and most private health insurers in Puerto Rico was around 3,093,773.79 dollars **(Table 43).** The crude rate of emergency department visits for asthma as the first diagnosis in children and adults of all ages for that year claimed to all the public and most private health insurers in Puerto Rico was 85.34 (95% CI: 84.33, 86.34) emergency department visits claimed per 10,000 persons **(Table 31).**[2,4]

In terms of sex, the rate for 2021 appeared to be higher for females (88.55 [95% CI: 87.15, 89.96] emergency department visits claimed per 10,000 females) **(Table 32; Figure 33).**[2,4]Also, for individuals aged 80 to 84 years (148.23 [95% CI: 140.73, 155.74] emergency department visits claimed per 10,000 of that age group) **(Table 33; Figure 34).**[4] In addition, the municipality and health region with the highest rate of emergency department visits claimed was Adjuntas (183.47 [95% CI: 163.67, 203.26] per 10,000 persons from that municipality) and the Caguas region (107.86 [95% CI: 105.05, 110.68] per 10,000 persons from that health region) **(Table 34; Table 35; Table 36; Figure 35; Figure 36).**

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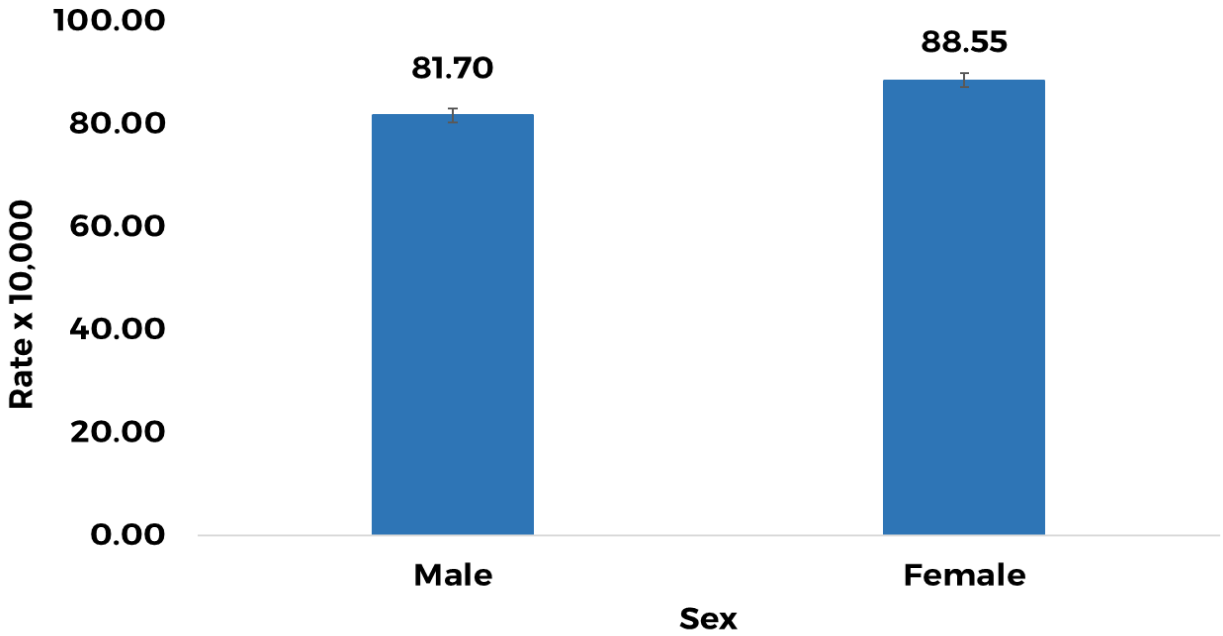
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

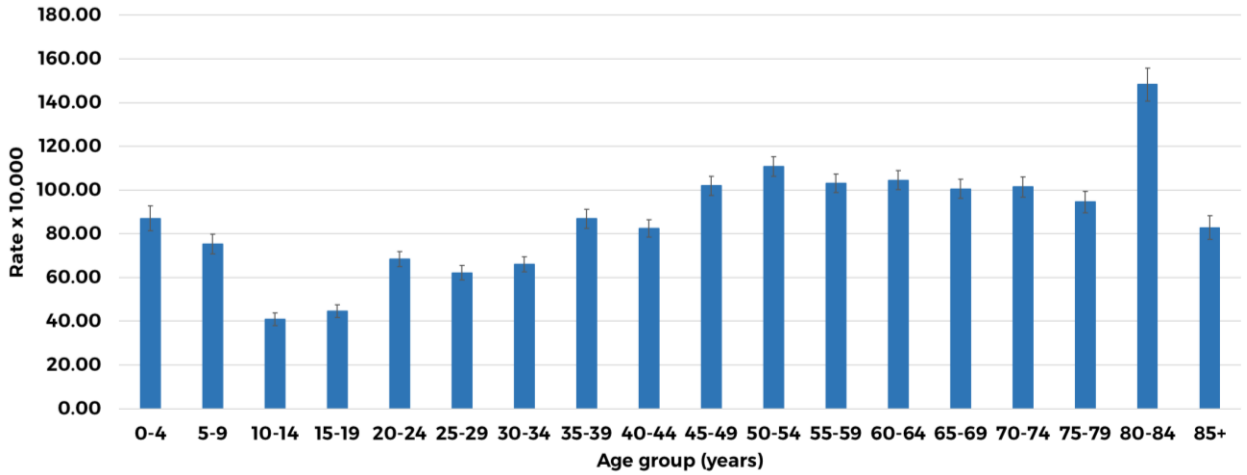
[4]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 33. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by sex for 2021.*[1]



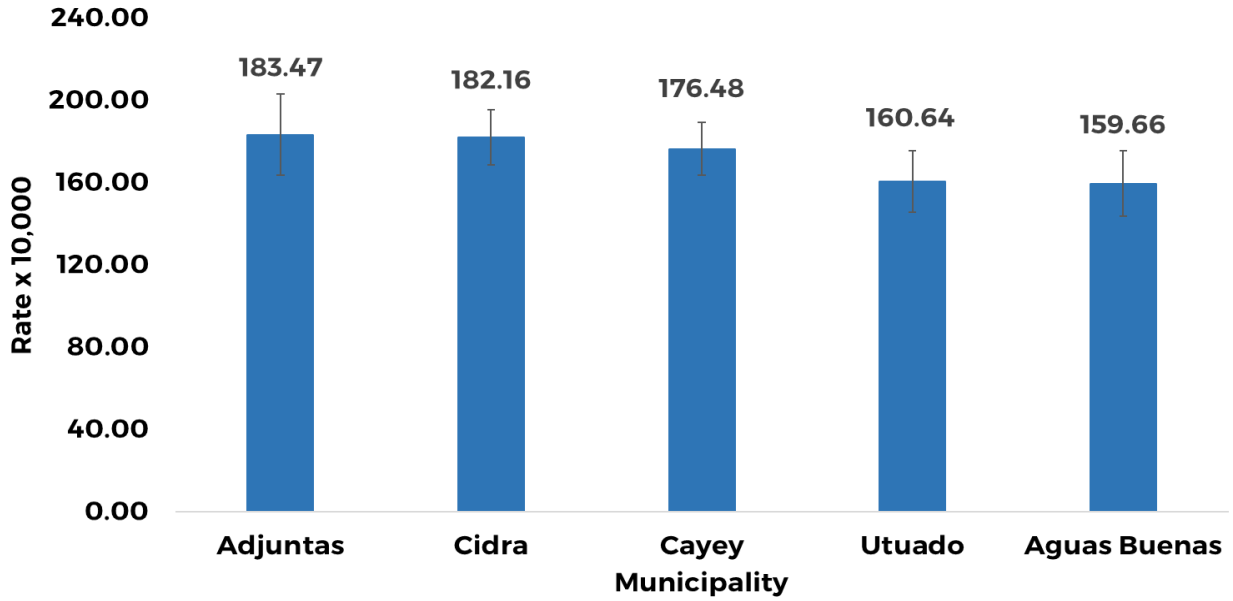
[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total emergency department visits claims for sex = 27,841. A total of 9 emergency department visits claims were not identified by sex. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 34. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by age group for 2021.*[1]



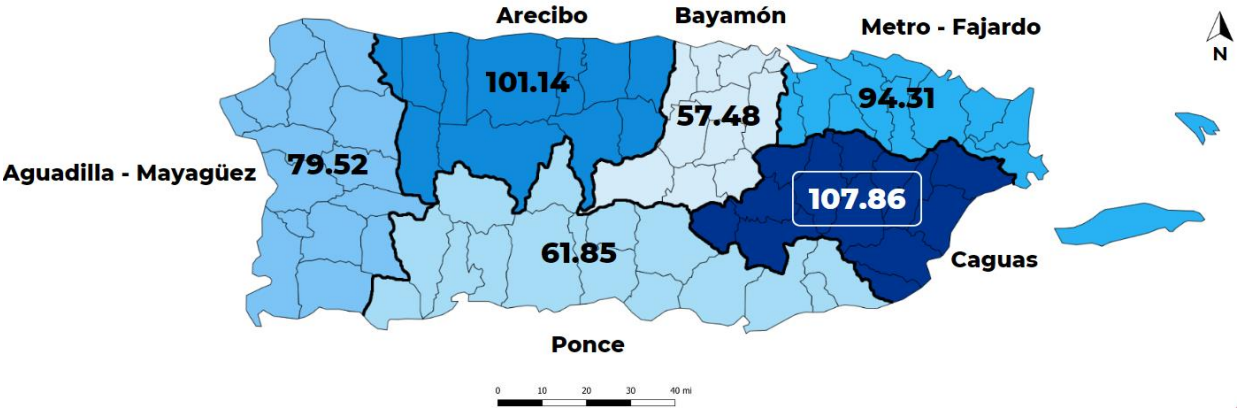
[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total emergency department visits claims for age group = 27,850. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 35. *First 5 municipalities with the highest emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence for 2021.*[1]



[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total emergency department visits claims for the 5 municipalities = 2,623. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 36. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by health region for 2021.*[1]



[1]***Notes.*** Rate x 10,000. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total emergency department visits claims for health region = 27,504. A total of 346 emergency department visits claims were not identified by health region. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Asthma hospitalizations

All the public and most private health insurers in Puerto Rico

2021

Asthma hospitalizations

Asthma hospitalizations as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico for 2021

For 2021, the cost of hospitalizations for asthma as the first diagnosis claimed to all the public and most private health insurers in Puerto Rico was around 17,450,478.42 dollars **(Table 43).** The crude rate of hospitalizations for asthma as the first diagnosis in children and adults of all ages for that year claimed to all the public and most private health insurers in Puerto Rico was 20.71 (95% CI: 20.22, 21.21) hospitalizations claimed per 10,000 persons **(Table 37).**[2,4]

Regarding sex, the rate for 2021 appeared to be higher for females (22.36 [95% CI: 21.65, 23.07] hospitalizations claimed per 10,000 females) **(Table 38; Figure 37).**[2,4]Also, for individuals under 5 years (90.01 [95% CI: 84.26, 95.75] hospitalizations claimed per 10,000 persons of that age group) **(Table 39; Figure 38).**[4] In addition, the municipality and health region with the highest rate of hospitalizations claimed was Florida (99.64 [95% CI: 81.51, 117.77] per 10,000 persons from that municipality) and the Arecibo region (36.28 [95% CI: 34.43, 38.12] per 10,000 persons from that health region) **(Table 40; Table 41; Table 42; Figure 39; Figure 40).** [2,4]

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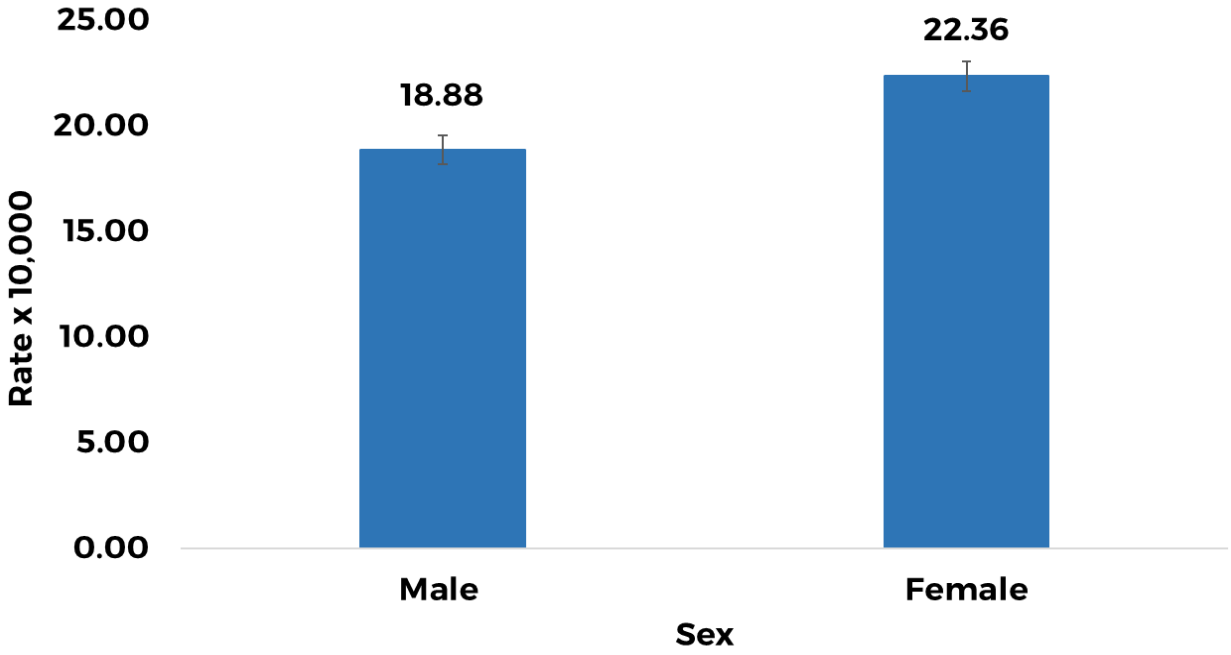
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

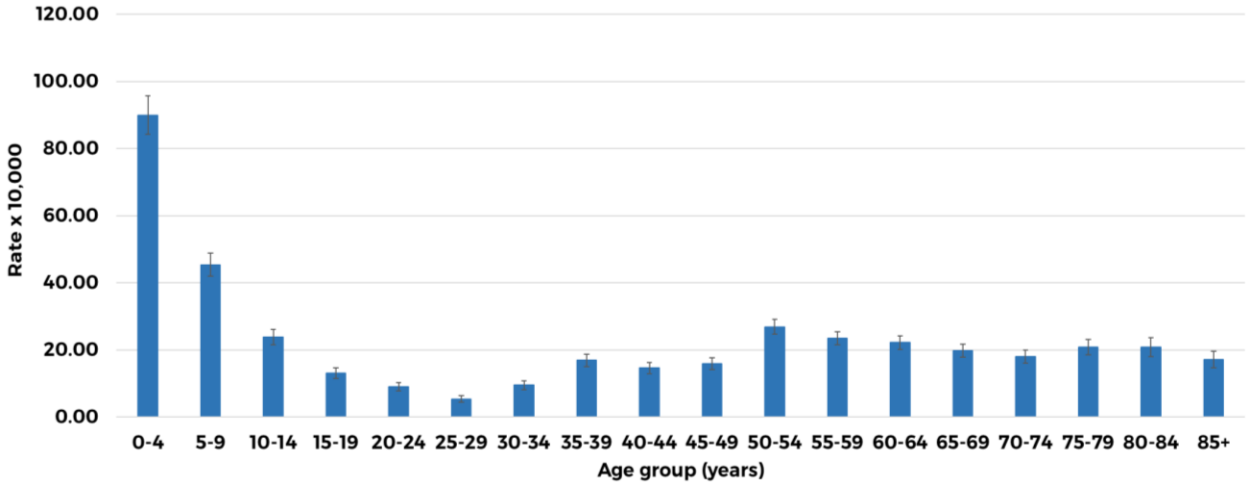
[4]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 37. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by sex for 2021.*[1]



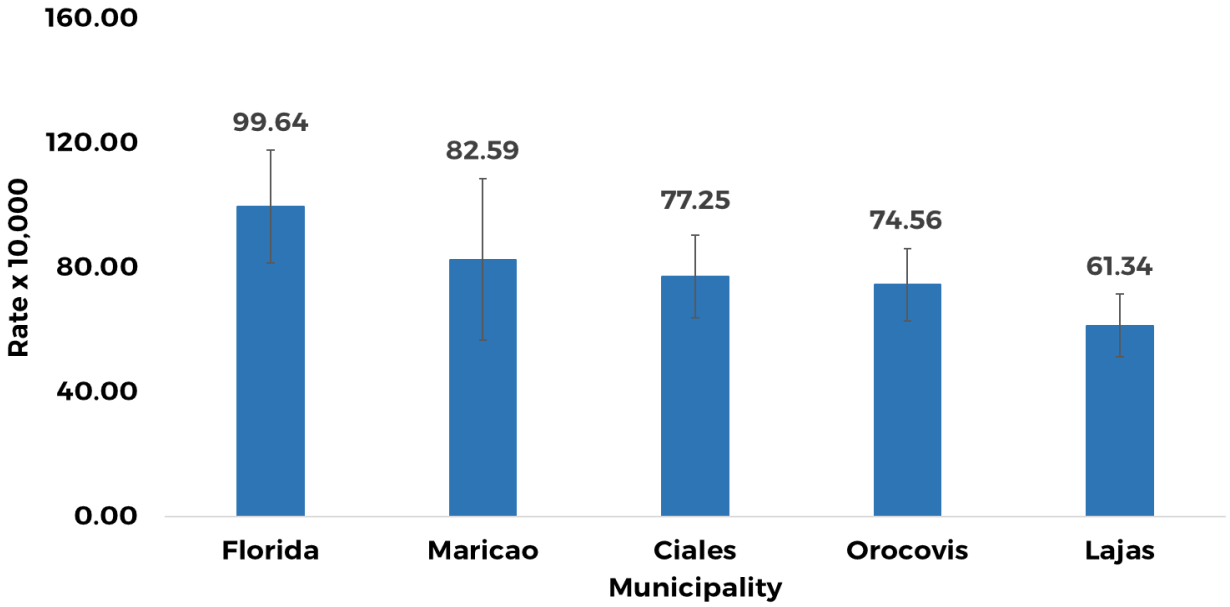
[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total hospitalizations claims for sex = 6,760. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 38. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by age group for 2021.*[1]



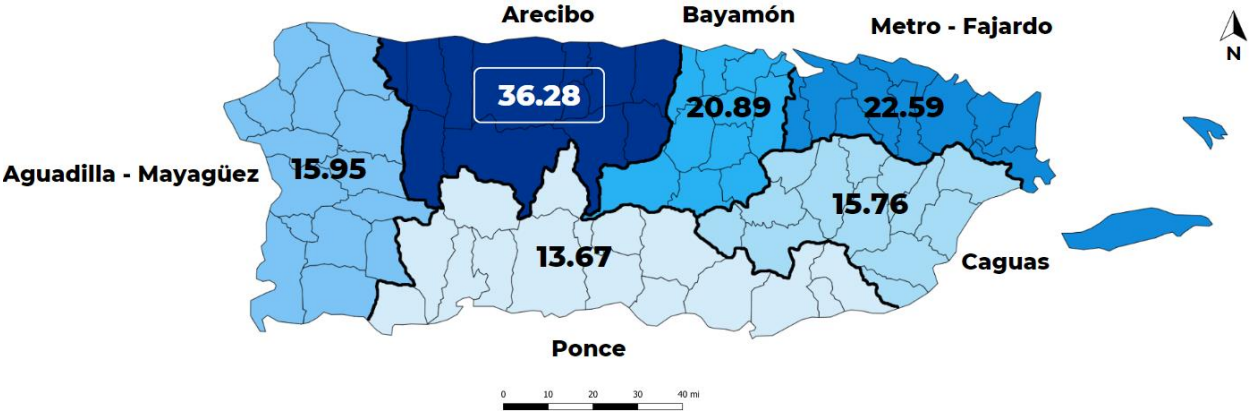
[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total hospitalizations claims for age group = 6,760. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 39. *First 5 municipalities with the highest hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence for 2021.*[1]



[1]***Notes.*** Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total hospitalizations claims for the 5 municipalities = 586. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Figure 40. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by health region for 2021.*[1]



[1]***Notes.*** Rate x 10,000. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. The population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. The total hospitalizations claims for health region = 6,747. A total of 13 hospitalizations claims were not identified by health region. People may be duplicated since we depend on the number of claims. The data on visits to the emergency department that resulted in hospitalization were found in both variables.

