ALASKA LEGISLATURE COMMITTEE FILES 1985-1986 8672

3354 HJUD HB 466 (FILE 2)

230

TABLE I.—MULTIPLE REGRESSION EQUATIONS FOR AGE-ADJUSTED TOTAL AND CARDIOVASCULAR DISEASE MORTALITY RATES[1]

[Lag in parentheses][2]

Explanatory variables	Total mortality 1950–80	Cardiovascular-renal disease mortality 1950–80	Cerebrosvascular disease mortality 1950–80	Ischemic heart disease mortality 1951–80
Economic:				
Income:				
Real Inc. PC, Exp. trend	−0.146E-2 (0)	−0.918E-3 (0)	−0.337E-3 (0)	−0.372 (0)
Over 65 Inc. ratio	(#)	−1.081** (0)	(#)	(#)
Labor force:				
Unemployment rate	6.011 (3)	5.481 (3)	1.376 (3) (W3)	1.709* (3)
Unemployment rate	6.978 (9–13) (W1)	3.352 (10)	0.084 (9–12)	(#)
L.F. Part. Rate, over 65, annual change	(#)	(#)	−0.943E-2	(#)
Business failure, annual change	(#)	0.626E-2 (0)	(#)	(#)
Business failure, annual change	0.148E-1 (2)	0.121E-1 (2)	0.378E-2 (2)	(#)
Behavioral:				
Cigarettes	0.124E-3 (4–7) (W2)	0.438E-3 (6)	0.142E-3 (7)	0.168E-3 (10)
Spirits	(#)	(#)	0.837E-1 (3)	0.435 (1)
Beer	(#)	(#)	(#)	−0.648E-2 (4–7) (W4)
Wine, annual change	(#)	(#)	(#)	−0.413 (1)
Animal fat	(#)	(#)	(#)	0.167E-3 (1)
Family and household divorce, annual change	0.815 (1)	0.496 (1)	0.882E-1** (1)	(#)
Other controls:				
Rho[3]	−0.549	−0.533	−0.566	−0.803
Binary var. 1968	(#)	(#)	(#)	0.869*
Binary var. 1979	(#)	(#)	(#)	−0.223
Constant	8.836	5.790	1.162	0.100**
R squared	0.997	0.998	0.999	0.995
F statistics	917.24	1321.840	2395.27	426.200
Durbin-Watson statistic	2.035	2.099	2.290	2.360

[3] Cochrane-Orcutt Transformation used to minimize residual autocorrelation.
(#) Variable omitted from equation either because of irrelevance or statistical insignificance.
[1] Unless otherwise noted, p is less than .001 for coefficients. * indicates p is less than .01. ** indicates p is less than .05.
[2] When lags are spread over a number of years the weighted sum of lags are designated in the table as follows: W1 weights = 1,3,3,2,1; W2 weights = 1,2,3,2; W3 weights = 1,5,4,1; W4 weights = 1,5,4,1.

TABLE II.—MULTIPLE REGRESSION EQUATIONS FOR AGE-ADJUSTED CIRRHOSIS, SUICIDE, AND HOMICIDE MORTALITY RATES AND THE INFANT MORTALITY RATE [1]

[Lag in parentheses]

Explanatory variables	Cirrhosis mortality 1951-80	Suicide mortality 1951-80	Homicide mortality 1951-80	Infant mortality 1950-80
Economic:				
Income:				
Real Inc PC, Exp Trend	−0.198E-4 (0)	(#)	(#)	−0.918E-2 (0)
Real Inc PC, annual change	(#)	(#)	−.263E-4 (0)	(#)
AFDC	(#)	(#)	(#)	−.751E-1 (0)
Labor force:				
Unemployment rate	0.256	0.104* (2)	(#)	32.140 (0)
16-24 Unemployment ratio	(#)	(#)	0.132E-3 (0)	(#)
20-24 male L.F. part. rate	(#)	(#)	(#)	−0.270* (0)
Business failures	(#)	0.150E-3* (1)	(#)	(#)
Behavioral:				
Cigarettes	(#)	(#)	(#)	0.335E-2 (0)
Total alcohol	(#)	(#)	0.767-1 (2)	(#)
Total alcohol, annual change	(#)	(#)	0.392E-1 (3)	(#)
Spirits	0.212E-1* (0)	0.513E-2** (0)	(#)	2.242* (0)
Spirits	0.421E-1 (3)	(#)	(#)	(#)
Spirits, annual change	(#)	(#)	0.156E-1 (2)	(#)
Spirits, annual change	(#)	(#)	0.136E-1 (3)	(#)
Beer ratio	−0.110E-1 (0)	(#)	(#)	(#)
Wine, annual change	0.279E-1* (3)	(#)	(#)	(#)
Narc. arr, annual change	(#)	(#)	0.143E-4** (1)	(#)
Family and household:				
Divorce, annual change	(#)	0.207E-1 (2)	(#)	(#)
Living alone	(#)	0.196E-3* (0)	(#)	(#)
Living alone, annual change	0.776E-3** (1)	(#)	(#)	0.111 (0)
Other controls:				
Rho π	−0.286	0.158	−0.129	−0.497
Nonwhite birth ratio				9.233
Constant	0.161	0.756	−0.132	6.464
R squared	0.984	0.969	0.992	0.999
F statistic	180.848	126.755	354.12[illegible]	1981.930
Durbin-Watson statistic	2.040	2.041	1.990	2.176

[1] Unless otherwise noted, p is less than .001 for coefficients, * indicates p is less than .01, ** indicates p is less than .05.
π Cochrane-Orcutt Transformation used to minimize residual autocorrelation.
Variable omitted from equation either because of irrelevance or statistical insignificance.

TABLE III.—MULTIPLE REGRESSION EQUATIONS FOR ARREST, IMPRISONMENT, AND PSYCHIATRIC HOSPITAL ADMISSION RATES [1]

[Lag in parentheses]

Explanatory variables	Total arrest rate, 1950–80	Narcotics arrest rate 1951–78	State imprisonment rate 1950–80	Psychiatric hospital admissions rate 1950–79
Economic:				
Income:				
Real income PC, Exp. trend	(#)	(#)	−0.790E−4 (0)	−0.143−2 (0)
Real income PC, annual change	(#)	−0.393 (0)	(#)	(#)
AFDC	(#)	(#)	0.935−E** (3)	(#)
Labor Force:				
Unemployment rate	0.162 (0)	2338.740* (1)	(#)	(#)
Unemployment rate	0.100 (6)	(#)	(#)	(#)
Unemployment rate	(#)	(#)	0.727** (0)	3.897* (1)
16–24 unemployment ratio	(#)	(#)	0.515E−3** (0)	(#)
Nonwhite unemployment ratio	(#)	(#)	0.672E−3** (2)	(#)
16–17 male L.F. part. rate	(#)	7.821* (0)	(#)	(#)
Behavioral:				
Total alcohol	(#)	625.924 (3)	(#)	(#)
Total alcohol, annual change	0.497−1 (0)	(#)	(#)	(#)
Spirits	(#)	(#)	(#)	0.437* (3)
Spirits, annual change	0.138E−3 (3)	(#)	(#)	(#)
Narc. arrests	(#)	(#)	0.146E−3* (0−1)	(#)
Narc. arrests, annual change	(#)	(#)	(#)	0.114E−2 (1)
Family and household:				
Divorce, annual change	(#)	(#)	(#)	0.517* (0)
Living alone	0.151E−3 (0)	(#)	(#)	(#)
Living alone, annual change	0.493E−3* (1)	(#)	(#)	(#)
Other controls:				
Rho ϖ	−0.615	−0.276	−0.240	−0.252
Endogenous	0.597 (1)	(#)	1.067 (1)	0.277** (1)
Time trend	(#)	(#)	(#)	0.112
Constant	0.896E−2	−2160.110	−0.122	3.840
R squared	0.995	0.984	0.991	0.982
F statistic	555.001	240.026	316.505	166.680
Durbin-Watson statistic	2.246	2.364	2.114	1.984

ϖ Cochrane-Orcutt Transformation used to minimize residual autocorrelation.
Variable omitted from equation either because of irrelevance or insignificance.
[1] Unless otherwise noted, p is less than .001 for coefficients, * indicates p is less than .01, ** indicates p is less than .05.

TABLE IV.—ESTIMATES OF THE DIRECT [1] EFFECTS OF A 10% CHANGE IN ECONOMIC VARIABLES ON THE INCIDENCE OF SOCIAL TRAUMA BASED ON 1980 POPULATION [2]

	Total incidence	Per capita income decline		Unemployment increase		Business failure rate increase		Annual change in business failure		16–24 unemployment ratio increase		Labor force decline	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total mortality	1,986,000	201,850	1.0	24,450	1.2	5,793	0.3	(3)	(3)	(3)	(3)	(3)	(3)
Cardiovascular mortality	1,035,250	150,631	1 5	17,392	1.7	(3)	(3)	4,783	0.5	(3)	(3)	(3)	(3)
Cirrhosis mortality	30,066	1,172	3.7	409	1.3	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Homicide	25,070	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	470	1.9	428	1.7
Suicide	27,640	1,066	3.8	189	0 7	(3)	(3)	(3)	(3)	(3)	(3)	1,300	4.8
Population in mental hospitals	139,543	(3)	(3)	5,885	4.2	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Imprisonment	304,332	7,964	2.6	(3)	(3)	(3)	(3)	(3)	(3)	18,471	6 0	(3)	(3)
Arrests	9,703,000	(3)	(3)	403,830	4.0	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Fraud and embezzlement	240,584	(3)	(3)	8,078	3 4	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Assaults	654,960	(3)	(3)	4,919	0 8	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)

[1] Direct effects only, estimates of indirect effects are discussed in Chapter V.
[2] Equations based on the years 1950–1980.
[3] Relationships not statistically significant or effects too small to be reported.

VI. APPLICATIONS TO ECONOMIC POLICY

The government's need to ascertain the quantitative implications of its economic policies arises because economic policies, deliberate or not, influence the nation's health and social behavior, and because the government has some responsibility for dealing with the problems of physical and mental illness and aggression.

Traditionally, economic policy has not been formulated on the basis of its objective implications for national health and well-being. Yet, to the extent that economic policy influences national economic activity, it has also influenced the nation's social well-being. Although it is usually assumed that high levels of unemployment, lack of economic growth, business failures, and economic inequality are undesirable and have unfortunate implications, the magnitude of these implications has never been clear.

This study, among others, has indicated the importance of economic growth for health and social well-being, the damaging effects of recession and its attendant losses, and the importance of equity considerations. Hardly a national economic policy decision arises that may not affect health levels, since policies that stimulate or curtail economic growth and employment intrinsically affect socioeconomic status and opportunities for social mobility, and consequently, influence health.

Estimation of Social Costs

Social costs are assessed by aggregating the various types of human reactions, such as mental hospital admission, use of primary and secondary health care, or imprisonment. Monetary costs, on the other hand, are calculated on the basis of: (1) the cost of using institutional facilities (prisons, mental hospitals, hospitals, and other medical care or criminal justice system requirements); (2) the cost to the families of the individuals who are ill, have died, or who have received injuries as a result of crime; and (3) the costs to the economy as a whole of debilitated or injured members of the labor force or of those who died of causes related to national economic distress.

In Table IV we provide estimates of the relationship between the principal economic indicators and changes in social pathology measures as they would have applied at specific times in the past. In this procedure, the full equations containing coefficients of the relationships between the economic indices and the various pathological indices were used. The incidence of societal pathologies was calculated for the 1980 population base.

An aggregate incidence was obtained for each of the indices of pathology based on the sum of the age-specific incidences. The age-specific sum was used rather than the incidence derived from a single equation representing either the total crude pathology meas-

ure or an age-adjusted measure. This is based partly on the differences in reaction patterns among age/sex subgroups to economic trauma and on the need to control for the effects of national economic changes on the population structure.

Effects of economic policy that can be measured would ordinarily be seen in levels of, or rates of change in, such indices as unemployment, per capita income, and business failures. One method of assessing the impact of future economic policies on social welfare would be a tentative forecast of the level of social pathology that would be related to a specific economic indicator. Such a forecast would be based on the historical record of the statistical relationship between the economic and social indices.

For example, in making a decision about the relative social costs of unemployment rates, one might project the values of mortality rates for specific causes that would be associated with different values for unemployment rates. Whether or not a 7 percent rate of unemployment is considered "tolerable," for example, would depend among other considerations on the estimated associated rate of morality.

It should be emphasized that any inferences about the future impact of economic indicators on social indices are built on the assumption of continuity in historical relationships. Two types of relationships are in fact subsumed, one among several economic indices, and the other between each of the economic indices and each of the several social indices. The relationships themselves are based on empirical research using data covering specific historical periods. In making assumptions about the future of any of these relationships, one must first assume that the structure and stability of the relationship will remain as they were during the period over which they were tested. When significant political and social changes interfere with the strength or stability of the basic relationships, assumptions will be altered.

Nevertheless, inferences about future situations are worthwhile. In the absence of more accurate indications of how economic trauma might inflict indirect social costs, they do provide an indication of social costs and benefits of alternative policies.

Derivation of Monetary Costs

a. Methodological Issues Related to Health Costs

DIRECT AND INDIRECT COSTS

The human costs associated with illness and early mortality are incalculable. Even the economic costs cannot be calculated with precision. Considerable progress has been made, however, in the development of methods for estimating the economic costs that occur as a result of illness or death. These represent expenditures on medical care, including hospital costs and fees for physicians' services and for pharmaceuticals. The indirect costs include both morbidity and mortality costs; morbidity costs reflect loss of working time by the ill or disabled, and mortality costs involve loss of expected earnings due to premature death (*1-5*).

The indirect costs of illness and premature death are calculated on the basis of average age- and sex-specific earnings, provided by

the U.S. Bureau of Labor Statistics, as well as on wage supplements. Lifetime earnings, estimated on the basis of these cross-sectional data, take into account that earnings usually increase with age, and are adjusted to account for increases in productivity projected to occur along with economic growth and for varying labor force participation rates according to age and sex.

There is no accurate way to measure forgone productivity due to illness among many women, because the value of household work must be added to earnings. Because there is no market price for household services, the currently used method estimates the cost of replacing household services with person-hours from the labor force (*6*). This method, which is based on time-motion study of housewives and the assumption of labor market replacement of analogous activities, is far from precise. Yet this method is superior to assessment by sample survey of the population's "willingness to pay" for household services, since individual responses would be extremely variable.

DISCOUNT RATE

In order to have a base of comparison with present costs, future costs based on projected earnings must be reduced to their present value, or be discounted. The theory is that costs in the present or near future are more of a burden than those in the distant future. There is agreement among economists on the principle of discounting, but considerable controversy as to the appropriate discount rate to be used in general and in specific circumstances. Indeed, the literature on the discount rate, reflecting this controversy, is extensive and has been reviewed in several contexts (e.g., *7*, *8*).

Calculations of the indirect costs of premature death or disability generally use discount rates ranging from 2 to 10 percent. In the present study, for total and cardiovascular illness (based on data for total and cardiovascular mortality rates), we provide a range of cost estimates based on discount rates of 2.5 percent and 10 percent, since the initial cost data have been worked out for these categories (*9*, *10*).

INFLATION FACTOR

Another issue in economic cost calculation concerns the value of the dollars projected over time. Typically, adjustment is made in the estimates to account for increases in prices of goods and services. The three approaches taken include calculation of increased costs of medical or institutional care, wage rates, and overall prices based on the rate of inflation as measured by changes in the consumer price index (CPI).

In this study, projected increases in medical care costs are used to deflate direct costs of illness; projected increases in wage rates are used to estimate the indirect costs of expected earnings forgone. The CPI is not used for deflation in the illness or mortality costs, but is used to deflate dollar costs of property crime loss. Original data for 1975 on average wages, medical costs, and detailed elements of the CPI are based on the Social Security Administration II B assumptions (*12*) and the Board of Trustees of the Federal Hospital Insurance Trust Fund Annual Report (*13*). These

estimates have been adjusted for the increased CPI, average wages, and rise in medical costs for the years between 1975 and 1980 by data from the Board of Trustees of the Federal Old Age and Survivors Insurance and Disability Insurance Trust Funds (*14, 15*).

PREVALENCE APPROACH

In the economic cost calculation of forgone earnings, this study has adopted the prevalence method of estimation. In the prevalence approach, the medical expenses of all cases prevalent during a particular year are calculated, and indirect costs from future earnings forgone due to mortality are assigned back to that year. It would also be important to know the lifetime costs associated with the incidence of disease, or the cost per new case of disease from onset until cure or mortality. This incidenced-based method of estimating lifetime costs is difficult to calculate.

The difficulty lies in the need to take into account the likely course of a disease; the type, volume, and cost of medical care that is usually used; the severity and duration of illness; and the effect of morbidity and mortality on earnings. Data and knowledge limitations preclude the use of the incidence method in this study. In the future, such incidence-based procedures as have been developed by Policy Analysis, Inc. (*4, 5, 11*) could be adopted. At present, we use the available cost calculations provided in *Health: United States, 1980* (*9*) and *Costs of Disease and Illness in the United States in the Year 2000* (*10*).

b. Cost of Total Illness and Diseases of the Circulatory System

For estimating the costs of total illness and diseases of the circulatory system, we use two alternative estimates for indirect costs, based respectively on a 2.5 percent and a 10 percent discount rate. The 1975 figures are taken from *Health United States, 1980* (*9*) and *Costs of Disease and Illness in the United States in the Year 2000* (*10*). Linking mortality in this study with total economic costs of recession assumes that the impact of recession on direct care and morbidity costs is comparable to its impact on mortality.

For each group, the *Year 2000* and *Health 1980* reports estimated three types of cost in arriving at the economic cost of illness for 1975. These costs were inflated to 1980 levels as follows:

—direct costs of prevention, detection, and treatment were increased to 1980 levels by using the same percentage increase that occurred in estimated personal health care expenditures from 1972–1975 and by adjusting these figures for a 57.69 percent increase in medical care cost between 1975 and 1980.

—indirect costs of disability (morbidity), the lost earnings and value of unperformed housekeeping services resulting from illness, were increased to 1975 levels by the percentage increase in average wages over 1972–1975, and adjusted for a 49.3 percent increase in average wages to 1980.

