

Health Risks and Perceptions of Air Quality: The West Long Beach Health Survey.¹

1. Executive Summary.

This report summarizes the findings from the “West Long Beach Health Survey” (WLBHS), a household survey conducted during summer and fall 2009. The WLHS was a collaborative community-based research project undertaken by the Greater Long Beach Interfaith Community Organization (ICO), St. Lucy’s Catholic Church, and California State University, Long Beach (CSULB) to learn more about the health issues and concerns of the residents who live in West Long Beach. Approximately 29,000 residents and over 9,000 students live or attend school in the West Long Beach target area, demarcated by the 710 freeway, the Long Beach/Los Angeles port complex, the 405 freeway to the north, and a major industrial sector.

The study was based on an initial sample of 608 randomly selected addresses from a sampling frame of 6101. Roughly 20% of these were removed because they were businesses, apartment complexes and other households without access, or non-functioning addresses. Using an in-person interview strategy, a research team canvassed the remaining 487 addresses (houses and apartments) obtaining 205 completed consented interviews for a usable-data response rate of 42%. The sample reflected the general characteristics of the neighborhood and thus allows a high degree of generalizability to the West Long Beach neighborhood.

A 14 question survey instrument was developed by the collaborative team to explore residents’ understandings of air quality and associated health impacts, as well as their perceptions about the origins of air pollutants and their source of information about health and other community issues. All interviews were conducted in the respondents’ primary language. Trained interviewers were instructed to introduce the study as a health survey and began by asking participants about length of time in the neighborhood and housing status. Next, subjects were asked to identify the two most important health problems facing the residents of West Long Beach. Among the responses, 38.4% cited air quality (e.g., air pollution, smell, smog, asthma, respiratory) as the most pressing health issue and 24% indicated general health concerns (e.g., obesity, cancer). All other issues combined (e.g., garbage in the streets, noise, violence, dust, among others) totaled 36% of the responses. Participants then responded to a series of questions, including health problems in the household, the importance of common drivers of air pollution to air quality, how concerned they were about air pollution, and their principal sources of information about local issues.

¹ This report was prepared for the Greater Long Beach Interfaith Community Organization by Gary Hytrek, PhD, California State University. Department of Sociology, 1250 Bellflower Blvd, Long Beach CA 90840

Findings:

Demographics:

- **Race and Ethnicity:** The sample of study participants reflected the general racial and ethnic characteristics of the larger target area, as indicated in census data (majority Latino and Asian/Asian-American).
- **Homeownership:** Over 50% owned their homes and 77% had lived in the neighborhood more than 6 years. These numbers were skewed by a lack of access to several apartment complexes, however.
- **Household size:** The average household for our study participants had 4.4 members (3.1 adults; 1.3 children).
- **Income:** 39% had an estimated annual income of less than \$39,000 and 29% more than \$50,000.
- **Education:** 89% had at least a high school degree and 62% had at least some college.

Health:

The core of the study focused on family health issues. Most noteworthy and troublesome is the number of households with asthma—especially childhood asthma—and heart related problems.

- **Asthma: one-third (29%)** of households indicated at least one case of adult asthma in the household and **18.9%** indicated at least one case of child asthma in the household. If we include chronic bronchitis (chronic bronchitis is an adult disease) the percentage for children increases to **19.4%**.
- **Heart Problems:** 17.4% of the households indicated at least one case of heart related problems.
- **Cancer:** 12.4% of the surveyed households had at least one case of cancer.
- **Allergies:** The other notable health problem was allergies, 42.3% of the households had an adult case and 16.4% had a child case of allergies.

Effects of time in the Neighborhood:

The data showed that asthma was more acute for those living the longest in the neighborhood. Concern with air quality also increased with time in the neighborhood. One particularly alarming finding is that *all* multiple cases of asthma—with the exception of one case—were in households that had been in the area 6 years or longer. These data are a cause for concern given that studies show these children will most likely have reduced lung capacity, prematurely aged lungs, and an increased risk of bronchitis.

- **Asthma:** Over 81% of all childhood asthma cases were in households that had been in the area more than 6 years, compared to less than 9% of cases for households that had been in the area one year or less.
- **Level of Concern and Air Quality:** Data also showed that only 4% of those living in the area less than 5 years felt that air quality was a “significant concern,” compared to 33.2% among those who had lived there longer than 11 years. Overall, 54% of the survey participants indicated air quality as a significant concern for them, while 15.7% indicated no concern. For those in which air quality is a significant concern, 66.7% cited health as the major reason, followed by unpleasant odors (45.6%). Among those citing air quality as a significant concern, 17% reported altering their outdoor activities because of the air quality. This number increases to 51% when combining those for which air quality was a significant or moderate concern.