Asthma mortality

Demographic Registry of Puerto Rico

2021

Asthma mortality

Asthma mortality in children and adults of all ages in Puerto Rico for 2020-2021

Regarding asthma mortality for this disease in children and adults of all ages from 2010 to 2021, it is observed that the mortality was not a frequent event and that the crude rate increased from 14.24 (95% CI: 10.41, 18.08) per million persons in 2010 (n = 53) to 26.04 (95% CI: 20.51, 31.58) per million persons in 2021 (n = 85) **(Figure 41).**[2] It is important to highlight that when we calculated the death rate ratio using the age-adjusted mortality rate of Puerto Rico with the age-adjusted rate of the United States provided by CDC WONDER (11.29 [95% CI: 10.94, 11.64] deaths per 1,000,000 persons; standard population: United States 2000) (CDC, 2023b) for 2020, it can be indicated that Puerto Rico's age-adjusted mortality rate is about 2 times more than the age-adjusted rate of United States for that year. The crude mortality rate for 2020 was 30.47 (95% CI: 24.50, 36.45), and for 2021 was 26.04 (95% CI: 20.51, 31.58) deaths per 1,000,000 persons **(Table 44; Figure 42)**.[2] Also, the age-adjusted asthma mortality rate for 2020 was 21.25 (95% CI: 17.08, 25.41), and for 2021 was 16.05 (95% CI: 12.64, 19.47) deaths per 1,000,000 persons (Standard population: United States 2000) **(Table 45; Figure 43).**

In terms of sex, the rate appeared to be higher for females in 2020 and 2021 (2020: 34.18 [95% CI: 25.46, 42.90]; 2021: 26.18 [95% CI: 18.53, 33.83] deaths per 1,000,000 females) **(Table 46; Figure 44).**[2] In addition, from the point of view of the sociodemographic characteristics of the age group, the rate was high too for both years for individuals with 65 years or older (2020: 92.65 [95% CI: 70.46, 114.83] and 2021: 79.68 [95% CI: 59.35, 100.01] deaths per 1,000,000 persons of that age group) **(Table 47; Figure 45).**[2]

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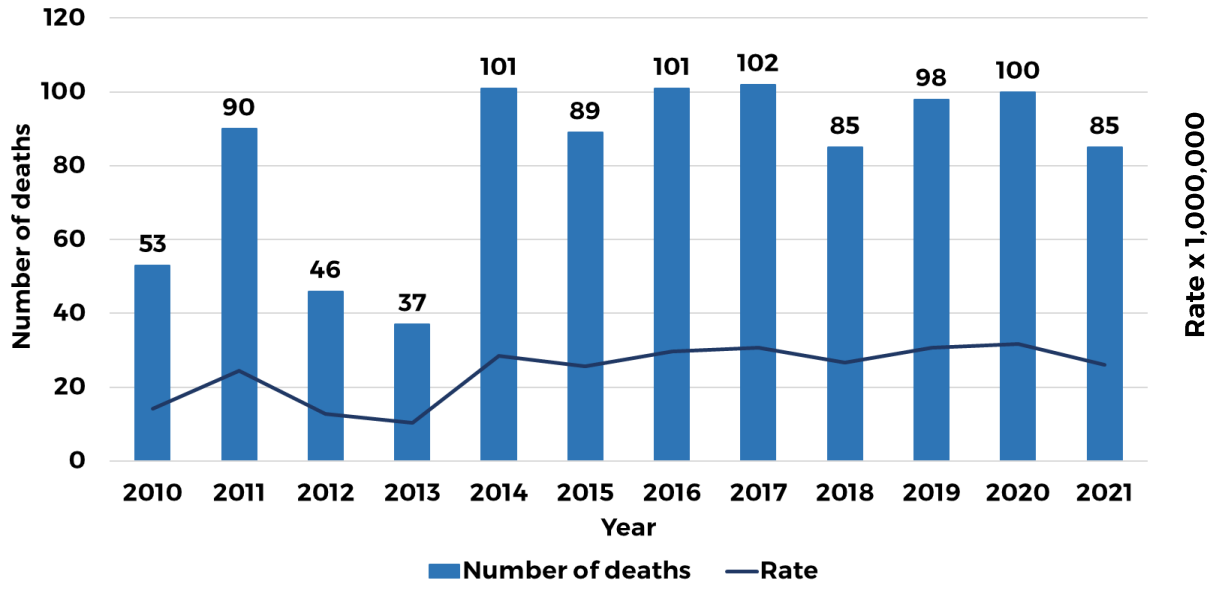
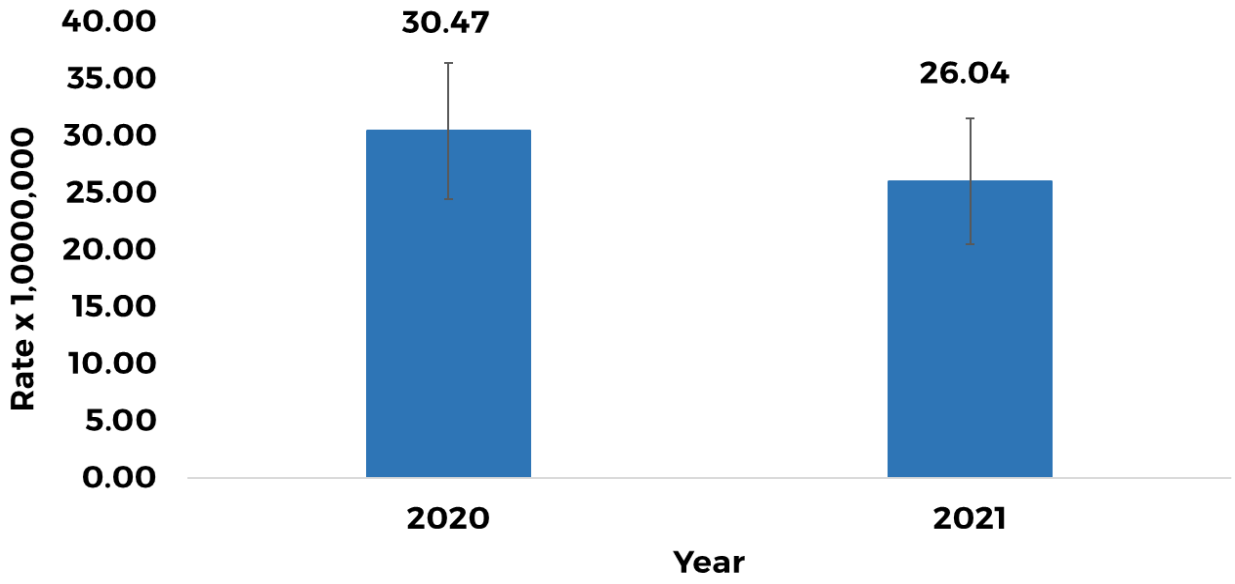
[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Figure 41. *Number of deaths for asthma and the trend in the crude asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by year for 2010-2021.*[1]



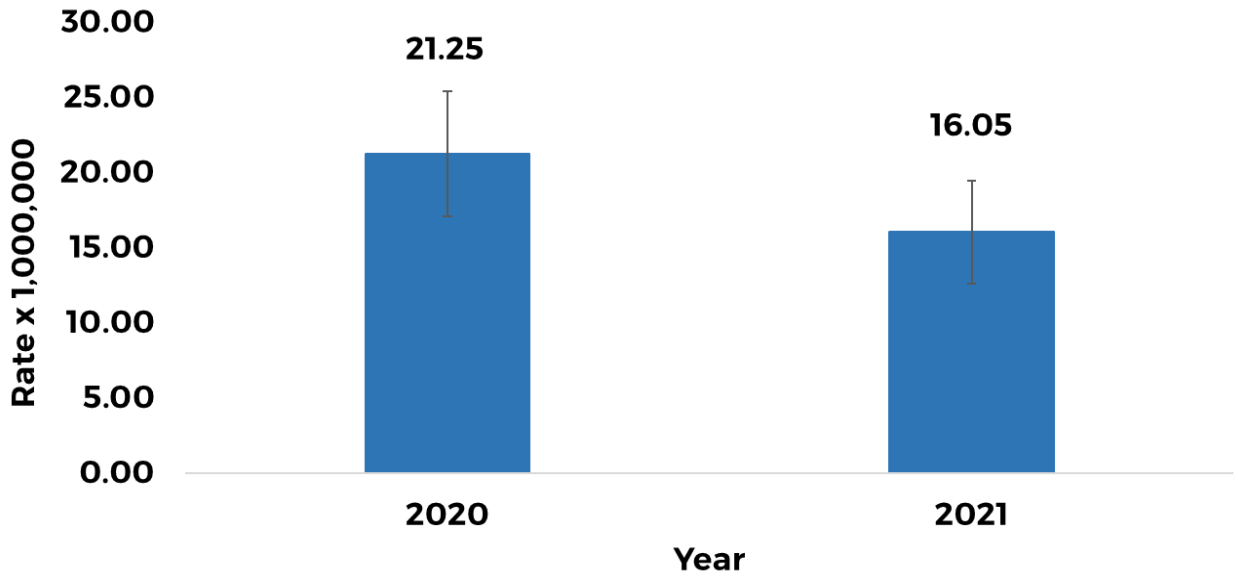
[1]***Notes.*** Data sources: Puerto Rico Demographic Registry. The population of Puerto Rico according to the United States Census for July 1, 2010, to 2021, and the Puerto Rico Institute of Statistics. The total deaths for 2010-2021 = 987.

Figure 42. *Crude asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by year for 2020-2021.*[1]



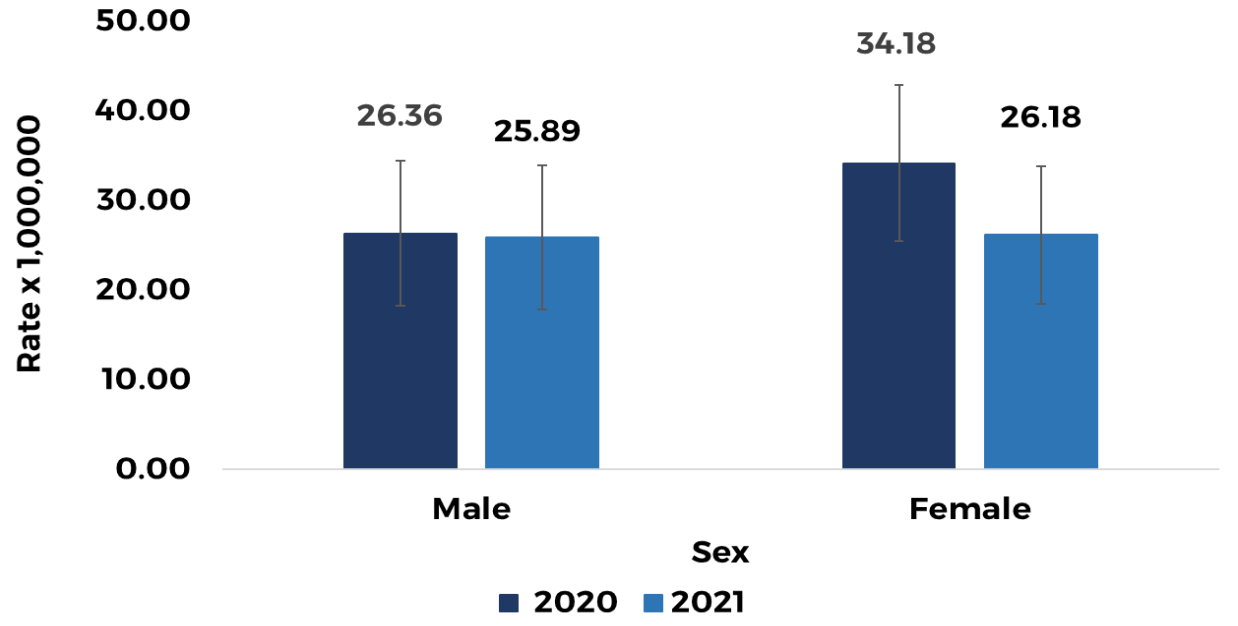
[1]***Notes.*** Data sources: Puerto Rico Demographic Registry. The population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. The total deaths for 2020 = 100, and 2021 = 85.

Figure 43. *Asthma mortality age-adjusted rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by year for 2020-2021.*[1]



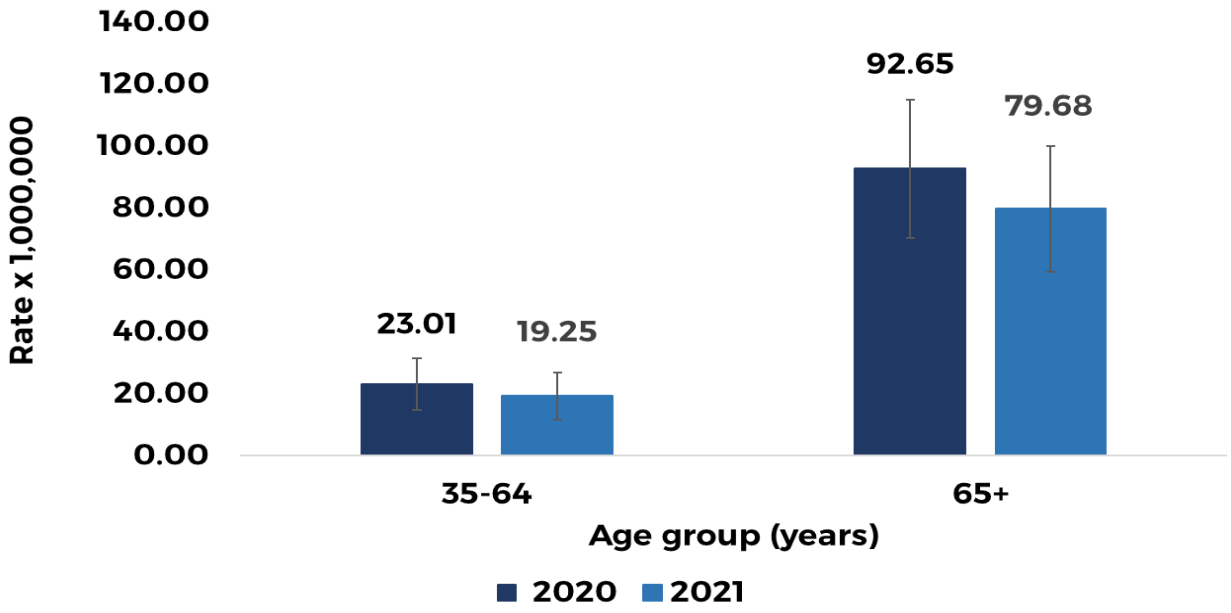
[1]***Notes.*** Data sources: Puerto Rico Demographic Registry. Standard population: United States 2000. The population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. The total deaths for 2020 = 100, and 2021 = 85.

Figure 44. *Asthma mortality rate per one million persons (1,000,000) in children and adults for all ages in Puerto Rico by sex for 2020-2021.*[1]



[1]***Notes.*** Data sources: Puerto Rico Demographic Registry. The population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. The total deaths for sex in 2020 = 100, and in 2021 = 85.

Figure 45. *Asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by age group for 2020-2021.*[1]



[1]***Notes.*** Data sources: Puerto Rico Demographic Registry. The population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. The total deaths for the age group in 2020 = 96, and in 2021 = 83. The crude asthma mortality rate was not presented for the <35 age group according to the analytical recommendations of the CDC (2019d; 2022g) and Klein et al. (2002).

Discussion

Asthma has been considered a public health problem of great importance on the island (Mangual et al., 2021). Also, this disease poses a great burden to the country and its residents (Lewis et al., 2019). As reported in the data, the age-adjusted prevalence (Standard population: United States 2000) of lifetime and current asthma among adults aged 18 years or older in Puerto Rico for 2011-2020, it was usually greater than 16.0% for lifetime asthma and greater than 10.0% for current asthma, except for the year 2012 where the results reflected certain changes in the survey methodology made in 2011 due to the change in weighting methodology and the addition of participants who responded by cell phone (CDC, 2015; 2022e) **(Figure 3)**.

According to Szentpetery et al. (2016), a possible explanation for these observations could be various interactions between heredity and various environmental risk factors, which could be the cause of asthma for residents in the island. However, this multifactorial cause must be studied in greater depth, and more studies must be carried out to support it (Szentpetery et al., 2016). On the other hand, some characteristic environmental risk factors of Puerto Rico that stand out in the literature, which can exacerbate asthma, are: "...molds and pollens from the tropical rain forest and particulate matter (PM) from African dust storms that travel across the island" (Prospero et al., 2008, as cited in Lewis et al. 2019, p. 887; Kanatani et al., 2010, as cited in Lewis et al., 2019, p. 887).

In terms of the prevalence of current asthma in adults aged 18 years or older, people with 55 to 64 years of age appeared to have the highest prevalence for the year 2020. Also, females (12.17%; 95% CI: 10.35, 14.26) and those who belonged to the Arecibo health region (17.28%; 95% CI: 10.37, 27.37) presented a high prevalence.[2]Something important that can be highlighted regarding the prevalence of asthma in females is that it has been suggested in the literature that this may be due to sex hormones (Zein & Erzurum, 2015). It is important to emphasize that further studies are needed to understand why the Arecibo region had the highest prevalence.

[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Regarding children and adolescents from 0 to 17 years of age, those with 5 to 9 years of age (15.95%; 95% CI: 13.50, 18.75) appeared to have the highest prevalence for the 2018-2020 period. In addition, boys (12.68%; 95% CI: 11.10, 14.45) and those who belonged to the Arecibo health region (18.10%; 95% CI: 14.57, 22.25) presented a high prevalence.[2]This is consistent with what has been reported in the literature, which suggests that boys who have not yet entered puberty have a higher prevalence than girls in the same age range (Fuhlbrigge et al., 2002, as cited in Dharmage et al., 2019). Furthermore, the previously mentioned explanation for adults can be applied for the health region.

For the 2018-2020 period, 59.58% (95% CI: 54.17, 64.77) of adults and 40.94% (95% CI: 30.92, 51.77) of the children and adolescents with current asthma had uncontrolled asthma.[2,5] This represents that about 3 out of 5 adults and 2 out of 5 children and adolescents with current asthma had their asthma uncontrolled.[2,5] This raises some concern, suggesting that those triggers and factors associated with managing and controlling asthma in Puerto Rico should be identified to reduce the lack of control of this disease in both the adult and pediatric populations.

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[5]"Caution should be taken when interpreting the measures for the children discussed because the frequency was less than 50, but the estimate was presented following CDC recommendations since the relative standard error was less than 30%" (CDC, 2022b, Small sample size section, para. 1).

