

# Asthma Deaths at Home are Unchanged Despite Declining Mortality in Other Settings: US Death Certificate Data From 2000–2019

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## Background & Rationale

- Declining rates of asthma mortality in the United States (US) have been reported<sup>1</sup>
- Trends in asthma mortality by place of death (inpatient, outpatient, home), however, have not been evaluated, which could shed light on the issues related to access to healthcare and patient/caregiver symptom recognition
- This study aims to describe temporal trends in asthma deaths by place of death in the US and provides a contemporary snapshot of these trends across demographic factors using census data from the US Centers for Disease Control and Prevention (CDC)

## Methods

### Data Sources

- The **CDC WONDER database**<sup>2</sup> provides national mortality and population data produced by CDC's National Center for Health Statistics
  - Mortality data are collected by state registries and provided to the National Vital Statistics System
  - Data are based on death certificates for US residents, and each death certificate contains a single underlying cause of death and demographic data
  - The number of deaths and death rates can be obtained by place of residence, age, race, Hispanic ethnicity, sex, place of death, and cause of death (4-digit ICD-10 codes)
- The **US Census Bureau**<sup>3–8</sup> provides intercensal estimates of the US population by age, race, Hispanic ethnicity, and sex

### Analysis

- Deaths with asthma as the underlying cause of death and place of death were identified in the CDC WONDER database using the ICD-10 code J45 (including all subcodes) during 2000–2019
- Place of death categories included the following: **(1)** Decedent's Home; **(2)** Medical Facility – Dead on Arrival; **(3)** Medical Facility – ER or Other Outpatient; **(4)** Medical Facility – Inpatient; **(5)** Medical Facility – Other (includes Medical Facility - Status Unknown; Hospice Facility; and Nursing Home/Long-term Care); and **(6)** Other/Unknown
- Asthma mortality rates were calculated by applying the death counts to US Census Bureau mid-year population estimates for each year
- Distribution of place of death was described for asthma deaths by 2-year time periods across the study period. For asthma deaths occurring during 2018–2019, distribution of place of deaths was further described by age, sex, race, Hispanic ethnicity, and geographic/metropolitan regions

## Results

### Asthma Mortality Rates by Place of Death

- Overall, 67,695 deaths with asthma as the underlying cause were registered in the US over the 20-year period, and an overall 32% decline in asthma mortality was observed (1.43 to 0.98 per 100,000 from 2000 to 2019, respectively)
- While asthma mortality rates declined in all medical facilities, the mortality rate for asthma deaths occurring at home remained relatively stable (0.32 to 0.34 per 100,000 persons in 2000 to 2019, respectively) (**Figure 1**)

## Key Takeaways

- Despite an overall decline in asthma mortality in the US, the rate of asthma deaths occurring at home has remained stable**
- In the most recent data, more than one-third of asthma deaths in the US occurred at home and not in a medical facility, and the proportion varied by age, race, Hispanic ethnicity, and geographic/metropolitan region**
- These findings warrant further research regarding the reasons for asthma death by location, overall and by various sociodemographic factors**

Figure 1. Crude Asthma Mortality Rate per 100,000 Persons by Place of Death and Calendar Year (2000–2019)