- **Sources of Air Pollution:** In general, the most visible sources were most often cited as significant sources of air pollution: 60% of survey respondents identified trucks and oil refineries as the major sources of poor air quality, followed by local freeways. While refineries account for only about 0.2% of NO_xs, they are a major source of bad smells in West Long Beach. Although less visible, ships were ranked the lowest by respondents, yet are a significant source of NO_xs.

Neighborhood Concern:

Interviewers reported a general concern among respondents regarding health and air quality issues. All subjects were given the opportunity to provide contact information if they wished to receive a copy of the final report and/or to receive updates on local air quality issues. Slightly more than 30% of participants expressed interest in further involvement with air quality issues and provided contact information.

2. Introduction.

Of all air pollutants, diesel exhaust is responsible for 70% of the cancer risks from air pollution in the state of California.¹ The particulates that make up 94% of diesel emissions are capable of penetrating deep into lung tissue and causing genetic and cellular damage.² Not surprisingly, diesel exhaust is associated with a long list of health problems. These include early death (from effects on the cardiopulmonary system, lung cancer, and infant mortality), respiratory problems (including asthma and bronchitis), irritation of the nose, sinuses, throat, and eyes; and heart attacks.³ Diesel pollution has also been implicated in adverse pregnancy outcomes such as reduced birth weight and premature delivery.⁴ Because their lungs are still developing and their airways are narrower than those of adults, children are at particular risk from air pollution. Studies show that children raised in heavily polluted areas have slower lung function growth, reduced lung capacity, prematurely aged lungs, and an increased risk of bronchitis and asthma compared to children living in less polluted areas.⁵ As adults, these children will experience more rapid deterioration of lung functions and be more susceptible to respiratory ailments. Each year in California, freight transport causes 2,400 people to die prematurely; 2,830 people to be admitted to the hospital; 360,000 missed workdays; and 1,100,000 missed days of school.⁶

3. West Long Beach Research Site.

Nowhere are these issues more problematic than in West Long Beach, home to the major drivers of air pollution in southern California. Approximately 29,000 residents and 8 public schools serving over 9,000 students are squeezed in between the 710 freeway to the east; the Long Beach/Los Angeles port complex, the 103 freeway and major oil refineries to the west; the 405 freeway to the north; the port and a major industrial section to the south. A principal generator of air pollution is the Port Complex, which includes ships, trains, and trucks. As the source for more than 40% of the nation's imports, over forty thousand truck trips a day are needed to move the goods from the docks and terminals.⁸ Some trucks head for the massive truck-to-train "intermodal" facility adjacent to Westside area schools, where the containers are transferred to trains running north to the rail yards east of Los Angeles. Other trucks make their way to the I-710 and rail corridor, what residents call "cancer alley," before hooking into the region's vast transportation matrix. The research site is highlighted in the map to the right (outlined in bold)

West Long Beach Research Site.⁷



The following pictures provide a visual reference for West Long Beach.

View of Port Complex.⁹



View of the Port from Adjacent Neighborhood.¹⁰



Truck Traffic through Adjacent Neighborhoods.¹¹



View of an “intermodal” Facility and Athletic Fields.¹²



4. West Long Beach Health Survey (WLBHS).

The WLBHS was developed to learn more about the health issues and concerns of the residents who live in West Long Beach. The study is a collaborative community-based research project undertaken by the Greater Long Beach Interfaith Community Organization (ICO), St. Lucy’s Catholic Church, and California State University, Long Beach (CSULB). The research was jointly carried out by Dr. Gary Hytrek at CSULB, Pat Kennedy at ICO, with the support of Father Michael Roebert at St. Lucy’s Church and community residents.

Air quality and health issues in West Long Beach has been an ongoing focus for ICO, and this ICO initiated project centers on two core ICO concerns: 1) Residents often fail to link their personal health issues with broader development and industrial causes; 2) Residents often feel that

questions of health and public policy are the purview of clinicians and public officials/experts, thereby reducing their input regarding neighborhood health concerns. The project was designed to serve as a data collection and educational vehicle for ICO to address these two substantive issues. The focus on how residents in West Long Beach perceive air quality and health issues emerged out of a series of discussions between Mr. Kennedy and Dr. Hytrek. From these discussions, a brief 14 question survey was generated. The study explores residents' understandings of air quality and associated health risks, as well as their perceptions about the origins of air pollution, and their source of information about health and other community issues.