Regarding the emergency department visits for asthma as the first diagnosis in children and adults of all ages for 2021 claimed to all the public and most private health insurers in Puerto Rico, the crude rate was was 85.34 (95% CI: 84.33, 86.34) emergency department visits claimed per 10,000 persons.[2,4]For sex, the rate appeared to be higher for females (88.55 [95% CI: 87.15, 89.96] emergency department visits claimed per 10,000 females).[2,4]Also, for individuals aged 80 to 84 years (148.23 [95% CI: 140.73, 155.74] emergency department visits claimed per 10,000 persons of that age group).[4] In addition, the health region with the highest rate of emergency department visits claimed was the Caguas region (107.86 [95% CI: 105.05, 110.68] per 10,000 persons from that health region).[2,4]

In terms of hospitalizations for that year the crude rate was 20.71 (95% CI: 20.22, 21.21) hospitalizations claimed per 10,000 persons. For sex, the rate appeared to be higher for females (22.36 [95% CI: 21.65, 23.07] hospitalizations claimed per 10,000 females).[2,4] Additionally, for individuals under 5 years (90.01 [95% CI: 84.26, 95.75] hospitalizations claimed per 10,000 of that age group).[4] Also, the health region with the highest rate of hospitalizations claimed was the Arecibo region (36.28 [95% CI: 34.43, 38.12] per 10,000 persons from that health region).[2,4]

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

[4]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables.

Regarding the results related to emergency department visits and hospitalizations, were consistent with the literature where it has been highlighted that adult women present a greater emergency department and hospitalizations visits for asthma (Satia et al., 2021). Also, the study by Lewis et al. (2019) carried out in 2013 found that the health region with the highest rate of claimed emergency department visits was Caguas, and the one with the highest rate of hospitalizations was Arecibo.

However, it is important to note that people may be duplicated since we depend on the number of claims, and that the data on visits to the emergency department that resulted in hospitalization were found in both variables, as mentioned in the footnote. In addition, there was no data on visits to the emergency department and hospitalizations for this disease for the population without health insurance, which, according to the one-year estimate of the American Community Survey (ACS) of the United States Census Bureau (n.d.), 5.7% (n = 185,161) of the civilian noninstitutionalized population in Puerto Rico were uninsured for 2021.

In terms of asthma mortality for this disease in children and adults of all ages from 2010 to 2021, it is observed that the mortality was not a frequent event and that the crude rate increased from 14.24 (95% CI: 10.41, 18.08) per million persons in 2010 (n = 53) to 26.04 (95% CI: 20.51, 31.58) per million persons in 2021 (n = 85) **(Figure 33).**[2] Besides that, for 2021, the rate was 26.04 (95% CI: 20.51, 31.58) deaths per 1,000,000 people.[2]It is important to highlight that when comparing the age-adjusted mortality rate of Puerto Rico with the age-adjusted rate of the United States (Standard population: United States 2000) for 2020, it can be indicated that Puerto Rico's age-adjusted mortality rate is about 2 times more than the age-adjusted rate of United States for that year.

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[2]Although this gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000).

Conclusion

Finally, as discussed in this report, asthma undoubtedly represents a public health problem in Puerto Rico. This suggests that efforts should be devoted to working with the population disproportionately affected by this disease. For this reason, the Puerto Rico Asthma Program of the Department of Health maintains the commitment to educate people who suffer from this disease so that they can have better management and control of this disease, which will increase their quality of life (Puerto Rico Department of Health, 2023).

References

American Lung Association. (2022, November 28). *Asthma symptoms & diagnosis*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/symptoms-diagnosis

American Lung Association. (2023, April 19). *What is asthma?*. https://www.lung.org/lung-health-diseases/lung-disease-lookup/asthma/learn-about-asthma/what-is-asthma

Centers for Disease Control and Prevention. (2022a, February 19). *2019 Behavioral Risk Factor Surveillance System Asthma Call-Back Survey history and analysis guidance*. https://www.cdc.gov/brfss/acbs/2019/pdf/acbs_history_2019-final-version-2-508.pdf

Centers for Disease Control and Prevention. (2022b, February 24). *2020 Adult asthma data: Technical information*. https://www.cdc.gov/asthma/brfss/2020/brfsstechinfo.html

Centers for Disease Control and Prevention. (2021a, March 31). *2020 Child asthma data: Technical information*. https://www.cdc.gov/asthma/brfss/2020/child/brfsschildtechinfo.html

Centers for Disease Control and Prevention. (2022c, June 3). *About adult BMI*. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Centers for Disease Control and Prevention. (2014, May 16). *About BRFSS*. https://www.cdc.gov/brfss/about/index.htm

Centers for Disease Control and Prevention. (2022d, March 1). *Behavioral Risk Factor Surveillance System (BRFSS) prevalence data*. https://www.cdc.gov/asthma/data-analysis-guidance/brfss-core-asthma-questions.htm

Centers for Disease Control and Prevention. (2019a, May 14). *Behavioral Risk Factor Surveillance System - core asthma questions*. https://www.cdc.gov/asthma/data-analysis-guidance/brfss-core-asthma-questions.htm

Centers for Disease Control and Prevention. (2020a). *BRFSS/asthma survey adult questionnaire-2020*. https://www.cdc.gov/brfss/acbs/2020/pdf/acbs_2020_adult_questionnaire-508.pdf

Centers for Disease Control and Prevention. (2020b). *BRFSS/asthma survey child questionnaire-2020*. https://www.cdc.gov/brfss/acbs/2020/pdf/acbs_2020_child_questionnaire-508.pdf

Centers for Disease Control and Prevention. (2015). *BRFSS prevalence & trends data*. https://www.cdc.gov/brfss/brfssprevalence/

Centers for Disease Control and Prevention. (2022e, April 29). *CDC – BRFSS 2012 survey data and documentation*. https://www.cdc.gov/brfss/annual_data/annual_2012.html

Centers for Disease Control and Prevention. (2022f, June 14). *CDC – BRFSS – BRFSS Asthma Call-back Survey*. https://www.cdc.gov/brfss/acbs/index.htm

Centers for Disease Control and Prevention. (n.d.). *Chapter 6: Questionnaire section 4 - symptoms and attacks*.

Centers for Disease Control and Prevention. (2021b, August). *Comparability of data BRFSS 2020*. https://www.cdc.gov/brfss/annual_data/2020/pdf/compare-2020-508.pdf

Centers for Disease Control and Prevention. (2022g, November 1). *Data analysis guidance: Underlying cause of death using CDC WONDER*. https://www.cdc.gov/asthma/data-analysis-guidance/ucd-data.htm

Centers for Disease Control and Prevention. (2019b, May 14). *Emergency department data (ED)*. https://www.cdc.gov/asthma/data-analysis-guidance/emergency-department-data.htm

Centers for Disease Control and Prevention. (2022h, October 19). *Frequently asked questions about changes to the Behavioral Risk Factor Surveillance System*. https://www.cdc.gov/surveillancepractice/reports/brfss/brfss_faqs.html#:~:text=BRFSS%20surveys%20a%20sample%20of,the%20population%20of%20each%20state

Centers for Disease Control and Prevention. (2012, May 18). *Lesson 3: Measures of risk*. https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section3.html

Centers for Disease Control and Prevention. (2019c, November 21). *LLCP 2018 codebook report*. https://www.cdc.gov/brfss/annual_data/2018/pdf/codebook18_llcp-v2-508.pdf

Centers for Disease Control and Prevention. (2020c, July 31). *LLCP 2019 codebook report*. https://www.cdc.gov/brfss/annual_data/2019/pdf/codebook19_llcp-v2-508.HTML

Centers for Disease Control and Prevention. (2021c, August 6). *LLCP 2020 codebook report*. https://www.cdc.gov/brfss/annual_data/2020/pdf/codebook20_llcp-v2-508.pdf

Centers for Disease Control and Prevention. (2022i, December 13). *Most recent national asthma data*. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm

Centers for Disease Control and Prevention. (2019d, May 17). *Multiple cause of death mortality (MCD) data*. https://www.cdc.gov/asthma/data-analysis-guidance/mcd-data.htm

Centers for Disease Control and Prevention. (2021d, July 7). *Overview: BRFSS 2020*. https://www.cdc.gov/brfss/annual_data/2020/pdf/overview-2020-508.pdf

Centers for Disease Control and Prevention. (2019e, May 14). *State hospital discharge data*. https://www.cdc.gov/asthma/data-analysis-guidance/state-hospital-discharge-data.htm

Centers for Disease Control and Prevention. (2013, August 15). *The BRFSS data user guide*. https://www.cdc.gov/brfss/data_documentation/pdf/UserguideJune2013.pdf

Centers for Disease Control and Prevention. (2022j, November 3). *Underlying cause of death 1999-2020*. https://wonder.cdc.gov/wonder/help/ucd.html

Centers for Disease Control and Prevention. (2023a, February 13). *Underlying cause of death, 1999-2020 results*. https://wonder.cdc.gov/controller/datarequest/D76;jsessionid=6C0B9B8B17AF018DBF1667BD35B0

Centers for Disease Control and Prevention. (2023b, February 15). *Underlying cause of death, 2018-2021, single race results*. https://wonder.cdc.gov/controller/datarequest/D158;jsessionid=5EDB73257AA73A6D0663A89EBCFC

Cicero, E. C., Reisner, S. L., Merwin, E. I., Humphreys, J. C., & Silva, S. G. (2020). Application of Behavioral Risk Factor Surveillance System Sampling Weights to Transgender Health Measurement. *Nursing Research*, *69*(4), 307-315. https://doi.org/10.1097/NNR.0000000000000428

Dharmage, S. C., Perret, J. L., & Custovic, A. (2019). Epidemiology of Asthma in Children and Adults. *Frontiers in Pediatrics*, *7*, 246. https://doi.org/10.3389/fped.2019.00246

GBD 2019 Diseases and Injuries Collaborators. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the global burden of disease study 2019. *Lancet*, *396*(10258), 1204-1222. https://doi.org/10.1016/S0140-6736(20)30925-9

Grupo de Análisis del Programa Especial de Análisis de Salud (SHA) de la OPS. (2002, September). La estandarización: Un método epidemiológico clásico para la comparación de tasas. *Boletín Epidemiológico, 23*(3), 1-16. https://www3.paho.org/Spanish/SHA/EB_v23n3.pdf

Klein, R. J., Proctor, S. E., Boudreault, M. A., & Turczyn, K. M. (2002). Healthy people 2010 criteria for data suppression. *Statistical Notes*, (24), 1-12.

Lewis, L. M., Mirabelli, M. C., Beavers, S. F., Kennedy, C. M., Shriber, J., Stearns, D., Morales González, J. J., Santiago, M. S., Félix, I. M., Ruiz-Serrano, K., Dirlikov, E., Lozier, M. J., Sircar, K., Flanders, W. D., Rivera-García, B., Irizarry-Ramos, J., & Bolaños-Rosero, B. (2019). Characterizing environmental asthma triggers and healthcare use patterns in Puerto Rico. *Journal of Asthma*, *57*(8), 886-897. https://doi.org/10.1080/02770903.2019.1612907

Mangual-Martínez, M. A.; Montalvo-Félix, I., & Narváez-Sánchez, K. E. (2021). *Puerto Rico Asthma Program strategic plan 2021-2025*. https://www.salud.gov.pr/menuInst/download/1239

Moreno-Altamirano, A., López-Moreno, S., & Corcho-Berdugo, A. (2000). Principales medidas en epidemiología. *Salud Pública de México*, *42*(4), 337-348.

National Heart, Lung, and Blood Institute. (2007). *Expert panel report 3: Guidelines for the diagnosis and management of asthma*. https://www.nhlbi.nih.gov/sites/default/files/media/docs/EPR-3_Asthma_Full_Report_2007.pdf

National Heart, Lung, and Blood Institute. (n.d.). *Expert panel report 4 (EPR-4) working group*. https://www.nhlbi.nih.gov/about/advisory-and-peer-review-committees/national-asthma-education-and-prevention-program-coordinating/EPR4-working-group

New York Department of Health. (1999, April). *Age-adjusted rates - statistics teaching tools*. https://www.health.ny.gov/diseases/chronic/ageadj.htm#:~:text=What%20is%20age%2Dadjustment%3F,age%20structures%20to%20be%20compared

Office of Disease Prevention and Health Promotion. (n.d.). *Reduce asthma deaths - RD-01*. https://health.gov/healthypeople/objectives-and-data/browse-objectives/respiratory-disease/reduce-asthma-deaths-rd-01/data-methodology

Pennsylvania Department of Health. (n.d.). *Tools of the trade: Confidence intervals for an age-adjusted rate*. https://www.health.pa.gov/topics/HealthStatistics/Statistical-Resources/UnderstandingHealthStats/Documents/Confidence_Intervals_for_an_Age_Adjusted_Rate.pdf

Puerto Rico Department of Health. (2023, January 26). *Programa de manejo y control de asma*. https://www.salud.gov.pr/CMS/88

Puerto Rico Department of Health. (n.d.). *Registro demográfico de Puerto Rico*. https://www.salud.gov.pr/CMS/DOWNLOAD/3202

Puerto Rico Department of Health. (2022, August 24). *Registro demográfico de Puerto Rico*. https://www.salud.gov.pr/CMS/36

Puerto Rico Health Insurance Administration. (n.d.a). *¿Qué es ASES?*. https://www.asespr.org/beneficiarios/sobre-ases/que-es-ases/

Puerto Rico Health Insurance Administration. (n.d.b). *Aseguradoras contratadas*. https://www.asespr.org/proveedores-2/contratos/

Puerto Rico Institute of Statistics. (n.d.). *Estimados anuales poblacionales de los municipios desde 1950*. https://censo.estadisticas.pr/EstimadosPoblacionales

Qin, X. (2018, May 5). SAS coding to categorize asthma control status.

Satia, I., Adatia, A., Cusack, R. P., Greene, J. M., O'Byrne, P. M., Killian, K. J., & Johnston, N. (2021). Influence of age, sex and respiratory viruses on the rates of emergency department visits and hospitalizations with

respiratory tract infections, asthma and COPD. *ERJ Open Research*, *7*(2), 00053-2021. https://doi.org/10.1183/23120541.00053-2021

Schoenbach, V. J., & Rosamond, W. D. (2000). Standardization of rates and ratios. In *Understanding the Fundamentals of Epidemiology* (2000th ed., pp. 129–151).

Surveillance, Epidemiology, and End Results Program. (n.d.). *Standard populations - 19 age groups*. https://seer.cancer.gov/stdpopulations/stdpop.19ages.html

Szentpetery, S. E., Forno, E., Canino, G., & Celedón, J. C. (2016). Asthma in Puerto Ricans: Lessons from a high-risk population. *Journal of Allergy and Clinical Immunology*, *138*(6), 1556-1558. https://doi.org/10.1016/j.jaci.2016.08.047

United States Census Bureau. (n.d.). *S2701: Selected characteristics of health insurance coverage in the United States*. https://data.canary.census.gov/table?t=Health+Insurance&g=0400000US72_0500000US13305&tid=ACSST1Y2021.S2701

World Health Organization. (2022, May 11). *Asthma*. https://www.who.int/news-room/fact-sheets/detail/asthma

Zein, J. G., & Erzurum, S. C. (2015). Asthma is Different in Women. *Current Allergy and Asthma Reports*, *15*(6), 28. https://doi.org/10.1007/s11882-015-0528-y

Appendix 1. Tables

Summary of the epidemiological data related to asthma in Puerto Rico

Table 1. *Summary of the epidemiological data related to asthma in Puerto Rico.*

Health indicator	Population	Year	Ages (years)	Measure	Value	LL[a]	UL[b]
Lifetime asthma	Adults	2020	18 or older	Crude prevalence (%)[c]	16.52	14.92	18.24
Current asthma	Adults	2020	18 or older	Crude prevalence (%)[c]	10.39	8.98	11.99
Lifetime asthma	Children	2018-2020	0 to 17	Crude prevalence (%)[c]	20.69	19.27	22.18
Current asthma	Children	2018-2020	0 to 17	Crude prevalence (%)[c]	12.18	11.04	13.42
Uncontrolled asthma in people with current asthma	Adults	2018	18 or older	Crude prevalence (%)[c]	63.71	54.29	72.18
	Adults	2019	18 or older	Crude prevalence (%)[c]	67.05	57.82	75.14
	Adults	2020	18 or older	Crude prevalence (%)[c]	47.97	37.79	58.31
	Adults	2018-2020	18 or older	Crude prevalence (%)[c]	59.58	54.17	64.77
	Children	2018-2020	0 to 17	Crude prevalence (%)[c]	40.94*	30.92	51.77
Asthma emergency department visits claimed to all the public and most private health insurers	Children and adults	2021	All ages	Crude rate x 10,000 persons[d]	85.34	84.33	86.34
Hospitalizations claimed to all the public and most private health insurers	Children and adults	2021	All ages	Crude rate x 10,000 persons[d]	20.71	20.22	21.21
Mortality for asthma	Children and adults	2021	All ages	Crude rate x 1,000,000 persons	26.04	20.51	31.58
	Children and adults	2021	All ages	Age-adjusted rate x 1,000,000 persons	16.05	12.64	19.47

Notes. Data sources: Behavioral Risk Factor Surveillance System (BRFSS), BRFSS Asthma Call-Back Survey (ACBS), Puerto Rico Demographic Registry, all the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud). Standard population: United States 2000. [a]Lower 95% confidence interval. [b]Upper 95% confidence interval. [c]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [d]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Lifetime and current asthma

Table related to the crude prevalence of lifetime and current asthma in adults aged 18 years or older in Puerto Rico for 2020

Table 2. *Crude prevalence of lifetime and current asthma among adults aged 18 years or older in Puerto Rico, 2020.*

Variable	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Lifetime Asthma									
Yes	825	450,952	24,509	402,903	499,002	16.52	0.85	14.92	18.24
No	4,111	2,279,488	45,935	2,189,435	2,369,541	83.48	0.85	81.76	85.08
Current Asthma									
Yes	515	283,602	21,977	240,518	326,686	10.39	0.77	8.98	11.99
No	4,421	2,446,838	45,743	2,357,162	2,536,514	89.61	0.77	88.01	91.02

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Tables related to the prevalence of lifetime asthma in adults aged 18 years or older in Puerto Rico for 2020 by sociodemographic characteristics, behavioral risks, and comorbidities

Table 3. *Prevalence of lifetime asthma among adults aged 18 years or older in Puerto Rico by sociodemographic characteristics, 2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Male	248	180,104	14.14	1.32	11.74	16.93	1,727	1,094,052	85.86	1.32	83.07	88.26
Female	577	270,848	18.60	1.10	16.55	20.84	2,384	1,185,436	81.40	1.10	79.16	83.45
Age group (years)												
18-24	76	63,347	18.26	2.20	14.34	22.97	314	283,498	81.74	2.20	77.03	85.66
25-34	132	73,362	16.90	1.79	13.68	20.70	615	360,766	83.10	1.79	79.30	86.32
35-44	130	77,285	17.71	2.70	13.02	23.62	653	359,204	82.29	2.70	76.38	86.98
45-54	144	68,940	15.19	1.50	12.49	18.36	809	384,904	84.81	1.50	81.64	87.51
55-64	160	69,534	16.11	1.53	13.34	19.33	794	362,076	83.89	1.53	80.67	86.66
65+	183	98,484	15.69	2.16	11.90	20.41	926	529,041	84.31	2.16	79.59	88.10
Educational level												
< High school[f]	98	100,046	15.62	2.30	11.63	20.66	483	540,488	84.38	2.30	79.34	88.37
≥ High school[g]	725	350,417	16.80	0.85	15.20	18.54	3,620	1,735,300	83.20	0.85	81.46	84.80
Annual income												
< $20,000[h]	386	235,876	18.35	1.48	15.63	21.43	1,711	1,049,617	81.65	1.48	78.57	84.37
≥ $20,000[i]	285	139,435	15.52	1.18	13.35	17.97	1,585	758,959	84.48	1.18	82.03	86.65
Employment status												
Working[j]	346	168,003	13.98	0.90	12.31	15.84	1,980	1,033,552	86.02	0.90	84.16	87.69
Not working[k]	477	282,771	18.71	1.35	16.21	21.50	2,093	1,228,505	81.29	1.35	78.50	83.79
Marital status												
Married/A member of an unmarried couple	395	183,893	15.54	1.42	12.96	18.53	2,151	999,219	84.65	1.42	81.47	87.04
Divorced/Separated	154	137,020	17.44	1.58	14.55	20.75	707	648,871	82.48	1.58	79.25	85.45
Widowed	61	41,029	14.72	2.37	10.65	19.99	261	237,710	85.28	2.37	80.01	89.35
Never married	212	88,238	19.01	1.55	16.16	22.24	963	375,847	80.99	1.55	77.76	83.84
Health region												
Aguadilla - Mayagüez	122	65,283	16.46	1.75	13.32	20.18	537	331,235	83.54	1.75	79.82	86.68
Arecibo	97	79,556	23.75	4.18	16.53	32.87	439	255,453	76.25	4.18	67.13	83.47
Bayamón	156	79,219	17.26	1.75	14.09	20.97	679	379,825	82.74	1.75	79.03	85.91
Caguas	145	80,204	17.52	1.96	14.01	21.69	691	377,637	82.48	1.96	78.31	85.99
Metro - Fajardo	197	92,272	14.16	1.22	11.93	16.72	1,109	559,484	85.84	1.22	83.28	88.07
Ponce	96	49,894	12.80	1.69	9.83	16.50	579	340,007	87.20	1.69	83.50	90.17

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). [g]Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). [h]Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). [i]Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. [j]Employed for wages and self-employed. [k]Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020).