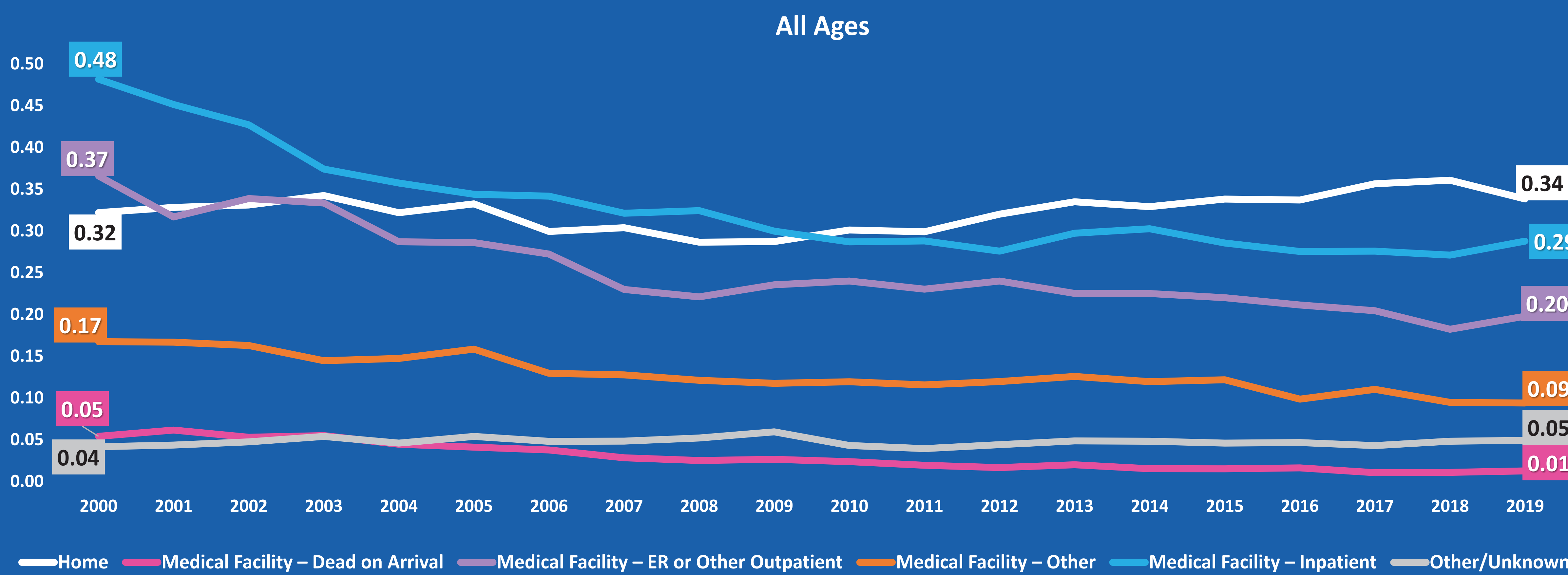
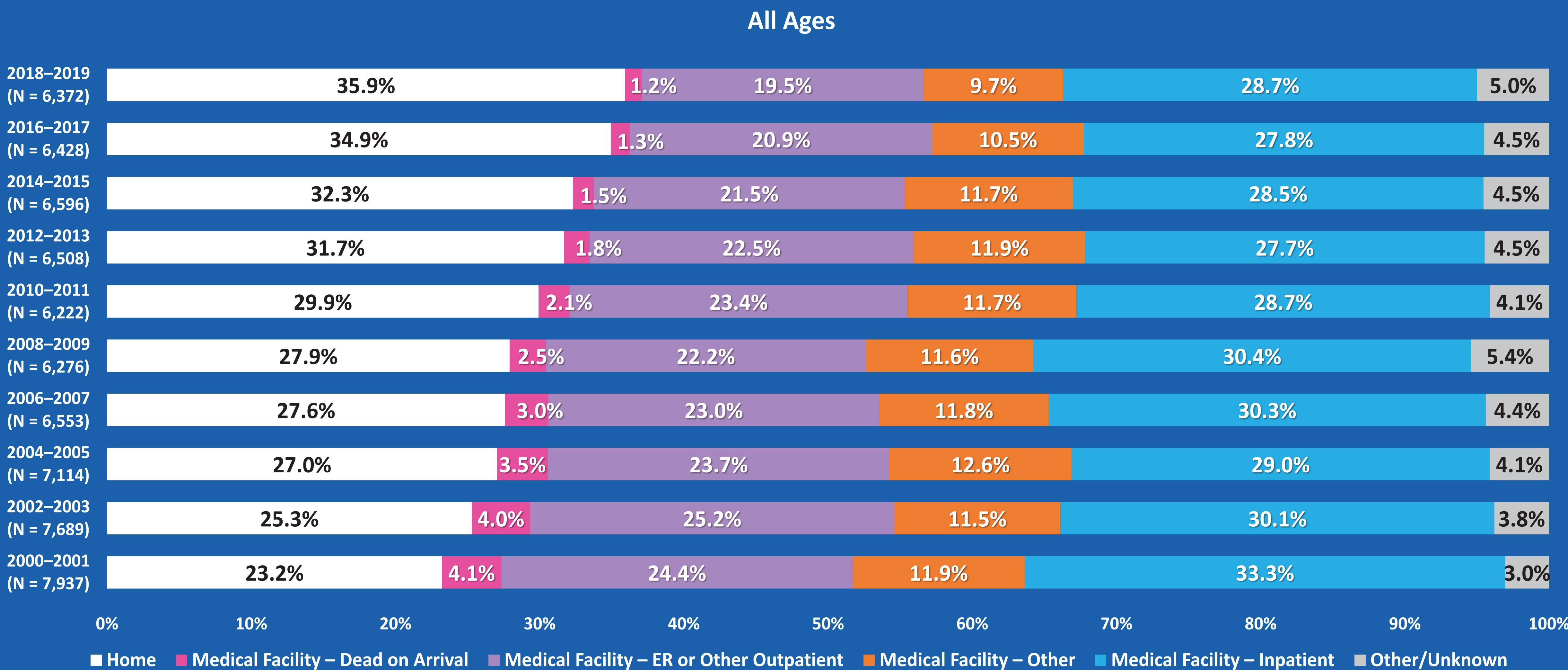


