We appreciate the observations made by Drs. Vlahov and Galea in their invited commentary (1) on our paper (2). Given that the World Trade Center (WTC) disaster was an unprecedented event, this was not a traditional epidemiologic study but rather a community health investigation designed to respond to the public’s concerns, as well as the first step in examining the potential health effects on local residents. Many constraints made this study difficult to design, including a lack of baseline prevalence and exposure data and unknown mobility patterns. As we explain below, most of the problems discussed by Vlahov and Galea were considered in our article and addressed to the extent possible.

Selection bias is one of their main concerns. Since a significant number of residents moved out of the affected area after September 11, the actual response rate might have been higher than estimated. In addition, the response rates were similar in the affected and control areas, and the demographic distribution of the participants was similar to that of the underlying population. To estimate selection bias, we targeted a subset of buildings in the affected and control areas for increased recruitment efforts and achieved higher response rates in both areas. The risk estimates from the targeted buildings, in which the samples are assumed to be more representative, were not only consistent with but also higher than those in the nontargeted buildings.

Another potential problem is information bias. We reported that “we emphasized the importance of participation for people with and without breathing problems” (2) and that we used “general terms such as ‘breathing or lung problems’ rather than specific terms like ‘asthma’ ” (2, p. 505). We also stated that “we asked symptom questions not only qualitatively but also quantitatively, by including questions on specific time frames, severity, and frequency, which are less prone to recall bias” (2, p. 505). In addition, the symptom questions that we chose for the questionnaire have been validated in many epidemiologic studies. To reduce reporting bias, we asked participants about prescription medications and listed the names of the medications. We also used more objective measures by asking participants about new diagnoses by a physician, unplanned medical visits, and hospitalizations (including the dates and reasons for hospitalization). We checked the differences between the two areas for WTC-unrelated variables (e.g., physical disabilities) and excluded participants who responded affirmatively to every question. To estimate reporting bias, we compared the proportions of unplanned medical visits among participants with specific respiratory symptoms and found them be similar in the affected and control areas for most symptoms. Finally, as we described in another article (3), screening spirometry was conducted in some participants to validate self-reported symptoms. Although there were no significant differences between the affected-area residents and the control-area residents (screening spirometry might not be sensitive for this exposure), the results of a pilot methacholine challenge test showed a higher proportion of positive findings in the participants with persistent new-onset symptoms than in asymptomatic participants.

We are conducting additional studies to address some of these concerns. A follow-up study will use nitric oxide in exhaled breath (eNO) as an objective measure of airway inflammation. Self-reported symptoms will be correlated with eNO measurements and validated. Another study will estimate changes in hospitalizations (an objective indicator of outcome) for respiratory and cardiovascular diseases before and after September 11, 2001, and compare the rates in both areas. The WTC Health Registry, which has recruited a larger cohort, also plans to follow this population.

The ambient air monitoring site located at the WTC was destroyed in the collapse, so ambient pollution levels immediately after September 11 were not available for exposure assessment. For this reason, we did not attribute our findings...
to a specific exposure, nor do we know the effect of non-residential exposure or psychological stress. Although we agree with Vlahov and Galea that bias cannot be ruled out, we undertook a number of strategies to minimize its impact. Consequently, we believe that our results are valid and consistent with the findings of other studies.

ACKNOWLEDGMENTS

Conflict of interest: none declared.

REFERENCES