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Toxics Epidemiology Program
CYRUS RANGAN, M.D., F.A.A.P., A.C.M.T., Director
695 South Vermont Avenue, 14th Floor-South Tower
Los Angeles, California 90005
TEL (213) 738-3220 • FAX (213) 252-4503

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Health Assessment for the Communities Closest to the Santa Monica Municipal Airport

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Report Prepared by: Cyrus Rangan, MD, FAAP, ACMT
Director, Toxics Epidemiology Program

The Toxics Epidemiology Program (TEP) worked with the Los Angeles County Department of Health Services, Data Collection and Analysis Unit and the California Birth Defects Monitoring Program (CBDMP) to obtain data on causes and rates of mortality for heart disease and respiratory related deaths, rates of low birth weight births, and rates of reported birth defects.

The data for the assessment of mortality rates were obtained from information on registered death certificates in Los Angeles County, which is maintained in the Automated Vital Statistics System (AVSS) by the Los Angeles County Department of Health Services, Data Collection and Analysis Unit. State law requires that death certificates be filed on all deaths and included information on age at death and causes of death. Since registration of death certificates is required by law, the reporting of deaths to AVSS is nearly 100 percent complete.

The data for the rates of low-birth-weight births were obtained from registered birth certificates entered into the Automated Vital Statistics System (AVSS) at the birth hospital or the office of the local registrar. Since registration of birth certificates is required by law, the data in the AVSS is nearly 100 percent complete.

The California Birth Defects Monitoring Program (CBDMP) collects data on all infants born with selected birth defects in the state. CBDMP is recognized internationally for the quality of its birth defects surveillance and research. In order to collect data on birth defects, CBDMP uses the “gold standard” for data collection; that is, CBDMP staff visits 250 hospitals and genetic centers in California to identify children with structural congenital anomalies diagnosed during the first year of life.

Methods

Death rates and causes of death (mortality):

The mortality analysis was performed with 2000-2002 death certificate data from each of three areas: the census tracts that contain and are closest to the Santa Monica Municipal Airport (2000 census tracts 2713.00, 2714.00, 2715.00, and 7023.00); the West Service Planning Area (SPA #5, which includes Bel Air, Beverly Hills, Brentwood, Culver City, Ladera Heights, Malibu, Mar Vista, Marina del Rey, Pacific Palisades, Playa del Rey, Santa Monica, Venice, West Los Angeles, and Westchester); and Los Angeles County as a whole. Jet fuel emissions contain compounds that are precursors of ground-level ozone (volatile organic compounds and nitrogen oxides), which can impede lung function.¹ Therefore, the causes of death analyzed for this report were those related to impaired lung function, specifically asthma and other chronic lower respiratory system diseases such as chronic bronchitis and emphysema; and cancers of the lung, bronchus and trachea. Heart disease was also analyzed because it has been associated with air pollution containing small particulate matter (PM_{2.5}), which may be present in jet fuel emissions.² Cause of death was determined by analyzing data on the listed underlying cause in the medical portion of each death certificate. “Underlying cause of death” is defined as the disease or injury initiating the sequence of events leading directly to death. Cumulative age-adjusted mortality rates were standardized to the population age distribution of the 2000 U.S. Census.

Low-birth-weight births:

The low-birth-weight analysis was performed with data on live births during the period 2000-2002. The analysis included births among women living in the area closest to Santa Monica Municipal Airport (2000 census tracts 2713.00, 2714.00, 2715.00, and 7023.00); the West Service Planning Area (SPA #5, which includes Bel Air, Beverly Hills, Brentwood, Culver City, Ladera Heights, Malibu, Mar Vista, Marina del Rey, Pacific Palisades, Playa del Rey, Santa Monica, Venice, West Los Angeles, and Westchester); and Los Angeles County as a whole. Low birth weight was defined as a birth weight less than 2500 grams (5.5 pounds).

¹ Holzman, David *Plane Pollution* Environmental Health Perspectives 105(12), December 1997

² U.S. Environmental Protection Agency *Air quality criteria for particulate matter EPA/600/P-95/001*cf. Research Triangle Park, NC: National Center for Environmental Assessment, Office of Research and Development, 1996.

Birth defects:

The analysis was performed on all recent available data on birth defects collected from 1990-2002 for the zip codes that contain the Santa Monica Municipal Airport (90064 and 90405) and the zip codes immediately adjacent to the airport (90025, 90066, 90291, and 90404). Even so, the rate estimates for the zip codes that contain and surround the Santa Monica Municipal Airport still had wide confidence intervals. These confidence intervals indicate that there is a 95% probability that the actual rate falls somewhere between the lower and the upper limit. In calculating rates for the zip codes that contain and surround Santa Monica Municipal Airport, wide confidence intervals mean that the estimates of the rates are very imprecise due to the small numbers of children born with birth defects. We judge two rates to be similar if the rate from the larger population, in this case Los Angeles County, falls within the confidence interval of the smaller population, in this case the neighborhoods surrounding the Santa Monica Municipal Airport. If the rate of Los Angeles County fell outside the confidence interval for the zip codes that contain and surround the Santa Monica Municipal Airport, a test of this difference was done to determine if it was statistically significant.

