CORRELATES OF FERTILITY AND MORTALITY IN LOW-MIGRATION STANDARD METROPOLITAN STATISTICAL AREAS

James B. Pick, Graduate School of Administration, University of California, Riverside

This study looks at regional, ethnic, and socioeconomic differences in 1970 mortality and period fertility for 29 U.S. Standard Metropolitan Statistical Areas characterized by low inmigration and net migration from 1960-1970. No prior work has coincided with this research in all aspects of design, although a relatively small number of past investigations have partially overlapped with it. An early regional fertility study was Keyfitz' comparison (1952 and 1953) of fertility and distance from the city for French Catholic families in Quebec and English Protestant families in Ontario. For each cultural group, a small sample of individual families was studied by a compartmental analysis of variance technique. Collver and Langlois (1962) concluded that among a varied group of nations fertility was inversely correlated with female labor force participation. A similar negative impact was shown by Collver (1968) for all ages of mother and for both whites and non-whites in a sample of 65 SMSA's in 1960. The negative correlation was stronger for whites and in younger childbearing ages. Biggar and Butler (1969) did a multiple correlation and regression analysis of fertility for all North Carolina counties in 1960. White fertility was shown to be primarily related to population characteristics (positively to population change, 1950-60, and to percent white women of age 15-44) whereas non-white 1960 fertility was strongly linked to population and socioeconomic factors (negatively to non-white per capita income and positively to percent non-white farm workers).

Heer and Turner (1965) performed regression of fertility, measured by the child-woman ratio, against eight population, labor force and literacy variables for local administrative units in eighteen Latin American nations. Closer to the present investigation was a later study by Heer and Boynton (1970) of differences in fertility in 591 U.S. counties in 1960. Fertility was measured as the ratio of actual to expected births. Variables found to have the greatest contribution to r^2 were percent Roman Catholic (positive factor), a density index (negative) and proportion non-white (positive). In a study of the effect of ten demographic and socioeconomic characteristics on total fertility rate in 1961 for 29 regions of the Venetian province of Italy (DeSandre (1971)) the independent variables of most importance for regression (in order of size of B coefficients) were percent of voters Christian Democrat (positive), amount of urban centralization (negative), persons per room (positive), percent with secondary education (positive) and female employment (negative).

Regional studies of mortality are fewer in number than those of fertility. In England, Melvin-Howe's investigation (1968) of geographic differences in mortality used the excellent data of the British National Health Service. The mortality measure chosen was death rate standardized against the age distribution of the whole British population. The areas picked were not uniform, but a mixture of geographical units, such as towns, counties, etc. A regional trend towards higher mortality in the Northwest of England and Wales was noted. Using the census tracts of Houston for areas, Roberts, et.al. (1970) correlated the variables of social class, percent black and percent Spanish surname against mortality for six disease categories and total death rate. Both social class and ethnicity were concluded to be factors influencing mortality levels of various diseases.

The major differences of the present research from past studies are the mode of sample selection (low inmigration areas), the inclusion of both mortality and fertility as dependent variables, the division of mortality indices into various portions of the life span, and introduction of a density index standardized for land use. The present research determines the relationships of white and non-white life expectancy and period fertility to each other and twelve population and socioeconomic variables for selected metropolitan areas in 1970. The criteria for choice of SMSA's in the sample were low gross and net inmigration 1960-70. It was reasoned that in metropolitan areas with higher levels of inmigration, local vital rates do not reflect adequately the area's own social and health conditions, but are altered by a large component in the population of recent inmigrants, who are heavily affected in their present vital rates by previous fertility and mortality factors from other regions. These migrants are assumed to take varying periods for assimilation. This past-history determinant has been documented for fertility (Matras, 1973), socioeconomic characteristics in Argentina (Germani, 1966), and in the United States among blacks (Beale, 1971).

The exact criteria for selection of SMSA's were the following: (1) less than 15% net inmigration 1960-70 for the white and non-white populations taken separately and (2) less than 16.1% gross inmigration 1965-1970 for whites and less than 10.6% gross inmigration 1965-1970 for blacks (in both cases, excluding annexation). The following additional criterion was also imposed: (3) the non-white population must exceed 13,500. This allows sufficient size to compute fertility and mortality rates for 5-year age groups. Thirty-one SMSA's were selected, and all happened to be located in the eastern half of the United States. However the New Haven and Bridgeport SMSA's did not have proper age-specific birth statistics due to their complicated township composition and were excluded. In Table 3 inmigration levels for the sample are compared with 73 other SMSA's not included in the sample.

