# Health communications: provider assessment of asthma control

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## Abstract

**Objective:** The patient–provider partnership is important for effective asthma care and improved asthma control. Our descriptive study describes demographic differences associated with patient–provider asthma communications using *Healthy People 2020* indicators.

**Methods:** Using 2013 National Health Interview Survey (NHIS) data, we examined provider assessments of asthma control at last healthcare visit for children and adults with current asthma; assessments included questions on frequency of asthma symptoms, use of quick-relief inhalers, and limitation of daily activities due to asthma. We calculated weighted prevalence and prevalence ratios (PR) with 95% confidence intervals (CI).

**Results:** Overall, 3,684 (weighted prevalence = 7.3%; 95% confidence interval [CI]=7.0–7.6) NHIS respondents reported current asthma. Among persons with current asthma, 58% reported a routine asthma care visit in the past year. Provider assessments of asthma symptoms, quick-relief inhaler use, and activity limitations were reported by 55.4%, 59.1% and 41.5% of respondents, respectively. Non-Hispanic blacks (PR = 1.11; 95% CI = 1.03–1.20), Puerto Ricans (PR = 1.23; 95% CI = 1.08–1.40), and Other-Hispanics (PR = 1.18; 95% CI = 1.05–1.32) were asked more often than non-Hispanic whites about 1 of the asthma control indicators. Providers more frequently assessed asthma symptoms (PR = 1.20; CI = 1.10–1.30), quick-relief inhaler use (PR = 1.10; CI = 1.02–1.19), and activity limitations (PR = 1.25; CI = 1.11–1.41) in children than adults.

**Conclusions:** Healthcare providers often discuss asthma control indicators with patients. Children and some racial and ethnic minorities were more frequently assessed on key asthma control indicators compared to adults and non-Hispanic whites, respectively. These findings may reflect provider efforts to target asthma control communications to populations with higher risk of morbidity.

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## Introduction

Over 24 million (7.8%) individuals in the United States currently have asthma (1). While many minority and low-income populations are disproportionately affected by asthma, the underlying reasons for disparities are varied and incompletely understood (2–6). To address asthma disparities, comprehensive and cross-cutting approaches are most effective (6–8). Healthcare provider communications integrating disease education, medication management, and patient support resources are important for improving asthma control and decreasing asthma morbidity (6–9).

The patient–provider partnership provides both a foundation for effective asthma care and an opportunity to optimize asthma control as described in *Healthy People 2020*. The *Healthy People 2020* objective for respiratory disease (RD-7.7) aims to increase the proportion of persons with current asthma whose doctor assessed their asthma control at the last visit according to National Asthma Education and Prevention Program (NAEPP) guidelines (10–11). Using national indicators created to examine health communications, we explored demographic differences in provider assessments of asthma control among persons with current asthma.

## Methods

### Data source and measures

The National Health Interview Survey (NHIS) (12) monitors the health of the nation by surveying the non-institutionalized, civilian U.S. population. Survey participants are selected using a multistage probability sampling of U.S. households. Adult family members are selected as proxy respondents for children (aged 0–17 years). We used data from the 2013 NHIS adult and child core and asthma supplement surveys. Current asthma was defined as "yes" responses to both of the following questions: "Has a doctor or other health professional EVER told you that you (or child) have/has asthma?" and "Do you (or child) still have asthma?"

The 2013 NHIS asthma supplemental questionnaire included questions about routine healthcare visits for asthma and about whether healthcare providers asked about asthma symptoms and management. The following survey prompt was used to assess asthma control: "The next three questions are about the last time you saw a doctor or other health care professional for routine care or for any reason." Survey respondents were then asked about the following indicators of asthma control: "At [your/his/her] last visit, did your (or child's) doctor or other health professional ask how often: (1) …you (child's name) had asthma symptoms?," (2) …you (child's name) used a quick relief inhaler?," and (3) …asthma symptoms limited [your/child's] daily activities?" We used responses to these questions to examine provider assessments of asthma control among persons with current

asthma and to explore differences in responses among patient demographic subgroups (i.e., sex, age, race/ethnicity, and income status).