5. Research Site and Survey Participants.

The project's focus was West Long Beach demarcated by the above parameters. Within these boundaries we identified 6101 total addresses. From this list, we drew a simple random sample of 608 addresses (10%). To preserve participant confidentiality, no addresses or subject identifying information was listed on the surveys. Each survey was given a code number which corresponded to an address kept on a master list in a locked cabinet in Dr. Hytrek's office.

Using an in-person interview strategy, researchers went door-to-door of each selected home filling out the questionnaire. Researchers/canvassers were provided with a training/orientation session prior to going into the field that covered effective interviewing techniques, ethical issues, and instructed to interview the "head-of-household" or an adult who could "speak" for the household. Additionally, the researchers/canvassers conducted the interviews in the language primarily spoken by the interviewee to ensure quality of data.

Through our canvassing we discovered that approximately 20% of the addresses were businesses, apartment complexes and other households without access, or non-functioning addresses and were eliminated from our list. Over the course of the summer and part of fall 2009, the research team canvassed the remaining 487 addresses. Follow up visits were conducted at those addresses missed in the first canvass. If the research team was unable to contact residents after two visits, a questionnaire was mailed. Approximately 20 additional surveys were obtained from the mail strategy. From these efforts, we were able to obtain 205 completed consented household interviews for a usable-data response rate of 42%.

Ethnicity/race:

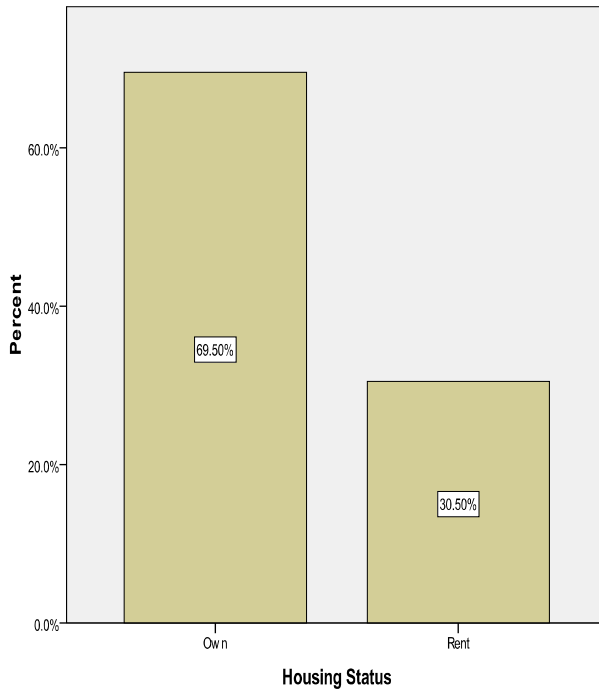
Self-reporting ethnicity/race of survey participants revealed the following characteristics: Latino 47%, Asian 28% (we included Pacific Islanders and Filipinos in this category), African-American 14%, White/Caucasian 8%, and Native American 0.5%. An additional 2.0% declined to answer this question. The ethnicity/racial profile is roughly consistent with the general demographics of West Long Beach: Latino 46%, Asian 24%, African-American 17%, White 6.6%. Corresponding numbers for the city of Long Beach are: Latino 35%, Asian 12%, African American 14% and White 33%.¹³ (Note: percentages do not add up to 100 due either to rounding or not including the "other" category.)

Home ownership and residency:

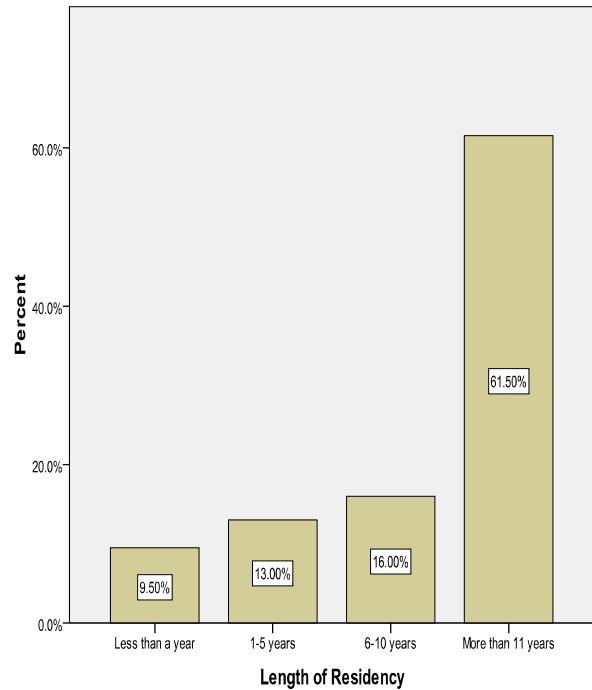
Generally, the West Long Beach research site is relatively stable. Data show that 52% of the households in the research site are owner-occupied. This compares to 41% for the city of Long Beach.¹⁴ Those participating in our survey however, were above the average, with 69.5 % reporting owner-occupancy status (graph 1). Survey respondents were also long-term residents; more than

