Birth Outcomes Soon After 9/11

The article in this issue by Maslow et al. is a substantial addition to literature concerning stress and adverse birth outcomes.[1] It is also a welcome addition to literature on the September 11, 2001 (9/11) World Trade Center (WTC) disaster exposures and perinatal health in New York City. Among its advantages is a large sample size that included women with high WTC-related environmental exposures, defined by proximity at the site and by a biologically appropriate window of exposure. The study observed that posttraumatic stress disorder (PTSD) and direct environmental exposure at the site each were associated with both low birth weight (LBW) and preterm birth (PTB) but not small-for-gestational-age infants among births within two years after 9/11. The authors show additional findings for an index of exposure combining any of the four stress–exposure metrics. However, the effects of two or more combined exposures were identical to those of single estimates for either PTSD or having done rescue and recovery work at the site; each showed about a twofold risk of LBW or PTB.

The Maslow et al. report appears to be the first observation of adverse birth outcomes directly related to particulate matter (PM) exposure in the WTC disaster. The study relied on rescue/recovery as a surrogate for the intense air pollution including PM around the WTC site after 9/11. Other studies have used varying exposure metrics but not PM in WTC perinatal research.[2,3] Findings of LBW and PTB associated with rescue and recovery are consistent with a large body of research devoted to air pollution, including particulate matter, and birth outcomes. Raised risk has been most convincing where exposures exceed 40 to 50 micrograms per cubic meter of PM.[4] Nine blocks northeast of the WTC site, PM of 10 micrometers or less was often greater than 100 micrograms per cubic meter and PM of 2.5 micrometers or less was greater than 40 micrograms per cubic meter through October 2001, and WTC particulate matter undoubtedly had adventitious contamination with many other toxic chemicals.[5]

PTSD in this and other disasters has been linked with adverse birth outcomes.[2] A unique opportunity exists in disaster studies like this one to understand how stress and environmental exposures may act together versus independently. Although their results indicate that PTSD did not mediate relationships between exposure and birth outcomes, Maslow et al. did not describe interactions between environmental factors and maternal stress. There is always concern that study of interactions may be limited by sample size, but this study included more than 3000 births during the early phase of interest. The primary exposures may have been considered small to allow meaningful study of interactions (e.g., 449 with PTSD and 494 women with rescue and recovery exposure) and even smaller numbers among those with adverse birth outcomes (LBW, n = 178; PTB, n = 219). And, although risk estimates were adjusted for confounders, most of the adverse outcomes occurred among women of Black race, low socioeconomic status, and low pregnancy weight gain. Still, an exploratory analysis would be desirable to address this idea. In addition, both prenatal stress and environmental exposures often exhibit sex-specific associations with infant health. This article considered infant sex as a covariate but did not report sex-specific associations or interactions. Previous studies of WTC-related birth outcomes were smaller (except one) and had little power to study interactions.

Thus, questions remain. Previous research, including a number of disaster studies, made clear connections between PTSD or stress and reduced fetal growth. Experimental studies strongly support such findings. Environmental factors are also established, and the importance of examining exposures and stress in context is becoming more recognized.[6] Disasters cannot be designed for epidemiology, but Maslow et al. and others[7] note the need for preparedness to guide future medical management and research in the aftermath of disasters. It has been said that training for preparedness after 9/11 is what enabled the rescue of a US Airways flight on the Hudson River in 2009,[8] and this new scientific contribution should lead to better response to future disasters. AJPH

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