—indirect costs of premature death (mortality), the present value of expected lifetime earnings or the market value of housekeeping services, were increased to 1980 levels by the percentage increase in average wages over 1972–1975 and

again adjusted for a 49.3 percent increase in average wages between 1975 and 1980.

The final step was to link the equation-based estimates of the impact of economic instability on total mortality and on cardiovascular mortality with these estimates of the costs in 1980 of total illness and of diseases of the circulatory system.

Table A in Chapter II provides the proportion of total stress incidence attributed to various kinds of economic indicators; e.g., .023 is the proportion of deaths from all causes related to a 14.3 percent increase in the unemployment rate.

Table B in Chapter II provides dollar costs associated with the changes in stress following the author's 1976 methodology in "Estimates of Selected Economic Costs of Unemployment." For example, if the cost of illness is $366.6 billion in 1980, then the economic loss associated with a 14.3 percent rise in the unemployment rate is $366.6×.023 (billion)=$8,479 million at a 10 percent discount rate for obtaining indirect costs. The same estimate discounted at 2.5 percent yields $12,371 million.

COST OF TOTAL ILLNESS

[In billions of dollars]

	Direct cost	Indirect cost	Total cost
(i) Using 10 percent discount rate:			
1975	118.5	120.4	238.9
1980	186.9	179.8	366.6
(ii) Using 2.5 percent discount rate:			
1975	118.5	204.1	322.6
1980	186.9	304.7	491.6

COST OF DISEASES OF THE CIRCULATORY SYSTEM

[In billions of dollars]

	Direct cost	Indirect cost	Total cost
(i) Using 10 percent discount rate:			
1975	15.9	29.7	45.6
1980	25.2	44.4	69.6
(ii) Using 2.5 percent discount rate:			
1975	15.9	50.4	66.3
1980	25.2	72.3	97.5

One of the measures of social trauma used in this report to indicate the impact of unemployment is suicide. Data used to develop an estimate for the economic cost of suicide in 1980 were originally taken from "The Cost of Mental Illness—1974" (*16*). The economic value of life lost through suicide is based on an estimate of the current market value of future earnings lost because of the suicide. The study mentioned above indicates that the cost of deaths due to mental illness in 1974 was estimated to be $4,942 million. To arrive at the percentage of deaths due to mental illness that are due specifically to suicide, it was necessary to use an earlier study, "The Cost of Mental Illness—1971" (*17*). This study indicates that sui-

cides represent 21.7 percent of the total number of deaths due to mental illness (the study assumes that all suicides were due to mental illness). Applying this percentage, the cost of deaths due to suicide in 1974 is $1,145 million. Because 1975 is used in this analysis as the reporting year for economic costs, the 1974 cost of suicide ($1,145 million) was adjusted for the 26.4 percent increase in average wages between 1975 and 1978, resulting in $1,448 million for 1978.

Another measure of social trauma used in this report to indicate the impact of economic distress is that of utilization of state mental hospitals. Based on data in "The Cost of Mental Illness—1974," the direct care expenditures for hospitalization in state and county mental hospitals were $2,756 million in 1974. First admissions to state and county mental hospitals were 29 percent of total admissions in 1972. The $3,263 million direct care cost in 1975 was adjusted for an increase in medical care cost of 42.19 percent between 1975 and 1979, resulting in a rise to $4,640 million.

Another element in the economic cost of state and county mental hospitalization is the value of the time lost, as reflected in lost wages of individuals in these institutions. "The Cost of Mental Illness—1974" indicates that in 1974, $4,524 million was lost to all patient care activities. In order to find the percentage lost only to care in state and county mental hospitals, it was necessary to use an earlier study, "The Cost of Mental Illness—1971." This study indicates that 54.3 percent of the value of time lost to all patient care for mental illness can be attributed to state and county mental hospitalization. Applying this percentage to the total 1974 cost of time lost to patient care ($4,524 million) yields an estimated cost of $2,457 million of time lost to patient care in state and county mental hospitals in 1974. Similarly, the lost earnings in 1975 were adjusted for a 37.56 percent increase in average wages, equalling $3,610 million.

After adjustment of the 1975 data, the sum of the direct care cost of $4,640 million and the indirect cost of the loss of potential earnings of $3,610 million for first admissions to state and county mental hospitals totalled $8,250 million in 1979. The table below shows the estimates for 1975 and 1979.

COST OF MENTAL HOSPITALIZATION

(In millions)

	1975	1979
Direct costs (of care)	$3,263	$4,640
Indirect costs (lost earnings)	2,624	3,610
Total	5,887	8,250

c. Methodological Issues Related to Costs of Crime

MEASURES

Efforts to determine the cost of crime generally consist of assigning money values to the consequences of criminal actions. While, at

first glance, estimating the costs of crime might seem relatively simple, there are problems involved in arriving at a figure that reflects either the total of crime or that of specific crimes (*18*).

One critical problem is the lack of agreement among those working in the area as to what should be included in crime cost estimates. Some writers limit their costs to criminal justice system expenditures, while others include property losses, earnings made through criminal activities, or expenses on preventive measures used by people to avoid crimes. Some researchers focus on indirect costs, including losses to society resulting from crime. Others feel that the costs of crime are inherently unquantifiable, especially when one considers the fear of crime and the ways such fear alters people's lives

The fundamental problem is that there are no reliable measures of crime itself—whether it results in reports to the police, death, arrest, imprisonment, or public reactions—for the actual amount of crime in society is unknown and inherently unknowable.

In this report, five types of measurement were considered, related partly to the author's 1976 report. The first is lost productivity (based on forgone earnings) of victims. This measure was used in 1976 to estimate homicide costs, in a manner similar to the cost estimates of other forms of mortality, and is retained in this report.

The second measure is based on the concept of underutilization of imprisoned manpower. The concept is that each inmate is assumed to be capable of earning the mean household income (based on census data) earned by employed members of the labor force with his educational and occupational background. Average earnings derived by this method adjust for the fact that inmates include a larger proportion of nonwhites than the population at large. But no adjustment is made for the higher unemployment rate that would prevail among persons at high risk for engaging in crime and becoming imprisoned (*19*). In addition, data on age-specific incarceration were unavailable after 1973. Because of these problems, the present study does not calculate such costs of imprisonment.

A third measure represents the costs of loss of money and physical property due to property crime. In this report, we use that measure in the estimate of white collar crime.

A fourth measure involves criminal justice system (federal, state, and local) costs and includes expenditures for police protection, courts, legal services and prosecution, indigent defense, and corrections. This measure is used in the present study.

A fifth measure involves the value of illegal goods and services that are the products of organized crime; the vast majority of these are narcotics and dangerous drugs. This measure, in addition to the forgone earnings of victims (of homicide), losses due to property crime, and criminal justice expenditures and related costs, was used for the estimate of total crime costs. The estimates are all taken from the Joint Economic Committee figures of 1976. For purposes of estimating economic costs of crime, the following indices were used: (1) homicide, which is only used to account for costs related to mortality caused by homicide; (2) the arrest rate for fraud and embezzlement, which is used as an indicator of white collar crime; and (3) the total arrest rate, which is used as a broad indica-

tor of total crime, and, more narrowly, as ar indicator of criminal justice system activity.

DOUBLE COUNTING

It should be pointed out that, because of the difference in measures of crime costs that are used in this study, one must be careful to avoid double counting. For example, the costs of homicide might include those of arrest, court adjudication, and imprisonment of persons responsible; the same costs might also be separately allocated to operation of the criminal justice system. Another common example is the confusion of the costs of drug abuse with those of crime, because of the tendency of the addicted population to use illegal methods to support the drug habit. Because drug abuse usually involves (costs of) crime, it cannot be reasonably added to the costs of crime.

This problem of double counting is most often an issue in crime cost accounting, but is also seen in the estimation of illness and mortality costs. For instance, for the population as a whole, the costs of a high suicide rate might be understood to involve mental hospital treatment of attempted suicides. Such costs attributed to suicide should then not be added to those of mental hospitalization, where the intention is to obtain a broad estimate of the costs of psychological disorder.

d. Cost Estimates for Crime

Though estimates of the cost of crime must rely on a tenuous base of information, the cost is clearly enormous. The direct costs of crime, its control, and prevention are massive. When the indirect costs resulting from loss of life, loss of income, and higher costs of goods and services are added, the costs rise even higher. From time to time, various agencies of government have tried to measure the economic impact of crime. In 1976, the Joint Economic Committee of the United States Congress published an estimate of the cost of crime that exceeded $125 billion per year (*20,* p. 26).

HOMICIDE

The economic costs of homicide were estimated by using the 1974 homicide statistics collected by the Division of Vital Statistics of the National Center for Health Statistics (*21*) and the Social Security Administration's estimates of lost earnings from death (*12*). Based on a conversion of the 1972 earnings into 1975 figures, it was found that the estimated 1975 economic cost of homicide mortality would have been over $5,406 million. This estimate was then adjusted for a 49.3 percent increase in wages between 1975 and 1980. The 1980 economic cost of homicide mortality alone would have risen to $8,076 million.

WHITE COLLAR CRIME

The second index of criminal activity employed in this study is white collar crime. White collar crime is among the fastest growing types of criminal activity. According to the Joint Economic Committee projection of 1976, 35 percent of all crime is attributable to

white collar crime. This encompasses, inter alia, bankruptcy, fraud, bribery, payoffs, computer crime, consumer fraud, illegal competition, credit card and check forgery, embezzlement and pilferage, insurance fraud, and securities theft and fraud. The estimated cost in 1976, $44 billion, was adjusted for the CPI increase of 44.8 percent between 1976 and 1980. The outcome is a cost of $63.8 billion in 1980 attributed to white collar crime.

CRIMINAL JUSTICE SYSTEM AND TOTAL CRIME

The arrest rate is taken, in this study, as an indicator of, at a minimum, criminal justice system costs and, at a maximum, total crime costs. The estimated cost of the criminal justice system, representing 18 percent of total crime costs in 1976, was $22.7 billion, according to the Joint Economic Committee Report of 1976. These costs are inflated by 44.8 percent between 1976 and 1980, with a resulting figure of $32.9 billion for 1980.

Overall crime costs, estimated by the Joint Economic Committee in 1976 as $125.2 billion, are similarly inflated by 44.8 percent between 1976 and 1980 to yield a 1980 figure of $181.3 billion.

PROBLEMS IN THE ESTIMATION OF SOCIAL COSTS

This study attempts to provide estimates of the social costs of economic change for both the recent past and the near future (based on projections). First, however, it is necessary to delineate two problems caused by the preliminary nature of our calculations: (1) a comparatively small number of pathological indices that are used to represent "social costs," and (2) the fact that pathological indices measure extremely severe reactions rather than typical effects. These elements point out that we have just uncovered the surface in estimating social costs of national economic distress.

The first problem is the relatively small number of pathological indices examined. The estimates presented here should be taken only as indicative of the great breadth of pathological reactions in the population. Although our present level of knowledge prevents accurate measurement of the full amount of social pathology associated with economic trauma, we can asume that it exceeds the estimates given in this report.

Our second major problem in estimating the overall social costs is the use of extraordinarily severe measures of pathology. These extreme indices can theoretically be extrapolated to the larger conception of mental and physical ill health and criminal aggression. If we wish to estimate the total "human cost" or the monetary cost of the impact of national economic distress in the light of these broad conceptual issues, then we must take into account two additional levels of analysis.

In the case of mental illness, we must extrapolate from mental hospital admission to other forms of general medical care and, finally, to the general mental health of the population, including those who do not receive care. For physical health, we must extrapolate from mortality to hospitalization and the use of primary and secondary health care, and finally, to the general status of the population's health, whether or not medical care is used. In considering aggression, we begin with the extreme indicator of imprison-

ment, and extrapolate to entrance into the criminal justice system (from arrest through conviction); then we must infer the behavior of criminal aggressors, including those who are not arrested and whose crimes are not reported, and finally extrapolate to the status of the population with respect to the variety of serious aggressive behavior.

Perhaps we have underestimated the impact of these relationships because of data inadequacies, incomplete theoretical formulations, and confinement of the analysis to the national level. The problems of data inadequacy are evident in the case of admissions to mental hospitals and prisons. The count of admissions is probably accurate, but the degree to which hospitalization and imprisonment are reliable measures of serious mental disorder and serious crime will vary with, among other things, administrative policies of these institutions. Thus, the extent of mental disorder and criminal aggression, of which institutionalization is one index, is not only unknown, but may change through time. Moreover, trends in the institutional indices of mental disorder and criminal aggression are probably least sensitive to the effects of economic and social change simply because they display relatively little variability over time in comparison to non-institutional measures.

The problem of incomplete theories with respect to the effects of stress on serious pathology—let alone the effects of economic trauma on stress—have similarly been understated. The basic theories have not been completely worked out, and few studies of these phenomena at the individual level are available for use in national policy analyses. Thus, we have had to make several assumptions about the structure of such relationships on the national level, including a number of non-economic explanations of trends in the pathological phenomena. We do not presently have the data base needed to pinpoint which groups among the populations will be most sensitive to national economic changes, which further restricts the sharpness of our analysis. We are forced to examine large populations, only a small proportion of which actually reacts pathologically.

Still, it should be noted that certain important factors that could have a bearing on types of pathology that individuals might show in response to economic trauma could not be dealt with in this report. Such factors include personality, political or religious persuasion, and previous conditions of poor physical health or mental health.

The relatively consistent findings of the present study appear all the more remarkable in the face of problems associated with data inadequacies, incomplete theories, and aggregate levels of anlaysis. It is therefore conceivable that under more nearly ideal study conditons the relationships would be found to show even greater statistical strength.

We are quite aware, however, that the models offered here are by no means structurally complete. They represent only a second-stage research effort and are based on earlier scientific work in several different disciplines. The translation of theoretical positon and discovery into policy-oriented, empirical models was based on relatively simple assumptions of linear relationship between the economic and pathological indices. These assumptions of linearity

are probably imprecise, because they do not take into account the duration and rate of change in economic distress. For example, they assume that a change in the unemployment rate from 2 to 3 percent would have a pathological impact similar to that of a change from 7 to 8 percent. Increases at higher levels of unemployment may have considerably more deleterious effects.

Discussion of the Findings Based on Recession-Related Indices

Unemployment and business failures are the two principal recession-related influences at all ages, judging by total and cardiovascular mortality, but labor force participation rates, hours worked in manufacturing, and annual changes in per capita income are also useful to describe other short-term impacts of recession. Because unemployment often shows a major effect after 2 or 3 years, it is difficult to measure shorter lags using the same unemployment variable. The alternative recession-related indicators may be independent enough of the unemployment rate to allow observation of effects of recession that occur within less than 2 years.

No short-term recession-related relationships were found to occur for cirrhosis mortality. An age-specific income ratio, however, was a significant contributor at all ages to the explanatory model. It suggests that, in the short run, doing relatively poorly constitutes a high risk situation for pathological drinking, or drinking and drug use combined. Also implicated are the stresses of social isolation and the delayed effects of unemployment, which may work to set off the pathological processes that may result in death a decade later.

With respect to homicide, which also lacks a short-term recession-related variable in the multivariate equation, there is probably another aspect of relative deprivation at work. All other indices of crime, it should be noted, are highly recession-related. With homicide, however, the unemployment variable is the youth unemployment ratio, not an indicator of recession. We interpret this to mean that the youth respond violently to a situation of sharp contrast between comparatively good societal economic conditions and their own chronic unemployment or underemployment with little prospect for improvement.

A final observation is in order on the interpretation of the recession indicators in the context of multivariate analyses. Because many factors are required to develop acceptable empirical models of hypothesized relations between recession-related loss and pathological response, it is not possible to consider the effects of any isolated variables. For instance, although a 10 percent increase in the unemployment rate may be associated with a 5 percent increase in mortality from some cause, it does not follow that one can see exactly a 5 percent change in the vital statistics a year or two after the rise in unemployment. Many other trends and changes are at work simultaneously, either to raise or lower the actual rate. Only if other trends and changes were somehow controlled could the unemployment effect be isolated.

Research Priorities

Our findings further corroborate earlier research on the statistical effects of economic declines on measures of social pathology. They also confirm the tradition of research on the inverse relationship between socioeconomic status and pathological consequences of economic distress. The research in this paper allows the problem to be evaluated in terms of economic distress originating at least partly at the national level. The implication is that substantial components of societal stress originate with economic maladjustments that, in turn, can be moderated through national economic policy actions.

It is hoped that this effort will encourage research on the impact of economic policy on societal well-being. Solutions to many of the major problems found in the work presented here will doubtless be found as research proceeds on the national and urban levels. It is probably to the urban level, particularly, that we need to look for a determination of the negative effects of long-term growth in economic affluence. It is on the urban level, moreover, that the largest differences in unemployment rates prevail. It is clear that we need to examine these relationships by comparing cities, states, industries, and occupational groups.

Comparisons should also be made at the international level. Extension of this comparative research to other countries will bring us closer to understanding the sources of pathological response to changes in economic conditions.

Finally, a research priority is the determination of which components of economic growth have the most impact on the indices of societal well-being. For example, it would be important to determine what proportions of declining mortality are statistically related to increased availability and use of medical technology, to nutrition, or to the general decline in the physical and emotional stress of work life. It would also be important to break down the components of the CPI to determine whether price increases of specific goods and services are most responsible for the pathological effects or, in fact, whether it is the implication of changes in the income structure (related to changes in price levels) that is behind the relationship of inflation rates and pathology indices.

Refined applications that go beyond the use of the broad findings of the present report require far more extensive analysis. Such research can be undertaken in both the national and subnational (even individual) levels of analysis. Efforts should be made to study populations that tend to undergo substantial economic difficulty that is heightened by national economic adversity. This is especially true of many urban centers in the United States, where serious pathological problems as well as high unemployment and relative economic decline have coexisted in recent years. In addition, age, racial, occupational, and industrial groups that are particularly vulnerable to the instabilities in the national economy represent a priority for substantial study, as it could provide the basis for targeting specific ameliorative economic measures to populations where they would provide the greatest benefit, in terms of both effectiveness and efficiency.