61% indicated they have lived in the neighborhood more than 11 years; 77% have lived in the neighborhood 6 years or longer (graph 2). We caution that the lack of access to several apartment complexes in the neighborhood biased these data toward homeowners.

Graph 1. Owners and Renters.



Graph 2. Time in Neighborhood.



Household characteristics:

For those participating in the survey, the average household had 4.4 members (3.1 adults and 1.3 children), with households ranging from 1 to 9 adults and 0 to 8 children (see table 1). At the low end, 37.7% of the households had 0 children, and 6.0% had one adult. Table 2 provides comparison data: these households were slightly larger than the West Long Beach research site as a whole (3.9 average household size) and the city of Long Beach (2.8 average household members).¹⁵ Among those participating in the survey, 62% indicated that at least one child under the age of 18 was living in the household, which is slightly lower than the West Long Beach research site average of 70%, but higher than the city of Long Beach average of 56%. By comparison 17.2% of survey respondents indicated there were 3 or more children under the age of 18 living in the households, while 57.7% reported 3 or more adults living in the household (maximum was 9 adults). We might speculate that households are encompassing relatives or adult children due to economic difficulties. Here we would note that unemployment rates and overcrowding have historically been higher in West Long Beach than is the case for the city as a whole.

Table 1. Size of Household.

Number of Household Members	<u>Adults:</u> Percentage of Total Households	<u>Children</u> Percentage of Total Households
0	NA	37.7%
1	6.0%	22.1%
2	36.3%	23.0%
3	27.4%	11.3%
4	15.9%	3.4%
5	9.0%	1.5%
6	2.5%	0.5%
7	2.5%	0%
8	0%	0.5%
9	0.4%	0%
Total	100%	100%

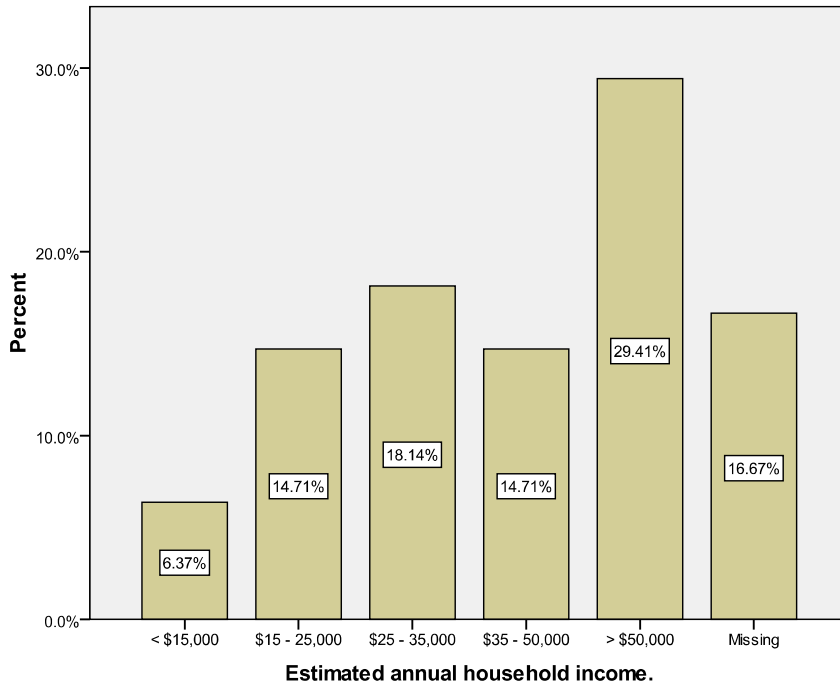
Table 2. Comparison of Household Size.

