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JET PLANE NOISE EFFECTS ON MORTALITY RATES

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INTRODUCTION

We study here the health effects of jet plane noise on residents living
under the flight patters (test area) of Los Angeles International
Airport. These people are compared to a control group (contiguous to
those in the test group) sufficiently removed so that the plane noise
is not dominant. The test group is chosen in the 90 dBA contour:
virtually every overflight produces over 90 dBA of noise in this con-
tour.   The contour is defined through the use of a combination of
technical reports and on site measurements [1]. The two sites combined
involve nearly 200,000 people.

One of the first studies of the harmful effects of noise on residents
living close to large airports was conducted by Herridge, et al. at
Heathrow Airport [2]. They found a 30% increase in nervous breakdowns.
We earlier reported some preliminary results on this work [3]. For
other work on these questions the reader is referred to the cited
references.

DESCRIPTION OF STUDY

The test areas lies within the cities of Lennox and Inglewood, suburbs
of Los Angeles, California. The control area is contiguous (in order to
minimize errors) to the test area; it lies mainly within Inglewood and
Hawthorne. The planes can be heard within the control area although
the noise is considerably reduced. Thus, the control is conservatively
located since there may be some residual jet plane noise effect within
it. Demographic information was obtained from US Census Tapes, Fourth
Count, for 1970 and for 1980. Mortality information, broken down by
age, race, sex, disease, and area was obtained from the Los Angeles
County Department of Health Services Mortality Tapes for the years

1970 through 1977. These computer tapes had earlier been used, see
[4], to calculate the 1970 standardized morality rate (SMR) through-
out all of Los Angeles County. Some results are shown in Table 1
broken down by race.

Table 1. 1970 Mortality Rates
in Los Angeles County by Race
(per 1,000, per year)

Race	Rate
White	11.3
Black	7.6
Chicano	4.3
Japanese(Asiatic)	4.6

Table 2. Total Expected using SMR,
and Observed Mortalities 1970-1971

	Test	Control
Exp.	2618	2366
Obs.	1759	1558

Using the complete SMR tables we calculated the expected and observed
mortalities in our test and control areas, see Table 2.

We use the term Chicano (which the poeple generally prefer) rather
than Latino or Hispanic, which in fact are inaccurate. Obviously,
the SMR tables are not functioning satisfactorily in these areas. A
close examination of the 1970 versus the 1980 census indicates that
one reason for the inflated, expected values is that there are sub-
stantial demographic changes going on in these areas. During the de-
cade of this study there was a consistent movement of (often older)
Whites away from these areas and of (often younger) Blacks and
Chicanos into the areas. It is very important to break down mortality
tests by age group thus avoiding this major possible source of error.
The effect becomes more aggravated for later years. In order to
minimize such errors we used the average of the 1970 and 1980 census.
The control was chosen to match the test for racial composition to
within a percent or two, see Table 3.

Table 3. Average Numbers, 1970 and 1980 Census

	Test		Control	
	Number	Percent	Number	Percent
White(non-Chicano)	38,813	37.8	34,281	37.5
Black	32,344	31.5	29,422	32.1
Chicano	24,495	23.8	21,891	23.9
Asiatic	7,090	6.9	5,865	6.5
	102,742	100.0	91,459	100.0

Furthermore, monthly income was examined within the two areas, taken
from the 1970 census. For the test and control areas respectively
the average income per person was $262 and $267 per month, identical
for our purposes.

STATISTICAL RESULTS

We examine all deaths in one age group due to non-cardiovascular disease (other than strokes, heart attacks). The number of deaths due to disease X, say, which one would expect if there were no noise augmentation for that disease would be given by,

$$(X_T)_E = (\text{non } CV_T)_o (X_c)_o / (\text{non } CV_c)_o \qquad (1)$$

where the sub T and sub C refer respectively to the number of deaths in the test and control areas and where sub E and sub o refer to expected and observed values. This supposes conservatively, that only cardiovascular diseases may be noise connected. We apply one-sided chi-square test for statistical significance (valid the numbers of deaths greater than 5) to test our hypothesis: that the number of deaths due to certain diseases may be increased by jet noise. Only confidence levels above 0.95 are accepted though trends are evident.

The results for deaths due to cardiovascular/disease are shown in Table 4 . The ratio is that

Table 4 .

Deaths Due to Cardiovascular Disease From 1970 through 1977

Age	Test	Control	Ratio,o/E	Conf.
35-44	64.0	73.0	1.13	-
45-54	154.0	214.0	0.89	-
55-64	349.0	412.0	0.94	-
65-74	527.0	466.0	0.99	-
75+	1084.0	861.0	1.18	0.97

of the observed to expected number of deaths per catagory. The expected number of deaths due to cardiovascular disease from 1970 through 1977 were calculated using Eq. (1). The number of deaths for older people, 75+, are clearly increased, by 18%. The number of observed deaths in excess of those which would have occurred (expected) if the extreme jet noise had no effect on mortality is 165 during this eight year period, far in excess of air-accident deaths at this airport.

This same procedure showed no significant increase in the number of deaths in the high noise area, due to cancer, mental disorders, and bronchitis and asthma. Deaths due to cirrhosis of the liver (chiefly alcoholism) showed an increasing trend for ages over 35, though the number of such deaths was too small to be satistically significant. The number of suicide deaths in the high noise area for ages 45-54 showed over a 100% increase at the 0.99 confidence level; other age groups showed a marked trend of increased suicides, but again a larger

sample is needed for significance. Violent deaths, including suicide, are shown in Table 5.

Table 5. Total Deaths Due To Accidents, Poisoning, Violence From 1970 through 1977

Age	Test	Control	Ratio,O/E	Conf.
45-54	59.0	65.0	1.12	-
55-64	44.0	43.0	1.13	-
65-74	34.0	27.0	1.11	-
75+	41.0	24.0	1.61	0.96

There is a 60% increase for ages over 75, and an increasing trend in every age group. If we add just the significant increases in mortality in Table 5 to those in Table 4 . we have an average of 20 deaths per year attributable to jet noise in this area, and we believe this number to be conservative.

There is rapid turnover of residents in these areas, as judged by changes in the school attendance. It appears that the average time of residence may be but a few years. Thus, these marked effects are made even more dramatic by the fact that they have occurred due to exposure for a relatively short period of time. It is noted that older, weaker people are particularly at risk.

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