It is also important to evaluate the effects of non-economic ameliorative programs on the physical health, mental health, and criminal justice areas in light of national, regional, and local economic trends. It may be that, in many instances, the ameliorative programs are overwhelmed by the effects of the economic trauma and can only prevent greater pathology.

Well-designed research at the individual level should help to identify how strongly different kinds of economic trauma affect the tendency toward serious physical and mental health pathologies and aggression in the population. For example, population cohorts could be followed and intensively examined over periods of several years to ascertain the effects of the economic changes specific to their lives, as economic changes tend to be associated with specified pathological conditions.

Studies of the relationship of economic change to societal pathologies in individuals have often lacked controls for other risk factors, focused too narrowly on employment status, and been inadequate in size of sample. Research over the past several years has shown that it is critical to consider the established risk factors for specific pathologies, such as the controls in the present study for cigarette smoking and alcohol consumption in the analysis of chronic disease mortality. Research has also revealed the pervasive effects of economic conditions in a family, work organization, community, or region. Because recession-related losses are felt not only by the unemployed, but by their families, former co-workers, and neighbors, a comparison should be made between persons in regions or communities differentially affected by economic changes, not just between the unemployed and the employed. These analytic considerations will require large sample sizes if the results are to be statistically meaningful.

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APPENDIX A—METHODOLOGY

Analytic Techniques

The statistical analyses in this study were performed using the Time Series Processor (TSP) computer programs for multivariate time-series regression analysis. Standard statistical procedures for analyzing multiple variables were used. Routine tests for significance of individual variables and of complete equations are shown in the tables. The Durbin-Watson test for autocorrelation of residuals is also reported. Since it was found useful in all cases to transform the data to minimize serial correlation, the Cochrane-Orcutt procedure was employed for this purpose; rho values are included in the tables.

Despite the theoretical strength of the models under study, in many instances specific variables were not found statistically significant. Of these, several were omitted in the final equations because: (a) their t values are near zero, (b) their presence as statistical controls is not required, and (c) their presence tends to damage the statistical significance of the overall equations (F or DW values). Several other variables whose t values are greater than zero, but not technically significant, were retained in the final equations if: (a) they are needed for statistical control and (b) their presence does not damage the statistical significance of the overall equations.

Data Sources and Limitations

The data are those routinely used in this country for measuring a variety of economic and social conditions at the national level. Sources are listed at the end of this chapter. While generally the analyses cover a time span from 1950 through 1980, exceptions occur on account of variations in the availability of data. Analysis begins later when either the measure of societal pathology or some important control variable could not be obtained for earlier years. Similar problems arise at the end of the period. Analyses of mortality by sex, age, and cause, for example, terminate in 1978 for lack of later cross-classified data. Total mortality and mortality for each cause by age, but not cross-classified by sex, are analyzed through 1980. However, the last two years of the series—1979 and 1980—are data estimated on the basis of a 10 percent sample of death certificates. It is worth noting that such delays in the tabulation and publication of basic national social statistics handicap researchers and policy-makers alike who require detailed current information for analysis and forecasting.

29-726 O—84——7

Tests of Validity

Total mortality and mortality for each of four causes were examined by 10-year age groups for each sex separately (1951–78) and for the sexes combined (1950–80). Nonwhite mortality in 10-year age groups was analyzed for the period 1950–77. Where possible, e.g., arrests and mental hospital resident patients, each of the other categories of pathology was examined by age group. The purpose of the replications by demographic group and categories of pathology is to validate the findings on basic relationships. To the extent that consistency of results is observed among the many replications for each of the main economic indices, additional confidence may be placed on the validity of the relationships associated with each of the indices.

Two other factors made it desirable to examine the relationships between the economic and social indices by demographic groups. The relationships do, indeed, vary by age, sex and race. Thus, representation of the relationships only by the total rates of the pathological indices can be seriously biased by the influence of a minority of subgroups which dominate the totals (e.g., the age groups over 75 in the case of total mortality, or those over 65 in mental hospital admissions).

A second factor that would cause bias is that changes in the economic indices are often associated with changes in the demographic structure of population. Disaggregation of the pathological indices into age-specific components was used to deal with this problem. Technically, then, specification of the pathological data by age, sex, and race was used to obtain more accurate estimates of the coefficients of pathology associated with the economic indices, and subsequent translation of those coefficients into numerical estimates.

For the most part, however, it was decided not to utilize corresponding age/sex-specific unemployment rates or income measures in the analysis of pathological indices classified by these demographic categories. The most important factor in this decision is that the correlation between fluctuations over time in the national unemployment rate and those in the age- and sex-specific rates is extremely high. This means that, over time, subgroup-specific fluctuations in unemployment rates are virtually indistinguishable from those in the national rates, although the size of the coefficients would probably differ, and the resulting empirical models would be very similar. Furthermore, data for the subgroup-specific unemployment rates did not become available until 1947, which considerably narrows the span of time available for analysis of relations with long lags.

As a test of the assumption that the total unemployment rate and the age-specific unemployment rate would yield very similar results, an appropriate age-specific male unemployment rate was tested in analyses of total mortality for both sexes in ten-year age groups, starting with 25–34, for time spans ending in 1978 and 1980. The test was limited to the shorter lags of unemployment, since the age-specific data are available only beginning in 1947.

From the standpoint of interpretation of the relations between economic fluctuations and pathological indices, the use of sub-

group-specific unemployment rates may actually be quite misleading. Not only is there a lack of independence among the subgroups in their unemployment rates over time, but there is a lack of independence among different age and sex groups in their social and economic status because they are bound together in family and other social units. Thus, the economic implications of unemployment or income loss of a breadwinner may be quite substantial for the entire family whose members are of diverse ages and both sexes. A more realistic index of psychological stress due to income loss would be a measure of deterioration in family socioeconomic status, for which data are as yet unavailable.

Apart from the economic interdependency of people of different characteristics is the problem of diffusion among different members of a family of psychological stress generated by economic trauma frequently mediated through only one member's relationship to the economy. For example, for a working wife the emotional stress of unemployment may bring about severe agitation, depression, or deterioration in physical health status. Such conditions might have serious pathological implications for her relationships with family members, friends, neighbors, or other associates. Her husband and children might well become hostile or withdrawn and eventually exhibit adverse patterns of reaction separate from those of the person who initially encountered the economic trauma.

Thus, although the initial mental stress has been encountered by one individual, what results is stress to the entire family or even the larger community. In situations where an entire family is undergoing stress initiated by the actions of one of its members, it is often difficult to predict which of the members will actually show the most serious pathological reaction. The probability of pathological response will depend, at least in part, on the previous mental and physical condition of the individuals involved. To take this problem of diffusion one step further, it may be found that high anxiety levels are generated among workers who are themselves not unemployed, but who observe a high incidence of job loss around them, and then become fearful for their own employment and income.

The Problem of Causal Relations

The research techniques utilized in this study are essentially based on statistical correlation and regression analysis. As in all research based on correlation or regression, it is important to state the caveat that one cannot establish causation with these procedures. At most, one can test specific hypotheses grounded on sound theoretical considerations and earlier research findings. In these tests, the hypotheses are either supported or unsupported by the statistical evidence. Even when they are supported on the basis of statistically significant relations, they are not proven since the statistical tests only indicate whether or not the findings may result from "chance" factors at specific levels of probability.

In addition to the problem of lack of causal certainty is the issue of possible spuriousness, even for the relations found to be statistically significant. Regardless of stringent controls, outside influences may have unobservable effects on the relationships. The pos-

sibility remains that we have not taken all relevant factors into account, especially since the state of our knowledge in the fields involved is incomplete. Thus, some unknown factor may be influencing both the economic trends and those of the pathological indices. Finally, it is probable that the techniques of measurement used in constructing the economic or social indices are not without some error. To the extent that such measurement error exists, our results may be biased.

Having stated the caution on causal interpretation, we should nevertheless point out that the statistical techniques used in this study are standard for the problems encountered, and do not necessarily involve greater error or bias than would be true in other research based on correlation or regression techniques.

Analysis

The pathological indices, or the dependent variables in this analysis, included: total mortality rate (age-, sex-, and race-specific); cardiovascular-renal disease mortality rate (age- and sex-specific); suicide rate (age- and sex-specific); admissions to mental hospitals; patients in mental hospitals (age-specific); imprisonment rate; total arrest rate (age-specific); selected serious crimes known to the police.

From the standpoint of research strategy, we are interested in a single question. What is the empirical relation between economic changes and pathology patterns, holding constant other aggregate-level factors which tend to influence those pathology patterns? To answer that question adequately, it is necessary to select control variables which, on both theoretical and empirical grounds, can help to explain the variance in the pathology patterns that is not appropriately accounted for by the variables which represent economic changes. To the extent that the control variables perform in that classical manner, we will neither overestimate nor underestimate the importance of the economic variables.

It is toward this end that a multivariate operational model of the relation between national economic changes and mortality rates has been developed over the past several years. Theoretically grounded in the epidemiologic, demographic, and stress research literatures, the regression model includes factors associated with: (1) long-term growth in the economy; (2) economic instability—especially recession as indicated by unemployment, income loss, business failures and recession-related declines in average weekly hours worked in manufacturing industries; (3) physical environmental disturbances; and (4) deleterious behavioral risk factors historically associated with economic growth—especially alcohol and cigarette consumption per capita and measures of social isolation, such as divorce and living alone.

Lagged Endogenous Variables

Mental hospital admission, mental hospital resident patients, imprisonment, arrests, and crimes known to the police all involve institutional intervention in the process that links incidence of initial pathology to official recording of the occurrence. These mental health system and criminal justice system interventions impose

trends and cycles of their own on demographic changes in the recorded data. It is these intervention-based trends and cycles that frequently give institutional data "self-generating" properties. These properties in turn are measured by the lagged endogenous variable. Lagged endogenous variables were utilized to measure the trend of cyclic patterns of institutional activity in all cases where factors involved a "system" response to a specific pathology, intervening between the incidence of pathology and its offical record.

Analysis of Lag Relations

Analysis of the lag structures of each of the time-series relations was accomplished in the following four stages: (a) theoretical specification of the relevant time span over which the relation may lag; (b) estimation of the actual range of statistically significant lagged relations; (c) narrowing of the range of significant lagged relations under conditions of multivariate statistical controls; and (d) selection of the optimum lag, within previously determined range, under multivariate controls.

The last stage, selection of the optimum lag, is the most difficult since, in fact, the relations usually take place over several years and the "optimum" lag is eitner the strongest or the average. The ideal procedure, when degrees of freedom permit, is to express the relations in distributed lag form, typically polynominal. This method can be used if we find the number of independent variables to be relatively small, i.e.. under six, for a given equation. In the case of this study, however, the combined number of independent variables and controls precludes the use of the polynominal distributed lag method due to insufficient remaining degrees of freedom.

In order to illustrate points (a) and (b) of this procedure, let us take, for example, the case of the unemployment rate in its theoretical relation to the general mortality rate. We can specify, theoretically, that three periods are involved in this relation, covering an overall span of sixteen years. The first period—involving the fear and shock of major economic loss—covers less than two years including the zero year and the first lagged year. The second period covers the span of post-recession depressed employment, which typically last 2-3 years following an "ordinary" recession, and 3-5 years following longer and deeper recession, and culminates in economic reintegration. But, for the population over 40, reintegration probably occurs only with another loss in socioeconomic status. The third and fourth periods are those in which vulnerabilities arising from the first 1-5 years of economic loss and illness result in subsequent illness and mortality. These vulnerabilities are greatly compounded by the occurrence of a new recession.

In this example, we have limited ourselves to a total span of investigation of lagged relations covering fifteen years. In the present study, since the total period of analysis is from 1950 to 1980, it is unlikely that we will be able to measure "cyclical" influences of much greater than fifteen years of lag. Empirically it has been observed in previous studies that lags of unemployment of about 7-15 years have tended to show positive relations to general mortality rates. As a result of those earlier findings, we can, in the present study, take the theoretical position that a principal factor underly-

ing the existence of those two relations is the vulnerability to future episodes of loss and illness of people who have once experienced major loss and illness, especially as engendered by the cyclic movements of national economic activity.

During the present study, it was again confirmed that patterned relations do exist between the unemployment and mortality rates at lags of greater than five years, and that the range of these lagged relations is 7–15 years. Further, the peak lags within this range were found at approximately 10–11 years. The hypothesis was then once again entertained that it is specifically vulnerability to subsequent recession that tends to account for the peak lags, beyond five years, of the unemployment-mortality relationship.

An examination was then made of the average distances between recessions in the post-War period as they are recorded in the Business Conditions Digest. It was found that there tended to be a range of 10–11 years that is, indeed, so regular as to give the appearance of a true periodicity of recessions at roughly each decade (i.e., 1949, 1960, 1970, 1980). These findings provided empirical support for the view that the peak ranges and, especially, the peak lags in the unemployment-mortality relation actually reflect vulnerabilities to the trauma of recession that are engendered by the experience of past recessions.

Subsequent analysis, nevertheless, determined that the peak lags of approximately 10–11 years in the unemployment-total mortality relation were clearly part of a longer distributed lag process. This distributed lag process ranges over the entire span of 7–15 years. It is evident that part of the reason for the relatively long span of lagged relations in total mortality is that it describes a compositional effect which reflects different lag patterns among categories of mortality which have different chronic disease causes. Thus, the cirrhosis of liver mortality-unemployment relations, over the long term, tend to peak at approximately 9 years while cardiovascular mortality does so at 10–11 years (and subcategories of cardiovascular disease, by age, also vary somewhat in their peak long-term lag).

Stability of the Relations

It is a matter of concern in time series analysis that relations be relatively stable across the time span of analysis. To the extent that the relations—which can be understood as average relations—are unstable, they will be less appropriate for explanation of variance, over any intervening span, or for forecasting. Also, it is reasonable to test the basic explanatory equations and especially the theoretically crucial variables, for time spans that are not covered by them.

The principal explanatory equations were therefore tested for internal 1950–1980 stability through the Chow test. This test splits the period in two—i.e., 1950–1965 and 1966–1980—and compares the resulting two fitted equations according to the magnitudes of their coefficients. Equations explaining mortality rates for the nine principal age groups (infants, 1–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74 and 75 and over) were analyzed in this way. The result was that no significant difference could be found between the two

periods in the coefficients of the economic variables and almost all other variables. The only exceptions were that in two age groups specific control variables had to be removed from the equations in order to achieve stability for the economic variables. For 15–24 year old mortality rates cigarette consumption, divorce rates and the proportion of the population living alone were removed; for 65–74 mortality rates, spirits consumption was removed.

Additional tests were performed using equations which were initially fitted to 1950–1980 over the periods 1960–1980, for each of the nine groups. In all cases the short-run relations of the mortality rates to recessional indices, especially the unemployment rate, were found at similar lags. For infant mortality the peak lag was zero; for all other age groups the peak lag was at approximately 3 years during 1950–1980 and 1960–1980, and 2–3 years during 1940–1960 and 1950–1970. For three time spans, 1950–1970, 1950–1980, 1960–1980, the longer-term lagged relations between unemployment and mortality rates over age 45 were significant at 7–15 years; for 1940–1960 those relations were significant at 9–12 years.

Principal Data Sources

Per capita real income: U.S. Bureau of Economic Analysis. *The National Income and Product Accounts of the United States, 1929–1974;* Survey of Current Business.

Unemployment rates and ratios: U.S. Bureau of Labor Statistics. *Employment and Earnings,* monthly.

Labor force participation rates: U.S. Bureau of Labor Statistics. *Special Labor Force Reports.*

Business failure rate: Dun & Bradstreet, Inc., New York, N.Y. *Monthly New Business Incorporation Report.*

Income ratios—median income of full-time workers with income: U.S. Bureau of the Census. *Current Population Reports,* Series P-60.

Average weekly hours worked in manufacturing establishments: U.S. Bureau of Labor Statistics. *Employment and Earnings,* monthly.

Cigarette consumption per capita:
U.S. Bureau of Alcohol, Tobacco, & Firearms. *Alcohol & Tobacco Summary Statistics.*
U.S. Federal Highway Administration. *Highway Statistics.*

Divorce rate: U.S. Bureau of the Census. *Current Population Reports,* Series P-20

Female heads of household: U.S. Bureau of the Census. *Current Population Reports,* Series P-20.

AFDC: U.S. Social Security Administration. *Social Security Bulletin.*

Military personnel: U.S. Department of Defense. *Selected Manpower Statistics,* annual.

Crimes known to police: U.S. Federal Bureau of Investigation. *Uniform Crime Reports for the United States,* annual.

Arrest, total and narcotics: U.S. Federal Bureau of Investigation. *Uniform Crime Reports for the United States,* annual.

Imprisonment: U.S. Law Enforcement Assistance Administration. *National Prisoner Statistics,* superceded by *Prisoners in State and Federal Institutions on December 31,* annual.

Mental Hospitalization: U.S. National Institute of Mental Health. *Patients in Mental Institutions.*

Birth rates: U.S. National Center for Health Statistics. *Vital Statistics of the United States,* annual.

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APPENDIX B—DETAILED ANALYTIC TABLES

Structure of the Appendix Tables

Each of the Appendix Tables 1-33 describes one time series regression equation showing the relation between measures of economic change and indices of pathology, holding constant other risk factors for health and social pathology as discussed in Chapter IV on the "Economic Change Model of Pathology." The Appendix tables only represent a fraction of the total regression equations on which this report is based. A full set of detailed tables is available from the author.

Five components are included in the Economic Change Model: (1) the exponential trend in real per capita income, (2) economic instability, (3) economic inequality, (4) adaptational error associated with economic growth, and (5) random shocks.

As reported in the Appendix tables, the outstanding statistical relationships are grouped in a manner by which they can be identified with the five components of the Economic Change Model. In the Appendix tables, four major categories of variables are found: Economic, Behavioral, Family and Household, and Other Controls. The Economic variables in the Appendix tables include the Economic Change Model categories of: (1) the exponential trend in real per capita income, (2) economic instability, and (3) economic inequality. The Behavioral and Family and Household variables include those which in the Economic Change Model occur under (4) adaptational error associated with economic growth. Other Controls in the Appendix tables include the Economic Change Model Category of (5) random shocks. Other Controls also include the variable rho, which is derived from the Cochrane-Orcutt procedure for minimizing autoregression among residuals.