	Average Household Size (number)	Households with Children (percentage)
Survey Respondents	4.4	62.3%
West Long Beach Research Site	3.9	70.0%
City of Long Beach	2.9	56.0%

Income:

Self reported income among the survey respondents is somewhat skewed with 29.4% earning over \$50,000 and 39% earning less than \$35,000. Income for 21% of the survey respondents is below what is considered a minimum living wage level for the city. See graph 3. Based on data from the Center for Community Economic Development, a conservative living wage estimate for a family of 3 (two adults one school-aged child) in Long Beach is \$13.89 per hour or roughly \$29,000 per year (40 hours/week at 52 weeks/year).¹⁶ Researchers at the Poverty Project at Penn State University calculate a Long Beach living wage at \$24.49 for two adults and one child (roughly \$50,000/year calculated at 40 hours/week at 52 weeks/year).¹⁷

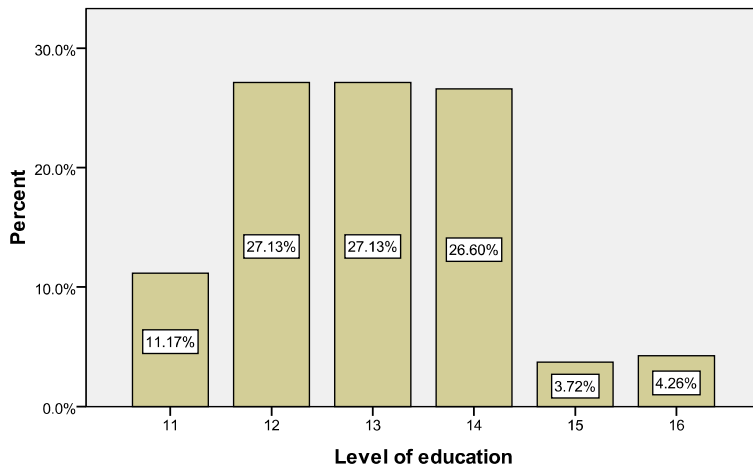
Graph 3. Income.



Educational Level:

Education levels among survey respondents were higher than the general West Long Beach research site population. Census data show that 43% of research site residents did not have a high school diploma, compared to 27% for the city of Long Beach.¹⁸ Among those participating in our survey however, only 11.2% listed less than a high school education, while a 62% had at least some college, and 26.6% indicated they had a college degree. Comparative numbers for the West Long Beach research site as a whole are 23% (some college) and 10% (college degree); for the city of Long Beach, 30% (some college) and 24% (college degree).¹⁹

Graph 4. Education.



11 = less than high school; 12 = high school graduate; 13 = some college; 14 = college graduate; 15 = post-graduate school; 16 = doctorate.

6. Air Quality and Health Issues.

Health Issues:

Among the most pressing issues in West Long Beach as expressed in question 3, was air quality. While the core of the survey focused on family health, perceptions of air quality, and origins of air pollution, the consequences of air pollutants were clearly a central concern identified by the survey participants. When asked to identify the two most significant health problems confronting West Long Beach, 38.4% of responses identified air quality (e.g., air pollution, smell, smog, asthma, respiratory), 24% cited general health issues (obesity, cancer), while all other issues combined (e.g., garbage in the streets, noise, violence, dust, among others). In order to get at these fundamental concerns, the survey asked respondents to indicate if adults or children in the household have “experienced any of the following health issues.” We included those health problems cited in existing studies, such as asthma, allergies, and heart problems, among others as listed in table 3. Data are given by household.

The results show that almost **one-third** (29%) of the surveyed households have at least one adult case of asthma and **18.9%** indicated at least one case of child asthma. Asthma in children is often called chronic bronchitis (chronic bronchitis is an adult disease), however, so if we include chronic bronchitis the percentage increases to **19.4%**. Given the importance of air quality to adverse respiratory outcomes for children, we ran a secondary analysis looking at the length of time in the neighborhood and asthma rates. According to the data, the number of childhood asthma cases dramatically increased with the length of time in the neighborhood. As table 4 shows, **81.9%** of all asthma cases among children were in households that had live in the area longer than 6 years, compared to 9% for those who had live in the area for less than 1 year. With the exception of one case, **all** multiple cases of childhood asthma were in households that had been in the area 6 years or longer.