Table 4. *Prevalence of lifetime asthma among adults aged 18 years or older in Puerto Rico by behavioral risks, BRFSS 2020.*

Behavioral Risks	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
BMI (kg/m^2)												
Underweight[f]	-	-	-	-	-	-	51	41,295	79.40	6.98	62.55	89.90
Normal[g]	163	92,036	11.68	1.15	9.60	14.12	1,132	696,238	88.32	1.15	85.88	90.40
Overweight[h]	251	147,058	15.79	1.59	12.91	19.15	1,475	784,541	84.21	1.59	80.85	87.09
Obese[i]	352	177,248	21.89	1.64	18.84	25.28	1,257	632,442	78.11	1.64	74.72	81.16
Current smoker												
Yes	60	31,369	11.77	1.92	8.50	16.08	369	235,085	88.23	1.92	83.92	91.50
No	761	418,127	17.22	0.92	15.48	19.10	3,678	2,010,616	82.78	0.92	80.90	84.52

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Underweight = below 18.5 kg/m^2. [g]Normal = 18.5 - 24.9 kg/m^2. [h]Overweight = 25.0 - 29.9 kg/m^2. [i]Obesity = 30.0 kg/m^2 and above (CDC, 2022c). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table 5. *Prevalence of lifetime asthma among adults aged 18 years or older in Puerto Rico by comorbidities, 2020.*

Comorbidities	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Diabetes												
Yes	166	93,601	21.97	3.03	16.61	28.48	594	332,373	78.03	3.03	71.52	83.39
No	658	356,847	15.54	0.83	13.98	17.24	3,505	1,939,073	84.46	0.83	82.76	86.02
Myocardial infarction												
Yes	66	33,614	27.46	5.15	18.58	38.59	134	88,776	72.54	5.15	61.41	81.42
No	756	416,110	15.99	0.86	14.37	17.76	3,970	2,185,945	84.01	0.86	82.24	85.63
Coronary heart disease or angina												
Yes	98	49,126	31.18	3.92	24.05	39.34	185	108,421	68.82	3.92	60.66	75.95
No	723	398,862	15.65	0.87	14.02	17.44	3,918	2,149,104	84.35	0.87	82.56	85.98
Stroke												
Yes	-	-	-	-	-	-	61	29,429	73.96	5.70	61.40	83.53
No	798	439,268	16.34	0.85	14.73	18.08	4,048	2,249,259	83.66	0.85	81.92	85.27
Skin cancer												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	812	444,767	16.46	0.85	14.86	18.19	4,065	2,257,895	83.54	0.85	81.81	85.14
Other cancer												
Yes	59	35,305	22.58	6.41	12.44	37.44	206	121,079	77.42	6.41	62.56	87.56
No	763	414,276	16.12	0.80	14.61	17.76	3,901	2,155,684	83.88	0.80	82.24	85.39
COPD, emphysema, or chronic bronchitis												
Yes	157	79,870	53.75	3.85	46.17	61.15	138	68,739	46.25	3.85	38.85	53.83
No	664	362,916	14.10	0.84	12.54	15.83	3,972	2,210,455	85.90	0.84	84.17	87.46
Arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia												
Yes	278	141,666	21.85	2.13	17.95	26.31	905	506,823	78.15	2.13	73.69	82.05
No	539	305,626	14.79	0.90	13.12	16.64	3,185	1,760,251	85.21	0.90	83.36	86.88
Depression												
Yes	224	118,258	28.29	2.28	24.05	32.96	559	299,735	71.71	2.28	67.04	75.95
No	600	332,504	14.40	0.91	12.71	16.28	3,545	1,916,288	85.60	0.91	83.72	87.29
Kidney disease												
Yes	-	-	-	-	-	-	141	66,874	75.98	3.85	67.65	82.71
No	777	429,259	16.28	0.87	14.65	18.05	3,962	2,208,272	83.72	0.87	81.95	85.35
One or more chronic diseases[f]												
Yes	517	959,732	22.89	1.57	19.96	26.12	1,783	284,915	77.11	1.57	73.88	80.04
No	308	1,319,756	11.17	0.77	9.76	12.77	2,328	166,037	88.83	0.77	87.23	90.24

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). COPD = Chronic obstructive pulmonary disease. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]At least one of the following chronic diseases: diabetes, myocardial infarction, coronary heart disease or angina, stroke, skin cancer, other cancer, COPD, emphysema, or chronic bronchitis, arthritis, rheumatoid arthritis, gout, lupus or fibromyalgia, and kidney disease. -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Tables related to the prevalence of current asthma in adults aged 18 years or older in Puerto Rico for 2020 by sociodemographic characteristics, behavioral risks, and comorbidities

Table 6. *Prevalence of current asthma among adults aged 18 years or older in Puerto Rico by sociodemographic characteristics, 2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Male	143	106,383	8.35	1.19	6.30	10.99	1,832	1,167,773	91.65	1.19	89.01	93.70
Female	372	177,220	12.17	1.00	10.35	14.26	2,589	1,279,064	87.83	1.00	85.74	89.65
Age group (years)												
18-24	-	-	-	-	-	-	346	310,857	89.62	1.72	85.73	92.55
25-34	72	38,803	8.94	1.34	6.63	11.95	675	395,325	91.06	1.34	88.05	93.37
35-44	67	45,632	10.45	2.67	6.26	16.94	716	390,857	89.55	2.67	83.06	93.74
45-54	92	39,975	8.81	1.16	6.78	11.36	861	413,869	91.19	1.16	88.64	93.22
55-64	113	51,501	11.93	1.38	9.48	14.91	841	380,109	88.07	1.38	85.09	90.52
65+	127	71,705	11.43	2.07	7.96	16.14	982	555,820	88.57	2.07	83.86	92.04
Educational level												
< High school[f]	68	71,129	11.10	2.13	7.57	16.01	513	569,405	88.90	2.13	83.99	92.43
≥ High school[g]	445	211,985	10.16	0.76	8.77	11.75	3,900	1,873,733	89.84	0.76	88.25	91.23
Annual income												
< $20,000[h]	250	164,800	12.82	1.42	10.29	15.86	1,847	1,120,694	87.18	1.42	84.14	89.71
≥ $20,000[i]	168	76,055	8.47	0.92	6.83	10.44	1,702	822,339	91.53	0.92	89.56	93.17
Employment status												
Working[j]	201	95,704	7.97	0.70	6.70	9.44	2,125	1,105,851	92.04	0.70	90.56	93.30
Not working[k]	313	187,803	12.43	1.26	10.16	15.11	2,257	1,323,473	87.57	1.26	84.89	89.84
Marital status												
Married/A member of an unmarried couple	254	119,456	10.10	1.37	7.71	13.13	2,292	1,063,656	89.90	1.37	86.87	92.30
Divorced/Separated	94	86,118	10.96	1.36	8.56	13.92	767	699,774	88.04	1.36	86.08	91.44
Widowed	-	-	-	-	-	-	280	251,017	90.05	1.91	85.63	93.23
Never married	123	49,918	10.76	1.18	8.65	13.30	1,052	414,167	89.24	1.18	86.70	91.35
Health region												
Aguadilla - Mayagüez	84	44,683	11.27	1.44	8.74	14.41	575	351,836	88.73	1.44	85.59	91.26
Arecibo	62	57,874	17.28	4.30	10.37	27.37	474	277,135	82.72	4.30	72.63	89.63
Bayamón	92	46,483	10.13	1.42	7.67	13.26	743	412,562	89.87	1.42	86.74	92.33
Caguas	89	47,915	10.47	1.64	7.66	14.14	747	409,926	89.53	1.64	85.86	92.34
Metro - Fajardo	121	55,823	8.57	0.97	6.84	10.68	1,185	595,933	91.44	0.97	89.32	93.16
Ponce	59	28,377	7.28	1.25	5.17	10.15	616	361,524	92.72	1.25	89.85	94.83

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). [g]Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). [h]Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). [i]Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. [j]Employed for wages and self-employed. [k]Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table 7. *Prevalence of current asthma among adults aged 18 years or older in Puerto Rico by behavioral risks, 2020.*

Behavioral Risks	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
BMI (kg/m²)												
Underweight[f]	-	-	-	-	-	-	56	45,250	87.01	5.93	70.53	94.93
Normal[g]	96	50,898	6.46	0.82	5.03	8.26	1,199	737,375	93.54	0.82	91.74	94.97
Overweight[h]	153	93,485	10.03	1.51	7.44	13.40	1,573	838,114	89.97	1.51	86.60	92.56
Obese[i]	226	117,592	14.52	1.57	11.71	17.87	1,383	692,098	85.48	1.57	82.13	88.29
Current smoker												
Yes	-	-	-	-	-	-	391	248,941	93.43	1.30	90.39	95.55
No	475	265,527	10.93	0.84	9.38	12.70	3,964	2,163,215	89.07	0.84	87.30	90.62

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Underweight = below 18.5 kg/m². [g]Normal = 18.5 - 24.9 kg/m². [h]Overweight = 25.0 - 29.9 kg/m². [i]Obesity = 30.0 kg/m² and above (CDC, 2022c). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table 8. *Prevalence of current asthma among adults aged 18 years or older in Puerto Rico by comorbidities, 2020.*

Comorbidities	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Diabetes												
Yes	113	67,918	15.94	2.93	11.00	22.54	647	358,056	84.06	2.93	77.46	89.00
No	401	215,181	9.37	0.72	8.05	10.89	3,762	2,080,739	90.63	0.72	89.11	91.95
Myocardial infarction												
Yes	50	26,579	21.72	4.42	14.29	31.58	150	95,812	78.28	4.42	68.42	85.71
No	462	255,796	9.83	0.78	8.40	11.48	4,264	2,346,260	90.17	0.78	88.52	91.60
Coronary heart disease or angina												
Yes	68	33,009	20.95	3.33	15.16	28.22	215	124,538	79.05	3.33	71.78	84.84
No	443	247,629	9.72	0.79	8.27	11.38	4,198	2,300,337	90.28	0.79	88.62	91.76
Stroke												
Yes	-	-	-	-	-	-	73	34,907	87.73	4.34	76.42	94.03
No	500	277,396	10.32	0.77	8.90	11.94	4,346	2,411,131	89.68	0.77	88.06	91.10
Skin cancer												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	504	279,471	10.34	0.77	8.92	11.95	4,373	2,423,192	89.66	0.77	93.91	91.08
Other cancer												
Yes	-	-	-	-	-	-	217	124,340	79.51	6.44	64.12	89.39
No	465	250,336	9.74	0.70	8.46	11.20	4,199	2,319,623	90.26	0.70	88.80	91.54
COPD, emphysema, or chronic bronchitis												
Yes	116	57,273	38.54	3.70	31.58	46.00	179	91,336	61.46	3.70	54.00	68.42
No	395	218,163	8.48	0.76	7.11	10.08	4,241	2,355,208	91.52	0.76	89.92	92.89
Arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia												
Yes	203	103,472	15.96	1.99	12.43	20.24	980	545,017	84.04	1.99	79.76	87.57
No	307	177,601	8.60	0.80	7.16	10.29	3,417	1,888,276	91.40	0.80	89.71	92.84
Depression												
Yes	164	84,832	20.30	1.99	16.68	24.46	619	333,161	79.70	1.99	75.54	83.32
No	351	198,770	8.61	0.83	7.11	10.39	3,794	2,110,022	91.39	0.83	89.61	92.89
Kidney disease												
Yes	-	-	-	-	-	-	150	70,905	80.56	3.51	72.75	86.54
No	477	266,153	10.09	0.78	8.66	11.74	4,262	2,371,378	89.91	0.78	88.26	91.35
One or more chronic diseases[f]												
Yes	359	200,344	16.10	1.48	13.39	19.22	1,941	1,044,303	83.90	1.48	80.78	86.61
No	156	83,258	5.60	0.58	4.58	6.85	2,480	1,402,535	94.40	0.58	93.16	95.42

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). COPD = Chronic obstructive pulmonary disease. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]At least one of the following chronic diseases: diabetes, myocardial infarction, coronary heart disease or angina, stroke, skin cancer, other cancer, COPD, emphysema, or chronic bronchitis, arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia, and kidney disease. -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table related to the crude prevalence of lifetime and current asthma in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020

Table 9. *Crude prevalence of lifetime and current asthma among children and adolescents from 0 to 17 years in Puerto Rico, 2018-2020.*

Variable	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Lifetime Asthma									
Yes	804	143,018	5,255	132,716	153,320	20.69	0.74	19.27	22.18
No	2,980	548,356	7,051	534,531	562,180	79.31	0.74	77.82	80.73
Current Asthma									
Yes	462	84,136	4,256	75,791	92,481	12.18	0.61	11.04	13.42
No	3,319	606,772	6,703	593,630	619,913	87.82	0.61	86.58	88.96

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Tables related to the prevalence of lifetime asthma in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020 by sociodemographic characteristics of the children, sociodemographic characteristics of the parents or caregivers, and behavioral risks of the parents or caregivers

Table 10. *Prevalence of lifetime asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics, 2018-2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Boy	446	77,072	22.92	1.09	20.86	25.12	1,464	259,192	77.08	1.09	74.88	79.14
Girl	354	65,575	18.65	1.02	16.74	20.73	1,488	285,999	81.35	1.02	79.27	83.26
Age group (years)												
0-4	79	17,567	11.62	1.39	9.16	14.63	634	133,669	88.38	1.39	85.37	90.84
5-9	225	47,188	25.29	1.61	22.27	28.58	652	139,384	74.71	1.61	71.42	77.73
10-14	248	36,928	24.54	1.54	21.64	27.69	737	113,557	75.46	1.54	72.31	78.36
15-17	213	35,034	22.26	1.55	19.37	25.46	676	122,318	77.74	1.55	74.54	80.63
Health region												
Aguadilla - Mayagüez	107	18,485	20.57	2.08	16.79	24.95	397	71,372	79.43	2.08	75.05	83.21
Arecibo	140	25,253	28.57	2.30	24.39	33.38	344	62,819	71.33	2.30	66.62	75.61
Bayamón	143	23,675	19.16	1.65	16.14	22.60	536	99,886	80.84	1.65	77.40	83.86
Caguas	130	23,331	21.12	1.88	17.67	25.04	483	87,150	78.88	1.88	74.96	82.33
Metro - Fajardo	185	33,461	21.14	1.57	18.22	24.38	673	124,840	78.86	1.57	75.62	81.78
Ponce	88	16,715	15.37	1.69	12.34	18.98	496	92,016	84.63	1.69	81.02	87.66

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Table 11. *Prevalence of lifetime asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics of the parents or caregivers, 2018-2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Relationship												
Parent	688	124,645	21.24	0.82	19.67	22.89	2,449	462,309	78.76	0.82	77.11	80.33
Other[f]	115	18,312	17.82	1.71	14.70	21.43	519	84,447	82.18	1.71	78.57	85.30
Sex												
Male	-	-	-	-	-	-	280	51,945	86.98	2.04	82.44	90.48
Female	248	49,602	28.95	1.76	25.63	32.52	622	121,709	71.05	1.76	67.48	74.37
Age group (years)												
18-24	-	-	-	-	-	-	293	46,876	85.86	2.09	81.26	89.48
25-34	200	43,145	19.98	1.41	17.36	22.89	825	172,789	80.02	1.41	77.11	82.64
35-44	315	57,056	22.72	1.29	20.30	25.34	1,004	194,082	77.28	1.29	74.66	79.70
45-54	175	25,520	22.35	1.71	19.19	25.88	565	88,640	77.65	1.71	74.12	80.81
55-64	-	-	-	-	-	-	185	30,418	82.78	2.75	76.72	87.52
65+	-	-	-	-	-	-	108	15,551	82.70	3.65	74.35	88.75
Educational level												
< High school[g]	51	10,331	22.65	3.11	17.14	29.31	198	35,274	77.35	3.11	70.69	82.86
≥ High school[h]	753	132,687	20.55	0.76	19.10	22.09	2,780	512,878	79.45	0.76	77.91	80.90
Annual income												
< $20,000[i]	416	76,451	23.44	1.14	21.27	25.75	1,333	249,744	76.56	1.14	74.25	78.73
≥ $20,000[j]	315	53,284	18.64	1.09	16.59	20.88	1,266	232,602	81.36	1.09	79.12	83.41
Employment status												
Working[k]	465	78,702	19.69	0.94	17.91	21.60	1,774	321,088	80.31	0.94	78.40	82.09
Not working[l]	338	64,134	22.12	1.20	19.86	24.57	1,199	225,739	77.88	1.20	75.43	80.14
Marital status												
Married/A member of an unmarried couple	446	80,337	18.62	0.91	16.91	20.46	1,863	351,100	81.38	0.91	79.54	83.09
Divorced/Separated	160	26,924	28.55	2.17	24.49	32.99	385	67,380	71.45	2.17	67.01	75.51
Widowed	-	-	-	-	-	-	57	8,725	80.25	4.92	68.85	88.19
Never married	180	33,318	21.59	1.63	18.56	24.96	674	121,020	78.41	1.63	75.04	81.44

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Grandparent, foster parent or guardian, sibling, and other relative. [g]Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). [h]Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). [i]Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). [j]Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. [k]Employed for wages and self-employed. [l]Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table 12. *Prevalence of lifetime asthma among children and adolescents from 0 to 17 years in Puerto Rico by behavioral risks of the parents or caregivers, 2018-2020.*

Behavioral Risks	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
BMI (kg/m²)												
Underweight[f]	-	-	-	-	-	-	52	9,816	78.26	5.79	64.88	87.53
Normal[g]	182	30,139	16.57	1.25	14.26	19.17	834	151,791	83.46	1.25	80.83	85.74
Overweight[h]	273	48,181	20.60	1.29	18.20	23.24	996	185,669	79.40	1.29	76.76	81.80
Obese[i]	306	55,229	23.23	1.33	20.72	25.94	994	182,502	76.77	1.33	74.06	79.28
Current smoker												
Yes	72	12,560	20.00	2.36	15.77	25.04	269	50,230	80.00	2.36	74.96	84.23
No	731	130,235	20.75	0.78	19.26	22.32	2,705	497,371	79.25	0.78	77.68	80.74

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Underweight = below 18.5 kg/m². [g]Normal = 18.5 - 24.9 kg/m². [h]Overweight = 25.0 - 29.9 kg/m². [i]Obesity = 30.0 kg/m² and above (CDC, 2022c). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Tables related to the prevalence of current asthma in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020 by sociodemographic characteristics of the children, sociodemographic characteristics of the parents or caregivers, and behavioral risks of the parents or caregivers