I. RESEARCH METHODOLOGY

Eighteen dependent and 12 independent variables were chosen. Dependent variables 1-4, 17 and 18 were also included as independent variables in two or more of the regressions. The mode of calculation and justification of choice of these factors are given below. Summary values are in Table 4.

- Y(1) Life expectancy from age 0 (e(0)) for white males in the SMSA.
- Y(2) e(0) for white females.
- Y(3) e(0) for non-white males.
- Y(4) e(0) for non-white females.
- Y(5) Life expectancy from age 50 (e(50)) for white males in the SMSA.

Y(6) e(50) for non-white males.
Y(7) e(50) for white females.
Y(8) e(50) for non-white females.
Y(9) Life expectancy from age 1 to age 50 (e(1,50)) for white males in the SMSA.
Y(10) e(1,50) for non-white males.
Y(11) e(1,50) for white females.
Y(12) e(1,50) for non-white females.
Y(13) Infant mortality rate for white males in the SMSA.
Y(14) Infant mortality rate for non-white males.
Y(15) Infant mortality rate for white females.
Y(16) Infant mortality rate for non-white females.
Y(17) Gross reproduction rate (GRR) of the white population.
Y(18) GRR of the non-white population.

The above were calculated using standard demographic computer programs (Keyfitz and Flieger, 1971) from 5-year population data (U.S. Bureau of the Census, 1973), and from 5-year fertility data and 5- and 10-year mortality statistics (National Center for Health Statistics, 1974). The 10-year data was divided into 5-year periods by linear interpolation of the national 5-year white and non-white, male and female, age distributions in 1970. Life expectancy was considered the best general standardized measure of mortality at a single time point.

Prior studies used as indices of fertility period measures (crude birth rate, total fertility rate, child-woman ratio), cohort measures (children ever born) and a period index including birth expectation (ratio of actual to expected births). A cohort measure was not chosen because this study is intended to look at the immediate effect of 1970 socioeconomic factors on the fertility of the entire age range of women associated with a region. Cohort indices for older women record responses to the metropolitan area at a mixture of past time points. Also, in the past some of the women were living elsewhere. The GRR was considered superior to other measures because it averages 5-year rates for the whole childbearing period.

Independent Variables

X(19) Percent of population non-white.

This is simply non-white population divided by total population.

X(20) Net Migration (1960-1970).

This is calculated by the vital rate method of subtraction of natural increase 1960-1970 from total increase 1960-1970 (U.S. Bureau of the Census, 1970).

X(21) Inmigration for whites (1965-1970).

X(22) Inmigration for non-whites (1965-1970).

The latter was for the non-Negro portion of the population (U.S. Bureau of the Census, 1973), which is considered sufficiently close to the white segment due to the very small percentage of other non-white minorities in sampled metropolitan areas. The reason for including both net and gross inmigration, each for a different time span, is that these are the only sets of SMSA migration data available for 1960-1970, and they measure somewhat different groups of migrants.

X(23) Population Size.

This is total population of the SMSA in 1970.

X(24) Population Density Index.

Many previous studies using land density have calculated density as persons per square mile for the SMSA. It was felt that this ratio is inadequate for some comparisons because of the irregular pattern of land use within these urban areas. One SMSA, such as Nashville, might be mostly or entirely within city limits, whereas another might include large amounts of agricultural land, preserve, government-owned forest or park, or other undeveloped government lands (e.g., Baltimore, Buffalo, Bakerfield, Evansville). A new density index was constructed which takes the urbanized area as the basic city unit. The urbanized area (population within the city limits plus contiguous incorporated or unincorporated suburban units of 2,500 population or more per square mile plus certain contiguous suburban areas of lower density) is a more logical metropolitan unit than population inside city limits, since it includes the suburban population found to be of large magnitude in the 1970 Census (Hauser, 1971) and to be highly variable in SMSA's. The density index (D.I.) is defined as follows: D.I. =

$$\mathrm{LN}\ \frac{\text{Population of urbanized area plus population of towns and cities of 2500 population or more outside the urbanized area (within the SMSA) plus the population of the remainder of the SMSA population (=total SMSA population).}}{\text{Land area of the urbanized area plus land area of towns and cities of 2500 population or more outside the urbanized area (within the SMSA) plus the "land area" of the remainder of the SMSA population (calculated at 1 square mile per 1000 population).}}$$