Allergies tended to be more heavily concentrated among the adult population. More than twice as many of the households indicated a case of adult allergies (42.3% for adults compared to 16.4% for children). Chronic burning of eyes, nose, or throat followed a similar pattern with 23% of households indicating an adult suffering from this problem compared to 8.0% for children. We speculate that this difference might be a function of children not recognizing this as a problem, and thus not telling a parent. Other notable health issues included heart problems and cancer; where 17.4% (heart problems) and 12.4% (cancer) of the surveyed households indicated at least one adult case in the household.

Table 3. Self-reported Adult and Children Health Issues by Household.

Health Issue	Adult (18 yrs or older)	Children (17 yrs or younger)
Allergies	42.3%	16.4%
Asthma/Respiratory Problems	29.0%	18.9%
Chronic burning, eyes, throat, nose	23.0%	8.0%
Heart Problems	17.4%	1.0%
Cancer	12.4%	1.0%
Chronic bronchitis	8.0%	0.5%

Table 4. Percentage of Asthma among Children with Asthma by Time in the Area.

	Percentage of Asthma Cases among Children with Asthma
Less than 1 Year	9.0%
1 – 5 Years	9.0%
6 – 10 years	20.5%
More than 11 Years	61.4%

Air Quality:

Air pollution is a fact of life in West Long Beach as indicated by the responses to the open-ended question. Table 5 show that 54% of the households indicated air quality as a significant concern for them; only 15.7% indicated no concern. Of those for which air pollution was of significant or moderate concern (table 6), 66.7% cited health as the major reason, followed by unpleasant odors (45.6%); property values ranked a distant fourth at 22.1%. We should note that respondents could provide more than one answer. Still, for those in which air quality is a significant concern for them and their families, few reported altering their outdoor activities because of the air quality in their neighborhood. Chart I shows that only 17.24% of those households polled limit their outdoor activities because of air quality; nonetheless, 51% of those indicating air quality was a significant or moderate concern reported altering their outdoor activities. In general, concern with air quality increased with the length of time in the neighborhood (see table 7).

Table 5. Family Concern with Air Quality.

Level of Concern	Percentage Indicating Yes
Significant Concern	53.9%
Moderate Concern	29.4%
No Concern	15.7%

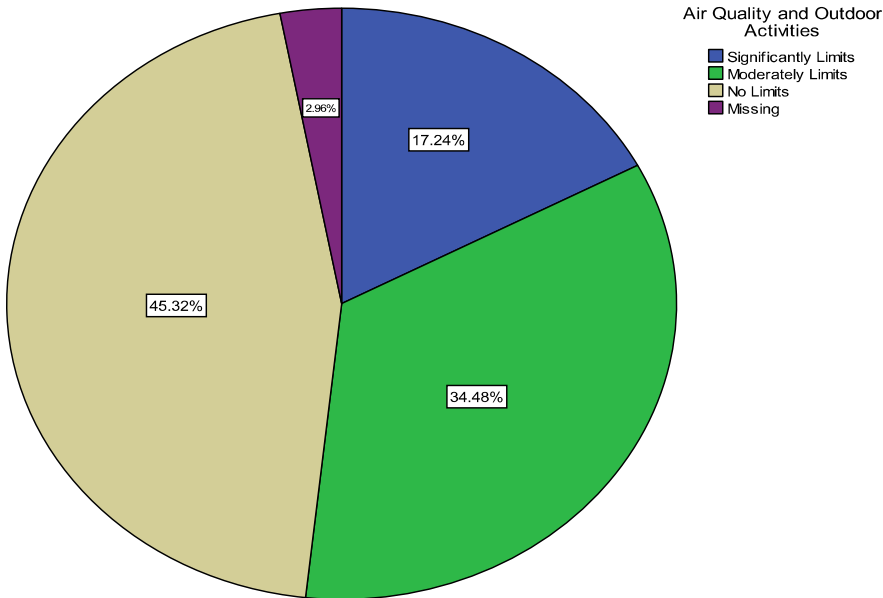
Table 6. Why Air Pollution is a Concern.

Issue	Rank	Percent
Health	First	66.7
Unpleasant Odors	Second	45.6
Soot and Dust	Third	41.7
Property Values	Fourth	22.1

Table 7. Time and Level of Concern with Air Quality.

Length of Residency	Level of Concern		
	Significant Concern	Moderate Concern	No Concern
	Percentage	Percentage	Percentage
Less than 1 Year	4.0%	2.0%	3.5%
1 – 5 Years	6.5%	4.0%	2.0%
6 – 10 years	11.6%	3.0%	1.5%
More than 11 Years	33.2%	20.0%	8.5%

Chart 1. Air Quality and Limitations on Outdoor Activities.