Using NHIS survey sample weights to obtain national estimates, we calculated weighted prevalence, prevalence ratios (PR), and 95% confidence intervals (CIs) for the following demographic characteristics: sex, age (children aged 0–17 years, adults aged 18 years and older, and six age groups), race/ethnicity, and income status. Race/ethnicity was self-reported by respondents and categorized as follows: white (non-Hispanic), black (non-Hispanic), Asian/American Indian/Alaska Native/other race (non-Hispanic), Puerto Rican, Mexican, and other Hispanic (excludes Mexican or Puerto Rican and includes Cuban, Central and South American, or Spanish origin). Income status was categorized as the "ratio of income to poverty" using poverty thresholds based upon federal poverty level (FPL) designations. The U.S. Census Bureau FPL thresholds are based upon family size and ages of family members; they are used with total family income to compute poverty status (13).

All statistical analyses were conducted using SAS-callable SUDAAN11, version 9.3 (SAS Institute, Cary, NC; SUDAAN11, RTI International, Research Triangle Park, NC). Multivariable logistic models, controlled for sex, age, race/ethnicity, and income status, were used to calculate PRs with 95% CIs for each asthma control indicator across demographic categories.

## Results

In 2013, 3,684 NHIS survey respondents reported having current asthma, representing an estimated 7.3% of the U.S. population. Characteristics of persons with current asthma are shown in Table 1 and national estimates are displayed as weighted prevalence percentages. Groups with the highest asthma prevalence were females (8.3%; 95% CI = 7.9–8.8), children (8.3%; 95% CI = 7.8–8.9), Blacks (non-Hispanic) (9.9%; 95% CI = 9.1–10.8), Puerto Ricans (14.6%; 95% CI = 11.8–17.9), and persons with income status <100% FPL (11.0%; 95% CI = 10.1–12.0).

In terms of asthma morbidity, Puerto Ricans and Blacks (non-Hispanic) had the highest report of an emergency room or urgent care center visit during the past 12 months at 24.9% (95% CI = 17.5–34.2) and 20.5% (95% CI = 17.2–24.2), respectively. During the past 12 months, Other-Hispanics had the highest report of an episode of asthma or an asthma attack at 58.0% (95% CI = 48.0–67.4). Overall, among persons with current asthma, over half (57.7%, 95% CI = 55.5–59.8) reported having a routine healthcare visit for asthma in the last 12 months.

Table 2 shows weighted prevalence of asthma control assessments by sex, age, race/ethnicity, and income status. Assessments of asthma control indicators at last healthcare visit for asthma symptoms, quick-relief inhaler use, and activity limitations were reported by 55.4% (95% CI = 53.1–57.7), 59.1% (95% CI = 57.1–61.0), and 41.5% (95% CI = 39.5–43.6) of respondents, respectively. Healthcare providers asked about one or more of the asthma control indicators among most survey respondents with current asthma [66.4% (95% CI = 64.4–68.4)].

Table 3 shows PRs for each of the asthma control assessments across demographic categories. After adjusting for sex, age, and income status, blacks (non-Hispanic) (PR = 1.11; 95% CI = 1.03–1.20), Puerto Ricans (1.23; 95% CI = 1.08–1.40), and other Hispanics (1.18; 95% CI = 1.05–1.32) were more frequently asked at least one of the three asthma-control indicators compared to non-Hispanic whites (Figure 1). Healthcare providers asked about the three asthma control indicators when assessing children more often than adults. After adjusting for sex, race/ethnicity, and income status, children were more frequently assessed by providers for asthma symptoms (1.20; 95% CI = 1.10–1.30), quick-relief inhaler use (1.10; 95% CI = 1.02–1.19), and limitations in daily activities from asthma (1.25; 95% CI = 1.11–1.41) when compared to adults. Differences in prevalence were not identified by sex or income status.