Data for the index is available (U.S. Bureau of the Census, 1973). The density estimate of 1000/square mile for the population outside the urbanized area and outside other towns or cities was obtained by averaging census estimates of land areas of the smallest towns. It is considered that this estimate for rural population offers more accuracy than averaging arbitrary amounts of non-urbanized land, as is done in conventional calculation of SMSA densities.

X(25) Medical care index.

This is computed as 3.31 x hospital beds per capita plus non-federal physicians per capita (American Hospital Association, 1972; Haug, et.al., 1971). The weighting factor of 3.31 was calculated to equalize the separate variances of the two terms above. These two factors were chosen over others such as hospital admissions and hospital daily census, because it was felt that the latter partially measure admissions policies and the proportion of inpatient versus outpatient care. An error introduced into this index is the lack of standardization for percentage of persons in the metropolitan area with substandard health, but no comparative data exist for such a standardization. The health care available to non-whites is less accurately measured by the above index than for whites, because it does not show areas which are particularly strong in minority group physicians, hospitals, and medical training (e.g., Nashville) or areas which are weak.

X(26) Welfare (non-white).

This is estimated as average public assistance or public welfare income (for non-white families receiving this income) x percent of the non-white families receiving this income (U.S. Bureau of the Census, 1973). A similar variable is not introduced for the white population, since the average value of the measure for whites is so much lower than that for non-whites, and hence of little demographic importance.

X(27) Percent in the labor force for the white male population 16+ in the SMSA.

X(28) Percent in the labor force for the white female population 16+.

X(29) Percent in the labor force for the black male population 16+.

X(30) Percent in the labor force for the black female population 16+.

Data were from the U.S. Census (1973). Labor force includes unemployed workers, but excludes persons in school. Again the statistical error in substituting black for non-white population is very small.

II. RESULTS

Simple correlations appear in Table 5. For calculation of fertility and mortality measures, a computer program was written to sort and interpolate vital statistics into 5-year age groups for input into a standard Keyfitz and Flieger LIFE and LOTKA routine. For the independent variables software was created to convert raw census and other data into the measures employed. Secondary data were analyzed using a correlation program designed for this study and the UCLA Biomed stepwise multiple regression program (Dixon, 1973). Age distributions were studied by PYRAMID graphics (Pick, 1974) and a sex-age gap routine.

Results of a separate age structure analysis showed little ethnic variation among metropolitan regions. Instead different features occurred consistently between the white and non-white structures with the following notable differences: (1) the non-white age distribution in each SMSA was more tapered than the white, (2) the depression age gap (defined as an indentation in the male and female sides of the 1970 population pyramid for age categories born in the low fertility period 1925-45) is present for white distributions, except Nashville, but is generally flattened or nonexistent (in ten of the cases) for non-white distributions, (3) the sex ratio for age categories 75+ is on the average 29 percent larger for non-whites (Table 1).

Table 1. Sex Ratios at Different Ages for SMSA's.

	Non-white			White		
Age	1-49	50-74	75+	1-49	50-74	75+
AVERAGE	90	85	75	98	85	58
Standard Deviation	2.0	5.6	10.2	1.5	3.6	6.0

In an attempt to understand (3), the sex-age gap differences in life expectancies are compared in Table 2. The larger sex-age gap in e(50) for whites, would partly account for (3), but only complete historical life expectancy and migration records could fully explain this effect.

Table 2. Ethnic Differences in the Sex-Age Gap in Life Expectancy.