Sources of Air Pollution:

Among the drivers for pollution, we asked survey participants to rank those which they felt were the most significant. Table 8 summarizes these responses, with the most visible sources most often cited as significant sources of air pollution. Sixty percent of survey respondents identified trucks and oil refineries as the major sources of poor air quality, followed by local freeways. The data raise two points: first, while trucks are a major source of air pollutants (roughly 34.5% of total basin nitrogen oxides emissions, NO_x), refineries account for only about 0.2% of NO_xs. Still, refineries are a major source of bad smells in West Long Beach. Second, research shows that ships are a significant source of air pollutants (daily producing NO_x equivalent to over 1 million cars) they are not as visible as refineries, trucks, or local freeways and a likely reason for the lower rankings among our survey participants.²⁰

Table 8. Origins of Air Pollution.

Factors	Significant	Moderately Significant	Little or no significance
Oil Refineries	60.9%	25.4%	13.7%
Trucks	60.7 %	23.9%	15.4%
Local Freeways	56.8%	25.6%	17.1%
Automobiles	43.1%	37.1%	19.8%
Trains	35.4%	31.3%	33.3%
Ships	27.6%	32.8%	39.6%

Sources of Information:

Finally, we were interested in where survey participants received their information about local issues. Specific choices are categorized along conventional lines: print and electronic media, formal and informal groups. Table 9 summarizes the data. The most often cited source was the print media, with the Long Beach Press Telegram (75%) identified over the Los Angeles Times as the principle source of information. We recognize that the use of the term “local,” may have influenced survey respondents’ choice, however, the Los Angeles Times does not often report on local Long Beach issues. Among electronic media forms, the internet was the most often identified source of information (94%) compared to email. Television tended to be most widely cited by Spanish speaking survey respondents, which makes sense given the lack of Spanish language print media focusing on local (Long Beach) issues. Friends (38%) and family (36%) were the most important sources of information among informal groups—though notable, friends were more often consulted over family—while schools (40%) and community groups (31%) were the most important formal groups. Elected officials were identified in only 9% of the cases, the lowest of all sources.

Table 9. Reported Sources of Information.

Sources	Percentage Reporting Using
Print Media	36.0 %
Electronic Media	26.8 %
Formal Groups	18.6 %
Informal Groups	18.6 %

7. Conclusion.

A number of important conclusions can be drawn from our household survey. In general, the study’s participants represented the ethnic, racial, and household characteristics of the broader West Long Beach neighborhood. As reflected in our study population, West Long Beach is a relatively stable community where a majority of residents own their own homes. Income levels however, are low, with 39% earning less than \$35,000, while educational levels tend to be high with 62% having at least “some college.”

Air quality and respiratory problems were identified as among the important issues facing the West Long Beach community. When asked what health issues were the most pressing for the neighborhood, the most often cited concern was air quality (38.4) followed by general health issues (e.g., obesity). Of the 54% indicating air quality as a “significant concern” for them and their family, 66.7% identified health as the principal reason. By comparison, only 22% identified property values as the main reason why air quality is a “significant concern.” The data showed that the concern with air quality increased the longer families lived in the neighborhood.

Among the drivers for pollution, survey participants tended to rank the most visible sources as the most significant producers of air pollution. Sixty percent of survey respondents identified trucks and oil refineries as the main causes of poor air quality, followed by local freeways. While refineries are major producers of bad smells, they account for only about 0.2% of nitrogen oxides (NOx) in the area. More polluting, though less visible sources, such as ships, ranked relatively low (27% as significant) in the survey.

Perhaps the most noteworthy finding is the number households with asthma: 29% of all households have an adult suffering from asthma; 18.9% had a child with asthma. The data further revealed that the number of child asthma cases *increased* with the length of time in the

neighborhood. Particularly alarming is that *all* multiple cases of asthma—with the exception of one case—were in households that had been in the area 6 years or longer. These data are a cause for concern given that studies show these children will most likely have reduced lung capacity, prematurely aged lungs, and an increased risk of bronchitis compared to children living in less polluted areas.

Overall, residents were generally concerned with staying informed about local/neighborhood health and air quality issues. Over 30% of the respondents provided contact information asking to be contacted about the study's results and future air quality community activities. Given the focus on local issues, this may explain why the Long Beach Press Telegram was the principal source of information cited by respondents.