## Discussion

From this study, we find that many persons with current asthma (66%) were asked about at least one of the key indicators of asthma control, including symptom frequency, rescue inhaler use, or activity limitations, during visits with a healthcare provider. While the majority of persons with current asthma were asked about at least one key indicator of asthma control, about one-third were not. This study provides a baseline measurement to compare asthma control assessment trends in the future. Our study provides insightful information on patient-provider communications regarding asthma control and *Healthy People 2020* objective RD-7.7. Notably, our findings indicate that groups that typically face higher asthma prevalence and morbidity, including children, non-Hispanic blacks, Puerto Ricans, and other Hispanic minorities, are asked more often about indicators of asthma control by their healthcare provider. This finding may reflect healthcare provider awareness of and efforts to specifically target asthma control communications to at-risk groups known to face an increased burden of asthma as encouraged by the NAEPP (8,11).

### Limitations

Similar to other studies using survey methodology, our analysis is subject to self-report and recall bias. Respondents were asked to recall communications that happened at their last medical visit and, as there is no time constraint on the survey question, it is unknown how long ago that visit may have occurred. Additionally, differences in patient–provider communications among minority groups with higher asthma prevalence and morbidity (e.g., American Indian and Alaska Native populations) were not able to be fully examined due to small sample sizes of these subgroups.

## Conclusion

Our study provides insights into asthma control communications between healthcare providers and their patients across multiple demographic characteristics. Our findings in children as well as racial/ethnic minorities suggest that groups currently with higher asthma prevalence and morbidity were more frequently asked by providers about asthma control during routine medical visits. As patient–provider communications are critical to disease monitoring and management, decreasing barriers to asthma control, and reducing asthma

disparities, this study demonstrates that clinicians are assessing asthma control measures among most persons with current asthma and, ideally, improving asthma outcomes.

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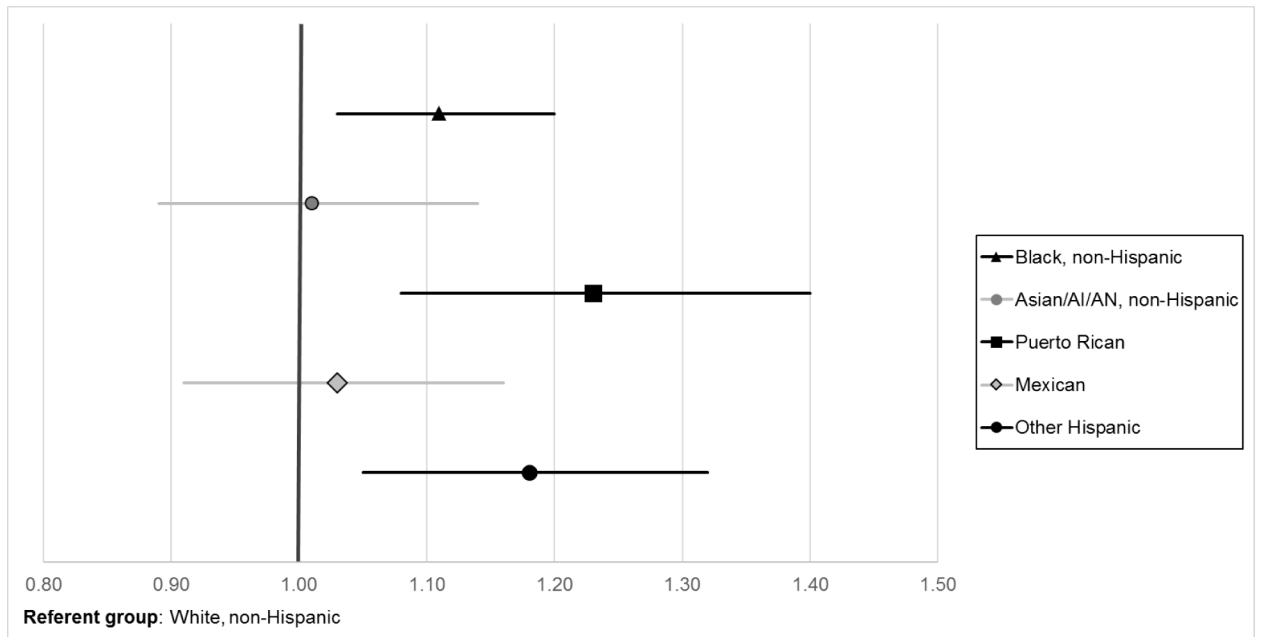
**Figure 1.**
Weighted Prevalence Ratios for Being Asked At Least One Indicator of Asthma Control by Race/Ethnicity. **Abbreviations:** AI: American Indian; AN: Alaskan Native. Adjusted for age, sex, and federal poverty level.