Results**Death rates and causes of death (mortality):**

Table 1 shows that the age-adjusted mortality rates were lower for the census tracts that contain and are closest to the Santa Monica Municipal Airport than for either the West SPA area or Los Angeles County as a whole. For asthma deaths, small numbers in the census tracts that contain and are closest to the Santa Monica Municipal Airport produced statistically unstable rates and, therefore, did not allow for comparison with the rates from the West SPA area and Los Angeles County.

Low-birth-weight births:

Table 2 shows that the observed percentage of low-birth-weight births among live births during the period 2000-2002 was lower for the area closest to the Santa Monica Municipal Airport than for the West SPA area and Los Angeles County overall.

Birth defects:

Table 3 shows the rates of reported birth defects with corresponding 95% confidence intervals for the zip codes that contain and surround the Santa Monica Municipal Airport and for all of Los Angeles County. The rates of reported birth defects for the zip codes that contain and surround the Santa Monica Municipal Airport were significantly lower than Los Angeles County for anencephaly, spina bifida, and other nervous system anomalies.

³ Holzman, David *Plane Pollution* Environmental Health Perspectives 105(12), December 1997

Conclusion

Death rates and causes of death (mortality):

The results do not provide evidence of elevated rates of mortality related to impaired lung function or heart disease during the period 2000-2002 among persons who had lived in close proximity to the Santa Monica Municipal Airport.

Low-birth-weight births:

The results do not provide evidence of an elevated rate of low-birth-weight births among women who lived in close proximity to the Santa Monica Municipal Airport and who gave birth in the years 2000-2002.

Birth defects:

There were no statistically elevated rates for any type of reported birth defect among residents living closest to the Santa Monica Municipal Airport compared to Los Angeles County as a whole.

This investigation cannot confirm whether exposure to chemicals from the Santa Monica Municipal Airport may be associated with a small increase in the risk of mortality, low-birth-weight births, or birth defects among specific individuals living nearby, because the scope of these analyses do not allow for scientific detection of such small increases in risk. Epidemiological investigations can be relatively conclusive when large, population-based samples are involved. Conversely, analyses of data from local areas, such as the communities surrounding the Santa Monica Municipal Airport, are limited by small sample sizes.

It is important to note that these types of analyses have a very limited ability to detect potential causal relationships between jet fuel emissions and adverse health effects because of the lack of information on the level of exposure to these emissions and the multitude of other factors that could influence mortality, low-birth-weight births, and birth defects, including similar emissions from local traffic. Thus, these results should be interpreted with caution.

Table 1: Number of deaths from specific causes, rates of mortality and 95% confidence intervals for the census tracts containing and surrounding the Santa Monica Municipal Airport (2713.00, 2714.00, 2715.00, and 7023.00), the West SPA, and Los Angeles County from 2000-2002.

| Cause of Death | Santa Monica Municipal Airport Census Tracts | | West SPA | | Los Angeles County | |
|---|--|------------------------|----------|------------------------|--------------------|------------------------|
| | Number | Rate* and 95%CI** | Number | Rate* and 95%CI** | Number | Rate* and 95%CI** |
| All Causes | 369 | 529.3 (474.1-584.5) | 12,860 | 570.0 (560.0-580.0) | 178,339 | 599.2 (696.0-702.5) |
| Cancers of the Lung, Bronchus and Trachea | 19 | 27.9 (15.2-40.47) | 721 | 34.8 (32.2-37.3) | 9,463 | 38.8 (38.0-39.6) |
| Ischemic Heart Disease | 108 | 148.1 (119.6-176.6) | 3,352 | 142.6 (137.7-147.5) | 47,868 | 189.5 (187.8-191.2) |
| Respiratory System Diseases | 37 | 51.4 (34.6-68.2) | 1,370 | 58.0 (54.9-61.1) | 17,179 | 68.1 (67.1-69.1) |
| Asthma | 0 | NR | 31 | 1.4 (0.9-1.9) | 426 | 1.6 (1.5-1.8) |
| Other Chronic Lower Respiratory Diseases† | 16 | 21.7 (11.0-32.5) | 571 | 24.9 (22.8-27.0) | 8,136 | 32.8 (32.1-33.5) |

* Per 100,000 persons, age-adjusted and cumulative over the years 2000-2002.

** 95% confidence interval

† Other chronic lower respiratory diseases include chronic bronchitis, emphysema, bronchiectasis, and other chronic obstructive pulmonary diseases.

NR: The number of observed deaths is too small (less than 10) to produce a reliable rate.