To the immediate right of most of the variables, and in parentheses, is the designation of the duration of lag in the relationships. The lag is in years (eitner the peak years of the relations or the range). If the range is designated, rather than the peak, the relation is distributed over the years identified. For example (7-15) describes lagged relations distributed over an entire 7-15 year period; the coefficient and related statistics refer to the unweighted sum of the lagged relations. In those cases where no lag is designated in parentheses, the relation has been tested only at zero lag and is therefore only significant at that lag (i.e., for the exponential trend in real income per capita and the age/sex-specific labor force participation rate).

The independent variables are used in one of three forms: rates, annual changes (of rates), and ratios. If neither annual changes nor ratios are actually stated in the variable name then the independent variable is in rate form—i.e., even if the term rate is not stated. Annual changes refer to the year-to-year arithmetic

changes (or "first differences") in the independent variables. Ratio variables either refer to measures of economic inequality or to alcohol consumption. Ratios designating economic inequality are: (a) ratios of age/sex-specific unemployment rates to total population unemployment rates or (b) ratios of age-specific median family income. Alcohol consumption ratios may be stated for specific beverages (spirits, wine or beer), and refer to the proportion of total per capita consumption of alcohol that is attributed to the per capita consumption of any one beverage.

The sequence of presentation of the tables is by major topic—i.e., total mortality, cardiovascular-renal disease mortality, cirrhosis mortality, suicide mortality, homicide mortality, state and county mental hospital resident patients, crimes known to the police, and arrests. In the full set of detailed tables all major topics are subclassified by age and where possible by sex; total mortality is separately analyzed for the non-white population. On occasion, more than one table (and thus more than one equation) will be presented for specific dependent variables. Where (1) different expressions were nearly equally effective from a statistical viewpoint, and (2) demonstrated the theoretical importance of specified explanatory or control variables, more than one equation is represented.

Appendix Tables

TABLE 1.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: 35–44—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.776906E−03	−11.6
Labor force:		
Unemployment rate (2)	2.231	2.188
Unemployment rate (7–15)	1.130	5.049
Behavioral:		
Cigarettes (4–8)	.179E−03	5.519
Spirits (0)	.251	2.616
Family and household: Living alone, annual change (0)	.651E−02	2.046
Other controls:		
RHO	.556	3.66
Constant	1.156	2.514

R-Squared = 0.905
Adjusted R-Squared = 0.88
F-Statistic (6., 23.) = 28.464
Durbin-Watson statistic = 1.794

TABLE 2.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: 45–54—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.143E−02	−17.445
Labor force:		
Unemployment rate (2)	5.0104	3.429
Unemployment rate (7–15)	1.7	7.445
Business failure (0)	.695E−02	2.775
Behavioral:		
Cigarettes (4–8)	.192E−03	5.914
Spirits (0)	.534	3.726
Family and household: Living alone, annual change (0)	.148E−01	2.424
Other controls:		
RHO	−.555E−02	−.309E−01
Constant	6.043	11.327

R-Squared = 0.989
Adjusted R-Squared = 0.986

TABLE 3.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: 55–64—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.31E-02	−13.731
Labor force:		
Unemployment rate (2)	15.48	3.092
Unemployment rate (7–15)	3.873	10.111
Labor force participation rate, 55–64 male, annual change (0)	−.245	−4.232
Manuf. Hours (0)	−.375	−3.667
Business failure (1)	.103E-01	2.199
Behavioral: Cigarettes (4–8)	.626E-03	7.202
Family and household: Living alone, annual change (0)	.535E-01	3.274
Other controls:		
RHO	−.319	−1.846
Constant	27.57	8.384

R-Squared = 0.991
Adjusted R-Squared = 0.988
F-Statistic (8., 21.) = 231.353
Durbin-Watson statistic = 2.11

TABLE 4.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: 55–64—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.297E-02	−12.545
Labor force:		
Unemployment rate (2)	9.26	2.043
Unemployment rate (7–15)	1.868	2.980
Behavioral:		
Cigarettes (4–8)	.356E-03	3.165
Spirits (0)	.851	2.008
Family and household: Living alone, annual change (0)	.389E-01	2.444
Other controls:		
RHO	.286	1.636
Constant	16.808	10.653

R-Squared = 0.956
Adjusted R-Squared = 0.944
F-Statistic (6., 23.) = 64.525
Durbin-Watson statistic = 1.773

TABLE 5.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: 65–74—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.732E−02	−16.279
Labor force:		
Unemployment rate (2)	23.190	2.471
Unemployment rate (7–15)	2.667	2.1
Over 65 labor force participation rate, annual change (0)	−.348	−2.307
Behavioral:		
Cigarettes (4–8)	.113E−02	4.407
Spirits (0)	1.546	1.585
Family and household: Living alone, annual change (0)	.912E−01	2.527
Other controls:		
RHO	.121	.665
Constant	33.736	9.052

R-Squared = 0.977
Adjusted R-Squared = 0.970
F-Statistic (7., 22.) = 130.174
Durbin-Watson statistic = 2.032

TABLE 6.—MULTIPLE REGRESSION EQUATION FOR TOTAL MORTALITY RATE, AGE: OVER 75—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.119E−01	−9.584
Labor force:		
Unemployment rate (2)	77.439	2.767
Unemployment rate (7–15)	8.8468	2.65
Over 65 labor force participation rate, annual change (0)	−1.067	−2.585
Business failure (0)	.105	2.264
Behavioral: Cigarettes (4–8)	.229E−02	4.395
Family and household: Living alone, annual change (0)	.375	3.412
Other controls:		
RHO	.358E−01	.196
Constant	84.719	9.975

R-Squared = 0.953
Adjusted R-Squared = 0.938
F-Statistic (7., 22.) = 60.56
Durbin-Watson statistic = 1.897

TABLE 7.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: 25–34—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T Statistic
Economic:		
Income: Real income PC, exp. trend	−0.204E-03	−21.230
Labor force:		
Unemployment rate (2–3)	.435	11.547
Unemployment rate (5)	.468	9.289
Unemployment rate (10)	.409	10.491
Business failure (0)	.885E-03	6.825
Behavioral:		
Wine ratio (2)	−.112	−4.377
Cigarettes, annual change (0)	.184E-04	2.331
Cigarettes (6)	.609E-04	11.106
Family and household:		
Divorce (1)	.282E-01	6.063
Living alone (0–1)	.104E-02	5.835
Other controls:		
RHO	−.489	−3.074
Constant	.416	28.413

R-Squared = 0.999
Adjusted R-Squared = 0.999
F-Statistic (10., 19.) = 1507.87
Durbin-Watson statistic = 2.191

TABLE 8.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: 35–44—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.61E-03	−27.582
Labor force:		
Unemployment rate (3)	1.138	6.368
Unemployment rate (5)	1.007	5.154
Unemployment rate (10)	1.8	19.711
Behavioral:		
Cigarettes, annual change (0)	.153E-03	4.991
Cigarettes (6)	.164E-03	15.176
Spirits ratio (3)	.366	7.401
Spirits (2)	.115	6.097
Wine (0)	−.721E-01	−4.022
Family and household: Living alone (0–1)	.457E-02	8.695
Other controls:		
RHO	−.636	−4.516
Constant	1.183	35.603

R-Squared = 0.999
Adjusted R-Squared = 0.999
F-Statistic (10., 19.) = 1018.12
Durbin-Watson statistic = 2.216

TABLE 9.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: 45–54—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T Statistic
Economic:		
Income: Real income PC, exp. trend	−0.186E-02	−32.949
Labor force:		
Unemployment rate (3)	2.313	5.818
Unemployment rate (5)	2.280	5.318
Unemployment rate (10)	5.013	22.422
Behavioral:		
Cigarettes (0)	.262E-03	7.116
Cigarettes (6)	.515E-03	14.442
Spirits ratio (3)	.602	7.297
Family and household:		
Divorce (1)	.112	4.463
Living alone (0–1)	.114	9.373
Other controls:		
RHO	−.491	−3.086
Constant	3.815	21.592

R-Squared = 0.999
Adjusted R-Squared = 0.999
F-Statistic (9., 20.) = 3008.14
Durbin-Watson statistic = 2.25

TABLE 10.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: 55–64—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.348E-02	−22.138
Labor force:		
Unemployment rate (3)	10.212	7.551
Unemployment rate (10)	9.589	14.705
Business failure, annual change (0)	.149E-01	5.184
Business failure, annual change (2)	.227E-01	4.907
Behavioral: Cigarettes (6)	.118E-02	12.336
Family and household:		
Divorce, annual change (1)	.871	5.547
Living alone (0)	.375E-01	7.943
Other controls:		
RHO	−.471	−2.927
Constant	12.550	56.617

R-Squared = 0.999
Adjusted R-Squared = 0.998
F-Statistic (8., 21.) = 1762.11
Durbin-Watson statistic = 2.18

TABLE 11.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: 65–74—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income:		
Real income PC, exp. trend	−0.476E−02	−20.435
Over 65 ratio (2)	−4.839	−2.4630
Labor force:		
Unemployment rate (3)	15.284	4.294
Unemployment rate (10)	24.209	13.119
Business failure, annual change (0)	.412E−01	4.891
Business failure, annual change (2)	.258E−01	2.389
Behavioral:		
Cigarettes (6)	.231E−02	8.081
Beer (5)	−.706E−01	−2.038
Other controls:		
RHO	−.451	−2.370
Constant	30.839	25.280

R-Squared = 0.998
Adjusted R-Squared = 0.998
F-Statistic (8., 21.) = 1174.04
Durbin-Watson statistic = 2.233

TABLE 12.—MULTIPLE REGRESSION EQUATION FOR CARDIOVASCULAR-RENAL DISEASE MORTALITY RATE, AGE: OVER 75—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.116E−01	−12.984
Labor force:		
Unemployment rate (3)	63.157	6.067
Unemployment rate (10)	47.414	7.395
Business failure, annual change (0)	.175	6.482
Business failure, annual change (7)	.180	5.188
Behavioral:		
Cigarettes (6)	.677E−02	7.739
Beer (5)	−1.032	−8.341
Wine (1)	3.694	3.097
Family and household: Living alone, annual change (0)	.170	2.682
Other controls:		
RHO	−.446	−2.732
Constant	96.878	22.651

R-Squared = 0.996
Adjusted R-Squared = 0.994
F-Statistic (9., 20.) = 495.558
Durbin-Watson statistic = 2.280

TABLE 13.—MULTIPLE REGRESSION EQUATION FOR CIRRHOSIS MORTALITY RATE, MALE, AGE: 45–54—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: 45–54 ration (1)	−0.160	−2.215
Labor force: Unemployment rate (8)	.557	2.439
Behavioral:		
Spirits (1)	.458	2.192
Wine, annual change (3)	.127	4.554
Beer ratio (0)	.516E–01	−5.827
Family and household: Divorce, annual change (1)	.126	5.101
Other controls:		
RHO	.748	−4.115
Chem. prod. (1)	.764E–03	3.208
Constant	.961	5.343

R-Squared = 0.995
Adjusted R-Squared = 0.994
F-Statistic (7., 20.) = 436.293
Durbin-Watson statistic = 1.926

TABLE 14.—MULTIPLE REGRESSION EQUATION FOR CIRRHOSIS MORTALITY RATE, MALE, AGE: 55–64—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: 55–64 ration (1)	−0.472	−3.277
Labor force: Unemployment rate (8)	.919	2.542
Behavioral:		
Spirits (1)	.129	4.326
Wine, annual change (3)	.111	2.520
Beer ratio (0)	−.525E–01	−3.914
Family and household: Divorce, annual change (1)	0.200	5.361
Other controls:		
RHO	−.613	−2.939
Chem. prod. (1)	.949E–03	3.491
Constant	1.225	4.486

R-Squared = 0.994
Adjusted R-Squared = 0.992
F-Statistic (7., 20.) = 328.789
Durbin-Watson statistic = 1.915

TABLE 15.—MULTIPLE REGRESSION EQUATION FOR CIRRHOSIS MORTALITY RATE, MALE, AGE: 65–74—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income:		
Real income PC, annual change (0)	−0.907E−04	−2.504
Over 65 ratio (1)	−.297	−2.639
Behavioral:		
Wine, annual change (3)	.907E−01	3.252
Beer ratio (1)	−.255E−01	−2.361
Family and household: Divorce, annual change (1)	.955E−01	3.685
Other controls:		
RHO	.673	4.153
Chem. prod. (1)	.983E−03	5.662
Hepatitis incidence (2)	.103E−02	2.392
Constant	.877	7.054

R-Squared = 0.922
Adjusted R-Squared = 0.895
F-Statistic (7., 20.) = 23.726
Durbin-Watson statistic = 1.750

TABLE 16.—MULTIPLE REGRESSION EQUATION FOR SUICIDE MORTALITY RATE, AGE: 15–24—UNITED STATES, 1951–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force:		
Unemployment rate (0)	0.146	3.371
Unemployment rate, annual change (2)	0.214	4.251
Behavioral: Total alc. (3)	0.393E−01	4.398
Family and household:		
Divorce, annual change (2)	0.142E−01	2.430
Living alone (0)	0.979E−03	7.728
Other controls:		
RHO	−0.322	−1.624
Constant	−.825E−01	−6.199

R-Squared = 0.995
Adjusted R-Squared = 0.994
F-Statistic (5., 24.) = 845.755
Durbin-Watson statistic = 1.916

TABLE 17.—MULTIPLE REGRESSION EQUATION FOR SUICIDE MORTALITY RATE, AGE: 45–54—UNITED STATES, 1951–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.125E-04	−5.[illegible]8
Labor force:		
Unemployment rate (0)	.240	3.398
Business failure (1)	.555E-03	6.073
Behavioral: Spirits ratio (0)	.521E-01	3.19[illegible]
Family and household: Divorce (1)	.207E-01	2.251
Other controls:		
RHO	−.539	−3.175
Constant	.119	6.775

R-Squared = 0.981
Adjusted R-Squared = 0.977
F-Statistic (6., 23.) = 158.947
Durbin-Watson statistic = 1.988

TABLE 18.—MULTIPLE REGRESSION EQUATION FOR SUICIDE MORTALITY RATE, MALE AGE: 45–54—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.546E-04	−7.592
Labor force:		
Unemployment rate (0)	.436	3.594
45–54 unemployment ratio (2)	.307E-03	4.265
Labor force participation rate (1)	−.582E-02	−2.029
Business failure (1)	.618E-03	4.231
Behavioral: Spirits ratio (0)	.114	5.337
Family and household: Divorce, annual change (1)	.373E-01	3.593
Other controls:		
RHO	−.626	−3.839
Constant	.838	2.922

R-Squared = 0.993
Adjusted R-Squared = 0.990
F-Statistic (7., 20.) = 280.118
Durbin-Watson statistic = 2.206

TABLE 19.—MULTIPLE REGRESSION EQUATION FOR SUICIDE MORTALITY RATE, AGE: 55–64—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, exp. trend	−0.584E−042	−21.042
Labor force:		
Unemployment rate (1)	.266	2.292
55–64 unemployment ratio (3)	.308E−03	4.541
Business failure (1)	.426E−03	2.142
Behavorial:		
Family and household: Living alone, annual change (3)	.172E−02	3.473
Other controls:		
RHO	.992E−01	.475
Constant	.482	45.569

R-Squared = 0.973
Adjusted R-Squared = 0.967
F-Statistic (5., 23.) = 145.260
Durbin-Watson statistic = 1.858

TABLE 20.—MULTIPLE REGRESSION EQUATION FOR HOMICIDE MORTALITY RATE, AGE: 1–14—UNITED STATES, 1951–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income:		
AFDC	0.612E−04	5.826
AFDC, annual change (3)	.509E−04	2.025
Labor force: Unemployment rate (2)	.194E−01	2.451
Behavioral: Total Alc., annual change (0)	.108E−01	4.688
Family and household: Living alone (1)	.714E−04	3.280
Other controls:		
RHO	−.158	−.862
Constant	−.390E−03	−.693

R-Squared = 0.989
Adjusted R-Squared = 0.986
F-Statistic (5., 23.) = 347.841
Durbin-Watson statistic = 1.943

TABLE 21.—MULTIPLE REGRESSION EQUATION FOR HOMICIDE MORTALITY RATE, FEMALE, AGE: 15–24—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: AFDC, annual change (3)	0.258E-03	3.486
Labor force:		
Under 25 unemployment ratio (3)	.174E-04	2.842
16–17 labor force participation rate (0)	.646E-03	4.642
Behavioral:		
Total Alc. (2)	.277E-01	7.094
Narc. arrests (0–1)	.115E-04	3.700
Family and household:		
Other controls:		
RHO	—.840E-01	—.438
Constant	—.622E-01	—5.466

R-Squared = 0.991
Adjusted R-Squared = 0.989
F-Statistic (5., 21.) = 448.350
Durbin-Watson statistic = 2.028

TABLE 22.—MULTIPLE REGRESSION EQUATION FOR HOMICIDE MORTALITY RATE, MALE, AGE: 15–24—UNITED STATES, 1951–78

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force:		
Under 25 unemployment ratio (0)	0.332E-03	2.575
16–17 labor force participation rate (0)	.172E-02	3.920
Behavioral:		
Total Alc. (2)	.157	16.817
Narc. arr., annual change (1–2)	.616E-04	2.433
Family and household: Divorce, annual change (0)	.556E-01	3.543
Other controls:		
RHO	—.232	—1.241
Constant	—.381	—8.946

R-Squared = 0.992
Adjusted R-Squared = 0.990
F-Statistic (5., 21.) = 496.723
Durbin-Watson statistic = 1.959

TABLE 23.—MULTIPLE REGRESSION EQUATION FOR STATE AND COUNTY MENTAL HOSPITAL PATIENTS RATE, AGE: 25–44—UNITED STATES, 1950–79

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force:		
Under 25 unemployment rate (3–5)	1.404	5.673
25–44 unemployment ratio (1)	0.117E–02	2.814
Behavioral:		
Total Alc., annual change (1)	.386	2.373
Total Alc., annual change (0)	.443	2.500
Family and household: Divorce, annual change (1)	.178	2.342
Other controls:		
RHO	—.288	—1.620
Endogenous (1)	.583	13.144
Time trend	—.510E–01	—9.917
Constant	1.254	6.904