G(1,50)= e(1,50) female - e(1,50) male

G(50)= e(50) female - e(50) male

	G(1,50) non-white	G(1,50) white	G(50) non-white	G(50) white
AVERAGE	1.7	.8	5.1	6.1
Standard Deviation	.47	.17	1.26	.68

For average values:

(G(1,50)W-G(1,50)NW)/G(1,50)NW=-.55

(G(50)W-G(50)NW)/G(50)NW=.21

There are a number of important relationships within and between the sets of independent variables. For e(0) and e(50), male-female correlations are significant for non-whites but insignificant for whites. White, non-white correlations for e(0) and e(50) are significant only for males. These results will be explained by later regressions in which dissimilarity of explanatory factors between male and female is greater for whites than for non-whites, and dissimilarity of factors between whites and non-whites is greater for females than for males. The lack of any correlations within the set of e(1,50)'s is due to greater differences among categories in susceptibilities to suicide, homicide, accidents and other common causes of deaths for age 1 to 50. The correlation between GRR(NW) and GRR(W) is quite high (r=.60), although explanations are quite different for the two GRR's.

The only significant correlation between fertility and mortality occurs between non-white male e(0) and white GRR (r=.53). Correlations between life expectancy variables and the independent variables are consistent with the results of the regressions and will be taken up below. The only significant correlation within the cluster of infant mortality variables is between infant mortality of non-white males and white females (r=.63). There are no significant correlations with other variables, and no significant multiple correlations.

A number of important relationships hold between the independent variables. Net-migration (1960-1970) is linked to inmigration of whites (1965-1970). Inmigration to these SMSA's is inversely related to population size in a feedback relationship noted by Hauser (1971). As expected total population and density are positively correlated. Labor force participation variables show strong inter-correlations except between males and females for whites. For females there are significant positive relationships of labor force with net-migration and inmigration. Possibly with greater influx of migrants, there is more expansion in business hiring of women.

Results of the Regression Analysis

Table 6 summarizes the results of linear regression analysis. For infant mortality no significant multiple correlations were obtained. As expected from the shape of the human mortality curve there are strong similarities between e(0) and e(50). The following analysis for e(0) will apply also to e(50) unless otherwise noted.

Total life expectancy of white males is most heavily linked to non-white inmigration. Since non-white inmigration is strongly correlated only with female non-white labor force participation, its importance here is unexplained and probably due to an outside factor. The positive response to white male labor force participation is likely due to the benefits on health of greater income and job health services. On the other hand non-white female job participation reduces male e(0). From their high joint correlation (r=.84), it can be reasoned that this factor may really represent percent in the white female labor force, and may be due to removal of the wife from the home. The opposite influences of total population and density show the importance of differentiating density.

Explanation of inter-SMSA differences for the white male force of mortality is altered for the older portions of the life span, resulting from a reordering of the importance of independent variables. The major change is that density is more significant, displacing non-white inmigration and labor force variables. A possible explanation is that occupational causes of mortality differences depend on inmigration and labor force participation, but these become less important at older ages due to increasing retirement. Thus density becomes more significant and reflects the same negative feedbacks to health already proposed for the white female. Another change is the appearance of net migration as a negative influence.

The most important variable in accounting for non-white male e(0) is white female labor force participation. Again, this likely reflects non-white labor force participation, through which higher income and occupational health benefits would account for higher e(0). Although the positive relation to GRR(W) is not readily understood, the linkage to medical care is obvious. It should be mentioned that for the study in general, medical care appears in only five out of 12 life expectancy regressions and is of dominant importance only once. The remaining factors are interpreted similarly to those for white males. Markedly different factors account for e(0) and e(50) for the non-white male, a negative relation with net migration being the most significant for e(50).

For the white female the largest effect on e(0) and e(50) is an inverse one with density. It does not show up at younger ages (note results for e(1,50)). That such an effect is negative is possibly due to a current medical theory that many health benefits of dense places are offset by the resultant environmental pollution, congestion, stress, noise, etc. (Hexter and Goldsmith, 1971; Lave and Seskin, 1970). Perhaps the older white female's unusual sensitivity to density is due to her more fragile health and her suburban location, where intra-city differences in such environmental effects are greater than between central cities. The second most important variable, welfare, is also typical of denser and larger cities (r (welfare, total population) = .54). The same suburban argument would account for the presence of density as a less strong negative influence on life expectancy of older white males. Perhaps another cause of density's lesser influence for non-whites is that under the same density stress healthy non-whites are less inclined to leave a SMSA than are healthy whites.