Endnotes

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- ¹ South Coast Air Quality Management District. Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES-II). March 2000. <http://www.aqmd.gov/matesiidf/matestoc.htm>.
- ² Cited in Wade Graham. 2007. "Dark Side of the New Economy." *OnEarth* (Spring), p. 18; see also the Long Beach Alliance for Children with Asthma, <http://www.lbaca.org/>
- ³ United States Environmental Protection Agency, National Center for Environmental Assessment. "Health Assessment Document for Diesel Exhaust." EPA/600/8-90/057E, September 2002; Ulfvarson U et al. 1991. "Pulmonary function in workers exposed to diesel exhausts: The effect of control measures." *American Journal of Industrial Medicine*. Vol. 19, No. 3: 283-9; Rudell B et al. 1996. "Effects on symptoms and lung function in humans experimentally exposed to diesel exhaust." *Occupational and Environmental Medicine*. Vol. 53:658-62; Pandya RJ, GM Solomon, A Kinner, and JR Balmes. 2002. "Diesel exhaust and asthma: Hypotheses and molecular mechanisms of action." *Environmental Health Perspectives*. Vol. 110, supp. 1:103-112; Pope CA. 1995. "Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults," *American Journal of Respiratory and Critical Care Medicine*. Vol. 151:669-674; California Air Resources Board. Report to the Air Resources Board on the Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, Part A, Exposure Assessment as Approved by the Scientific Review Panel, Executive Summary. April 22, 1998: ES-5. http://www.oehha.ca.gov/air/toxic_contaminants/pdf/diesel%20exhaust.pdf.
- ⁴ Bobak M. 2000. "Outdoor Air Pollution, Low Birth Weight, and Prematurity." *Environmental Health Perspectives*, vol. 108, no. 2 (February).
- ⁵ Palaniappan, Meena, Swati Prakash, and Diane Bailey, 2006. *Paying with our Health: The Real Cost of Freight Transport in California*. Hayward, CA: Alonzo Printing Co. (November). Ed Avol. 2010. "The Children's Health Study: Where We've Been... (& Where We're going)." Presented Pediatric Grand Rounds. Miller Children's Hospital. Long Beach, CA. October 8.
- ⁶ California Air Resources Board. 2006. "Quantification of the Health Impacts and Economic Valuation of Air Pollution from Ports and Goods Movement in California." Appendix A, in Emission Reduction Plan for Ports and Goods Movement. (March 22): p. 14. http://www.arb.ca.gov/planning/gmerp/march21plan/appendix_a.pdf.
- ⁷ Map from Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 1.
- ⁸ Cited in Wade Graham. 2007. "Dark Side of the New Economy." *OnEarth* (spring), p. 17.
- ⁹ Palaniappan, Meena, Swati Prakash, and Diane Bailey, 2006. *Paying with our Health: The Real Cost of Freight Transport in California*. Hayward, CA: Alonzo Printing Co. (November). p. 10.
- ¹⁰ *Trade, Health, and the Environment: Making the Case for Change*. 2009. The Impact Project. (June). p. 6. Available at <http://hydra.usc.edu/scehsc/web/index.html>
- ¹¹ *Trade, Health, and the Environment: Making the Case for Change*. 2009. The Impact Project. (June). p. 9. <http://hydra.usc.edu/scehsc/web/index.html>
- ¹² *Trade, Health, and the Environment: Making the Case for Change*. 2009. The Impact Project. (June). p. 13. <http://hydra.usc.edu/scehsc/web/index.html>
- ¹³ See Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 2. Figure C-2. Data are from the 2000 U.S. Census.
- ¹⁴ See Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 5. C-13.
- ¹⁵ See Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 5. C-11.
- ¹⁶ Chung, Jenny. 2009. "The California Self-Sufficiency Standard and Calculator: A Path to Security." *Center for Community Economic Development*. Presented at the Long Beach Community Action Partnership (April 1)
- ¹⁷ Poverty in America Project. Penn State University. <http://www.povertyinamerica.psu.edu/>.
- ¹⁸ See Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 3. C-3.
- ¹⁹ See Crampon, William J., John W. Humphrey, and Alex J. Norman. Nd. *Santa Fe Corridor*. Rethinking Greater Long Beach. p. 3. C-3.
- ²⁰ Cited in "The Science Behind the Smog" in "Toxic Air: How the Ports Contribute to Pollution in the L.A. Basin." A Special Report by the *Long Beach Press Telegram*. Available at <http://lang.presstelegram.com/projects/toxicair/>