R-Squared = 0.999
Adjusted R-Squared = 0.999
F-Statistic (7., 21.) = 4873.930
Durbin-Watson statistic = 2.093

TABLE 24.—MULTIPLE REGRESSION EQUATION FOR STATE AND COUNTY MENTAL HOSPITAL PATIENTS RATE, AGE: 45–64—UNITED STATES, 1950–79

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force:		
Unemployment rate (3–4)	0.972	2.685
Unemployment rate (6)	2.692	5.763
45–54 unemployment ratio (1)	.340E–02	2.413
Non-white unemployment ratio (0)	.370E–02	6.910
Behavioral: Spirits, annual change (3)	.101	2.025
Family and household: living alone (0)	.733E–02	2.078
Other controls:		
RHO	—.705	—5.360
Time trend	—.524E–01	—17.405
Endogenous (1)	.856	26.475
Constant	—.213	—.677

R-Squared = 0.9999
Adjusted R-Squared = 0.9999
F-Statistic (8., 20.) = 35453.9
Durbin-Watson statistic = 2.124

TABLE 25.—MULTIPLE REGRESSION EQUATION FOR ASSAULT RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income, PC, annual change (0)	−0.250E-03	−2.770
Labor force:		
Unemployment rate (3)	4.485	9.806
Labor force participation rate, male 18–19 (1)	.155E-01	−8.432
Behavioral: Total Alc. (0–1)	.477	10.481
Family and household: Living alone (2)	.102E-01	4.952
Other controls:		
RHO	.686	−5.161
Binary var. (1960)	.507	17.196
Endogenous (1)	.635	15.004
Constant	−1.093	−6.157

R-Squared = 0.9998
Adjusted R-Squared = 0.9997
F-Statistic (7., 22.) = 15869.7
Durbin-Watson statistic = 1.977

TABLE 26.—MULTIPLE REGRESSION EQUATION FOR BURGLARY RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, Annual change (0)	−0.106E-01	−4.919
Labor force:		
Unemployment rate (3)	26.671	3.595
Labor force participation rate, male 18–19 (0)	−.326	−5.453
Labor force participation rate, male 16–17, annual charge (1)	.153	1.936
Behavioral:		
Total Alc. (3)	9.462	3.799
Spirits (2)	2.317	2.213
Other controls:		
RHO	−.211	−1.185
Binary var. (1960)	2.264	3.970
Endogenous (1)	.537	6.029
Constant	2.008	.730

R-Squared = 0.998
Adjusted R-Squared = 0.997
F-Statistic (8., 21.) = 862.948
Durbin-Watson statistic = 2.187

TABLE 27.—MULTIPLE REGRESSION EQUATION FOR LARCENY RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, annual change (0)	−0.112E-01	−2.922
Labor force:		
Unemployment rate (3)	45.329	2.057
Labor force participation rate, male 18-19 (0)	−.541	−3.651
Behavioral:Total Alc. (3)	17.015	3.693
Other controls:		
RHO	.263	1.496
Binary Var. (1960)	4.806	3.761
Endogenous (1)	.656	6.304
Constant	6.953	.875

R-Squared = 0.987
Adjusted R-Squared = 0.984
F-Statistic (6., 23.) = 233.7
Durbin-Watson statistic = 1.813

TABLE 28.—MULTIPLE REGRESSION EQUATION FOR ROBBERY RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, annual change (0)	−0.179E-02	−8.055
Labor force:		
Unemployment rate, annual change (0)	3.969	2.961
Labor force participation rate, male 16–17 (2)	.193778E-01	3.76525
Labor force participation rate, male 18–19 (3)	.339E-01	−6.694
Behavioral:		
Total Alc. (0)	1.516	14.015
Spirits (2)	.649	5.874
Family and household: Living alone, annual change (3)	.573E-02	2.396
Other controls:		
RHO	−.730	−5.853
Binary var. (1960)	.184	3.496
Endogenous (1)	.328	8.356
Constant	−2.173	−5.837

R-Squared = 0.999
Adjusted R-Squared = 0.999
F-Statistic (9., 20.) = 3527.64
Durbin-Watson statistic = 2.34

TABLE 29.—MULTIPLE REGRESSION EQUATION FOR FORCIBLE RAPE RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force: Unemployment rate (3)	0.634	3.736
Behavioral: Total Alc. (1)	.227	9.058
Family and household: Living alone (3)	.481E-02	9.058
Other controls:		
Binary variable (1960)	.495E-01	4.320
RHO	—.893E-01	—.499
Constant	—.573	—16.608

R-Squared = 0.996
Adjusted R-Squared = 0.995
F-Statistic (4., 25.) = 1446.05
Durbin-Watson statistic = 1.909

TABLE 30.—MULTIPLE REGRESSION EQUATION FOR AUTO THEFT RATE (CRIMES KNOWN TO POLICE)—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, annual change (0)	—0.231E-02	—3.442
Labor force:		
Unemployment rate (3)	8.559	2.665
Labor force participation rate, male 18–19 (1)	—.828E-01	—3.942
Labor force participation rate, male 20–24 (0)	—.154	—3.186
Behavioral: Total Alc. (0)	3.834	5.2
Family and household: Divorce, annual change (0)	.89	2.346
Other controls:		
RHO	—.123	—.681
Binary var. (1960)	.647	3.017
Endogenous (1)	.340	3.228
Constant	12.787	3.598

R-Squared = 0.997
Adjusted R-Squared = 0.995
F-Statistic (6., 21.) = 569.556
Durbin-Watson statistic = 2.023

TABLE 31.—MULTIPLE REGRESSION EQUATION FOR TOTAL ARREST RATE, AGE: 18–24—UNITED STATES, 1950–80

(Lag, in years, in parentheses)

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, annual change (1)	−0.232E-04	−2.992
Labor force:		
Unemployment rate (0)	.928E-01	3.043
Unemployment rate, annual change (3)	.722E-01	2.344
Unemployment rate (6)	.926E-01	3.148
Behavioral:		
Total Alc., annual change (0)	.289E-01	2.984
Total Alc., annual change (1)	.363E-01	3.591
Family and household: Living alone (0)	.603E-03	6.801
Other controls:		
Endogenous (1)	.448	9.026
RHO	.507	−3.221
Constant	.234E-01	−6.860

R-Squared = 0.998
Adjusted R-Squared = 0.997
F-Statistic (8., 21.) = 873.129
Durbin-Watson statistic = 2.194

TABLE 32.—MULTIPLE REGRESSION EQUATION FOR TOTAL ARREST RATE, AGE: 25–34—UNITED STATES, 1950–80

(Lag, in years, in parentheses)

	Coefficient	T-Statistic
Economic:		
Income: Real income PC, annual change (1)	−0.221E-04	−2.554
Labor force:		
Unemployment rate (0)	.124	3.380
Unemployment rate (2–3)	.426E-01	3.068
Unemployment rate (6)	.831E-01	2.548
Behavioral:		
Total Alc., annual change (0)	.313E-01	2.828
Total Alc., annual change (1)	.432E-01	3.883
Family and household: Living alone (0)	.219E-03	5.480
Other controls:		
Endogenous (1)	.555	7.198
RHO	.502	−3.181
Constant	−.109E-01	−5.180

R-Squared = 0.994
Adjusted R-Squared = 0.992
F-Statistic (8., 21.) = 348.126
Durbin-Watson statistic = 2.328

TABLE 33.—MULTIPLE REGRESSION EQUATION FOR FRAUD AND EMBEZZLEMENT ARREST RATE, AGE: TOTAL—UNITED STATES, 1950–80

[Lag, in years, in parentheses]

	Coefficient	T-Statistic
Economic:		
Labor force:		
Unemployment rate (0)	3.23	3.288
Unemployment rate (3)	2.734	2.693
Unemployment rate (6–7)	1.509	2.473
Behavioral: Total Alc., annual change (1)	1.187	3.438
Family and household:		
Divorce (3)	.137	3.876
Living alone (0)	.887E–02	3.773
Other controls:		
Endogenous (1)	.282	2.226
RHO	.154	−.855
Constant	−.979	−6.501

R-Squared = 0.99
Adjusted R-Squared = 0.986
F-Statistic (7., 22.) = 289.776
Durbin-Watson statistic = 2.035

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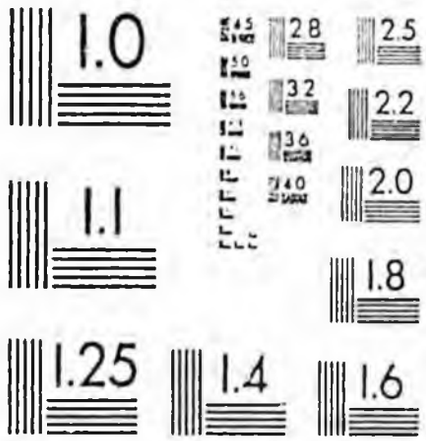

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Hardship and Depression*

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Journal of Health and Social Behavior 1985, Vol. 26 (December):312–327

We argue that successful fulfillment of husbands' and wives' role obligations in the household affects psychological well-being. Ongoing economic hardship–the inability to adequately feed, clothe, and provide medical care for the family–indicates unsuccessful fulfillment of both breadwinner and homemaker obligations. Using a national sample of married couples, we find that economic hardship is increased by low income, low education, being young, and having young children. Economic hardship, in turn, increases both spouses' depression levels. Other factors affect husbands and wives differently. A husband's personal earnings directly decrease his depression, because, we argue, his earnings indicate successful fulfillment of provider obligations. A wife's major role obligation is not provider, but homemaker. We find that a wife's personal earnings do not affect her depression, whereas her education and children do.

The household is a microcosm that reflects the interplay of occupational and family responsibilities and access to material goods. Married couples live, and rear children, in households linked to society by labor market activities that largely determine their level of living. The factors that shape household life tend to be durable and persistent, anchored in economic organizati n, social relations, and family structure (Pearlin, 1975; Pearlin and Johnson, 1977). It is in the household that the larger social and economic order impinges on individuals, exposing them to varying degrees of hardship, frustration, and struggle. The ease or difficulty of meeting household obligations—of having enough money to pay the bills, to feed, clothe, and care for the health of the family—is influenced, ultimately, by socioeconomic status and by factors such as the presence of children, which put demands on the resources associated with SES. The ability to meet family obligations, in turn, has consequences for emotional well-being.

Successful fulfillment of role obligations in the household affects emotional well-being since both husbands and wives are involved with the family above all other life spheres (Pleck, 1983; Mackie, 1983). Traditionally the husband's socially defined household role is that of breadwinner. To most men the primary meaning of work is that it enables them to be good providers for the family (Pleck, 1983). Current laws and norms require the husband to assume the major responsibility for the support of his family if he is able to do so, and reactions to a hypothetical husband who "did not do his best to support his family" are overwhelmingly negative (Slocum and Nye, 1976). The wife's primary role, on the other hand, is to care for the family, not to provide for it. Respondents feel that childcare is the wife's responsibility, and a large majority would reject a wife who "neglected the physical needs of her children"

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Data collection was supported by a grant from the National Science Foundation (Soc 78–18015) to Joan Huber. Sampling, pretesting, and interviewing were conducted by the Survey Research Laboratory of the University of Illinois. An earlier version of this paper was presented at the American Sociological Association annual meeting in San Antonio, 1984.

and Nye, 1976). Even when a woman [illegible] her earnings are often seen as supplementary to her husband's. Few respondents feel it is ever a wife's *duty* to work outside the home, even if she does not have children (Slocum and Nye, 1976). A husband may help his wife with the housework and childcare, but homemaker is not his primary role. A wife may help the family by earning money, but breadwinner is not her primary role. The widespread use of the word "help" underscores which household role is still primary for whom (Lopata, 1971).

Economic hardship undermines both spouses' ability to fulfill their role obligations. Ongoing difficulties in acquiring food, clothing, and medical care for the family indicate the breadwinner's inability to meet basic obligations. It also means that the homemaker lacks the resources necessary to provide adequate family care. Other factors, however, such as education, personal earnings, and children, may affect husbands and wives differently depending on whether they contribute to the fulfillment of the homemaker or breadwinner role. Using a national sample of married couples, we examine those factors that help or hinder successful fulfillment of household role obligations and thus affect psychological well-being.

SOCIOECONOMIC STATUS AND ECONOMIC HARDSHIP

Living on the Edge

In our national sample, 53% of the wives and 41% of the husbands feel some economic hardship. These feelings range from extreme hardship, in which people very often feel that they do not have enough money to buy food, clothing, and medical care for the family, to mild hardship in which these pressures are not felt very often. Feelings of economic hardship are reflections of objective realities; realities in which a lack of income, the presence of young children, being young oneself, and a lack of education converge to make life hard.

Families who feel chronic economic hardship, who never get ahead of their bills, who Rubin (1976) describes as "perched on the edge," and Pearlin and Schooler (1978) describe as engaged in economic "brinksmanship," are, firstly, families with low family incomes. The poor and chronically unemployed obviously feel economic hardships. But they are not the only ones. Many families just up from poverty feel economic hardship. In these families the husband is employed (unless temporarily laid off or sick). The wife may be employed, too, and the husband may work overtime—all to pay for the house, car, and television; the food, clothing, and medical care.

Many people in the working and lower middle classes live with their resources pushed to the breaking point. They spend as much or more than comes in. Each month the bills come on the mortgage, the car, and the appliances and furniture bought on time. Each day the children must be fed and kept clothed. When someone is sick the doctor must be paid and medicine bought. This balance is easily upset by layoffs, seasonal unemployment, strikes, an injury on the job, or getting fired. The day-to-day struggle to pay the bills and feed and clothe the family is then intensified until the husband gets back to work, or the wife gets a job, or both. During any temporary unemployment the debts increase, and the family gets further behind.

Low family income increases economic hardship, but the translation from income to economic hardship is not one-to-one. Other factors make independent contributions. Couples who are young, often recently married, feel more economic hardship than older, more established couples; not only are their earnings at a low point, but what they have must buy more. Veroff et al. (1981) found that younger men were more likely than older to report that they did not feel adequate as a breadwinner. Young couples who start with little or nothing must make major investments in a car, furniture, and household appliances. Setting up a household is expensive and is likely to increase a young couple's debt. If they also buy their first home, the down payment and mortgage payments increase financial difficulties (Wilensky, 1961).

Young children also increase economic hardship. Each dollar must go further—must buy more food, clothes, and medical care. The more young children, the more economic strain on the household. Campbell et al. (1976) found

that children, especially young children, increase financial pressures on the family. Families with three or more children were more likely than others to report that they "worry all the time" about meeting their bills. Younger children increased pressures more than older. Using a measure of "psychological stress" that combined economic worries and emotional well-being, Campbell et al. found that stress scores were highest for parents of children less than six years old; as the children's ages increased the parents' stress decreased. Young children drain the family's economic resources. Conversely, childless couples and couples with grown children have the most adequate incomes of all life course groups (Campbell et al., 1976).

Income, age, and young children are, of course, associated with one another. A young couple is likely to have young children and a low income. Furthermore the presence of young children is likely to increase the pressures to buy a home. An apartment may seem too small or the couple may prefer a house with a yard as a better place to raise children. At the same time that young children increase the pressures to buy a house and thus increase economic difficulties, the presence of young children often means the mother does not work outside the home. She may quit her job while the children are young, thus further increasing the family's economic hardship (Wilensky, 1961). If the woman continues to be employed, family funds are often needed for day-care. This produces an early life-cycle economic squeeze (Wilensky, 1961).[1]

Low education also contributes to economic hardship. Not only is low education associated with more children and less income, but lack of education makes it more difficult to cope with an inadequate income. Education contributes to the skills, information, cognitive flexibility, and presence of well-educated friends that help a person to deal with the stresses of life, including a low income. Veroff et al. (1981) found that men with low levels of education are more likely to feel inadequate as breadwinners than men with high levels of education. People who have not finished or just finished high school are doubly disadvantaged because their low education translates into low earnings and their low education increases the difficulties of coping with the low earnings. Thus, we expect that education and income have an interactive effect on economic hardship. Stated positively, each year of education increases the subjective value of a dollar, making it go further to decrease economic hardship. The converse, of course, is that for people with low education the dollars do not go as far to decrease economic hardship.

We expect that this is especially true for wives. Usually it is the wife's responsibility to run the household: to do the shopping, take the children to the doctor, and often pay the bills or keep the checking account. It is the husband's job to make the money but the wife's job to make ends meet. This arrangement is especially prevalent in the working classes where there is just enough money to get by, where the budget must be juggled to get all the bills paid and still have enough money left for food (Rubin, 1976). Management, budgeting, and purchasing responsibilities fall on the wife's shoulders, and it is often her responsibility to make sure that the earnings stave off economic hardship. Thus, we expect that the synergistic effect of low education coupled with low earnings will have a larger effect on the wife's perceived economic hardship than on her husband's.

Our expectations about the determinants of economic hardship may be summarized with the following hypotheses:

1. Low family income, low education, and their combination increase perceived economic hardship of husbands and wives.
2. Young husbands and wives feel more economic hardship than older couples.
3. The more young children in the family, the greater the husband's and wife's perceived economic hardship.
4. The synergistic effect of low education and low income on perceived economic hardship is greater for wives than for husbands.

SOCIOECONOMIC STATUS AND DEPRESSION

Material and Emotional Well-Being

"The dominant memories are of pain and deprivation—both material and emotional, for

one follows the other almost as certainly as night follows day" (Rubin 1976:46).

Economic hardship has emotional consequences. Young, recently married couples with high school degrees or less, often with young children, struggle to manage a household and feed a family on an inadequate income. "The economic realities that so quickly confronted young, working-class couples richocheted through the marriage, dominating every aspect of experience" (Rubin 1976:75). Young, poorly educated and poorly paid couples with young children feel economic hardship—hardship that leads to feelings of disappointment, betrayal, sadness, frustration, and hopelessness.