Table 13. *Prevalence of current asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics, 2018-2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Boy	244	42,627	12.68	0.85	11.10	14.45	1,665	293,513	87.32	0.85	85.55	88.90
Girl	217	41,448	11.80	0.87	10.20	13.61	1,623	309,783	88.20	0.87	86.39	89.80
Age group (years)												
0-4	57	13,190	8.73	1.25	6.57	11.51	655	137,922	91.27	1.25	88.49	93.43
5-9	145	29,704	15.95	1.34	13.50	18.75	730	156,528	84.05	1.34	81.25	86.50
10-14	139	20,461	13.60	1.22	11.37	16.18	846	130,024	86.40	1.22	83.82	88.63
15-17	98	16,922	10.75	1.18	8.65	13.30	791	140,431	89.25	1.18	86.70	91.35
Health region												
Aguadilla - Mayagüez	62	11,314	12.59	1.81	9.45	16.58	442	78,543	87.41	1.81	83.42	90.55
Arecibo	87	15,919	18.10	1.96	14.57	22.25	396	72,048	81.90	1.96	77.75	85.43
Bayamón	93	15,898	12.87	1.43	10.32	15.93	586	107,663	87.13	1.43	84.07	89.68
Caguas	66	11,745	10.65	1.39	8.23	13.69	546	98,499	89.35	1.39	86.31	91.77
Metro - Fajardo	97	18,497	11.69	1.29	9.40	14.46	760	139,680	88.31	1.29	85.54	90.60
Ponce	51	9,610	8.84	1.30	6.61	11.73	533	99,121	91.16	1.30	88.27	93.40

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Table 14. *Prevalence of current asthma among children and adolescents from 0 to 17 years in Puerto Rico by sociodemographic characteristics of the parents or caregivers, 2018-2020.*

Sociodemographic Characteristics	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Relationship												
Parent	393	72,687	12.39	0.67	11.14	13.76	2,742	513,926	87.61	0.67	86.24	88.86
Other[f]	68	11,389	11.10	1.46	8.55	14.29	565	91,246	88.90	1.46	85.71	91.45
Sex												
Male	-	-	-	-	-	-	300	55,387	92.74	1.60	88.91	95.32
Female	136	28,255	16.53	1.47	13.84	19.63	732	142,694	83.47	1.47	80.37	86.16
Age group (years)												
18-24	-	-	-	-	-	-	311	49,466	90.81	1.77	86.71	93.74
25-34	132	28,063	13.00	1.19	10.84	15.50	893	187,871	87.00	1.19	84.50	89.16
35-44	182	34,551	13.78	1.08	11.79	16.04	1,135	216,245	86.22	1.08	83.96	88.21
45-54	84	11,403	9.99	1.15	7.94	12.49	656	102,758	90.01	1.15	87.51	92.06
55-64	-	-	-	-	-	-	203	32,889	89.51	2.28	84.12	93.22
65+	-	-	-	-	-	-	121	17,544	93.30	2.32	87.07	96.65
Educational level												
< High school[g]	-	-	-	-	-	-	219	39,718	87.55	2.47	81.84	91.64
≥ High school[h]	433	78,486	12.16	0.62	10.99	13.44	3,098	566,850	87.84	0.62	86.56	89.01
Annual income												
< $20,000[i]	251	47,053	14.44	0.96	12.66	16.42	1,496	278,780	85.56	0.96	83.58	87.34
≥ $20,000[j]	169	28,273	9.89	0.83	8.37	11.65	1,412	257,613	90.11	0.83	88.35	91.63
Employment status												
Working[k]	257	44,934	11.25	0.76	9.85	12.81	1,980	354,627	88.75	0.76	87.19	90.15
Not working[l]	204	39,021	13.47	1.00	11.63	15.55	1,332	250,615	86.53	1.00	84.45	88.37
Marital status												
Married/A member of an unmarried couple	259	47,776	11.07	0.74	9.71	12.60	2,050	383,661	88.93	0.74	87.40	90.29
Divorced/Separated	93	16,546	17.56	1.87	14.19	21.54	451	77,654	82.44	1.87	78.46	85.81
Widowed	-	-	-	-	-	-	62	9,349	87.91	3.88	78.04	93.71
Never married	99	18,438	11.96	1.30	9.63	14.75	754	135,775	88.04	1.30	85.25	90.37

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Grandparent, foster parent or guardian, sibling, and other relative. [g]Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). [h]Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). [i]Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). [j]Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. [k]Employed for wages and self-employed. [l]Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Table 15. *Prevalence of current asthma among children and adolescents from 0 to 17 years in Puerto Rico by behavioral risks of the parents or caregivers, 2018-2020.*

Behavioral Risks	Yes						No					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
BMI (kg/m²)												
Underweight[f]	-	-	-	-	-	-	57	10,638	87.34	4.91	74.28	98.24
Normal[g]	106	17,535	9.64	0.99	7.86	11.77	910	164,395	90.36	0.99	88.23	92.14
Overweight[h]	142	26,696	11.42	1.05	9.52	13.64	1,126	207,049	88.58	1.05	86.36	90.48
Obese[i]	184	33,363	14.03	1.09	12.03	16.31	1,116	204,369	85.97	1.09	83.69	87.97
Current smoker												
Yes	-	-	-	-	-	-	299	55,098	87.75	0.64	83.32	91.13
No	420	76,444	12.19	1.98	8.87	16.68	3,013	550,696	87.81	1.98	86.50	89.01

Notes. Data source: Behavioral Risk Factor Surveillance System (BRFSS). BMI = Body Mass Index. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Underweight = below 18.5 kg/m². [g]Normal = 18.5 - 24.9 kg/m². [h]Overweight = 25.0 - 29.9 kg/m². [i]Obesity = 30.0 kg/m² and above (CDC, 2022c). -"...BRFSS did not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" (CDC, 2021b, p. 6).

Uncontrolled asthma in people with current asthma

Tables related to the crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018, 2019, and 2020

Table 16. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico, 2018.*

Asthma Control Indicators	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Asthma control (3-level)									
Very poorly controlled	67	95,800	13,916	68,356	123,245	30.53	4.20	22.92	39.37
Not well controlled	67	104,131	14,357	75,816	132,447	33.18	4.29	25.32	42.11
Well controlled	70	113,894	16,960	80,446	147,342	36.29	4.58	27.82	45.71
Asthma control (2-level)									
Uncontrolled	134	199,931	17,206	165,998	233,865	63.71	4.58	54.29	72.18
Well controlled	70	113,894	16,960	80,446	147,342	36.29	4.58	27.82	45.71
Daytime symptoms									
Uncontrolled	59	85,396	13,202	59,358	111,433	27.21	3.98	20.10	35.71
Well controlled	145	228,430	19,249	190,466	266,393	72.79	3.98	64.29	79.90
Nighttime awakening symptoms									
Uncontrolled	51	75,798	13,048	50,062	101,534	24.43	3.98	17.45	33.08
Well controlled	150	234,515	19,140	196,763	272,266	75.57	3.98	66.92	82.55
SABA use-inhaler									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	165	251,820	18,956	214,434	289,205	80.24	3.79	71.72	86.67
SABA use-nebulizer									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	176	266,167	18,867	228,957	303,376	84.81	3.41	76.82	90.39
Limited activity (Last 30 days)									
None	80	124,362	16,956	90,918	157,805	40.06	4.62	31.38	49.42
Any limitation[f]	122	186,045	17,336	151,854	220,237	59.94	4.62	50.58	68.62

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Some limitation and extreme limitation. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Table 17. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico, 2019.*

Asthma Control Indicators	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Asthma control (3-level)									
Very poorly controlled	56	96,980	18,268	60,929	133,031	33.06	5.10	23.86	43.76
Not well controlled	68	99,733	13,153	73,777	125,689	34.00	4.42	25.88	43.18
Well controlled	62	96,652	13,111	70,779	122,525	32.95	4.42	24.86	42.18
Asthma control (2-level)									
Uncontrolled	124	196,713	20,024	157,196	236,229	67.05	4.42	57.82	75.14
Well controlled	62	96,652	13,111	70,779	122,525	32.95	4.42	24.86	42.18
Daytime symptoms									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	141	219,041	16,578	186,324	251,759	74.94	4.87	64.18	83.31
Nighttime awakening symptoms									
Uncontrolled	52	83,405	16,705	50,437	116,373	28.71	4.94	20.01	39.35
Well controlled	132	207,054	16,710	174,075	240,032	71.29	4.94	60.65	79.99
SABA use-inhaler									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	141	216,795	18,884	179,528	254,062	73.90	4.38	64.39	81.60
SABA use-nebulizer									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	147	225,788	16,216	193,787	257,789	76.96	4.82	66.14	85.11
Limited activity (Last 30 days)									
None	85	138,030	15,921	106,610	169,450	47.05	4.91	37.59	56.73
Any limitation[f]	101	155,335	18,565	118,697	191,973	52.95	4.91	43.27	62.41

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Some limitation and extreme limitation. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Table 18. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico, 2020.*

Asthma Control Indicators	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Asthma control (3-level)									
Very poorly controlled	-	-	-	-	-	-	-	-	-
Not well controlled	56	70,545	14,076	42,801	98,288	23.50	4.38	15.98	33.17
Well controlled	131	156,192	13,806	128,981	183,402	52.03	5.28	41.69	62.21
Asthma control (2-level)									
Uncontrolled	91	143,975	24,584	95,522	192,428	47.97	5.28	37.79	58.31
Well controlled	131	156,192	13,806	128,981	183,402	52.03	5.28	41.69	62.21
Daytime symptoms									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	177	214,179	18,205	178,296	250,061	72.98	5.53	60.85	82.43
Nighttime awakening symptoms									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	184	228,482	17,910	193,182	263,782	76.90	5.58	64.19	86.08
SABA use-inhaler									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	197	264,632	24,555	216,236	313,027	88.16	3.18	80.34	93.14
SABA use-nebulizer									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	208	266,734	18,439	230,393	303,076	88.86	5.45	72.95	95.93
Limited activity (Last 30 days)									
None	153	195,548	16,762	162,512	228,585	65.41	5.62	53.68	75.53
Any limitation[f]	68	103,392	22,311	59,419	147,366	34.59	5.62	24.47	46.32

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Some limitation and extreme limitation. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Tables related to the crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018-2020

Table 19. *Crude prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico, 2018-2020.*

Asthma Control Indicators	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Asthma control (3-level)									
Very poorly controlled	158	88,737	10,367	68,377	109,097	29.34	2.86	24.05	35.25
Not well controlled	191	91,470	8,053	75,655	107,285	30.24	2.51	25.55	35.38
Well controlled	263	122,246	8,500	105,552	138,939	40.42	2.71	35.23	45.83
Asthma control (2-level)									
Uncontrolled	349	180,207	12,152	156,341	204,072	59.58	2.71	54.17	64.77
Well controlled	263	122,246	8,500	105,552	138,939	40.42	2.71	35.23	45.83
Daytime symptoms									
Uncontrolled	145	79,318	9,715	60,238	98,398	26.45	2.78	21.36	32.26
Well controlled	463	220,550	10,447	200,034	241,066	73.55	2.78	67.74	78.64
Nighttime awakening symptoms									
Uncontrolled	139	75,941	9,665	56,961	94,922	25.37	2.78	20.32	31.20
Well controlled	466	223,350	10,354	203,016	243,684	74.63	2.78	68.80	79.68
SABA use-inhaler									
Uncontrolled	109	58,037	7,084	44,124	71,950	19.19	2.23	15.19	23.94
Well controlled	503	244,415	12,035	220,780	268,051	80.81	2.23	76.06	84.81
SABA use-nebulizer									
Uncontrolled	81	49,556	8,913	32,052	67,060	16.38	2.64	11.83	22.24
Well controlled	531	252,896	10,368	232,535	273,257	83.62	2.64	77.76	88.17
Limited activity (Last 30 days)									
None	318	152,647	9,547	133,898	171,396	50.73	2.85	45.15	56.29
Any limitation[f]	291	148,257	11,382	125,904	170,611	49.27	2.85	43.71	54.85

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Some limitation and extreme limitation.

Tables related to the prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico for 2018-2020 by sociodemographic characteristics, knowledge and management of asthma, behavioral risks, comorbidities, missed days at work, asthma attacks, and type of medication for asthma used

Table 20. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by sociodemographic characteristics, 2018-2020.*

Sociodemographic Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Male	66	38,995	35.34	5.21	25.89	46.10	88	71,346	64.66	5.21	53.90	74.11
Female	197	83,251	43.33	2.93	37.70	49.15	261	108,860	56.67	2.93	50.85	62.30
Age group (years)												
18-34	62	43,258	51.92	6.42	39.46	64.15	-	-	-	-	-	-
35-64	134	58,231	38.18	3.38	31.80	45.00	206	94,276	61.82	3.38	55.00	68.20
65+	67	20,758	31.15	4.77	22.62	41.19	98	45,878	68.85	4.77	58.81	77.38
Educational level												
< High school[f]	-	-	-	-	-	-	61	52,290	73.82	5.85	60.88	83.63
≥ High school[g]	233	103,698	44.78	2.98	39.04	50.67	287	127,860	55.22	2.98	49.33	60.96
Annual income												
< $20,000[h]	118	59,736	34.18	3.59	27.50	41.54	211	115,045	65.82	3.59	58.46	72.50
≥ $20,000[i]	113	47,377	54.66	5.17	44.45	64.49	85	39,302	45.34	5.17	35.51	55.55
Employment status												
Working[j]	125	62,517	63.32	4.56	54.00	71.74	72	36,214	36.68	4.56	28.26	46.00
Not working[k]	138	59,729	29.52	3.02	23.94	35.78	276	142,625	70.48	3.02	64.22	76.06
Marital status												
Married/A member of an unmarried couple	141	55,224	47.17	4.24	39.00	55.50	155	61,841	52.83	4.24	44.50	61.00
Divorced/Separated	-	-	-	-	-	-	70	58,828	64.53	5.51	53.13	74.48
Widowed	-	-	-	-	-	-	55	30,022	77.01	5.52	64.48	86.08
Never married	58	25,721	46.56	5.88	35.39	58.10	69	29,516	53.44	5.88	41.90	64.61

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Never attended school or only attended kindergarten, grades 1 through 8 (Elementary), and grades 9 through 11 (Some high school). [g]Grade 12 or GED (High school graduate), college 1 year to 3 years (Some college or technical school), and college 4 years or more (College graduate). [h]Less than $10,000, less than $15,000 ($10,000 to less than $15,000), and less than $20,000 ($15,000 to less than $20,000). [i]Less than $25,000 ($20,000 to less than $25,000), less than $35,000 ($25,000 to less than $35,000), less than $50,000 ($35,000 to less than $50,000), less than $75,000 ($50,000 to less than $75,000), and $75,000 or more. [j]Employed for wages and self-employed. [k]Out of work for 1 year or more, out of work for less than 1 year, homemaker, student, retired, and unable to work (Cicero et al., 2020). -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Table 21. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by knowledge and management of asthma, 2018-2020.*

Knowledge and Management of Asthma	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Signs of an episode[f]												
Yes	169	76,377	39.91	3.38	33.48	46.70	231	115,009	60.09	3.38	53.30	66.52
No	85	42,137	40.59	4.71	31.77	50.07	111	61,662	59.41	4.71	49.93	68.23
Attack response[g]												
Yes	156	75,120	41.68	3.41	35.18	48.48	220	105,113	58.32	3.41	51.52	64.82
No	93	41,065	38.15	4.80	29.27	47.90	116	66,575	61.85	4.80	52.10	70.73
Peak flow[h]												
Yes	85	34,294	31.52	4.13	24.02	40.12	142	74,523	68.48	4.13	59.88	75.98
No	170	82,561	45.20	3.50	38.46	52.12	196	100,101	54.80	3.50	47.88	61.54
Action plan[i]												
Yes	79	36,665	31.64	4.31	23.83	40.63	150	79,233	68.36	4.31	59.37	76.17
No	172	77,725	44.76	3.44	38.13	51.58	189	95,926	55.24	3.44	48.42	61.87
Formal class[j]												
Yes	17*	10,151	35.45	7.85	21.88	51.86	44*	18,483	64.55	7.85	48.14	78.12
No	245	111,394	40.79	2.89	35.26	46.56	305	161,724	59.21	2.89	53.44	64.74
Any education component[k]												
No educational component	-	-	-	-	-	-	54	25,867	51.64	6.77	38.53	64.52
Any educational component	210	95,591	39.00	2.98	33.32	44.98	287	149,539	61.00	2.98	55.02	66.68
Any 3 of 5 components[l]												
Less than 2 educational components	146	64,544	42.75	3.81	35.48	50.35	162	86,445	57.25	3.81	49.65	64.52
3 or more educational components	87	40,762	34.44	4.29	26.56	43.28	156	77,588	65.56	4.29	56.72	73.44

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Responded to the question: "Has a doctor or other health professional ever taught you how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020a, p. 14). [g]Responded to the question: "Has a doctor or other health professional ever taught you what to do during an asthma episode or attack?" (CDC, 2020a, p. 14). [h]Responded to the question: "Has a doctor or other health professional ever taught you how to use a peak flow meter to adjust your daily medications?" (CDC, 2020a, p. 14). [i]Responded to the question: "Has a doctor or other health professional EVER given you an asthma action plan?" (CDC, 2020a, p. 15). [j]Responded to the question: "Have you ever taken a course or class on how to manage your asthma?" (CDC, 2020a, p. 15). [k]This calculated variable combines the questions related to asthma education into one variable, indicating a positive response in any of the five questions. [l]This calculated variable combines the five questions related to asthma education into one variable, indicating a positive response to any 3 or more of the questions. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13). *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Table 22. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by behavioral risks and comorbidities, 2018-2020.*

Behavioral Risks and Comorbidities	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
BMI (kg/m²)												
Underweight[f]	-	-	-	-	-	-	-	-	-	-	-	-
Normal[g]	50	28,889	55.37	6.16	43.20	66.93	-	-	-	-	-	-
Overweight[h]	81	35,715	36.42	4.87	27.48	46.40	114	62,349	63.58	4.87	53.60	72.52
Obese[i]	121	53,094	38.53	3.84	31.32	46.28	168	84,713	61.47	3.84	53.72	68.68
Current smoker												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	250	116,558	42.30	2.88	36.77	48.02	313	159,001	57.70	2.88	51.98	63.23
COPD												
Yes	-	-	-	-	-	-	52	25,426	82.72	5.70	68.64	91.28
No	249	113,716	43.34	2.98	37.61	49.26	287	148,666	56.66	2.98	50.74	62.39
Emphysema												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	249	115,513	42.94	2.83	37.49	48.57	306	153,480	57.06	2.83	51.43	62.51
Chronic bronchitis												
Yes	50	19,422	24.24	4.35	16.74	33.74	123	60,691	75.76	4.35	66.26	83.26
No	210	101,389	47.45	3.20	41.24	53.74	215	112,276	52.55	3.20	46.26	58.76
Depression												
Yes	85	34,984	28.95	3.64	22.35	36.58	170	85,871	71.05	3.64	63.42	77.65
No	178	87,262	48.14	3.75	40.87	55.50	178	93,987	51.86	3.75	44.50	59.13
Any respiratory condition[j]												
No respiratory condition	195	93,174	49.54	3.42	42.87	56.24	179	94,888	50.46	3.42	43.76	57.13
Any respiratory condition	61	24,456	24.07	3.78	17.44	32.24	157	77,148	75.93	3.78	67.76	82.56

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). BMI = Body Mass Indez. COPD = Chronic obstructive pulmonary disease. [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Underweight = below 18.5 kg/m². [g]Normal = 18.5 - 24.9 kg/m². [h]Overweight = 25.0 - 29.9 kg/m². [i]Obesity = 30.0 kg/m² and above (CDC, 2022c). [j]This calculated variable combines the respiratory conditions COPD, emphysema, and chronic bronchitis into one variable, indicating a positive response in any of the three questions related to the conditions. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Table 23. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by missed days at work, 2018-2020.*

Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Having at least one workday missed												
Yes	68	32,271	28.09	4.08	20.80	36.75	146	82,600	71.91	4.08	63.25	79.20
No	188	87,681	52.97	3.53	46.01	59.81	159	77,854	47.03	3.53	40.19	53.99
Workday missed (days)												
No missed day	188	87,681	52.97	3.53	46.01	59.81	159	77,854	47.03	3.53	40.19	53.99
1-7	50	24,014	34.51	5.57	24.52	46.09	83	45,567	65.49	5.57	53.91	75.48
8-30	-	-	-	-	-	-	51	30,340	80.92	6.43	65.17	90.58
31 or more	-	-	-	-	-	-	-	-	-	-	-	-

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13).