For the non-white female, the life span is related strongly to non-white inmigration. Possibly the inmigration stream allows greater expansion of access to female preventative and medical care. The opposite tendency with white inmigration and net migration might involve employment competition or less access to health care services. For all females results for e(50) are highly similar to those for e(0).

Regression analysis of e(1,50) differs extremely from that of e(50). This is attributed to causative factors of death specific to the two portions of life. Unlike older ages, from age 1 to 50 accidents and violence are of major importance (accounting for 37% of the life table l(x) column for males and 20% for females in the U.S. in 1964. In general e(1,50) reveals much less influence from the structural forces of migration and density than at ages over 50.

For the white male the positive relationship of e(1,50) to welfare and to male employment may be due to less violence. Higher labor force levels for white males may raise e(1,50) because of job health benefits. For the non-white male e(1,50) is positively related to medical care and population size, which likely also reflects better health care. The negative link with percent non-white is unexplained.

For white female e(1,50) higher employment rates for the husband may be beneficial, because of more income and job-related health care. The more important inverse effect of white GRR may be only hypothesized as stress from greater childbearing leading to increased cancer or heart disease. It should be noted that, in this study, the only other significant relationship between fertility and mortality, a positive one between non-white male e(0) and white GRR, would appear even less interpretable. These fertility-mortality effects might be clarified by further medically-oriented research.

For GRR of whites, an inverse relation with level of medical care is of greatest import. The reason may be greater availability and exposure to birth control information and wider use of contraception. As just mentioned, the second factor in importance, e(0) of non-white males, is unexplained. Density's positive effect on the fertility of both ethnic groups has no ready explanation. The result is similar to that of DeSandre (1970) for density measured by persons per room, but opposite to the findings of Heer (1970) for density calculated as distance from other cities.

Different influences account for non-white fertility, the most significant being a negative relationship with percent non-white. Perhaps there is a desire in small non-white populations in areas with low past migration to reproduce more in order to retain or increase their size to a level they consider adequate. The negative relationship with non-white welfare might relate to the availability of extra income to allocate to contraception. The positive influence of density is again unexplained.

The lesser contributors to non-white GRR are non-white male labor force participation (negative), white male labor participation (positive), and net migration (negative). The first is again interpreted as less emphasis on reproduction among non-whites with the female in the labor force, while the second can be explained as indirect competition leading to less availability of jobs for non-white males and a consequent increase in fertility. Higher net migration, creating a more expansive job market for non-whites, may lower fertility because employment would tend to reduce emphasis on childbearing.

CONCLUSION

Regional, ethnic and sex variations in period fertility, life expectancy, infant mortality and age structure were examined for 29 SMSA's in the eastern half of the United States in 1970. The SMSA's were chosen on the basis of low inmigration, and ranged in size from 232,000 to 4,800,000. The age structures revealed ethnic variation with a more tapered non-white distribution and with greater proportionate numbers of non-white males at older ages. There was an increase with age in the proportionate size of sex-age gap in life expectancy of whites relative to non-whites; but these differences were not large enough to account for the larger sex ratios for non-whites at older ages.

Consistent geographical trends in fertility or life expectancy were not apparent. These vital indices were explained in terms of twelve population and socioeconomic characteristics, including size, density, medical care, welfare, migration, labor force and ethnic composition. Density was measured by an index which excludes land to which persons are not likely to relate. Important regression results obtained are dissimilarity between e(50) and e(1,50), negative effects of density on older white female life expectancy, specific effects of migration on older life expectancies, explanation of white period fertility by medical care (negative) and density (positive) and of non-white period fertility by percent non-white (negative), welfare (positive), and density (positive). Except for the non-white male, there is surprisingly small simple or multiple correlation of life expectancy to the medical care index. Infant mortality is not correlated with the independent variables included.