The chronic strain of struggling to pay the bills and feed and clothe the family takes its toll, often in feelings of depression—in feeling run down, that everything is an effort, that the future is hopeless, that you can't shake the blues, that nagging worries make for restless sleep, and that there is not much to enjoy in life. When life is a constant struggle to get by, when it is never taken for granted that there will be enough money for food, clothes, and medical care, people feel worn down and hopeless. There is no relief from the struggle—it pulls at the person every day in the form of another bill, an injury that must be attended to, or the arrival of the last week in the month with less than a week's worth of food money left.

The inverse relationship between socioeconomic status and psychological distress is well-documented (Dohrenwend and Dohrenwend, 1969; Kessler, 1982; Liem and Liem, 1978; Wheaton, 1978), and longitudinal analysis supports a causal interpretation: differences in the demands and resources of various social positions produce differences in distress (Pearlin et al., 1981; Wheaton, 1978). Exploring the relationship between socioeconomic status and psychological well-being further, Pearlin and his colleagues have investigated the detrimental effects of chronic, ongoing hardships. Pearlin (1975:192) describes the emphasis on chronic, rather than acute, stress:

> It is a focus on the conflicts and frustrations that are built into activities of the normal life cycle. Unlike those studies that focus on crises and ephemeral threats (life events) as the major precursors of stress, our research focuses on durable, structured experiences that people have as they engage in their various social roles, such as economic, occupational, family, and parental roles.

Although most investigations of the SES-distress relationship have focused on life events (Kessler, 1979; Kessler and Cleary, 1980; Myers et al., 1974), Pearlin and his colleagues investigated the effects of chronic economic hardship on depression (Pearlin et al., 1981). They focused on the economic aspects of socioeconomic status, proposing that chronic economic strain is one factor that explains the relationship between income and depression. They found that decreases in income increase economic hardship which in turn increases depression (in part by way of decreasing self-esteem and feelings of mastery).

Our next hypothesis is the following:

5. For both husbands and wives, economic hardship increases depression.

Beyond Material Well-Being

Economic difficulties are important mediators of the association between socioeconomic status (especially family income) and depression, but they are not the whole story. According to Kessler (1982), more than a simple economic reality is involved in the relationship between SES and distress. We expect that other aspects of socioeconomic status also affect depression in other ways. The importance of these components may differ for husbands and wives (Kessler, 1982).

Personal earnings, by adding to family income, decrease economic hardship and depression. But personal earnings, independently of their purely financial aspects, may also affect depression. Family income, from whatever source—a spouse's earnings, social security, or public assistance—is important to psychological well-being because it allows one to pay the bills, and feed, clothe, and care for the health of one's family. But the money one earns oneself may affect well-being in other ways. For instance, income from unemployment compensation is very important to pay the bills and buy food, but it does little or nothing for one's feelings of self-worth and self-respect. Personal earnings, on the other hand, may be important for self-esteem be-

cause they symbolize worth in our society. This may be especially true for husbands.

A husband's primary role obligation is to be the family breadwinner (Pleck, 1983). Not only is the husband's primary role in the family that of breadwinner, but the primary meaning of work to a majority of husbands is that it enables them to be good breadwinners. Most men are more involved with their families than with their jobs, and most get more satisfaction from the family than from the job. The primary meaning of work is not that it lets a man express achievement motivation or find intrinsic gratification, but that it enables him to fulfill his socially defined breadwinner obligations (Yankelovich, 1974; Andrews and Withey, 1976; Wilensky, 1981; Pleck, 1983). A "good husband" is a good provider. Therefore, a man's personal earnings may be very important to his psychological well-being. In his analysis of eight surveys, Kessler (1982) found that men's distress levels were most affected by personal earnings. Family income and education had smaller effects and occupation was not significant.

On the other hand, even if a woman is employed, breadwinner is not the wife's role obligation. Wives are not expected to be providers. Thus, fulfillment of the role expectations of wife does not depend on earning money. Whereas a "good" husband is largely a good breadwinner, a "good" wife is a homemaker, nurturer, and childrearer. Furthermore, many employed women see their jobs as adjuncts to their husband's. A wife who is employed is usually perceived as helping out the family economically, but her primary role is not provider. Therefore, personal earnings may be less important to a wife's well-being. Her education and children may be more salient.

Education provides knowledge, skills, and information that may improve coping ability. Education exposes people to more than one way of looking at the world, thus increasing cognitive flexibility and coping. Education also symbolizes worth to oneself and others. Thus finishing college, for example, may increase self-esteem and pride in one's accomplishments. Finally, education may give one a sense of mastery over one's life and hope about the future by providing the skills, information, and credentials necessary to control one's life. Feelings of mastery and a sense of control over one's life are important to psychological well-being, not only because they decrease feelings of hopelessness, but because they are associated with an active problem-solving approach to life (Pearlin and Schooler, 1978; Wheaton, 1980). In contrast, the feeling that one is helpless to control one's life may lead to hopelessness, giving up, and depression.

Education may be especially important to wives' psychological well-being, for a number of reasons. First, approximately 50% of married women are not employed. Therefore they must link their self-esteem to something other than a job. Even women who are employed generally earn much less than their husbands, and they tend to be in jobs where high levels of education do not translate into high earnings, as they do for men. For a wife, a college degree, for instance, may be more important to her self-worth than a comparable degree for her husband simply because her degree does not translate into comparable earnings. Second, a woman's identity, even if she is employed, may be more strongly linked to the home, family, and children than to her job (Mackie, 1983). Education is a resource that helps a wife fulfill her homemaker role. Less educated people are not only lower in overall efficacy and have less control over planning, they are also more helpless in their relationships with other people (Veroff et al., 1981). This means that more highly educated women may have an easier time and be more successful than other women in the daily work of family nurturance. Kessler (1982) and Kessler and McRae (1982) found that, for women, employed or not, education was more important than earnings or family income in predicting distress. Occupation was least important.

If a wife's primary role obligation is to be a homemaker and mother, to provide emotional support and nurturance to the family, then children may affect her psychological well-being. As discussed earlier, children may increase the family's economic hardship and thus decrease the psychological well-being of both husband and wife. But children may also have positive effects on psychological well-being, independent of economic burdens. This may be especially true for wives. Although this inference follows from our arguments concerning the importance to well-being of successfully fulfilling role obligations, past literature does

not strongly support this hypothesis. Gove and Geerken (1977) found that children are detrimental to women's mental health because they increase demands on them, decrease their privacy, and isolate them from other adults. Most research, however, finds that children have an insignificant or inconsistent effect on wives' psychological well-being (Kessler and McRae, 1982; Ross et al., 1983; Radloff, 1975; Gore and Mangione, 1983). Radloff, for example, found that, for housewives, children do not increase depression, and she had weak evidence that they decrease depression. Children had no consistent effect on the depression levels of employed women (Radloff, 1975). Insignificant and inconsistent effects could result if children had both positive and negative effects on psychological well-being. By increasing economic hardship, children may increase depression, but children may bring gratifications as well as burdens. For wives, they may indicate successful fulfillment of role obligations. Thus, children may decrease wives' depression, independent of economic hardship.

In sum, we expect that education, personal earnings, and children affect depression independently of economic hardship, and that the importance of these components differs for men and women. Thus we hypothesize:

6. For husbands, personal earnings decrease depression independent of economic hardship.
7. For wives, education decreases depression independent of economic hardship.
8. For wives, children decrease depression independent of economic hardship.

METHODS

Sample

This research is based on a 1978 telephone survey of a national probability sample of U.S. households. Random digit dialing procedures were used to ensure the inclusion of unlisted numbers (Sudman, 1973; Waksberg, 1978). The age range for respondents was 18 through 65. If they were married, their spouse was also asked to be interviewed.[2] The spouses' ages ranged from 18 to 75. Of the members of each couple who were asked first, 4.2% refused to be interviewed. Of the 95.8% who gave interviews, 20.1% of their spouses refused.[3] Thus, the total response rate for married couples (in which both spouses were interviewed) is $100 \times (1 - .042)(1 - .201) = 76.5\%$. There are a total of 680 wives and 680 husbands in the completed sample.

Variables

Depression is measured using a modified form of the Center for Epidemiological Studies' Depression scale (CES-D) (Radloff, 1977). The CES-D measures symptoms of depression in community populations; it does not indicate a diagnosis of clinical depression. However, the CES-D discriminates between clinically depressed patients and others, and it correlates highly with other depression rating scales (Weissman et al., 1977). Respondents were asked to report the number of days in the past week that they had each symptom. Answers were coded from *0* to *7*. Preliminary factor analyses performed separately for men and women showed that crying spells and thinking one's life has been a failure are not good indicators of depression for men, and that feeling people dislike you and are unfriendly are not good indicators for either men or women. As a consequence we eliminated those four items. The final index contains 16 items: (1) feeling depressed; (2) bothered by things that do not usually bother you; (3) feeling fearful; (4) feeling lonely; (5) feeling sad; (6) feeling like you can't shake off the blues; (7) not feeling like eating; (8) having trouble concentrating; (9) feeling that everything is an effort; (10) having restless sleep; (11) talking less than usual; and (12) feeling that you cannot get going. Scored in reverse are the remaining four items: (13) enjoying life; (14) feeling hopeful; (15) feeling happy; and (16) feeling as good as others. The alpha reliability (unbiased estimate) of the index is .85 for women and .82 for men.

Perceived economic hardship is measured by a modified form of Pearlin et al.'s (1981) economic strain measure. Respondents were asked: "During the past 12 months how often did it happen that you did not have enough money to afford the kind of . . . (1) food you thought your household should have, (2) clothes you thought your household should have, and (3) medical care you thought your

household should have?" Responses were coded never (*0*), not very often (*1*), fairly often (*2*), very often (*3*). The three items were summed to produce a scale scored from low to high economic hardship. The alpha reliability (unbiased estimate) is .80 for wives and .82 for husbands.

Family income is recorded on a 7-point scale: less than $5,000 a year (coded *1*), $5,000 to $9,999 (*2*), $10,000 to $14,999 (*3*), $15,000 to $19,999 (*4*), $20,000 to $24,999 (*5*), $25,000 to $29,999 (*6*), $30,000 or more (*7*). The wife's earnings and the husband's earnings are coded in the same way, with the addition of a *0* code if the person is not employed and therefore has no personal earnings.

Education is measured as the number of years of formal education completed. Age is measured in years. The number of young children is measured as the number of children under age 12 living at home. Race, a control variable, is coded white (*1*) or nonwhite (*0*).

The bivariate correlations among the variables, and their means and standard deviations are shown in Table 1.[4]

Analysis

We developed a structural equation model with nonlinear effects (Stolzenberg, 1980). We made the following causal-order assumptions: Sociodemographic variables may affect family income, which in turn may affect perceived economic hardship, and, in turn, depression. Although it is possible that preexisting depression could color one's perceptions of economic hardship rather than economic hardship influencing depression, longitudinal analyses provide evidence for our causal-order assumptions. Pearlin et al. (1981) found that changes in family income between 1972 and 1976 affected changes in economic strain, and that changes in economic strain affected changes in depression. Using longitudinal data, Wheaton (1978) also found that socioeconomic status affects psychological distress, rather than vice versa. Because our data are cross-sectional they cannot be used to demonstrate the validity of our causal-order assumptions. However, the data could fail to substantiate our theory if, given our causal-order assumptions, we fail to find the hypothesized effects.

First we predicted an unrestricted model. Next we restricted the model by eliminating from each equation any variable whose significance level was greater than .10, using a 2-tailed test. No linear recursive effect was eliminated on a priori grounds. In addition to testing all linear effects, we allowed for the possibility of an interactive effect of education and family income on perceived economic hardship. This tests the possibility that the effect of income on perceived economic hardship is different at different levels of education.

RESULTS

The determinants of family income are the same for husbands and wives. Family income is a function of the husband's salary, the wife's

TABLE 1. Bivariate Correlations, Means, and Standard Deviations for Husbands in the Lower Triangle (N = 680) and Wives in the Upper Triangle (N = 680)

	1	2	3	4	5	6	7	8	mean	standard deviation
1. education		−.145	.164	−.024	.278	.397	−.201	−.107	12.738	2.315
2. age	−.199		−.031	−.372	−.038	.074	−.173	−.168	37.751	11.305
3. race (1 = white)	.127	−.011		−.088	−.065	.010	−.103	−.079	.912	.284
4. number of young children	.078	−.334	−.020		−.228	−.093	.186	.040	.798	1.065
5. earnings	.352	−.056	.143	.076		.339	−.076	−.042	1.077	1.232
6. family income	.405	.045	.120	−.040	.733		−.352	−.091	4.220	1.684
7. economic hardship	−.220	−.136	−.156	.124	−.228	−.344		.287	1.550	2.062
8. depression	−.107	−.081	−.045	.025	−.142	−.159	.283		20.239	15.738
mean	13.131	40.420	.915	.778	3.465	4.318	1.190	16.686		
standard deviation	2.889	12.305	.280	1.048	1.792	1.658	1.869	13.715		

).

For husbands, feelings of economic hardship are affected by a number of variables. Within the 18-to-65 age range, older men feel hardship less than younger men. Whites feel less economic hardship than nonwhites, and men with young children at home feel more hardship than those without young children. Higher family income and education decrease feelings of economic hardship.[5] In addition, there is an interaction between education and family income that can be interpreted in the following way: Low income produces less economic hardship for persons who are well educated than it does for persons who are poorly educated. Stated another way, each additional year of education increases the subjective value of a dollar.

For wives, the determinants of economic hardship are much the same as they were for husbands, except that race is not significantly related to perceived hardship. Age, number of young children, education, family income, and the interaction of education and income significantly affect perceived economic hardship. The interactive effect of education and income on economic hardship is larger for wives than for husbands. Low levels of education increase the detrimental effect of low income on economic hardship, especially for wives. This interaction effect is illustrated in Figure 1. Looking at the effect of low income (e.g., $\bar{X}$ − 1 SD, or 2.54) on economic hardship, it is clear that women with low levels of education feel the most hardship at this low income level (see Figure 1).[6]

The determinants of depression are quite different for husbands and wives. Two variables have direct effects on husbands' depression: perceived economic hardship and their own earnings. All other variables have their

TABLE 2. Restricted Regression Equations for the Husbands' Path Model in Figure 2

Independent Variables	Dependent Variable		
	Family Income		
	b	Seb	Beta
1. husband's age	.016***	.003	.121
2. husband's education	.084***	.015	.147
3. husband's earnings	.634***	.023	.685
4. wife's earnings	.366***	.032	.272
constant	−.041		
R^2	.649		
	Economic Hardship		
	b	Seb	Beta
1. husband's age	−.020***	.006	−.129
2. husband's race (1 = white)	−.407*	.244	−.061
3. number of children	.151**	.068	.085
4. husband's education	−.125***	.035	−.193
5. family income	−.398***	.068	−.353
6. education × income (4 × 5)	.008*	.004	.134
constant	5.116		
R^2	.161		
	Depression		
	b	Seb	Beta
1. husband's earnings	−.628*	.295	−.082
2. economic hardship	1.937***	.282	.264
constant	16.556		
R^2	.086		

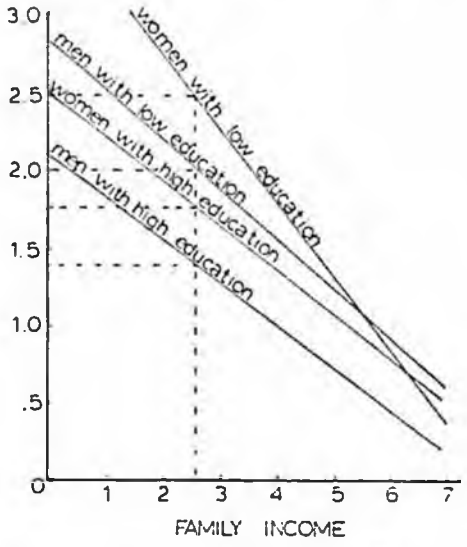
* $p < .05$, 1-tailed test.
** $p < .01$, 1-tailed test.
*** $p < .001$, 1-tailed test.

Wives' Path Model in Figure 3.

Independent Variables	Dependent Variables		
	Family Income		
	b	Seb	Beta
1. wife's age	.021***	.004	.144
2. wife's education	.129***	.021	.177
3. husband's earnings	.546***	.026	.581
4. wife's earnings	.393***	.038	.288
constant	−.512		
R^2	.541		
	Economic Hardship		
	b	Seb	Beta
1. wife's age	−.023***	.007	−.133
2. number of children	.206**	.075	.107
3. wife's education	−.275**	.084	−.288
4. family income	−.875***	.242	−.715
5. education × income (3 × 4)	.039*	.018	.532
constant	7.045		
R^2	.171		
	Depression		
	b	Seb	Beta
1. wife's age	−.216***	.055	−.161
2. wife's education	−.549*	.262	−.081
3. number of children	−1.020*	.597	−.069
4. economic hardship	1.954***	.298	.256
constant	33.184		
R^2	.106		

* $p < .05$, 1-tailed test.
** $p < .01$, 1-tailed test.
*** $p < .001$, 1-tailed test.

FIGURE 1. The Interactive Effect of Education and Family Income on Economic Hardship for Husbands and Wives (based on regression equations in Tables 2 and 3 and solved at the mean levels of all other variables).



Note: Women with high education = $\bar{x}$ + 1 SD = 15.053; women with low education = $\bar{x}$ − 1 SD = 10.423; men with high education = $\bar{x}$ + 1 SD = 16.020; men with low education = $\bar{x}$ − 1 SD = 10.242.

The dotted lines show the predicted level of economic hardship at low family income ($\bar{x}$ − 1 SD = 2.54) for men and women with high and low levels of education.

effects indirectly through family income and economic hardship.

For women, economic hardship also has a large effect on depression. However, economic factors—earnings, income, and financial difficulties—are not as overwhelmingly important for wives as they were for their husbands. For wives, education, age, and young children also have significant direct effects. Older wives, wives with more education, and wives with children are less depressed.