**Table 1.**

Current Asthma Prevalence by Demographic Characteristics — National Health Interview Survey, United States, 2013

| Survey Respondent Characteristics | Survey Sample | Prevalence of Current Asthma |
|---|---|---|
| | No. | Weighted % (95% CI) |
| **Total Persons with Current Asthma** | 3,684 | 7.3 (7.0–7.6) |
| **Sex** * | | |
|   Male | 1,497 | 6.2 (5.8–6.6) |
|   Female | 2,187 | 8.3 (7.9–8.8) |
| **Age Group (years)** * | | |
|   Children (0–17) | 1,149 | 8.3 (7.8–8.9) |
|   Adults (18–85) | 2,535 | 7.0 (6.6–7.3) |
| **Age (years)** * | | |
|   0–4 | 149 | 4.2 (3.4–5.0) |
|   5–14 | 765 | 9.9 (9.1–10.7) |
|   15–17 | 235 | 9.8 (8.4–11.6) |
|   18–34 | 676 | 6.8 (6.2–7.6) |
|   35–64 | 1,326 | 7.3 (6.8–7.8) |
|   65 | 533 | 6.3 (5.6–7.1) |
| **Race/Ethnicity** * | | |
| **Non-Hispanic** | | |
|   White | 2,002 | 7.4 (7.0–7.8) |
|   Black | 771 | 9.9 (9.1–10.8) |
|   Asian/AI/AN | 268 | 5.8 (5.0–6.7) |
| **Hispanic** | | |
|   Puerto Rican | 142 | 14.6 (11.8–17.9) |
|   Mexican | 312 | 4.7 (4.0–5.4) |
|   Other, Hispanic | 189 | 6.1 (5.0–7.3) |
| **Income Status** * | | |
|   Poor (<100% FPL) | 957 | 11.0 (10.1–12.0) |
|   Near Poor (100%–199% FPL) | 711 | 7.1 (6.5–7.7) |
|   Not Poor ( 200% FPL) | 1,680 | 6.6 (6.2–7.0) |

Boldface* indicates statistical significance (*p 0.0001)

AI = American Indian; AN=Alaska Native; FPL=Federal Poverty Level.

**Table 2.**

Assessing Asthma Control among Persons with Current Asthma by Demographic Characteristics, NHIS, United States, 2013