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Table 3. Characteristics of SMSA's

SMSA	Rank in Size	Total Population	Percent Non-White	Percent of Non-White Non-Negro	White In-Migration (1965-70)*	Negro In-Migration (1965-70)	Net Migration (1960-70)	Natural Increase (1960-70)	Exp (Density Index)	Density Index
Philadelphia	4	4817914	18.1	3.3	7.3	4.2	1.0	9.9	3556	8.18
Pittsburgh	9	2401245	6.3	3.3	5.9	3.6	-7.0	6.8	2240	7.71
St. Louis	10	2363017	16.4	2.3	9.0	4.4	.8	11.5	3463	8.15
Baltimore	11	2070670	26.2	2.3	9.4	3.9	2.9	11.9	2824	7.95
Cleveland	12	2064194	16.1	3.0	8.2	5.7	-2.4	10.5	2985	8.00
Cincinnati	21	1384851	11.3	2.3	9.1	4.7	-2.9	12.0	2262	7.72
Buffalo	24	1349211	8.1	8.9	5.4	6.0	-6.4	9.6	3288	8.10
Kansas City	26	1253916	12.6	4.4	13.6	5.8	2.5	12.3	1977	7.59
New Orleans	31	1048809	31.3	1.3	10.9	3.5	.8	15.3	6277	8.74
Columbus (Ohio)	35	916228	12.0	3.5	16.0	8.7	6.7	14.7	2678	7.89
Louisville	40	826553	12.2	1.7	10.3	4.7	2.0	11.9	3131	8.05
Birmingham (Ala.)	44	739274	29.6	.5	10.8	3.0	-7.3	9.8	1825	7.51
Toledo	46	692571	8.2	4.8	9.9	6.8	-1.1	11.0	1982	7.59
Akron	48	679239	8.2	3.3	11.7	6.3	.3	11.9	1904	7.55
Gary	52	633367	17.7	2.3	10.2	6.9	-4.4	14.9	2671	7.89
Greensboro	56	603895	19.9	.3	12.8	7.3	2.8	13.3	1564	7.36
Nashville	60	541108	18.1	1.5	14.2	8.5	4.8	11.9	1269	7.15
Youngstown	62	536003	9.7	3.0	11.4	5.2	-3.8	9.1	2118	7.66
Richmond	65	518319	25.1	1.3	15.6	7.7	7.7	11.2	2103	7.65
Wilmington (Del.)	66	499493	12.2	3.6	13.1	6.5	6.8	13.7	2161	7.68
Harrisburg	72	410626	7.1	3.1	11.7	7.3	2.0	8.5	1835	7.51
Knoxville	74	400337	7.2	5.1	12.0	6.1	-2.0	10.7	1309	7.18
Mobile	78	376690	30.0	.9	12.1	3.5	-11.6	15.3	1296	7.17
Canton	80	372210	6.0	3.5	9.8	8.6	.6	10.0	2013	7.61
Beaumont	95	315943	21.6	1.1	10.8	4.6	-9.9	13.1	1703	7.44
Chattanooga	97	304927	16.4	1.0	12.7	2.8	-3.5	11.2	1462	7.29
Greenville	101	299502	15.1	1.2	15.1	4.2	2.2	13.9	1443	7.27
South Bend	113	280031	6.7	.5	11.9	10.6	-6.5	9.8	2007	7.60
Evansville	132	232775	6.0	2.7	9.1	4.1	4.3	8.7	2056	7.63
AVERAGE		997234	14.9	2.8	11.0	5.7	-1.0	11.5	2324	7.68
Migration Averages for 73 other SMSA's+					17.7	11.8	9.9			

* Actually for non-blacks

+ SMSA's larger than Evansville and possessing complete migration statistics.

SOURCES: See footnotes in text.

Table 4. Values of SMSA Variables.