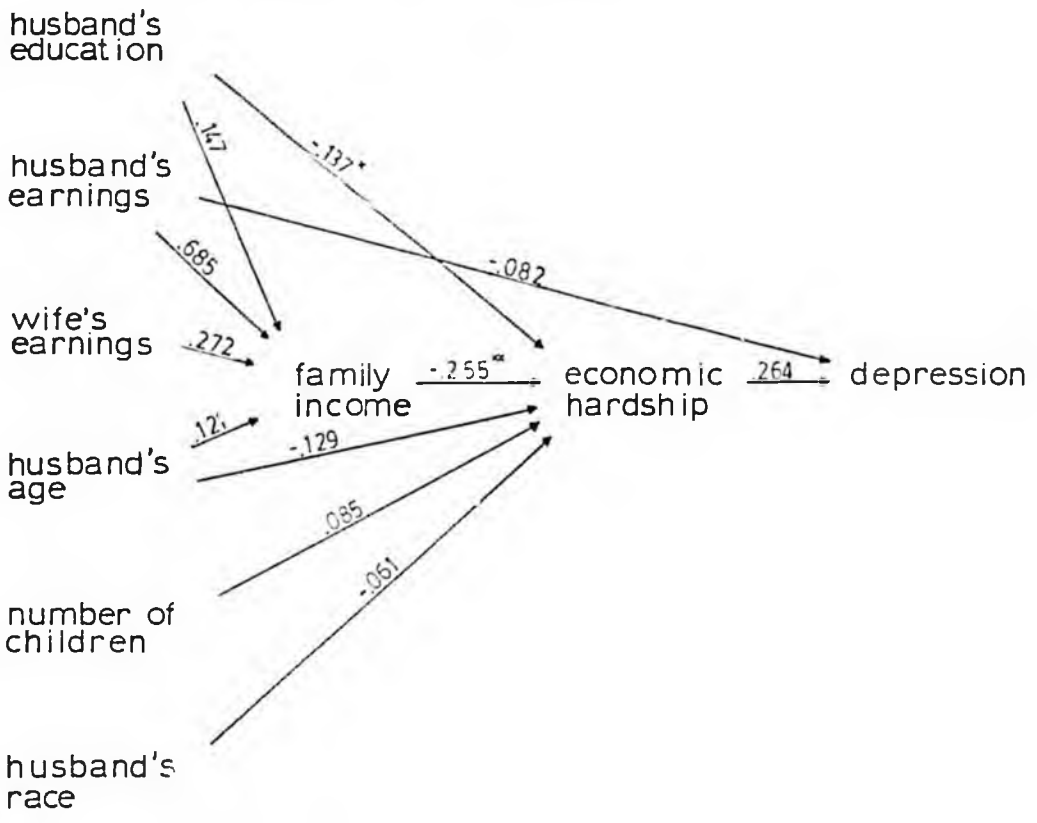
Stepping back from the specific predictions and looking at the husbands' and wives' models as wholes, a number of differences stand out (see Figures 2 and 3). Economic factors and their consequences largely determine the depression levels of married men. A man's education, age, earnings, and his wife's earnings affect his family income, and in turn, his perceived economic hardship. In addition, education, age, race, and number of young children affect economic hardship directly. Thus, holding objective economic conditions constant, men with more education, older men, white men, and men with fewer young children feel fewer economic difficulties. Perceived economic hardship, in turn, has a large effect on depression. The husband's personal earnings also affect depression apart from family income and economic hardship. Apparently a man's own earnings symbolize something more to him than simply the absence of financial difficulties. Increased earnings may increase self-esteem and feelings of power and control, which are beneficial to psychological well being, apart from purely monetary considerations. For a husband, personal earnings may improve psychological well-being because they indicate successful fulfillment of role obligations.

The determinants of wives' depression levels that act by way of perceived economic hardship are largely the same as they were for husbands. Age, education, her earnings, and her husband's earnings affect family income and, in turn, economic hardship. And, holding family income constant, younger wives, wives with less education, and wives with young children feel under greater financial pressure. Economic hardship has a large effect on wives' depression, just as it did for husbands.

For wives, however, personal earnings affect depression only in that they add to the family income and thus decrease perceived economic hardship. An employed woman's earnings do not decrease her own depression levels much more than they decrease her husband's. The total causal effect of a wife's earnings on her husband's depression equals (.272 × −.255 × .264) = −.018. The total causal effect of a wife's earnings on her own depression equals (.288 × −.304 × .256) = −.022 (see Table 4).

Education, age, and the presence of children, on the other hand, have direct effects on wives' depression levels. For men, education is relevant to depression only in that it increases potential earnings, whereas for women it is important in its own right. In addition, older women are less depressed than younger women, and women with children are less de-

FIGURE 2. Restricted Path Model of Husbands' Depression (standardized coefficients).



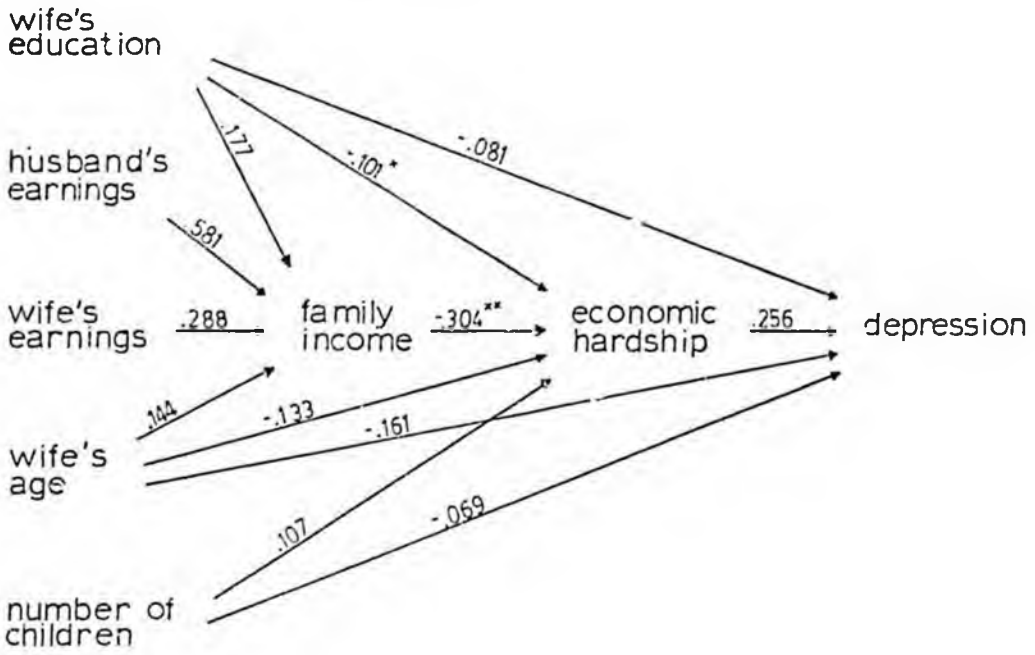
* This the multiple regression coefficient representing the effect of education on economic hardship at the mean level of income, multiplied by the ratio of the standard deviation of education to the standard deviation of economic hardship $(-.089\ (ed)\ \frac{2.889}{1.869} = -.137\ (ed))$.

** This is the multiple regression coefficient representing the effect of income on economic hardship at the mean level of education, multiplied by the ratio of the standard deviation of income to the standard deviation of economic hardship $(-.288\ (inc)\ \frac{1.658}{1.869} = -.255\ (inc))$.

pressed than those without.[7] Interestingly, the presence of young children has both positive and negative effects on a wife's well-being. Young children at home increase perceived economic hardship, thus increasing depression (.107 × .256 = .027). However, holding economic hardship constant the presence of young children decreases a wife's depression (−.069). This appears to be empirical support for the common knowledge that children bring both joys and difficulties. For wives, children may indicate successful fulfillment of role obligations.

Table 4 summarizes the direct, indirect, and total causal effects of socioeconomic status variables on depression for husbands and wives. It shows that most of the effect of socioeconomic status on depression is indirect—mediated by economic hardship. The two notable exceptions are the direct effect of a husband's earnings on his depression, and the direct effect of a wife's education on hers.

FIGURE 3. Restricted Path Model of Wives' Depression (standardized coefficients).



* This the multiple regression coefficient representing the effect of education on economic hardship at the mean level of income, multiplied by the ratio of the standard deviation of education to the standard deviation of economic hardship ($-.09$ (ed) $\frac{2.315}{2.062} = -.101$ (ed)).

** This is the multiple regression coefficient representing the effect of income on economic hardship at the mean level of education, multiplied by the ratio of the standard deviation of income to the standard deviation of economic hardship ($-.371$ (inc) $\frac{1.684}{2.062} = -.304$ (inc)).

DISCUSSION

Successful fulfillment of male and female role obligations in the household affects psychological well-being. Ongoing economic hardship—the inability to adequately feed, clothe, and provide medical care for the family—is a recognition of unsuccessful fulfillment of both breadwinner and homemaker obligations. We find that economic hardship has a large effect on both spouses' depression levels. Other factors affect husbands and wives differently. A husband's personal earnings have a direct effect on his depression, because, we argue, his earnings indicate successful fulfillment of his provider obligations. A wife's major role obligation, on the other hand, is not breadwinner, but homemaker. We find that a wife's personal earnings do not affect her depression levels, whereas her education and children do.

It is in the household that the larger social and economic order impinges on individuals, exposing them to varying degrees of difficulty in meeting obligations. The ability to fulfill household duties is influenced by differences in the demands and resources of various socioeconomic positions. Although the finding that socioeconomic status is inversely related to depression and other forms of psychological distress is well documented, answers to the questions of *which* aspect of socioeconomic

TABLE 4. Direct, Indirect, and Total Causal Effects of Socioeconomic Status Variables on Depression for Husbands and Wives[a]

	Direct	Indirect	Total Causal
Husbands			
family income	—	−.067	−.067
husband's education	—	−.046	−.046
husband's earnings	−.082	−.046	−.128
wife's earnings	—	−.018	−.018
Wives			
family income	—	−.078	−.078
wife's education	−.081	−.040	−.121
wife's earnings	—	−.022	−.022
husband's earnings	—	−.045	−.045

[a] See Figures 2 and 3 for path models. These are standardized coefficients. Note that all indirect effects of SES on depression are mediated by economic hardship.

status affects psychological well-being, and *why* socioeconomic status affects psychological well-being are less firmly established. To date, only Kessler (1982) has systematically examined *which* aspect of socioeconomic status is the important determinant of psychological well-being for men and women; and only Pearlin and his colleagues (1981) have focused on chronic economic hardship as the explanation of *why* socioeconomic status is associated with psychological well-being. We have synthesized these two approaches: (1) we examined three aspects of socioeconomic status—education, family income, and personal earnings—and (2) we addressed the issue of why a person's position in the social structure affects depression by focusing on the chronic stress of not having enough money to adequately feed, clothe, and acquire medical care for one's family. As Pearlin et al. (1981) note, chronic stress has received little attention in the research on socioeconomic status and psychological well-being.

Our findings indicate that chronic economic difficulties are extremely important factors in depression for both men and women. Furthermore, we find that while objective measures of family income have a large impact on perceived economic hardship, the perceptions are not a one-to-one reflection of income. Other factors—age, education, and number of children— also play a role. Married persons who are younger, poorly educated, or have many young children feel more financial difficulties than their counterparts who are older, well-educated, or have fewer young children, even at the same income levels.

The role of education in perceived economic hardship is more complex: Education interacts with income in its effect on perceived economic hardship, especially for women. Because ours is the first study to find that education and income have an interactive effect on perceived economic hardship, the finding should be considered tentative until replicated. Given this caution, we interpret the result as follows. Poverty and lack of education have a synergistic effect on economic hardship, each making the effect of the other worse. A person who is poorly educated needs more money to fend off economic hardship than does a person who is well-educated. Each year of education increases the subjective value of a dollar. Education may provide knowledge and information on how to budget household expenses, where to get the best buy for one's money, when paying less is a good strategy and when it simply buys an inferior product, what foods are cheap but nutritious, how to keep the children healthy, and when a visit to the doctor is necessary and when it is not. People who are well educated also tend to have friends who are well educated and are thus better able to help them out with information and support. The interaction of education and family income may be stronger for wives than for their husbands because it is usually the woman's job to see to the daily operation of the home, including shopping for food and clothes, and caring for the children's health.

Kessler (1982:761) concluded that, as an explanation for depression, the "focus on economic strain is inappropriate," and that more than a simple economic reality is involved in psychological well-being. We disagree with the first statement. Both our findings and those of Pearlin and his colleagues (1981) indicate that economic hardship plays an important role in depression. However, we agree with the second statement—more than a simple economic reality *is* involved. For men, personal earnings affect depression, apart from their impact on economic hardship. Family income, including money that a man's wife earns and money from

other sources such as interest, dividends, property sale, public assistance, or social security, affects a man's depression *only* by way of decreasing perceived economic hardship. His own earnings, however, have an independent affect on his depression levels. In the United States, a husband who earns a lot of money is a man who has successfully met his obligation as household provider; who is respected and admired by others; and who can afford the material symbols of success. Furthermore his earnings may increase his self-esteem and feelings of control. A husband's personal earnings indicate his success at fulfilling his role obligations, and thus affect his psychological well-being independently of economic hardship.

For a husband, the bottom line in socioeconomic status and psychological well-being appears to be money and what it symbolizes to himself and others. For a wife, economic factors are only part of the story. Whereas a man's education is important to his psychological well-being only in that it increases his income and decreases perceived economic hardship, a woman's education plays an independent role in her psychological well-being. Furthermore education affects the depression levels of both employed married women and homemakers. Even employed married women, because their primary role is not provider, may be less dependent on high paying jobs for identity and self-esteem than are married men. Instead, education appears to be the most important component of SES to women's psychological well-being, possibly because education helps a wife successfully meet her responsibilities in the home.

Whereas a husband's earnings have an independent effect on his depression, a wife's earnings only affect her depression by way of adding to the family income and thus decreasing perceived economic hardship. In fact, a wife's earnings have about the same effect on her husband's depression as they do on her own. A wife's earnings have a small beneficial effect on both spouses' psychological well-being because they increase the family income and thus decrease economic hardship.

The number of young children at home increases depression levels of both spouses by increasing their economic hardship. However, for women, children also decrease depression levels directly. Thus, for wives, having young children has both positive and negative effects on psychological well-being. Gove and his colleagues suggested that the presence of young children would increase a wife's psychological distress by isolating her from adult social support and confronting her with incessant demands (Gove and Tudor, 1973; Gove and Geerken, 1977). However, some studies have found children to be insignificantly related to a woman's psychological well-being. An apparent near-zero association can result if positive and negative effects cancel each other out. In these data young children increase wives' depression by way of increasing economic hardship, but also decrease wives' depression directly. Thus young children may increase demands and burdens but also be a source of gratification to wives in that they indicate successful fulfillment of role obligations. Since ours is the first study to examine the effect of children on depression independent of economic hardship, these results and interpretations should be viewed cautiously, especially since the direct negative effect of children on wives' depression levels is significant only at $p < .05$ with a 1-tailed test. We hope these results will be replicated.

Role expectations for husbands and wives have been slow to change in response to other household transitions. Over the course of the twentieth century, household patterns in the United States have undergone many changes, largely due to increases in women's participation in the labor force. Marriages are shifting from the *complementary* type, in which the husband is employed and the wife stays home and cares for the household and children, to the *parallel* type, in which both spouses are employed and both care for the household and children. However, the shift from one type of household-and-work pattern to another is still incomplete. In 1978, 56% of married women in the sample were employed full- or part-time. However, the household division of labor has been slow to catch up: Even when the wife is employed, only 20% of the husbands share the housework and childcare equally with their wives. Eighty percent of employed wives still have primary responsibility for the home; 93% of nonemployed wives bear primary responsi-

bility for the home. Since husbands of employed wives are more likely to share the housework and childcare, the trend toward shared participation in the home is likely to increase as women's participation in the labor force increases. Last to change are role expectations. Even if a wife is employed, she is likely to think of her employment as supplementary to her husband's. Many women work outside the home in order to help maintain or improve the family's accustomed standard of living, but they do not see themselves as the primary providers. As more wives work outside the home, more (although not many) husbands help with the housework and childcare, but husbands do not see themselves as the primary homemaker. Role expectations still largely follow traditional ideas of what a husband and wife are supposed to do. It is the husband's duty to try his best to support the family, even if he needs financial help from his wife. It is not the wife's duty to provide for her family, and few respondents consider a woman a "bad" wife because she does not work outside the home.[8] We expect that as more married women are employed and as more husbands share the housework and childcare, role expectations for husbands and wives will change, too. Possibly, in future households, husbands and wives will both be expected to be providers and homemakers; and as husbands and wives' role obligations converge, so will the determinants of their psychological well-being.

NOTES

1. The presence of an early economic squeeze does not deny the facts that there may be later life cycle squeezes when the children are older, or that the vulnerability to economic squeezes varies by occupation. (Oppenheimer, 1974; Estes and Wilensky, 1978).
2. One advantage of interviewing couples by phone is that, even if the other spouse is in the room, he or she is not aware of the spouse's answers to specific questions, but hears only cryptic answers (e.g., "agree," "yes," "four") without hearing the questions.
3. Respondents whose spouses refused to be interviewed did not differ significantly in terms of age or education from respondents whose spouses were interviewed.
4. For each variable we also examined the correlation between husbands and wives. Both husbands and wives were asked to report family income and number of children, so that the correlation may be used as an indicator of reliability. The correlation between husbands' and wives' reports of family income is .81. The correlation between reports of number of children is .97. The correlations also show the sociodemographic similarity between spouses. Husbands' and wives' level of education correlate .60; race, .81; and ages, .93. Husbands' and wives' earnings are not correlated, however ($r = .01$). Perceptions of economic hardship correlate .48, and Table 1 shows that wives perceive more economic hardship than husbands. The depression levels of husbands and wives are positively but weakly correlated ($r = .14$).
5. The unadjusted association between family income and economic hardship illustrates the strength of the association most graphically. For husbands and wives combined, the approximate average family income for persons who feel economic hardship very often is $13,000; fairly often, $15,000; not very often, $19,000; and never, $24,000.
6. When two variables are positively correlated, an apparent interaction between them may actually be due to a nonlinear effect of one of the variables. Thus, the significant interaction of education × income may actually be education × education (education^2) or income^2 (Southwood, 1978). In order to test for these nonlinearities in both the husbands' and wives' models, we replaced the interaction term, first with the quadratic term for income, and then with the quadratic term for education. The squared term did not have a significant t-test associated with it nor did it add significantly to the R^2 in either case.
7. We also examined the determinants of depression separately for wives who are employed and those who are not. Education is more important than earnings, even for employed wives. And children decrease depression for employed and nonemployed wives.
8. In response to the question, "should an able-bodied woman be expected to work if she is married and has no children," 71% of the respondents in the sample answered "no." When the hypothetical wife had young children, 88% felt she should not be expected to work.