Table 24. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by asthma attacks, 2018-2020.*

Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Episode of asthma attack in the last 12 months												
Yes	66	32,363	26.27	3.83	19.46	34.45	168	90,819	73.73	3.83	65.55	80.54
No	197	89,883	50.52	3.45	43.78	57.25	178	88,024	49.48	3.45	42.75	56.22
Number of attacks in the past 3 months												
No attacks	230	105,552	51.25	3.17	45.04	57.41	207	100,414	48.75	3.17	42.59	54.96
1 or more	33*	16,694	18.20	3.92	11.71	27.18	129	75,043	81.80	3.92	72.82	88.29

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Table 25. *Prevalence of asthma control indicators among adults aged 18 years or older with current asthma in Puerto Rico by type of medication for asthma used, 2018-2020.*

Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Controller medicaments												
Not used	194	93,928	52.07	3.70	44.81	59.24	155	86,467	47.93	3.70	40.76	55.19
Used	69	28,317	23.20	3.28	17.39	30.24	194	93,740	76.80	3.28	69.76	82.61
Reliever or rescue medicaments												
Not used	204	96,666	67.57	3.39	60.59	73.85	95	46,384	32.43	3.39	26.15	39.41
Used	59	25,580	16.05	2.54	11.66	21.68	254	133,822	83.95	2.54	78.32	88.34

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Tables related to the crude prevalence of asthma control indicators in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020

Table 26. *Crude prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico, 2018-2020.*

Asthma Control Indicators	Frequency[a]	Weighted frequency[b]	SE[c]	LL[d]	UL[e]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Asthma control (3-level)									
Very poorly controlled	19*	13,927	3,280	7,428	20,426	16.20	3.80	10.00	25.18
Not well controlled	25*	21,262	4,378	12,587	29,938	24.74	4.77	16.52	35.31
Well controlled	73	50,764	5,322	40,219	61,309	59.06	5.34	48.23	69.08
Asthma control (2-level)									
Uncontrolled	44*	35,189	5,026	25,231	45,147	40.94	5.34	30.92	51.77
Well controlled	73	50,764	5,322	40,219	61,309	59.06	5.34	48.23	69.08
Daytime symptoms									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	110	80,300	4,997	70,400	90,201	93.42	2.45	86.58	96.90
Night-time awakening symptoms									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	110	80,644	5,024	70,689	90,598	94.28	2.51	86.77	97.64
SABA use-inhaler									
Uncontrolled	-	-	-	-	-	-	-	-	-
Well controlled	108	80,240	5,119	70,097	90,383	93.35	2.15	87.60	96.54
SABA use-nebulizer									
Uncontrolled	13*	11,383	3,175	5,093	17,673	13.24	3.63	7.55	22.20
Well controlled	104	74,570	5,195	64,277	84,863	86.76	3.63	77.80	92.45
Limited activity (Last 30 days)									
None	81	57,642	5,423	46,897	68,388	67.06	5.09	56.33	76.27
Any limitation[f]	36*	28,311	4,639	19,120	37,501	32.94	5.09	23.73	43.67

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Some limitation and extreme limitation. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13). *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Tables related to the prevalence of asthma control indicators in children and adolescents from 0 to 17 years in Puerto Rico for 2018-2020 by sociodemographic characteristics, knowledge and management of asthma, missed days at school, and asthma attacks

Table 27. *Prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by sociodemographic characteristics, 2018-2020.*

Sociodemographic Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Sex												
Boy	39*	24,295	55.67	7.22	41.30	69.15	25*	19,346	44.33	7.22	30.85	58.70
Girl	34*	26,469	62.56	7.63	46.70	76.11	19*	15,843	37.44	7.63	23.89	53.30
Age group (years)												
0-9	30*	25,311	50.45	7.62	35.75	65.07	27*	24,862	49.55	7.62	34.93	64.25
10-17	43*	25,453	71.14	6.61	56.56	82.35	17*	10,327	28.86	6.61	17.65	43.44

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Table 28. *Prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by knowledge and management of asthma, 2018-2020.*

Knowledge and Management of Asthma	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Signs of an episode[f]												
Yes	51*	37,653	58.61	6.05	46.35	69.90	34*	26,587	41.39	6.05	30.10	53.65
No	19*	11,319	56.82	11.38	34.42	76.74	10*	8,602	43.18	11.38	23.26	65.58
Attack response[g]												
Yes	50*	37,320	65.16	6.15	52.24	76.18	26*	19,951	34.84	6.15	23.82	47.76
No	22*	12,533	45.64	9.39	28.41	63.99	17*	14,926	54.36	9.39	36.01	71.59
Peak flow[h]												
Yes	22*	18,759	62.40	8.68	44.35	77.55	15*	11,305	37.60	8.68	22.45	55.65
No	49*	30,924	56.86	6.74	43.34	69.43	28*	23,466	43.14	6.74	30.57	56.66
Action plan[i]												
Yes	32*	26,471	55.11	7.55	40.14	69.21	24*	21,560	44.89	7.55	30.79	59.86
No	37*	22,829	64.21	7.45	48.56	77.32	18*	12,725	35.79	7.45	22.68	51.44
Formal class[j]												
Yes	-	-	-	-	-	-	-	-	-	-	-	-
No	64*	42,825	58.46	5.70	46.91	69.15	39*	30,431	41.54	5.70	30.85	53.09

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. [f]Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020b, p. 13). [g]Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} what to do during an asthma episode or attack?" (CDC, 2020b, p. 13). [h]Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} how to use a peak flow meter to adjust his/her daily medications?" (CDC, 2020b, p. 13). [i]Responded to the question: "Has a doctor or other health professional EVER given you or {child's name} an asthma action plan?" (CDC, 2020b, p. 14). [j]Responded to the question: "Have you or {child's name} ever taken a course or class on how to manage {his/her} asthma?" (CDC, 2020b, p. 14). -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13). *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Table 29. *Prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by missed days at school, 2018-2020.*

Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Having at least one miss day at school												
Yes	28*	24,304	53.42	7.92	37.91	68.31	25*	21,188	46.58	7.92	31.69	62.09
No	45*	26,460	68.09	6.85	53.31	79.95	17*	12,401	31.91	6.85	20.05	46.69
Missed school (days)												
No missed day	45*	26,460	68.09	6.85	53.31	79.95	17*	12,401	31.91	6.85	20.05	46.69
1-7	18*	14,079	44.43	9.25	27.57	62.67	19*	17,611	55.57	9.25	37.33	72.43
8-30	-	-	-	-	-	-	-	-	-	-	-	-
31 or more	-	-	-	-	-	-	-	-	-	-	-	-

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. -"ACBS follows a rule of not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" (CDC, 2022a, p. 13). *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Table 30. *Prevalence of asthma control indicators among children and adolescents from 0 to 17 years with current asthma in Puerto Rico by asthma attacks, 2018-2020.*

Characteristics	Well controlled						Uncontrolled					
	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]	Frequency[a]	Weighted frequency[b]	Prevalence (%)	SE[c]	LL[d]	UL[e]
Episode of asthma attack in the last 12 months												
Yes	18*	12,611	54.78	9.64	35.91	72.37	15*	10,411	45.22	9.64	27.63	64.09
No	55*	38,154	60.63	6.32	47.69	72.23	29*	24,778	39.37	6.32	27.77	52.31
Number of attacks in the past 3 months												
No attacks	61*	42,099	60.30	5.97	48.10	71.34	33*	27,723	39.70	5.97	28.66	51.90
1 or more	12*	8,665	53.72	11.41	31.86	74.23	11*	7,466	46.28	11.41	25.77	68.14

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Those who answered "Don't know" or "Refused" were not included in the sample for the estimates. [b]Weighted count. [c]Linearized standard error. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. *Although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented following CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1).

Asthma emergency department visits

Tables related to asthma emergency department visits as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico for 2021

Table 31. *Crude asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico, 2021.*

Year	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
2021	27,850	3,263,584	85.34	84.33	86.34

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 32. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by sex, 2021.*

Sex	Frequency[a,b]	Population[c]	Rate	LL[c]	UL[d]
Male	12,622	1,544,936	81.70	80.27	83.12
Female	15,219	1,718,648	88.55	87.15	89.96

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]A total of 9 emergency department visits were not identified by sex. [b]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [c]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Table 33. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by age group, 2021.*

Age group (years)	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
Under 5	913	104,882	87.05	81.40	92.70
5-9	1,105	146,754	75.30	70.86	79.74
10-14	727	177,975	40.85	37.88	43.82
15-19	873	195,781	44.59	41.63	47.55
20-24	1,505	219,620	68.53	65.07	71.99
25-29	1,394	224,356	62.13	58.87	65.40
30-34	1,368	207,294	65.99	62.50	69.49
35-39	1,591	183,250	86.82	82.56	91.09
40-44	1,680	203,947	82.37	78.44	86.31
45-49	2,081	204,039	101.99	97.61	106.37
50-54	2,358	213,060	110.67	106.21	115.14
55-59	2,317	224,625	103.15	98.95	107.35
60-64	2,273	217,512	104.50	100.20	108.80
65-69	2,014	200,281	100.56	96.17	104.95
70-74	1,865	183,878	101.43	96.82	106.03
75-79	1,402	148,267	94.56	89.61	99.51
80-84	1,498	101,056	148.23	140.73	155.74
85 or more	886	107,007	82.80	77.35	88.25

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 34. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Adjuntas	330	17,987	183.47	163.67	203.26
Aguada	150	37,957	39.52	33.19	45.84
Aguadilla	376	54,409	69.11	62.12	76.09
Aguas Buenas	385	24,114	159.66	143.71	175.61
Aibonito	264	24,435	108.04	95.01	121.07
Añasco	125	25,541	48.94	40.36	57.52
Arecibo	783	87,053	89.95	83.65	96.25
Arroyo	62	15,801	39.24	29.47	49.01
Barceloneta	185	22,821	81.07	69.38	92.75
Barranquitas	152	29,019	52.38	44.05	60.71
Bayamón	1,223	182,673	66.95	63.20	70.70
Cabo Rojo	323	47,340	68.23	60.79	75.67
Caguas	1,384	126,756	109.19	103.43	114.94
Camuy	226	32,743	69.02	60.02	78.02
Canóvanas	272	42,556	63.92	56.32	71.51
Carolina	1,033	152,993	67.52	63.40	71.64
Cataño	213	22,861	93.17	80.66	105.68
Cayey	733	41,535	176.48	163.70	189.25
Ceiba	111	11,118	99.84	81.26	118.41
Ciales	198	16,828	117.66	101.27	134.05
Cidra	726	39,854	182.16	168.91	195.42
Coamo	256	34,950	73.25	64.27	82.22
Comerío	195	18,882	103.27	88.78	117.77
Corozal	163	34,460	47.30	40.04	54.56
Culebra	-	-	-	-	-
Dorado	171	36,110	47.36	40.26	54.45
Fajardo	176	31,590	55.71	47.48	63.95
Florida	173	11,642	148.60	126.46	170.74
Guánica	131	13,520	96.89	80.30	113.49
Guayama	221	36,511	60.53	52.55	68.51
Guayanilla	149	17,527	85.01	71.36	98.66
Guaynabo	658	89,195	73.77	68.13	79.41
Gurabo	199	41,407	48.06	41.38	54.74
Hatillo	261	38,660	67.51	59.32	75.70
Hormigueros	102	15,605	65.36	52.68	78.05

Table 34. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Humacao	557	50,624	110.03	100.89	119.16
Isabela	219	42,856	51.10	44.33	57.87
Jayuya	59	14,643	40.29	30.01	50.57
Juana Díaz	128	46,338	27.62	22.84	32.41
Juncos	252	37,279	67.60	59.25	75.94
Lajas	164	23,151	70.84	60.00	81.68
Lares	382	27,586	138.48	124.59	152.36
Las Marías	40	8,726	45.84	31.63	60.05
Las Piedras	285	35,498	80.29	70.96	89.61
Loíza	116	23,412	49.55	40.53	58.56
Luquillo	94	17,687	53.15	42.40	63.89
Manatí	504	39,123	128.82	117.58	140.07
Maricao	55	4,722	116.48	85.69	147.26
Maunabo	88	10,506	83.76	66.26	101.26
Mayagüez	751	71,939	104.39	96.93	111.86
Moca	414	37,346	110.86	100.18	121.53
Morovis	277	28,871	95.94	84.65	107.24
Naguabo	185	23,621	78.32	67.03	89.61
Naranjito	83	29,205	28.42	22.31	34.53
Orocovis	120	21,326	56.27	46.20	66.34
Patillas	69	15,866	43.49	33.23	53.75
Peñuelas	96	20,058	47.86	38.29	57.44
Ponce	761	135,084	56.34	52.33	60.34
Quebradillas	212	23,558	89.99	77.88	102.10
Rincón	48	15,173	31.64	22.69	40.58
Río Grande	288	46,979	61.30	54.22	68.38
Sabana Grande	241	22,593	106.67	93.20	120.14
Salinas	115	25,662	44.81	36.62	53.00
San Germán	323	31,560	102.34	91.18	113.51
San Juan	4,704	337,300	139.46	135.48	143.45
San Lorenzo	336	37,530	89.53	79.96	99.10
San Sebastián	469	38,970	120.35	109.46	131.24
Santa Isabel	100	20,291	49.28	39.62	58.94
Toa Alta	256	67,569	37.89	33.25	42.53
Toa Baja	376	74,368	50.56	45.45	55.67

Table 34. *Asthma emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Trujillo Alto	316	67,211	47.02	41.83	52.20
Utuado	449	27,950	160.64	145.78	175.50
Vega Alta	220	35,410	62.13	53.92	70.34
Vega Baja	504	53,897	93.51	85.35	101.68
Vieques	53	8,224	64.45	47.10	81.80
Villalba	90	21,813	41.26	32.74	49.78
Yabucoa	251	30,186	83.15	72.86	93.44
Yauco	338	33,633	100.50	89.78	111.21

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]A total of 346 emergency department visits claims were not identified by municipality of residence. [b]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [c]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. -Since the number of claims is less than 30 or the relative standard error (RSE) is greater than 30% the rates cannot be considered statistically reliable and they were suppressed (CDC, 2019b; Klein et al., 2002).

Table 35. *First 5 municipalities with the highest emergency department visits rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence, 2021.*

Position	Municipality	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
1	Adjuntas	330	17,987	183.47	163.67	203.26
2	Cidra	726	39,854	182.16	168.91	195.42
3	Cayey	733	41,535	176.48	163.70	189.25
4	Utuado	449	27,950	160.64	145.78	175.50
5	Aguas Buenas	385	24,114	159.66	143.71	175.61

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 36. *Asthma emergency department rate visits per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by health region, 2021.*

Health region	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Aguadilla - Mayagüez	3,800	477,888	79.52	76.99	82.04
Arecibo	4,154	410,732	101.14	98.06	104.21
Bayamón	3,172	551,883	57.48	55.48	59.48
Caguas	5,645	523,345	107.86	105.05	110.68
Metro - Fajardo	7,828	830,052	94.31	92.22	96.40
Ponce	2,905	469,684	61.85	59.60	64.10

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]A total of 346 emergency department visits claims were not identified by health region. [b]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [c]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Asthma hospitalizations

Tables related to asthma hospitalizations as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico for 2021

Table 37. *Crude asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico, 2021.*

Year	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
2021	6,760	3,263,584	20.71	20.22	21.21

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics of Puerto Rico. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 38. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by sex, 2021.*

Sex	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
Male	2,917	1,544,936	18.88	18.20	19.57
Female	3,843	1,718,648	22.36	21.65	23.07

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 39. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and private health insurers in children and adults of all ages in Puerto Rico by age group, 2021.*

Age group (years)	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
Under 5	944	104,882	90.01	84.26	95.75
5-9	666	146,754	45.38	41.94	48.83
10-14	424	177,975	23.82	21.56	26.09
15-19	256	195,781	13.08	11.47	14.68
20-24	198	219,620	9.02	7.76	10.27
25-29	122	224,356	5.44	4.47	6.40
30-34	198	207,294	9.55	8.22	10.88
35-39	310	183,250	16.92	15.03	18.80
40-44	298	203,947	14.61	12.95	16.27
45-49	326	204,039	15.98	14.24	17.71
50-54	573	213,060	26.89	24.69	29.10
55-59	528	224,625	23.51	21.50	25.51
60-64	483	217,512	22.21	20.23	24.19
65-69	397	200,281	19.82	17.87	21.77
70-74	332	183,878	18.06	16.11	20.00
75-79	310	148,267	20.91	18.58	23.24
80-84	211	101,056	20.88	18.06	23.70
85 or more	184	107,007	17.20	14.71	19.68

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 40. *Asthma hospitalization rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages by in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Adjuntas	-	-	-	-	-
Aguada	54	37,957	14.23	10.43	18.02
Aguadilla	-	-	-	-	-
Aguas Buenas	-	-	-	-	-
Aibonito	70	24,435	28.65	21.94	35.36
Añasco	-	-	-	-	-
Arecibo	227	87,053	26.08	22.68	29.47
Arroyo	-	-	-	-	-
Barceloneta	63	22,821	27.61	20.79	34.42
Barranquitas	44	29,019	15.16	10.68	19.64
Bayamón	308	182,673	16.86	14.98	18.74
Cabo Rojo	-	-	-	-	-
Caguas	144	126,756	11.36	9.50	13.22
Camuy	44	32,743	13.44	9.47	17.41
Canóvanas	48	42,556	11.28	8.09	14.47
Carolina	201	152,993	13.14	11.32	14.95
Cataño	60	22,861	26.25	19.60	32.89
Cayey	69	41,535	16.61	12.69	20.53
Ceiba	-	-	-	-	-
Ciales	130	16,828	77.25	63.97	90.53
Cidra	70	39,854	17.56	13.45	21.68
Coamo	31	34,950	8.87	5.75	11.99
Comerío	-	-	-	-	-
Corozal	47	34,460	13.64	9.74	17.54
Culebra	-	-	-	-	-
Dorado	57	36,110	15.79	11.69	19.88
Fajardo	-	-	-	-	-
Florida	116	11,642	99.64	81.51	117.77
Guánica	38	13,520	28.11	19.17	37.04
Guayama	42	36,511	11.50	8.02	14.98
Guayanilla	-	-	-	-	-
Guaynabo	95	89,195	10.65	8.51	12.79
Gurabo	79	41,407	19.08	14.87	23.29
Hatillo	147	38,660	38.02	31.88	44.17
Hormigueros	47	15,605	30.12	21.51	38.73

Table 40. *Asthma hospitalization rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages by in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Humacao	54	50,624	10.67	7.82	13.51
Isabela	35	42,856	8.17	5.46	10.87
Jayuya	-	-	-	-	-
Juana Díaz	-	-	-	-	-
Juncos	59	37,279	15.83	11.79	19.87
Lajas	142	23,151	61.34	51.25	71.43
Lares	31	27,586	11.24	7.28	15.19
Las Marías	-	-	-	-	-
Las Piedras	65	35,498	18.31	13.86	22.76
Loíza	-	-	-	-	-
Luquillo	-	-	-	-	-
Manatí	237	39,123	60.58	52.87	68.29
Maricao	39	4,722	82.59	56.67	108.51
Maunabo	-	-	-	-	-
Mayagüez	101	71,939	14.04	11.30	16.78
Moca	49	37,346	13.12	9.45	16.79
Morovis	144	28,871	49.88	41.73	58.02
Naguabo	45	23,621	19.05	13.48	24.62
Naranjito	112	29,205	38.35	31.25	45.45
Orocovis	159	21,326	74.56	62.97	86.15
Patillas	-	-	-	-	-
Peñuelas	-	-	-	-	-
Ponce	196	135,084	14.51	12.48	16.54
Quebradillas	48	23,558	20.38	14.61	26.14
Rincón	-	-	-	-	-
Río Grande	61	46,979	12.98	9.73	16.24
Sabana Grande	33	22,593	14.61	9.62	19.59
Salinas	46	25,662	17.93	12.75	23.11
San Germán	56	31,560	17.74	13.10	22.39
San Juan	1,249	337,300	37.03	34.98	39.08
San Lorenzo	67	37,530	17.85	13.58	22.13
San Sebastián	112	38,970	28.74	23.42	34.06
Santa Isabel	-	-	-	-	-
Toa Alta	126	67,569	18.65	15.39	21.90
Toa Baja	128	74,368	17.21	14.23	20.19

Table 40. *Asthma hospitalization rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages by in Puerto Rico by municipality of residence, 2021.*

Municipality	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Trujillo Alto	142	67,211	21.13	17.65	24.60
Utuado	43	27,950	15.38	10.79	19.98
Vega Alta	91	35,410	25.70	20.42	30.98
Vega Baja	260	53,897	48.24	42.38	54.10
Vieques	-	-	-	-	-
Villalba	-	-	-	-	-
Yabucoa	66	30,186	21.86	16.59	27.14
Yauco	107	33,633	31.81	25.79	37.84

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]A total of 13 hospitalizations claims were not identified by municipality of residence. [b]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [c]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval. -Since the number of claims is less than 30 or the relative standard error (RSE) is greater than 30% the rates cannot be considered statistically reliable and they were suppressed (CDC, 2019e; Klein et al., 2002).