Variable	Name	Mean	Standard Deviation	Coefficient of Variation
Y(1)	e(0) Male (W)	67.524	.808	.0120
Y(2)	e(0) Male (NW)	60.264	1.486	.0247
Y(3)	e(0) Female (W)	75.459	.684	.0091
Y(4)	e(0) Female (NW)	68.865	1.902	.0276
Y(5)	e(50) Male (W)	22.866	.629	.0275
Y(6)	e(50) Male (NW)	20.939	1.153	.0550
Y(7)	e(50) Female (W)	29.013	.654	.0225
Y(8)	e(50) Female (NW)	26.033	1.642	.0630
Y(9)	e(1,50) Male (W)	47.473	.182	.0038
Y(10)	e(1,50) Male (NW)	45.736	.410	.0090
Y(11)	e(1,50) Female (W)	48.230	.078	.0016
Y(12)	e(1,50) Female (NW)	47.407	.374	.0079
Y(13)	Infant Mortality Male (W)	20.479	2.379	.1161
Y(14)	Infant Mortality Male (NW)	42.041	9.810	.2333
Y(15)	Infant Mortality Female (W)	15.403	2.109	.1369
Y(16)	Infant Mortality Female (NW)	32.345	10.245	.3167
Y(17)	GRR (W)	1.117	.077	.0689
Y(18)	GRR (NW)	1.487	.145	.0977
X(19)	Percent Non-White	14.945	7.634	.5108
X(20)	Net Migration	-1.043	4.934	.4707
X(21)	In-Migration (W)	10.900	2.693	.2470
X(22)	In-Migration (NW)	5.697	1.960	.3440
X(23)	Total Population	997233.625	973921.563	.9766
X(24)	Density Index	7.683	.357	.0464
X(25)	Medical Care Index	.879	.156	.1770
X(26)	Welfare	208.966	103.800	.4967
X(27)	Male (W) Labor Force Partic.	.786	.040	.0509
X(28)	Male (NW) Labor Force Partic.	.701	.036	.0512
X(29)	Female (W) Labor Force Partic.	.405	.039	.0957
X(30)	Female (NW) Labor Force Partic.	.478	.049	.1033

SOURCES: See footnotes in text.

Table 5. Simple Correlation Matrix for Variables (Excluding Infant Mortality)

	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10	/11	/12	/17	/18	/19	/20	/21	/22	/23	/24	/25	/26	/27	/28	/29	/30
/1	1.00	.52[b]	.18	.71[d]	.83[d]	.48[a]	.03	.58[b]	.57[b]	.37	.27	.38	.29	.33	-.56[b]	-.05	-.19	.51[b]	.05	.10	-.25	.24	.20	-.28	-.02	.03
/2		1.00	.11	.62[d]	.47	.64[d]	.01	.39	.29	.62[d]	.15	.45	.53[b]	.32	-.34	-.35	-.29	.27	-.12	.00	-.11	.09	.07	.25	-.40	.24
/3			1.00	-.07	.53[b]	.04	.92[d]	-.08	-.41	.05	.08	.21	-.27	-.00	-.01	-.15	.24	-.02	-.02	-.61[d]	.08	-.48[a]	-.22	-.26	.10	-.05
/4				1.00	.54[b]	.65[d]	-.08	.78[d]	.37	.32	.07	.57[b]	.39	.32	-.34	-.10	-.16	.53[b]	.03	.16	-.12	.23	.18	.26	-.03	.04
/5					1.00	.49[a]	.43	.55[b]	.15	.24	.20	.26	.22	.32	-.47	-.26	-.05	.45	-.11	-.43	-.28	-.03	-.03	.08	-.08	-.36
/6						1.00	.05	.65[d]	.13	.05	.15	.17	.43	.28	-.24	-.40	-.28	.23	-.03	.01	-.35	.04	.14	.32	-.26	-.19
/7							1.00	.00	-.61[d]	.02	-.19	-.13	-.26	-.05	.07	-.18	.38	.02	-.38	-.71[d]	.03	-.59[c]	-.33	-.28	.13	.04
/8								1.00	.25	.13	-.14	.08	.28	.06	-.27	-.08	-.12	.59[c]	-.01	-.02	-.17	.24	-.01	.19	-.02	.04
/9									1.00	.23	.36	.21	.15	.05	-.41	.15	-.47[a]	.12	.43	.42	.03	.68[d]	.38	.27	-.14	-.08
/10										1.00	.02	.28	.28	.30	-.49	.09	.09	.48	-.34	-.24	-.00	.03	-.21	.11	-.04	.16
/11											1.00	.23	-.10	.28	-.24	.03	-.24	-.08	.27	.20	.01	.20	.36	.11	-.01	-.12
/12												1.00	.19	.35	-.11	-.13	-.11	.17	.06	.21	.08	.10	.08	.08	-.02	-.07
/17													1.00	.60[c]	-.29	-.42	-.34	.11	-.05	.18	-.49[a]	.11	.28	.29	-.39	-.22
/18														1.00	-.62[d]	-.29	-.17	.12	.20	.04	-.42	.12	.18	.06	-.16	.00
/19															1.00	-.03	.24	-.40	.08	.14	.31	-.41	.04	-.17	-.02	-.16
/20																1.00	.52[b]	.36	.08	.16	.20	-.06	-.01	.26	.72[d]	.69[d]
/21																	1.00	.36	-.52[b]	-.45	.12	-.67[d]	-.13	.07	.59[c]	.57[b]
/22																		1.00	-.30	-.17	-.18	-.05	-.17	.35	.38	.48
/23																			1.00	.55[b]	.28	.55[b]	.09	.04	-.06	-.05
/24																				1.00	.26	.45	.35	.22	-.15	-.14
/25																					1.00	.18	-.36	-.44	.06	-.10
/26																						1.00	.04	-.17	-.21	-.24
/27																							1.00	.48[a]	.03	.08
/28																								1.00	.24	.47[a]
/29																									1.00	.85[d]
/30																										1.00