Source: Linked Death Files 1999-2003, Los Angeles County Department of Health Services, Data Collection and Analysis Unit

Population: Summary File 1, Census 2000, U.S. Census Bureau

Table 2: Number of live births, low-birth-weight births, and the rates of low-birth-weight births for the census tracts containing and surrounding the Santa Monica Municipal Airport (2713.00, 2714.00, 2715.00, and 7023.00), the West SPA, and Los Angeles County from 2000-2002.

| | Santa Monica Municipal Airport Census Tracts | West SPA | Los Angeles County |
|---|--|--------------|-----------------------|
| Total Number of Live Births | 471 | 19,788 | 462,081 |
| Number and Percent of Low-Birth-Weight Births | 23 (4.9%) | 1,299 (6.6%) | 30,515 (6.6%) |

Source: 2000-2002 Linked Birth Files, Los Angeles County Department of Health Services, Data Collection and Analysis Unit

Table 3: Birth defect rates with 95% confidence intervals for the zip codes containing and surrounding the Santa Monica Municipal Airport (90025, 90064, 90068, 90291, 90404, and 90405) and Los Angeles County from 1990-2002. (Rates per 10,000 live and still births.)

| Type of Birth Defect | Santa Monica Municipal Airport Zip Codes | Los Angeles County |
|-------------------------------------|--|-------------------------|
| Anencephaly | 0.67 (0.08-1.87%) | 2.04 (1.84-2.24%) |
| Spina Bifida | 1.68 (0.54-3.43%) | 3.51 (3.25-3.77%) |
| Encephalocele† | 1.19 (0.24-2.86%) | 0.84 (0.71-0.98%) |
| Microcephalus† | 7.91 (4.83-11.73%) | 8.72 (8.28-9.17%) |
| Hydrocephalus† | 2.77 (1.11-5.16%) | 4.63 (4.31-4.96%) |
| Other Nervous System Anomalies† | 8.30 (5.14-12.21%) | 14.32 (13.76-14.89%) |
| Eye Anomalies§ | 23.63 (17.49-30.68%) | 30.10 (29.19-31.01%) |
| Ear Anomalies§ | 44.37 (35.78-53.85%) | 47.83 (46.69-48.98%) |
| Cardiac Septal Closure Anomalies† | 27.28 (21.24-34.08%) | 33.65 (32.79-34.53%) |
| Transposition of Great Vessels | 5.36 (3.07-8.29%) | 4.46 (4.17-4.75%) |
| Tetralogy of Fallot | 2.68 (1.16-4.83%) | 3.44 (3.19-3.70%) |
| Other Heart Anomalies† | 22.14 (16.73-28.30%) | 23.97 (23.24-24.71%) |
| Other Circulatory System Anomalies† | 22.93 (17.42-29.19%) | 21.66 (20.97-22.36%) |
| Respiratory System Anomalies§ | 26.04 (19.57-33.42%) | 31.99 (31.06-32.93%) |
| Cleft palate and/or cleft lip | 12.06 (8.45-16.31%) | 14.53 (14.01-15.06%) |
| TE/Fistula§ | 1.93 (0.53-4.23%) | 2.42 (2.16-2.68%) |
| Pyloric Stenosis§ | 12.06 (7.80-17.22%) | 15.11 (14.47-15.76%) |

Table 3 (Continued):

| Type of Birth Defect | Santa Monica Municipal Airport Zip Codes* | Los Angeles County |
|----------------------------------|--|-------------------------|
| Small Intestinal Atresia§ | 3.86 (1.67-6.95%) | 4.05 (3.72-4.39%) |
| Large Intestinal Atresia§ | 3.38 (1.36-6.30%) | 2.44 (2.18-2.70%) |
| Hirschsprung | 1.19 (0.24-2.86%) | 1.24 (1.08-1.41%) |
| Genital Anomalies§ | 31.34 (24.20-39.40%) | 27.89 (27.02-28.77%) |
| Urinary System Anomalies§ | 14.95 (10.16-20.65%) | 21.30 (20.54-22.07%) |
| Musculo-skeletal§ | 27.49 (20.82-35.06%) | 30.54 (29.63-31.47%) |
| Limbs§ | 34.72 (27.18-43.17%) | 45.13 (44.02-46.25%) |
| Other Musculoskeletal Anomalies§ | 36.17 (28.46-44.78%) | 38.58 (37.56-39.62%) |
| Anomalies of the Integument§ | 33.76 (26.32-42.09%) | 40.85 (39.80-41.92%) |
| Down Syndrome† | 7.91 (4.83-11.73%) | 13.22 (12.68-13.77%) |
| Other Chromosomal Anomalies§ | 5.30 (2.65-8.87%) | 8.49 (8.01-8.98%) |
| Other Congenital Disorders§ | 9.16 (5.52-13.72%) | 10.71 (10.17-11.26%) |

† California Birth Defect Monitoring Program reported data from the years 1990-2000, excluding 1998.

§ California Birth Defect Monitoring Program reported data from the years 1990-1997.