Table 41. *First 5 municipalities with the highest hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by municipality of residence, 2021.*

Position	Municipality	Frequency[a]	Population[b]	Rate	LL[c]	UL[d]
1	Florida	116	11,642	99.64	81.51	117.77
2	Maricao	39	4,722	82.59	56.67	108.51
3	Ciales	130	16,828	77.25	63.97	90.53
4	Orocovis	159	21,326	74.56	62.97	86.15
5	Lajas	142	23,151	61.34	51.25	71.43

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [b]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [c]Lower 95% confidence interval. [d]Upper 95% confidence interval.

Table 42. *Asthma hospitalizations rate per ten thousand persons (10,000) as the first diagnosis claimed to all the public and most private health insurers in children and adults of all ages in Puerto Rico by health region, 2021.*

Health region	Frequency[a,b]	Population[c]	Rate	LL[d]	UL[e]
Aguadilla - Mayagüez	762	477,888	15.95	14.81	17.08
Arecibo	1,490	410,732	36.28	34.43	38.12
Bayamón	1,153	551,883	20.89	19.69	22.10
Caguas	825	523,345	15.76	14.69	16.84
Metro - Fajardo	1,875	830,052	22.59	21.57	23.61
Ponce	642	469,684	13.67	12.61	14.73

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico. [a]A total of 13 hospitalizations claims were not identified by health region. [b]People may be duplicated since we depend on the number of claims, and the data on visits to the emergency department that resulted in hospitalization were found in both variables. [c]Population of Puerto Rico according to the United States Census for July 1, 2021, and the Puerto Rico Institute of Statistics. [d]Lower 95% confidence interval. [e]Upper 95% confidence interval.

Costs to all the public and most private health insurers for asthma as the first diagnosis by place of service

Table related to costs to all the public and most private health insurers for asthma as the first diagnosis in children and adults of all ages in Puerto Rico by place of service for 2021

Table 43. *Costs to all the public and most private health insurers for asthma as the first diagnosis in children and adults of all ages in Puerto Rico by place of service, 2021.*

Place of service	Costs ($)
Emergency department	3,093,773.79
Hospitalization	17,450,478.42
Summary of costs for use of services as a first diagnosis of asthma	20,544,252.21

Notes. Data sources: All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico.

Asthma mortality

Tables related to asthma mortality in children and adults of all ages in Puerto Rico for 2020-2021

Table 44. *Crude asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by year, 2020-2021.*

Year	Deaths	Population[a]	Rate	LL[b]	UL[c]
2020	100	3,281,538	30.47	24.50	36.45
2021	85	3,263,584	26.04	20.51	31.58

Notes. Data source: Puerto Rico Demographic Registry. [a]Population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. [b]Lower 95% confidence interval. [c]Upper 95% confidence interval.

Table 45. *Age-adjusted asthma mortality rate per one million (1,000,000) persons in children and adults of all ages in Puerto Rico by year, 2020-2021.*

Year	Deaths	Population[a]	Rate	LL[b]	UL[c]
2020	100	3,281,538	21.25	17.08	25.41
2021	85	3,263,584	16.05	12.64	19.47

Notes. Data source: Puerto Rico Demographic Registry. Standard population: United States 2000. [a]Population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. [b]Lower 95% confidence interval. [c]Upper 95% confidence interval.

Table 46. *Asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by sex, 2020-2021.*

Sex	2020					2021				
	Deaths	Population[a]	Rate	LL[b]	UL[c]	Deaths	Population[a]	Rate	LL[b]	UL[c]
Male	41	1,555,294	26.36	18.29	34.43	40	1,544,936	25.89	17.87	33.91
Female	59	1,726,244	34.18	25.46	42.90	45	1,718,648	26.18	18.53	33.83

Notes. Data source: Puerto Rico Demographic Registry. [a]Population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. [b]Lower 95% confidence interval. [c]Upper 95% confidence interval.

Table 47. *Asthma mortality rate per one million persons (1,000,000) in children and adults of all ages in Puerto Rico by age group, 2020-2021.*

Age group (years)	2020					2021				
	Deaths	Population[a]	Rate	LL[b]	UL[c]	Deaths	Population[a]	Rate	LL[b]	UL[c]
< 35	-	-	-	-	-	-	-	-	-	-
35-64	29	1,260,475	23.01	14.63	31.38	24	1,246,433	19.25	11.55	26.96
65+	67	723,175	92.65	70.46	114.83	59	740,489	79.68	59.35	100.01

Notes. Data source: Puerto Rico Demographic Registry. [a]Population of Puerto Rico according to the United States Census for July 1, 2020, to 2021, and the Puerto Rico Institute of Statistics. [b]Lower 95% confidence interval. [c]Upper 95% confidence interval. - Since the number of deaths is less than 20, the rates cannot be considered statistically reliable because they correspond to a relative standard error (RSE) greater than 23% and they were suppressed (CDC, 2019d; CDC, 2022g; Klein et al., 2002).

Appendix 2. Methodology

This appendix discusses the different health indicators, as well as the sources of information, epidemiological measures, variables, and the statistical analysis used. In **Table 48**, a summary of health indicators, sources of information, and epidemiological measures is presented for a better understanding of the methodology.

Summary of health indicators, sources of information and epidemiological measures

Table 48. *Summary of health indicators, sources of information, and epidemiological measures used in the report of the Asthma Surveillance System in Puerto Rico.*

Health indicator	Source of information	Measure
Lifetime asthma	Behavioral Risk Factor Surveillance System (BRFSS)	Crude prevalence (%)
Current asthma		
Uncontrolled asthma in people with current asthma	BRFSS Asthma Call-Back Survey (ACBS)	Crude prevalence (%)
Asthma emergency department visits claimed to all the public and most private health insurers	All the public and most private health insurers of Puerto Rico[a]	Crude rate x 10,000 persons
Hospitalizations claimed to all the public and most private health insurers		
Mortality for asthma	Puerto Rico Demographic Registry	Crude rate x 1,000,000 persons
		Age-adjusted rate x 1,000,000 persons

Notes. [a]All the public (First Medical Health Plan, Inc., MMM, Plan de Salud Menonita, and Triple-S Salud) and most private health insurers (First Medical Health Plan, Inc., Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., MMM, Plan de Salud Menonita, PROSSAM, Ryder Health Plan, Inc., and Triple-S Salud) in Puerto Rico.

Lifetime and current asthma

Source description

The Behavioral Risk Factor Surveillance System known as the BRFSS is a national system managed by the Behavioral Surveillance Branch of the CDC that uses a cross-sectional methodology through telephone surveys to know about health related aspects such as health-related risk behaviors, chronic health conditions, and the utilization of prevention-focused services. This system collects data in the 50 states of the United States (U.S.), the District of

Columbia and three U.S. territories, where Puerto Rico is one of these. It is important to highlight that the BRFSS conducts more than 400,000 interviews through complex sampling with the adult population per year, making the system the largest telephone health survey in the world (CDC, 2013; 2014; 2019a; 2022d).

In addition, since it is a representative sample of each place where it is administered, population estimates can be made (CDC, 2013; 2022h). What this means is that in the case of Puerto Rico, estimates can be made with the sample selected for each year. It has three sections:

> the core (a fixed core which is asked every year and a rotating core which is asked every other year), optional modules (standardized sets of questions, which are optional to the state), and state-added questions (state-specific questions which states can add at their own discretion) (CDC, 2019a, History of BRFSS data collection section, para. 4).

It is important to highlight that the BRFSS, in addition to having modules for adults, also has modules for children. For the children and adolescents, the answers provided by the adult (parent or guardian) are used for the estimates (CDC, 2021a). In the case of Puerto Rico and for this report, the BRFSS Core, BRFSS Random Child Selection Module, and the BRFSS Child Prevalence Module are used for the estimates. For adults 18 years or older, the database for 2020 was used and for children and adolescents from 0 to 17 years, and the databases for the years 2018, 2019, and 2020 were merged into one that included the three years (2018-2020).

Variable definitions

The two main BRFSS variables used were defined as:

- Lifetime asthma:
    - Adults:
        - Affirmative answer to the question: “Has a doctor, nurse, or other health professional ever told you that you had asthma?” (CDC, 2022b, Lifetime asthma: Question number 6.4., para. 1).
    - Children and adolescents:
        - Affirmative answer to the question: “Has a doctor, nurse or other health professional ever said that the child has asthma?” (CDC, 2021a, Lifetime asthma: Question number M31.01, para. 1).
- Current asthma:
    - Adults:
        - Affirmative answer to the questions: “Has a doctor, nurse, or other health professional ever told you that you had asthma?” and “Do you still have asthma?” (CDC, 2022b, Current asthma: Question number 6.5, para. 1).
    - Children and adolescents:
        - Affirmative answer to the question: “Has a doctor, nurse or other health professional ever said that the child has asthma?” and “Does the child still have asthma?” (CDC, 2021a, Current asthma: Question number M31.02, para. 1).

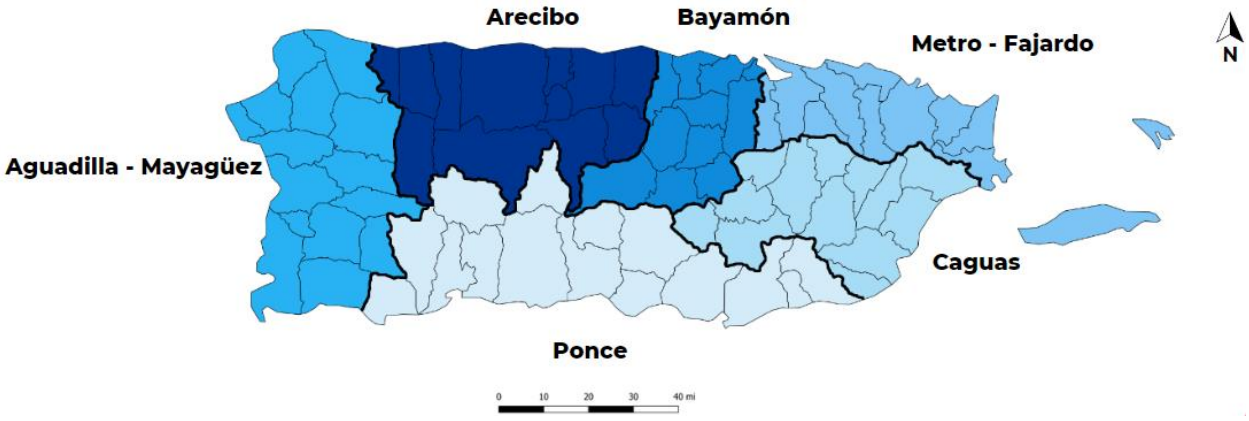
The variables related to the sociodemographic characteristics, behavioral risks, and comorbidities were defined and coded according to the codebook provided by the BRFSS for the years that were analyzed (CDC, 2019c; 2020c; 2021c).

The sociodemographic variables as presented in the tables **(Table 3; Table 6; Table 10; Table 11; Table 13; Table 14)** included:

- Sex
- Relationship
- Age group (years)
- Educational level
- Annual income
- Employment status:
    - The categories of the study "Application of Behavioral Risk Factor Surveillance System Sampling Weights to Transgender Health Measurement" were used for the category of not working (Cicero et al., 2020).
- Marital status
- Health region:
    - Calculated nominal qualitative variable that grouped the municipalities into the health regions of the Puerto Rico Department of Health for administrative purposes **(Figure 46):**
        - **Aguadilla-Mayagüez:** Aguada, Aguadilla, Añasco, Cabo Rojo, Hormigueros, Isabela, Lajas, Las Marías, Maricao, Mayagüez, Moca, Rincón, Sabana Grande, San Germán, and San Sebastián
        - **Arecibo:** Arecibo, Barceloneta, Camuy, Ciales, Florida, Hatillo, Lares, Manatí, Morovis, Quebradillas, Utuado, and Vega Baja

- **Bayamón:** Barranquitas, Bayamón, Cataño, Comerío, Corozal, Dorado, Naranjito, Orocovis, Toa Alta, Toa Baja, and Vega Alta
- **Caguas:** Aguas Buenas, Aibonito, Caguas, Cayey, Cidra, Gurabo, Humacao, Juncos, Las Piedras, Maunabo, Naguabo, San Lorenzo, and Yabucoa
- **Metro-Fajardo:** Canóvanas, Carolina, Ceiba, Culebra, Fajardo, Guaynabo, Loíza, Luquillo, Río Grande, San Juan, Trujillo Alto, and Vieques
- **Ponce:** Adjuntas, Arroyo, Coamo, Guánica, Guayama, Guayanilla, Jayuya, Juana Díaz, Patillas, Peñuelas, Ponce, Salinas, Santa Isabel, Villalba, and Yauco

Figure 46. *Health regions of the Department of Health of Puerto Rico.*



The behavioral risks variables as presented in the tables **(Table 4; Table 7; Table 12; Table 15)** included:

- Body Mass Index (BMI) (kg/m^2):
  - This were according to CDC (2022c) Body Mass Index (BMI) categories: underweight = below 18.5 kg/m2, normal = 18.5 - 24.9 kg/m2, overweight = 25.0 - 29.9 kg/m2 and obesity = 30.0 kg/m2 and above.
- Current smoker

The comorbidities variables as presented in the tables **(Table 5; Table 8)** included:

- Diabetes
- Myocardial infarction
- Coronary heart disease or angina
- Stroke
- Skin cancer
- Other cancer
- Chronic obstructive pulmonary disease (COPD), emphysema or chronic bronchitis
- Arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia
- Depression
- Kidney disease
- One or more chronic diseases:
    - Qualitative nominal variable defined as at having least one of the following chronic diseases: diabetes, myocardial infarction, coronary heart disease or angina, stroke, skin cancer, other cancer, COPD, emphysema or chronic bronchitis, arthritis, rheumatoid arthritis, gout, lupus or fibromyalgia, and kidney disease.

Statistical analysis

The crude prevalence, weighted frequency, standard error (SE), and 95% confidence interval (95% CI) for the variables lifetime and current asthma as well as by sociodemographic, risk behaviors and comorbidities variables were estimated using the statistical software STATA version 15.1 for Windows. Also, the frequency was presented too using the same statistical program. The Microsoft Excel and Word programs were used to create various illustrative graphs and to design the tables with all the data. Paintmaps.com and Paint

were used to create the model illustrative map of the prevalence for lifetime and current asthma for the health regions.

The weighing variables provided by the BRFSS were used for adults (_LLCPWT) and for children and adolescents (_CLLCPWT) with the purpose of making estimates for the population of Puerto Rico (CDC, 2021d). The weighting variable was divided by three for the children and adolescents combined year analysis (2018-2020). The BRFSS recommendation of "...not report percentage estimates where the RSE was greater than 30% or the denominator represented fewer than 50 respondents from an unweighted sample" was followed (CDC, 2021b, p. 6). In addition, those who answered, “Don’t know” or “Refused” were not included in the sample for the estimates. Also, although the crude prevalence gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000). For this reason, a footnote was included throughout the report.

Uncontolled asthma in people with current asthma

Source description

The Asthma Call-back Survey (ACBS) is a survey product of the Asthma and Community Health Branch (ACHB) in the National Center for Environmental Health (NCEH) focused on deeper issues related to asthma disease (CDC, 2022f). It is done about 2 weeks after the BRFSS survey has been administered to those eligible participants who reported having a diagnosis of asthma (ever being diagnosed with the disease) (CDC, 2022a; 2022f). As previously mentioned, BRFSS, collects data in the 50 states of the United States (U.S.), the District of Columbia and three U.S. territories, where Puerto Rico is one of these (CDC, 2019a; 2022a). It is important to highlight that (CDC, 2022a):

> If a state includes children in the BRFSS and the randomly selected child has ever been diagnosed with asthma, then the child is eligible for the ACBS. If both the selected child and the BRFSS adult in a household have asthma, then one or the other is eligible for the ACBS (50/50 split) (p. 7).

In the case of Puerto Rico and for this report, for the children and adolescents, the answers provided by the adult (parent or guardian) are used for the estimates (CDC, 2021a; 2022f). For adults 18 years of age or older, the 2018, 2019, and 2020 databases were used. In addition, they were merged for the 2018-2020 period. Regarding children and adolescents from 0 to 17 years old, the database for the 2018-2020 period provided by the PR-BRFSS was used.

Variable definitions

The two main ACBS variables used were defined as:

- Current asthma:
    - Adults:
        - Affirmative answer to the questions: “Do you still have asthma?” (CDC, 2020a, p. 4). A calculated variable was provided in the database that combines the BRFSS and ACBS responses (CDC, 2022a; 2022f).
    - Children and adolescents:
        - Affirmative answer to the question: “Does [he/she] still have asthma?” (CDC, 2020b, p. 52). A calculated variable was provided in the database that combines the BRFSS and ACBS responses (CDC, 2022a; 2022f).
- Uncontrolled asthma:
    - This calculated variable was defined through an algorithm based on the concept of impairment of asthma control from the Guidelines for the Diagnosis and Management of Asthma (EPR-3) (NHLBI, 2007) and the CDC recommendations (CDC, n.d.; Qin,

2018). The algorithm included the following components: daytime symptoms, nighttime awakening symptoms, use of Short-Acting Beta-Agonist (SABA) inhaler or nebulizer and limited activity (CDC, n.d.; Qin, 2018) **(Table 49).** It is important to highlight that although there is an EPR-4, in this what was done was an update of certain topics of the EPR-3 (NHLBI, n.d.). For this reason, the EPR-3 continues to be used to perform the algorithm for the analysis.

- As in the EPR-3, the variable related to asthma control included three categories: "well controlled", "not controlled" and "very poorly controlled", the latter being the most severe (NHLBI, 2007; CDC, n.d.; Qin, 2018). However, for this report, the last two categories were merged into one titled "uncontrolled". In other words, the prevalence was calculated based on two control categories: "well controlled" and "uncontrolled" **(Table 49).** In addition, the extreme limitation category was used for the indicator, but for the creation of the component tables it was joined with some limitation under the any limitation category.

Table 49. Description of the asthma control algorithms.