Key

/1=e(0) white male
/2=e(0) non-white male
/3=e(0) white female
/4=e(0) non-white female
/5=e(50) white male
/6=e(50) non-white male
/7=e(50) white female
/8=e(50) non-white female
/9=e(1,50) white male
/10=e(1,50) non-white male
/11=e(1,50) white female
/12=e(1,50) non-white female
/17=gross reproduction rate white
/18=gross reproduction rate non-white
/19=percent non-white
/20=net in-migration 1960-1970
/21=gross in-migration (white) 1965-1970
/22=gross in-migration (non-white) 1965-1970
/23=total population
/24=density index
/25=medical care index
/26=welfare for non-whites
/27=labor force participation white male
/28=labor force participation non-white male
/29=labor force participation white female
/30=labor force participation non-white female

Levels of Significance

a	.01
b	.005
c	.001
d	.0005

Table 6. Beta Coefficients, Multiple Correlation Coefficients and Percent of Variance Explained by Selected SMSA Characteristics for Life Expectancy and Gross Reproduction Rate.

	Beta Coefficients													
	e(0)				e(50)				e(1,50)				GRR	
SMSA Characteristics	WM	NWM	WF	NWF	WM	NWM	WF	NWF	WM	NWM	WF	NWF	W	NW
Gross reproduction rate (white)*		.47				.06				.33	-.65[b]			
Gross reproduction rate (non-white)*											.44	.57		
Percent non-white	-.34				-.21					-.39	-.24			-1.04[d]
Net migration 1960-70					-.43[a]	-.58[a]							-.24	- .34
Gross in-mig. white 1965-70			-.31	-.39			-.17	-.38						
Gross in-mig. non-white 1965-70	.76[d]	.29		.72[d]	.59[b]	.31		.73[d]		.27				
Total population	.47[b]				.38					.33				
Density index	-.41	-.33	-.62[c]		-.52[b]		-.58[d]						.35	.53[b]
Medical care index		.47	.29				.28			.42		.40	-.50[b]	
Welfare			-.45				-.39[a]		.72[d]					-.65[b]
Labor force part. white male	.49[b]	.41		.25	.22				.20		.51[b]			.24
Labor force part. non-white male						.35			.29			.40		-.37
Labor force part. white female		-.50										.46		
Labor force part. non-white female	-.46[b]										-.34	-.61		
e(0) non-white male+													.39[b]	
Multiple Correlation Coefficient	.85[d]	.76[b]	.74[c]	.70[c]	.81[d]	.66[a]	.82[d]	.69[d]	.80[d]	.72[b]	.69[a]	.54	.78[d]	.84[d]
% of Variance Explained (R^2)	.72	.58	.54	.49	.65	.44	.68	.47	.65	.52	.48	.29	.62	.71

* Excluded as independent variables for fertility regressions

+ For fertility regressions all life expectancy variables were included as independent variables

Levels of Significance
a .01
b .005
c .001
d .0005

Abbreviations
WM white male
NWM non-white male
WF white female
NWF non-white female