Socioeconomic disparities in asthma prevalence are well established in the US. Evidence suggests environmental factors may play a role, but no studies have examined the role of class-based residential segregation. We investigated whether class-based residential segregation attenuated the association between individual-level income and asthma prevalence among 164,145 non-Hispanic (NH) white, 19,493 NH black, and 14,599 Hispanic participants of the 2009 Behavioral Risk Factor Surveillance System aged 18 years and older. Current asthma was based on self-report. Class-based segregation was measured at the metropolitan level using the poverty isolation index, a measure of the extent to which individuals with incomes below the poverty threshold are spatially isolated from non-poor individuals. Each metropolitan area was given an index score ranging from near 0 to 1, with lower scores indicating less segregation. Among blacks, odds of asthma was 0.84 times lower per quartile higher income (95% CI 0.77 to 0.91) after adjusting for age and gender. However, this association varied by level of segregation (p for interaction = 0.07). Income was more weakly associated with odds of current asthma at low segregation (10th percentile; OR 0.90, 95% CI 0.78 to 1.03) vs high segregation (90th percentile; OR 0.74, 95% CI 0.66 to 0.82). For whites, income was also inversely associated with odds of current asthma, but adjustment for segregation did not attenuate this relationship. Neither income nor segregation was associated with current asthma among Hispanics. These findings suggest that among blacks, class-based segregation may help explain individual-level income disparities in asthma prevalence.