Component of control	Age group (years)	Classification of asthma control		
			Uncontrolled	
		Well controlled	Not well controlled	Very poorly controlled
Daytime symptoms[a]	0-4, 5-11 and 12+	≤ 2 days per week	> 2 days per week, but not throughout the day	Every day and throughout day
Nighttime awakening symptoms[b]	0-4	≤ 1 day per month	≥ 2 and ≤ 4 days per month	≥ 5 days per month
	5-11	≤ 1 day per month	≥ 2 and ≤ 8 days per month	≥ 9 days per month
	12+	≤ 2 day per month	≥ 3 and ≤ 12 days per month	≥ 13 days per month
Use of Short-Acting Beta-Agonist (SABA) inhaler or nebulizer	0-4, 5-11 and 12+	≤ 0.29 uses per day	0.29 < uses per day < 2.00	At least 2 (≥2.00) uses per day
Limited activity[c]	0-4, 5-11 and 12+	**No limitation**	**Some limitation**	**Extremely limited**
		Not at all or No current asthma, nothing happened past year	A little or A moderate amount	A lot

Notes. Data source: BRFSS Asthma Call-Back Survey (ACBS). [a]Responded to the questions: "During the past 30 days, on how many days did you have any symptoms of asthma?" and "Do you have symptoms all the time? 'All the time' means symptoms that continue throughout the day. It does not mean symptoms for a little while each day" (CDC, 2020a, p. 7; 2020b, p. 6). [b]Responded to the question: "During the past 30 days, on how many days did symptoms of asthma make it difficult for you to stay asleep?" (CDC, 2020a, p. 7; 2020b, p. 6). [c]Responded to the question: "During just the past 30 days, would you say you limited your usual activities due to asthma not at all, a little, a moderate amount, or a lot?" (CDC, 2020a, p. 13; 2020b, p. 10).

Adapted from *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma* (pp. 75-77), by National Heart, Lung, and Blood Institute, 2007.

The variables related to the sociodemographic characteristics, knowledge and management of asthma, behavioral risks, comorbidities, missed days at work, missed days at school, asthma attacks, and type of medication were defined and coded according to the codebook provided by the ACBS for the years that were analyzed (CDC, 2022f).

The sociodemographic variables as presented in the tables **(Table 20; Table 27)** included:

- Sex
- Age group (years)
- Educational level
- Annual income
- Employment status
    - The categories of the study "Application of Behavioral Risk Factor Surveillance System Sampling Weights to Transgender Health Measurement" were used for the category of not working (Cicero et al., 2020).
- Marital status
- Health region
    - Calculated nominal qualitative variable that grouped the municipalities into the health regions of the Puerto Rico Department of Health mentioned previously **(Figure 47).**

The knowledge and management of asthma variables as presented in the tables **(Table 21; Table 28)** included:

- Signs of an episode:
    - Adults:
        - Responded to the question: "Has a doctor or other health professional ever taught you how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020a, p. 14).
    - Children and adolescents:
        - Responded to the question: "Has a doctor or other health professional ever taught you or {child's name} how to recognize early signs or symptoms of an asthma episode?" (CDC, 2020b, p. 13).

- Attack response:
    - Adults:
        - Responded to the question: “Has a doctor or other health professional ever taught you what to do during an asthma episode or attack?” (CDC, 2020a, p. 14).
    - Children and adolescents:
        - Responded to the question: “Has a doctor or other health professional ever taught you or {child’s name} what to do during an asthma episode or attack?” (CDC, 2020b, p. 13).
- Peak flow:
    - Adults:
        - Responded to the question: “Has a doctor or other health professional ever taught you how to use a peak flow meter to adjust your daily medications?” (CDC, 2020a, p. 14).
    - Children and adolescents:
        - Responded to the question: “Has a doctor or other health professional ever taught you or {child’s name} how to use a peak flow meter to adjust his/her daily medications?” (CDC, 2020b, p. 13).
- Action plan:
    - Adults:
        - Responded to the question: “Has a doctor or other health professional EVER given you an asthma action plan?” (CDC, 2020a, p. 15; 2020b, p. 14).
    - Children and adolescents:
        - Responded to the question: “Has a doctor or other health professional EVER given you or {child’s name} an asthma action plan?” (CDC, 2020b, p. 14).

- Formal class:
    - Adults:
        - Responded to the question: “Have you ever taken a course or class on how to manage your asthma?” (CDC, 2020a, p. 15; 2020b, p. 14).
    - Children and adolescents:
        - Responded to the question: “Have you or {child’s name} ever taken a course or class on how to manage {his/her} asthma?” (CDC, 2020b, p. 14).
- Any education component:
    - This calculated qualitative nominal variable combines the questions related to asthma education into one variable indicating a positive response in any of the five questions (signs of an episode, attack response, peak flow, action plan, and formal class).
- Any 3 of 5 components:
    - This calculated qualitative nominal variable combines the five questions related to asthma education into one variable indicating a positive response to any 3 or more of the questions (signs of an episode, attack response, peak flow, action plan, and formal class).

The behavioral risks variables as presented in the tables **(Table 22)** included:

- Body Mass Index (BMI) (kg/m^2):
    - This were according to CDC (2022c) Body Mass Index (BMI) categories: underweight = below 18.5 kg/m2, normal = 18.5 - 24.9 kg/m2, overweight = 25.0 - 29.9 kg/m2 and obesity = 30.0 kg/m2 and above.
- Current smoker

The comorbidities variables as presented in the tables **(Table 22)** included:

- Chronic obstructive pulmonary disease (COPD)
- Emphysema
- Chronic bronchitis
- Depression
- Any respiratory condition:
    - This calculated nominal variable combines the respiratory conditions COPD, emphysema, and chronic bronchitis into one variable indicating a positive response in any of the three questions related to the conditions.

The missed days at work variables as presented in the tables **(Table 23)** included:

- Having at least one workday missed
- Workday missed (days)

The missed days at school variables as presented in the tables **(Table 29)** included:

- Having at least one miss day at school
- Missed school (days)

The asthma attacks variables as presented in the tables **(Table 24; Table 30)** included:

- Episode of asthma attack in the last 12 months
- Number of attacks in the past 3 months

The type of medication variables as presented in the tables **(Table 25)** included:

- Controller medicaments
- Reliever or rescue medicaments

Statistical analysis

The crude prevalence, weighted frequency, standard error (SE) and 95% confidence interval (95% CI) for uncontrolled asthma in people with current asthma as well as by sociodemographic characteristics, knowledge and management of asthma, behavioral risks, comorbidities, missed days at work, missed days at school, asthma attacks, and type of medication were estimated using the statistical software STATA version 15.1 for Windows. Also, the frequency was presented too using the same statistical program. The Microsoft Excel and Word programs were used to create various illustrative graphs and to design the tables with all the data. Paintmaps.com and Paint were used to create the model illustrative map of the prevalence of uncontrolled asthma for the health regions.

The weighing variables provided by the ACBS were used for adults (LLCPWT_F) and for children and adolescents (_CHILDWT_M_YEARS) with the purpose of making estimates for the population of Puerto Rico (CDC, 2022f). The weighting variable was divided by three for the adults combined year analysis (2018-2020). The ACBS recommendation of "...not reporting or interpreting point estimates based on fewer than 50 unweighted respondents (e.g. percentages based upon a denominator of < 50) or for which the Relative Standard Error is greater than 30%" was followed (CDC, 2022a, p. 13). In addition, Those who answered, "Don't know" or "Refused" were not included in the sample for the estimates. In the case of children, adolescents, and some variables for adults, although the frequency was less than 50, the relative standard error was less than 30%. For this reason, the estimate was presented in accordance with CDC recommendations. Nevertheless, "caution should be used in interpreting such "imprecise" estimates of prevalence" (CDC, 2022b, Small sample size section, para. 1). Also, even though_the crude prevalence gives us an idea of the prevalence or rate behavior, it should be adjusted for age for comparative purposes (Grupo de Análisis del Programa Especial de

Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000). For this reason, a footnote was included throughout the report.

Asthma emergency department visits and hospitalizations

Source description

To obtain the data related to the emergency department visits and hospitalizations due to asthma, we depended on the collaboration of all the public and most of the private health insurers in Puerto Rico regarding the claims made for this disease as the first diagnosis. Data concerning public health insurers were obtained through the Puerto Rico Health Insurance Administration (ASES).

ASES was the product of Law No. 72 of September 7, 1993 (amended by Law No.1 of January 8, 1994). Among the responsibilities that this government institution has is the implementation, administration and negotiation with various health insurers and organizations (defined in Law No. 113 of June 2, 1976, which was amended) with the purpose of making contractual agreements with them so that they can provide the residents of Puerto Rico with a health insurance system in which they can have access to medical and hospital care regardless of their economic capacity and payment. It is important to highlight that ASES also carries out inspection and evaluation processes of the services that health insurers provide (ASES, n.d.a).

The insurers contracted by ASES were: First Medical Health Plan, Inc., MMM, Triple-S Salud, and Plan de Salud Menonita, which shared data from their public health component for this report (ASES, n.d.b). On the other hand, nine private insurers shared their data regarding claims for asthma as first diagnosis, which were: First Medical Health Plan, Inc., MMM, Triple-S Salud, Humana, MAPFRE Life Insurance Company, MCS Advantage Inc., Plan de Salud Menonita, PROSSAM and Ryder Health Plan, Inc.

To obtain the data on claims for asthma as a first diagnosis from both public and private health insurers, a letter signed by the Secretary of Health was elaborated, which was addressed to the insurers contracted by ASES and to the private insurers to which we had access to their contact information. In addition, the data on the claims for the emergency department visits and hospitalizations should be shared on or before April 30, 2022. For this, a Spreadsheet was created in the Microsoft Excel Program with the purpose of achieving uniformity in the data. The Spreadsheet included the following components:

- Number of emergency department visits as first asthma diagnosis by age, sex, municipality of service and municipality of residence. The age intervals used were the same ones that the CDC requires of us in the data concerning emergency department visits and hospitalizations that we must report to them.
- Number of hospitalizations as first asthma diagnosis by age, gender, municipality of service and municipality of residence. The age intervals used were the same ones for emergency department visits.
- Summary of cost for use of services as first diagnosis of asthma.
- Number of hospitals providing data.
- Total of asthma emergency department visits resulting in hospitalization
- Costs for asthma at first diagnosis by place of service:
    - Physician's office
    - Emergency department visits
    - Hospitalizations
- Asthma rescue medication costs.
- Asthma controller medication costs.
- Number of people insured by age, gender and municipality of residence. The age intervals used were the same ones for emergency department visits.

For this report, the emergency department visits and hospitalization for asthma as the first diagnosis claimed to all the public and most of the private health insurers were presented in children and adults of all ages for the year 2021. It is important to highlight that the database created for that year included 99.8% of the insured population in Puerto Rico. This calculation was using the total insured population in the database divided by the one-year estimate of the civilian noninstitutionalized insured population for 2021 conducted by the ACS of the United States Census Bureau (n.d.). However, people may be duplicated because they could have had more than one medical insurance.

Variable definition

The main variables used were defined as:

- Asthma emergency department visits claims:
    - Emergency department visits due to asthma as the first diagnosis with the coding J45 of the International Classification of Diseases, Tenth Revision, Clinical Modification published by the World Health Organization (WHO) (ICD-10-CM).
- Asthma hospitalizations claims:
    - Hospitalizations due to asthma as the first diagnosis with the coding J45 of the International Classification of Diseases, Tenth Revision, Clinical Modification published by the World Health Organization (WHO) (ICD-10-CM).

The variables related to the sociodemographic characteristics were:

- Sex:
    - Dichotomous qualitative variable that was categorized as masculine “M” and feminine “F”. In the report tables it was presented as male and female **(Table 32; Table 38)**.

- Age:
    - Continuous variable that collected the age in years of the individual for whom the claim was made. In this report it was categorized into five years intervals **(Table 33; Table 39)**. In this report, they were categorized using 5-year intervals starting from under five years (0 to 4 years) to 80 to 84 years. Only three intervals were not using this pattern, which were 15 to 17, 18 to 19, and 85 years or older. It should be noted that as previously mentioned, the data was presented in this way based on the requirements that the CDC indicates for data reporting.
- Municipality of residence:
    - Nominal qualitative variable that indicated the municipality in which the person who made the claim for the health service resided **(Table 34; Table 35; Table 40; Table 41).**
- Health region:
    - Calculated nominal qualitative variable that grouped the municipalities into the health regions of the Puerto Rico Department of Health mentioned previously **(Table 36; Table 42)**.

The variables related to the costs of health services were:

- Costs for asthma at first diagnosis by emergency department visits:
    - Calculated continuous quantitative variable that described the total cost of first-diagnosis asthma emergency department visits claimed from some public and private health insurers **(Table 43)**.
- Costs for asthma at first diagnosis by hospitalizations:
    - Calculated continuous quantitative variable that described the total cost of first-diagnosis asthma hospitalizations claimed from some public and private health insurers **(Table 43)**.

- Summary of costs for use of services as a first diagnosis of asthma:
    - Calculated continuous quantitative variable that described the total cost of first-diagnosis asthma emergency department visits and hospitalizations claimed from some public and private health insurers **(Table 43)**.

Statistical analysis

The crude emergency department visits and hospitalizations rate for asthma as first diagnosis claimed to all the public and most of the private health insurers, and the 95% confidence interval (95% CI) as well as by sociodemographic variables were estimated using Microsoft Excel. This last program was also used to calculate asthma costs by place of service and to create various illustrative graphs with the data. In addition, the Microsoft Word Program was used to create tables.

The crude rate was calculated using a modified formula provided by the CDC (2022i):

$$\textbf{Rate} = \frac{\text{ED or hospitalizations for asthma as first diagnosis given a time period}}{\text{Size of the population among which the ED or hospitalizations ocurred}} \times 10^{n}$$

Notes. ED = Emergency department visits. We use claims for the estimation.

The denominator used to calculate the rate was the estimated population for July 1 of the corresponding year in Puerto Rico, which was obtained from the United States Census databases provided by the Puerto Rico Institute of Statistics (n.d.). These estimates were used too for the sociodemographic characteristics of sex, age, municipality of residence and health region. The rate was expressed per 10,000 persons following the CDC (2022i) recommendations for the presentation of asthma data. In addition, the formula used to calculate the 95% confidence interval (Pennsylvania Department of Health, n.d.) was:

$$\textbf{Rate} \pm (1.96 \times SE)$$

Where the standard error (SE) was using the following formula (Keyfitz, 1966, as cited in Pennsylvania Department of Health, n.d.):

SE = Rate/ square root of number of claims

It is important to highlight that it should be considered that the differences in crude rates between groups may be due to differences in the population structure (eg. age) and not to differences in risk. For this reason, for comparative purposes it must be adjusted (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000). Also, we followed the CDC recommendation of not report the rates when the number of claims was less than 30 or the relative standard error (RSE) was greater than 30% since they cannot be considered statistically reliable (CDC, 2019a; Klein et al., 2002). On the other hand, it should be noted that the data on visits to the emergency department that resulted in hospitalization were found in both variables. In addition, that people may be duplicated since we depended on claims. People who could not be identified by age, sex, and municipality of residence were not included in the sample for the estimates.

Asthma mortality

Source description

The Demographic Registry of Puerto Rico is the product of Law No. 24 of April 22, 1931, which was amended as the "Ley del Registro Demográfico de Puerto Rico" (24 LPRA Section 1041). Among the main functions of the Registry, which are indicated in the law, are the production of vital statistics, the realization of the inventory and the organization of the registry books, and the certification of the events that are considered vital. These events include births, deaths, and marriages (Puerto Rico Department of Health, n.d.; 2022).

The production of vital statistics includes the registration and collection of those events that are vital to the Registry. Regarding the registry books, the

Registry must be the custodian of the civil books from 1885 to 1931. In addition, it must issue certifications of vital events that arrive at the Registry (Puerto Rico Department of Health, n.d.; 2022). It is important to highlight that:

> The Registrar is responsible for the correction, custody, and protection of the records of all vital events that occur in the jurisdiction. In addition, he is responsible for preparing the instructions, forms, forms, and books necessary to obtain the information for each event (Puerto Rico Department of Health, n.d., para. 2).

The Registry uses the quality standards of the National Association of Public Health Statistics Information System (NAPHSIS) to assess the quality of the information (Puerto Rico Department of Health, n.d.). Finally, for this report, deaths from asthma were presented as the underlying cause in children and adults for all ages for the years 2020 and 2021.

Variable definitions

The main variable used were defined as:

- Asthma mortality:
    - Deaths due to asthma as the underlying cause with the coding J45-J46 of the International Classification of Diseases, Tenth Revision, Clinical Modification published by the World Health Organization (WHO) (ICD-10).
        - Underlying cause of death: "...the disease or injury that started the series of events leading directly to death, or the circumstances of the accident or violence that produced the fatal injury" (WHO, n.d., as cited in CDC, 2022j, About cause of death classification section, para. 1).

The variables related to the sociodemographic characteristics were:

- Sex:
    - Dichotomous qualitative variable that was categorized as masculine “M” and feminine “F”. In the report tables it was presented as male and female (**Table 46**).
- Age:
    - Continuous variable that collected the age in years of the deceased. In this report it was categorized into less than 35 years, 35 to 64 years and 65 years or more **(Table 47)**. These groups were selected based on the Healthy People 2020 objectives (Office of Disease Prevention and Health Promotion [ODPHP], n.d.). In addition, with the purpose of not showing categories in which there were few deaths.

Statistical analysis

The crude mortality rate and 95% confidence interval (95% CI) for asthma as well as by sociodemographic variables were estimated using Microsoft Excel. Also, the frequency was presented too using the same program and the age-adjusted rate with the 95% CI. Excel and Word programs were used to create various illustrative graphs and to design the tables with all the data.

The crude asthma mortality rate was calculated using the formula provided by the CDC (2012; 2022i):

$$\textbf{Rate} = \frac{\text{Deaths ocurring during a given time period}}{\text{Size of the population among which the deaths ocurred}} \times 10^{n}$$

The denominator used to calculate the rate was the estimated population for July 1 of the corresponding year in Puerto Rico, which was obtained from the United States Census databases provided by the Puerto Rico Institute of Statistics (n.d.). These estimates were used too for the sociodemographic characteristics of sex and age. The rate was expressed per 1,000,000 persons

following the CDC (2022i) recommendations for the presentation of asthma data. In addition, the formula used to calculate the 95% confidence interval (Pennsylvania Department of Health, n.d.) was:

$$\textbf{Rate} \pm (1.96 \times SE)$$

Where the standard error (SE) was using the following formula (Keyfitz, 1966, as cited in Pennsylvania Department of Health, n.d.):

SE = Rate/ square root of number of deaths

It is important to highlight that it should be considered that the differences in crude rates between groups may be due to differences in the population structure (e.g., age) and not to differences in risk. For this reason, for comparative purposes it must be adjusted (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; New York State Department of Health, 1999; Schoenbach & Rosamond, 2000). In the case of the age-adjusted rates for the years presented in the report (2020 and 2021), they were calculated using the direct method for standardization and the standard population was: United States for the year 2000 (Grupo de Análisis del Programa Especial de Análisis de Salud de la OPS, 2022; Schoenbach & Rosamond, 2000; Surveillance, Epidemiology, and End Results Program [SEER], n.d.). The formulas used for the standard error and the calculation of the 95% confidence interval were those presented for the crude rate.

In addition, the death rate ratio between the age-adjusted rate in United States provided by the CDC WONDER (CDC, 2023b) and Puerto Rico for 2020 (standard population used: United States 2000) was calculated. It is important to note that it was used this year since CDC WONDER did not have the age-adjusted rate for the United States for 2021. This was done so that mortality could be compared in both populations.

The formula used was modified from Moreno-Altamirano et al., 2000 and was:

$$\textbf{Death rate ratio} = \frac{\text{Age-adjusted mortality rate in Puerto Rico x 1,000,000}}{\text{Age-adjusted mortality rate in United States x 1,000,000}}$$

Also, we followed the recommendation of not reporting rates based on less than 20 deaths because they correspond to a relative standard error (RSE) greater than 23% and they were not considered statistically reliable (CDC, 2019d; 2022g; Klein et al., 2002). People who could not be identified by age and sex were not included in the sample for the estimates.