| | Assessing Asthma Control | | | |
|---|---|---|---|---|
| | Assessment of symptoms | Assessment of quick-relief medication use | Assessment of daily activities limitations | Assessment of any asthma control indicators |
| | Difference Between Categories (ρ-value) | | | |
| | Weighted % (95% CI) | Weighted % (95% CI) | Weighted % (95% CI) | Weighted % (95% CI) |
| Total | 55.4 (53.1–57.7) | 59.1 (57.1–61.0) | 41.5 (39.5–43.6) | 66.4 (64.4–68.4) |
| **Sex** | 0.14 | 0.54 | 0.83 | 0.13 |
| Male | 57.3 (53.8–60.7) | 59.9 (56.8–62.9) | 41.2 (37.9–44.6) | 68.3 (65.0–71.4) |
| Female | 54.1 (51.3–56.9) | 58.5 (55.8–61.2) | 41.7 (39.2–44.2) | 65.1 (62.5–67.6) |
| **Age Group (years)** | **0.0000** ** | **0.0002** * | **0.0000** ** | **0.0000** ** |
| Children (0–17) | 64.3 (60.2–68.2) | 65.5 (61.5–69.3) | 49.5 (45.4–53.6) | 73.2 (69.4–76.6) |
| Adults (18–85) | 52.2 (49.6–54.8) | 56.8 (54.5–59.0) | 38.6 (36.2–41.1) | 64.0 (61.6–66.2) |
| **Age (years)** | **0.0000** ** | **0.0000** ** | **0.0000** ** | **0.0000** ** |
| 0–4 | 65.3 (54.4–74.7) | 56.3 (46.1–66.0) | 46.7 (36.0–57.8) | 77.2 (68.7–83.9) |
| 5–14 | 65.7 (60.7–70.3) | 67.4 (62.6–71.7) | 49.3 (44.3–54.3) | 73.6 (69.1–75.9) |
| 15–17 | 58.7 (50.6–66.4) | 65.7 (57.8–72.8) | 52.0 (44.1–59.8) | 69.0 (61.2–75.9) |
| 18–34 | 55.8 (50.6–60.9) | 60.4 (55.5–65.1) | 42.7 (37.8–47.8) | 67.4 (62.4–72.1) |
| 35–64 | 53.1 (49.7–56.4) | 57.3 (54.3–60.3) | 37.0 (34.0–40.1) | 64.2 (61.2–67.2) |
| 65 | 42.8 (37.1–48.7) | 48.3 (43.3–53.4) | 36.3 (31.7–41.2) | 56.8 (51.5–62.0) |
| **Race/Ethnicity** | **0.04** * | **0.0000** ** | **0.02** * | **0.0001** ** |
| White, non-Hispanic | 53.4 (50.4–56.4) | 56.2 (53.5–58.9) | 39.8 (36.9–42.7) | 63.7 (61.0–66.3) |
| Black, non-Hispanic | 59.8 (55.0–64.5) | 64.5 (60.1–68.8) | 45.6 (41.6–49.6) | 71.8 (67.4–75.9) |
| Other race, non-Hispanic | 57.0 (49.4–64.3) | 57.6 (50.2–64.6) | 38.3 (31.1–46.0) | 66.3 (58.6–73.3) |
| Puerto Rican | 59.9 (46.2–72.3) | 76.2 (64.1–85.1) | 54.1 (42.7–65.1) | 79.8 (68.1–87.9) |
| Mexican | 54.8 (48.6–60.8) | 59.3 (51.8–66.4) | 40.9 (34.4–47.6) | 67.0 (60.3–73.0) |
| Other, Hispanic | 65.5 (56.8–73.3) | 72.7 (64.6–79.5) | 49.4 (40.8–58.2) | 78.0 (69.8–84.5) |
| **Income Status** | 0.44 | 0.63 | 0.27 | 0.33 |
| Poor (<100% FPL) | 56.8 (52.2–61.2) | 61.0 (56.5–65.3) | 44.5 (40.1–49.0) | 68.8 (64.5–72.7) |
| Near Poor (100%–199% FPL) | 53.2 (48.4–58.0) | 58.1 (53.6–62.4) | 39.5 (35.2–44.0) | 64.4 (59.9–68.7) |
| Not Poor ( 200% FPL) | 56.8 (53.5–60.0) | 60.0 (57.1–62.8) | 41.3 (38.1–44.5) | 67.3 (64.4–70.1) |

Boldface indicates statistical significance (*ρ 0.05, **ρ 0.0001). The ρ–values were generated from chi-square tests of association of each measure of assessing asthma control across categories of each demographic variable (age, sex, race/ethnicity, and income status).