Figure 2. Distribution of Asthma Deaths by Place of Death per Calendar Period (2000–2019)

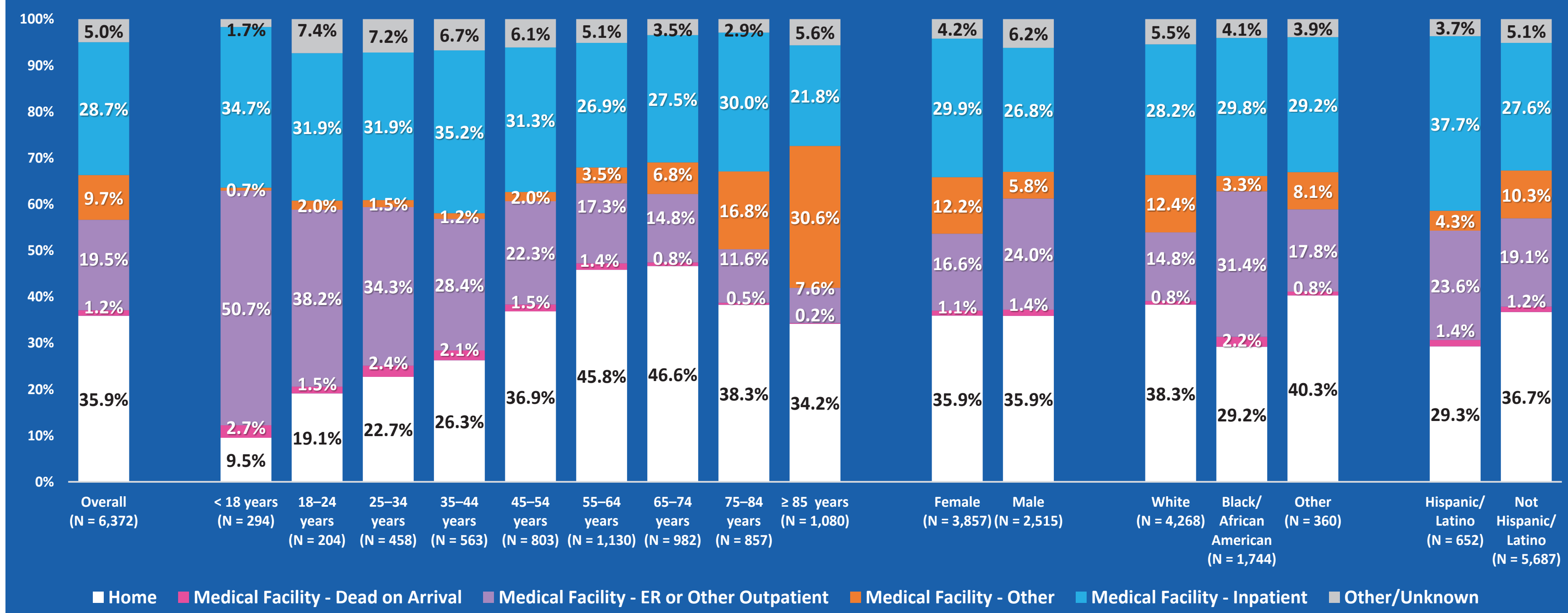


## Results (continued)

### Distribution of Place of Asthma Deaths

- As a proportion of all asthma deaths, deaths at home increased from 23.2% in 2000–2001 to 35.9% in 2018–2019, while the proportion of deaths occurring in medical facilities declined (**Figure 2**)
- Among the 6,372 asthma deaths occurring in the most recent 2-year period (2018–2019) (**Figure 3**):
  - By age:** Deaths at home were most common in persons aged ≥ 45 years, peaking in the groups aged 55–74; in persons aged < 35 years, asthma deaths in the ER/outpatient setting predominated, particularly in children (aged < 18 years)
  - By sex:** Females and males had the same proportion of deaths occurring at home (35.9%); in the ER/outpatient setting, fewer asthma deaths were reported in female than in male patients (16.6% vs 24.0%), while asthma deaths occurring in an “other” medical facility were more common among female vs male patients (12.2% vs 5.8%)
  - By race/ethnicity:** Asthma deaths at home were predominant among White patients (38.3%); in the ER/outpatient setting among Black/African American patients (31.4%); and in the inpatient setting among Hispanics/Latinos (37.7%)
  - By geographic regions** (data not shown): The proportion of deaths at home was lowest in the Northeast (Northeast, 31.2%; Midwest, 36.5%; South, 36.9%; West, 38.3%)

Figure 3. Distribution of Asthma Deaths by Place of Death (2018–2019)