Abbreviations: AI = American Indian; AN=Alaska Native; FPL=Federal Poverty Level.

**Table 3.**

Prevalence Ratios for Asthma Control Assessments by Healthcare Provider among Persons with Current Asthma[a]

| | Assessing Asthma Control | | | |
|---|---|---|---|---|
| | Assessment of symptoms | Assessment of quick-relief medication use | Assessment of daily activities limitations | Assessment of any asthma control indicators |
| | Weighted PR (95% CI) | Weighted PR (95% CI) | Weighted PR (95% CI) | Weighted PR (95% CI) |
| **Sex** | | | | |
| Male | REF | REF | REF | REF |
| Female | 0.98 (0.91–1.07) | 1.01 (0.93–1.09) | 1.06 (0.94–1.18) | 0.98 (0.92–1.04) |
| **Age Group (years)** | | | | |
| Children (0–17) | **1.20 (1.10–1.30)** | **1.10 (1.02–1.19)** | **1.25 (1.11–1.41)** | **1.11 (1.04–1.19)** |
| Adults (18–85) | REF | REF | REF | REF |
| **Age (years)** | | | | |
| 0–4 | 1.15 (0.95–1.39) | 0.89 (0.73–1.10) | 1.05 (0.79–1.39) | 1.12 (0.98–1.28) |
| 5–14 | **1.17 (1.04–1.31)** | 1.10 (0.98–1.22) | 1.13 (0.95–1.33) | 1.07 (0.97–1.18) |
| 15–17 | 1.02 (0.86–1.21) | 1.03 (0.89–1.21) | 1.16 (0.94–1.43) | 0.98 (0.85–1.12) |
| 18–34 | REF | REF | REF | REF |
| 35–64 | 0.96 (0.85–1.08) | 0.97 (0.87–1.08) | 0.85 (0.74–0.99) | 0.95 (0.87–1.04) |
| 65 | **0.79 (0.67–0.94)** | 0.82 (0.71–0.95) | 0.84 (0.70–1.01) | **0.86 (0.76–0.98)** |
| **Race/Ethnicity** | | | | |
| White, non-Hispanic | REF | REF | REF | REF |
| Black, non-Hispanic | 1.10 (0.99–1.22) | **1.14 (1.05–1.24)** | **1.14 (1.00–1.29)** | **1.11 (1.03–1.20)** |
| Other race, non-Hispanic | 0.99 (0.85–1.17) | 0.99 (0.85–1.16) | 0.87 (0.69–1.09) | 1.01 (0.89–1.14) |
| Puerto Rican | 1.08 (0.85–1.38) | **1.34 (1.16–1.56)** | 1.24 (0.96–1.61) | **1.23 (1.08–1.40)** |
| Mexican | 0.99 (0.86–1.15) | 1.01 (0.87–1.18) | 0.99 (0.80–1.21) | 1.03 (0.91–1.16) |
| Other, Hispanic | 1.14 (0.98–1.33) | **1.25 (1.09–1.42)** | 1.20 (0.97–1.47) | **1.18 (1.05–1.32)** |
| **Income Status** | | | | |
| Poor (<100% FPL) | 0.95 (0.85–1.05) | 0.97 (0.88–1.06) | 1.00 (0.88–1.14) | 0.97 (0.90–1.05) |
| Near Poor (100%–199% FPL) | 0.91 (0.82–1.02) | 0.94 (0.85–1.03) | 0.91 (0.79–1.05) | 0.93 (0.85–1.01) |
| Not Poor ( 200% FPL) | REF | REF | REF | REF |

Boldface indicates statistical significance at α=0.05.

Abbreviations: 95% CI= 95% confidence interval; AI = American Indian; AN=Alaska Native; FPL=Federal Poverty Level; PR=prevalence ratio; REF=referent category.

[a]Multivariate modeling adjusts for sex, age, race/ethnicity, and income status.