## References

(1) Pennington et al. *Am J Respir Crit Care Med*. 2019. 159(12):1575-1577; (2) Centers for Disease Control and Prevention, National Center for Health Statistics. Underlying Cause of Death 1999-2020 on CDC WONDER Online Database, released in 2021. Data are from the Multiple Cause of Death Files, 1999-2020, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program; (3) Table 1. Intercensal Estimates of the Resident Population by Sex and Age for the United States: April 1, 2000 to July 1, 2010 (US-EST00INT-01); Source: U.S. Census Bureau, Population Division; Release Date: September 2011; (4) Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States: April 1, 2010 to July 1, 2019 (NC-EST2019-SYASEXN); Source: U.S. Census Bureau, Population Division; Release Date: June 2020 (5) U.S. Census Bureau, Population Division, 2020 Demographic Analysis (December 2020 release); (6) Table 2. Intercensal Estimates of the Resident Population by Sex, Race, and Hispanic Origin for the United States: April 1, 2000 to July 1, 2010 (US-EST00INT-02); Source: U.S. Census Bureau, Population Division; Release Date: September 2011; (7) Annual Estimates of the Resident Population by Sex, Age, Race, and Hispanic Origin for the United States: April 1, 2010 to July 1, 2019 (NC-EST2019-ASR6H); Source: U.S. Census Bureau, Population Division; Release Date: June 2020; (8) U.S. Census Bureau, 2010 Census Public Law Redistricting Data File (P.L. 94-171) Summary File; 2020 Census Public Law Redistricting Data File (P.L. 94-171) Summary File.

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KK and AWL are employees and shareholders of Amgen Inc. CSA is an employee and shareholder of AstraZeneca. JO is a consultant for Amgen Inc. and Aqueview Therapeutics; a DSMB member and consultant for AstraZeneca, GSK, Regeneron, and Sanofi; and the Executive Editor for *Annals of Allergy, Asthma & Immunology*.

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