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Cominco Alaska

The Honorable H. A. "Red" Boucher
Alaska State Legislature
House of Representatives
P.O. Box V
Juneau, Alaska 99811

February 11, 1986

RE: SSHB 466, Alaska Resident Employment Preferences

Dear Representative Boucher:

Cominco Alaska is pleased to submit a summary of a report entitled "Potential Socio-Economic Impacts of the Polaris Mine Project". The purpose of the study was to examine the socio-economic impacts of the Polaris Mine on the Arctic coastal communities within Cominco's planned hiring area. If you desire a complete copy of this report contact:

Marion LaVigne
Outcrop Ltd.
Yellowknife, N.W.T.
403-873-6152

Ms. LaVigne also may be able to provide you with additional studies done on the socio-economic effects of unemployment in northern regions.

If there is additional information we may provide you, please contact our office.

Sincerely yours,

Lisa M. Parker

LMP:jae

Enclosure

Draft

Potential Socio-Economic Impacts of the Polaris Mine Project

An examination of the potential impacts on the community of Resolute Bay, the Arctic Coastal Communities, and the N.W.T. in general.

Prepared by:

Outcrop Ltd., Yellowknife, N.W.T.

in association with

DPA Consulting Limited, Vancouver

June, 1980


ELLESMERE ISLAND
Eureka
Polaris Mine
Grise Fiord
QUEEN ELIZABETH ISLANDS
PRINCE PATRICK ISLAND
BATHURST IS
MELVILLE IS
DEVON ISLAND
Resolute
BANKS ISLAND
Sachs Harbour
PRINCE OF WALES ISLAND
Arctic Bay
Pond Inlet
Clyde River
Nanisivik
BAFFIN ISLAND
Broughton Island
Cape Dyer
Kangerlussuaq
Iqaluit
Hall Beach
Old Crow
Aklavik
Inuvik
Tuktoyaktuk
AMUNDSEN GULF
Fort McPherson
VICTORIA ISLAND
Holman
Cambridge Bay
Spence Bay
Gjoa Haven
Pelly Bay
Arctic Circle
YUKON
Fort Good Hope
Coppermine
Repulse Bay
Frobisher Bay
Lake Harbour
Cape Dorset
Dawson
Norman Wells
Fort Franklin
GREAT BEAR LAKE
Fort Norman
Mayo
CONTWOYTO LAKE
Coral Harbour
SOUTHAMPTON ISLAND
Baker Lake
Wrigley
Whitehorse
Rankin Inlet
Chesterfield Inlet
Fort Simpson
Edzo
Rae
YELLOWKNIFE
HUDSON BAY
QUEBEC
Nahanni Butte
Fort Providence
Whale Cove
GREAT SLAVE LAKE
Fort Liard
Fort Resolution
Eskimo Point
Hay River
Pine Point
BRITISH COLUMBIA
Fort Smith
Sanikiluaq
Belcher Islands
ALBERTA
SASKATCHEWAN
MANITOBA

Summary

The Polaris Mine will be recruiting staff from a number of isolated, semi-traditional Inuit communities in the high and coastal Arctic. The potential employees speak Inuktitut, have some acquaintance with the wage economy, and little or no experience with mining.

The apparent economy of many of these communities is dependent on hunting and trapping. In fact, because other costs are increasing more rapidly than fur prices, these communities are increasingly dependent on cash from wage employment or government programs to finance traditional pursuits.

While educational levels are not high, the influence of "southern" schooling over the past 20 to 25 years has created some understanding and acceptance of "southern" values, and increasingly, wage employment is proposed by community residents as a solution to a growing number of young people educated in the "southern" methods, who are no longer willing or capable of practicing traditional activities.

The "solution" of wage employment is not easy to put into practice, as a number of government and industry experiments will testify. Further the communities, established some two to three decades ago as trading centres and government administrative areas, are not as a general rule located in prime industrial growth areas. When mines and other large wage employment projects develop they are close to communities only by chance.

Inuit make up a third of the population of the N.W.T. Contrary to some southern conceptions of Inuit lifestyles they are no longer living in a traditional manner. Inuit of 1980, are educated, relatively sophisticated in their tastes for North American consumer goods, politically astute, and willing and determined to take full responsibility for the direction of their own lives, and the protection of their culture.

The evidence is documented in a number of recent political papers including the Nunavut and COPE claims, and the debates of the N.W.T. Legislative Assembly.

Change over the past 25 to 30 years has become a way of life for the Inuit. Taken from their families in the early days for education, then settled in communities, introduced to western style government, and finally wage employment, in a mere 25 years, the Inuit are remarkable in their capacity to adapt, and to consider carefully and seize hold of foreign concepts to further their own cultural traditions.

Communications technology, upgrading of airports, increased air traffic and regular flights, radio programming, and the introduction of North American television have provided ready access to hundreds of new situations and new opportunities.

Both the government, and the Inuit as a people are concerned about the problems they face with an improved level of education and a high birth rate. With more than half the population under 18, the decisions which must be made to accommodate this group of young people in the N.W.T. economy are discussed regularly.

As development projects are proposed, the merits and disadvantages are widely debated. Cultural change is both feared and welcomed, but appears to be inevitable, given the state of communication technology in the N.W.T. Slowly the debate is switching from whether or not change should come, to how change can best be managed for the benefit of residents.

Development projects inevitably lead to questions about the merits of different employment systems. Should the Inuit move from communities to jobs or should townsites be developed at project sites for the Inuit? What are the social and economic consequences of either course? These and other concerns are addressed in this study.

Introduction

The purpose of this study is to examine the socio-economic impacts of the Polaris Mine on the community of Resolute and on the Arctic coastal communities within Cominco's planned hiring area. The intention is also to provide an overview of the impacts of the mine on the N.W.T. economy.

The study was conducted during a four month period from late January to late May, 1980. The field work, which involved visits to most of the communities, was completed in March and early April. Interviews were held with community councils, government officials, business owners/operators and individual residents.

The main emphasis of the report is on the potential impacts on the community of Resolute, which is the closest community to the mine, and the community most likely to experience impacts of the Polaris Mine. Impacts on Arctic coastal communities are discussed in lesser detail and the impacts on the N.W.T. economy are presented as an overview of the potential Polaris impacts compared with a benchmark "without the mine" scenario.

Project Overview

The Polaris Mine facilities will occupy 230 acres of Little Cornwallis Island, along the Crozier Strait, 60 miles northwest of Resolute Bay. The lead zinc mine will go into operation in early 1982 and when it reaches full operation in 1984, it will process 2,050 tonnes of ore per day. Surface facilities will consist of a concentrator, storage building, accommodation facilities as well as conveyors, fuel and water tanks and fresh water and tailings pipelines.

Accommodation will be provided for 240 in 208 single rooms and 16 two-room suites. Complete kitchen, dining and recreation facilities will be included in the accommodations complex. There will be telephone, CBC television and CBC-North radio services at the site. No townsite on Little Cornwallis Island is planned.

Ore will be transported to markets during the August 15 to October 15 shipping season and at the same time 4-5000 tons of supplies will be shipped to the mine each year. An additional 200 tons of supplies each year will be shipped by air via Resolute.

Employees will be move via commercial carriers from hiring centres in Montreal, Edmonton, Yellowknife, Cambridge Bay and Coppermine. Air charter shuttle flights three times weekly will move staff to the mine. Airfare will be paid by Cominco to and from these hiring centres. Individuals will be responsible for paying their own air fares between home communities and the hiring centres.

Peak construction employment will be in 1981. The total number of on site man hours is estimated at 850,000. Northerners could fill 30 to 40 percent of the Polaris Mine construction staffing requirements.

During operations, employees will follow one of two work rotation schedules. The southern rotation schedule will involve 12 weeks on the site and three weeks paid leave. The northern rotation schedule consists of six weeks on site plus four weeks leave, partially paid and pro rated to southern leave. The northern rotation schedule is proposed for the Inuit to allow them to earn a good wage, yet be able to pursue their own lifestyle to some extent.

There will be 205 Polaris Mine positions. This does not include 20 catering positions. For the Polaris Mine to run efficiently and meet its production targets, 163 of these 205 positions are classified as essential positions. Included in the 163 essential positions are 25 positions that will be filled by senior management personnel and administrative staff. There will also be one position in Resolute for a recruiter/expediter. The remaining 137 mine positions will be filled by rotational employees either from the North or the South. For each position filled by a southern hire a multiplier of 1.68 is used to determine the number of employees required to fill the position on a year round basis, considering "leave" time. For each position filled by a northern hire, the multiplier used is 1.84.

To provide employment for the Inuit and other N.W.T. residents, Cominco plans to recruit extensively in the North for people to fill training positions. Cominco plans to hire the majority of its northern rotational staff from the Arctic coastal communities and from Resolute.

All training programs will be particularly aimed at developing and integrating the northern employee. All supervisors will be given instruction in cross-cultural differences. Cominco has established 73 pre production training positions and will provide a total of 236 training months to employees, prior to the start of mining operations.

Once the mine is fully operational in 1985, the potential number of northern employees at the site, in Resolute and in Yellowknife could range from 74 to 102. The higher number assumes that travel costs to and from all Arctic coastal communities would be paid.

All northern employees as a percentage of the total Polaris staff could range from 29 percent to 40 percent in 1985.

About $2 million or 16 percent of the mine's operating supplies of $12.3 million could be purchased from northern suppliers. The small size of these northern purchases reflects the Territories lack of a manufacturing base and the project's distance from the Territories larger centres, especially Yellowknife.

Impacts on the Northwest Territories Economy

The last decade and a half has been a period of dramatic change for the Northwest Territories economy. Much of the growth occurred in the period from 1967 to the mid 1970s. The population of the territories from 1967 to 1974 increased from 30,124 to 40,802, representing an average annual growth rate of 4.4 percent, while real growth in gross territorial product was well over 10 percent per year.

These figures give only a partial picture of the structural changes which occurred over the period. From 1967 to 1974 the value of mineral production increased five times; investment expenditures more than tripled and totally new activities especially oil and gas exploration, were introduced to the N.W.T. economy.

Over this period a growing number of Northerners became members of, and dependent upon, the Northwest Territories wage economy.

While the data for more recent years is incomplete, it appears that the rate of economic growth has moderated and that the 1974-79 period has been one of consolidation for the Northwest Territories economy.

The Polaris Mine will have a positive impact on the N.W.T. economy, but the relative impact will be quite small, reflecting the high spending leakages out of the N.W.T. economy to southern Canada. These leakages are the result of the Territories lack of an industrial base.

The employment and income effects are generally greater in the construction phase particularly in 1981, than after start up. This is typically the situation for a highly capital intensive resource project.

The Polaris Mine will have a favourable, but minor effect on the N.W.T.'s high and increasing unemployment rate. This reflects the relatively small size of the project in relation to the Territories high unemployment at the present time, and the fairly substantial increases anticipated in the size of the N.W.T. labour force during the projected life of the mine.

In 1981, during the peak construction period, there will be about 159 jobs for Northerners as a result of the Polaris Mine. Personal income from these jobs will be approximately $4.2 million. This represents a percentage increase in personal income of about 1.3 percent.

When the mine is fully operational in 1986, approximately 128 Northerners will have jobs as a result of the mine. Of this number, 74 will be Polaris Mine employees. Thirty-one indirect jobs will result from Polaris purchases of suplies and services, and 23 jobs will result from the respending effects in the Northwest Territories.

Comparing these employment statistics with a projected "surprise free" future in the N.W.T. (i.e. no major projects going ahead) they represent a 5.3 percent increase in the number of Northerners employed in mining, and a 1.3 percent increase in the number employed in the residentiary sector (i.e. services industries) in 1986.

In real 1979 dollars, total personal income to Northerners will increase by approximately $2.9 million in 1986 as a result of the Polaris Mine.

Close to one half the jobs, and more than one half the personal income benefits will be in Yellowknife. The location of the operating/administrative office in Yellowknife and increased respending effects resulting from Yellowknife's more developed economy, account for the higher employment and income benefits in Yellowknife.

If travel payments to and from the mine site were extended to employees from other Arctic coast communities (in addition to Coppermine and Cambridge Bay) total Polaris related employment in 1986 could increase from 128 to 162. This represents an additional 28 direct jobs and 7 jobs as a result of respending. In real 1979 dollars, the personal income from these 162 jobs would be about 3.5 million.

Although the economic impacts of the Polaris Mine are relatively small, at the same time it can be argued that the economic effects of the mine are quite manageable and that the economic dislocations caused by the Polaris Mine should be negligible.

Impacts of the Polaris Mine on Resolute

Resolute, the closest community to the Polaris Mine, is 60 miles southeast of the mine. Founded in 1947, Resolute experienced gradual expansion until a boom period in the early 70s when seismic work and exploration activity in the high Arctic increased the size and economic importance of Resolute.

In the latter half of the 1970s this activity declined and by March, 1980 the total population of both the base and village areas of Resolute was less than 300. The Inuit population in March 1980 was 131, down from 169 in 1976. Of the Inuit population, 20 have full time jobs, although there is a total of some 135 jobs in Resolute. Most jobs are filled by southern Canadians working in Resolute on a rotational or short term basis.

Resolute, as a result of a government plan, now abandoned, has elaborate municipal services for its size. Water and sewer services are designed to handle a much larger population. In March, 1980 there were some 20 empty houses in Resolute, approximately half reserved for residents and half for territorial government staff. There is also a number of serviced lots available.

The Inuit population of Resolute has had contact with wage employment for some 25 years. Overall, residents are pleased with their modern community, and relations with the nearby base are cordial.

Hunting and trapping activities continue in Resolute, but are no longer the sole source of income. Usually they supplement wage income, or are seasonal activities, with participants working at part time jobs when the season is over, or when jobs are available. Since the mine is in a low priority hunting area, its location is not expected to effect hunting and trapping activities. Actual employment at the mine could have some effect, but the extent will depend on whether employees use their time off to hunt and trap. Most residents felt that four weeks off was adequate time for hunting and trapping.

It is estimated that some seven to 11 residents will have permanent jobs at the Polaris Mine in 1985. Based on an estimate of the amount of money to be spent by Polaris in the community,

a further eight jobs will be created, with five of the eight likely to be filled by Resolute residents. In addition, respending of wages will create three more jobs for a minimum of 15 new jobs for community residents.

Part time, or seasonal work created by the mine (e.g. ship loading, unloading) will likely exceed the capacity of the Resolute labour force, until 1985. This could cause peak period staffing difficulties for local businesses, and may also cause in-migration to fill expected jobs.

Overall, an increase of approximately 40 to 50 people, or 10 to 12 families is expected as a result of employment caused by the mine.

Comparing current community wage income and projected income from direct, indirect and induced employment, the Polaris Mine could cause a 102 percent increase in wage income in Resolute from 1980-1985 and a 64 percent increase in the total community income.

So that the community obtains the maximum benefit from the mine and related activity, the study team recommends that priority be given to Resolute residents who are prepared to fill available jobs.

While wage income will increase dramatically, the impact of the mine on the Resolute economy is not nearly as large, since much of the money pumped in by wage earners goes elsewhere to purchase goods for resale. There will be some strengthening of the local economy, due to greater use of existing capacity in the accommodation and airline businesses, if Cominco purchases services locally. Some new business opportunities may arise, and both the government and the Inuit Development Corporation should be prepared to assist these ventures.

If the population increases as expected, there will be a need for an additional classroom for the school, and possibly some additional housing. In the meantime, excess territorial staff housing could be made available to the community to temporarily alleviate any housing shortages.

Cominco should be prepared to hire a resident to provide ongoing liaison with the community on a number of subjects, including the provision of counselling services, the recruitment of staff for the Mine, and to monitor the effects of mine employment on the community generally.

Considering Cominco's work rotation and travel policies, families from other N.W.T. communities may decide to move to Resolute to be close to jobs If this becomes the case and housing shortages occur, there are two interrelated solutions; the government can discourage in-migration by advising other communities there is no housing, and the provision of convenient and paid travel to and from the job site, combined with work rotation adjustments if needed, would encourage people to stay in home communities.

Extensive interviews with residents of Resolute revealed a high respect for money, softened by more traditional values relating to a satisfactory life today, and concern for the well being of the family.

Prosperity — a new truck or skidoo — is respected, in both the traditional culture (where it implies an improved ability to gather food) and in the modern lifestyle.

Elders, leaders and people with particular skills, traditional or modern, are respected in the community. Polaris employment will create new skills in the community, and may tend to reinforce a trend toward division between the "rich" and the "poor".

From the point of view of community services and job opportunities, the relatively sophisticated population of Resolute is likely to consider the mine and associated employment to be an improvement over the present situation. Residents are aware that the level of community services depends on the total population and although they do not want rapid growth, they are also concerned about the current declining population.

Wage income would likely be spent on food and better equipment for traditional hunting, trapping and fishing, as is presently the case.

Although money is held in high regard, the traditional Inuit values have not been superceded by southern values. The family and traditional activities are of great importance to residents. People still move regularly to be close to fa and friends. Families still move out onto the land in hunting season.

This close knit family grouping may be affected by mine rotational employment. The residents interviewed suggested long absences of the father may create problems in the family. They also suggested that the six week work period may conflict with traditional hunting seasons, particularly in the spring.

However residents appear willing to try the planned 6 weeks on the job, 4 weeks off rotation proposed by C- inco. They suggested that modifications might be made to rotations in spring hunting season.

The study team concluded that the work rotation system should be implemented as planned, but that the effects on employees' families be monitored closely.

The company should be prepared to make changes to its rotational schedule, if negative effects on family life become evident.

Mine employment may also cause a short term impact on the leadership of the community; however, increasing numbers of women will take on both jobs and leadership roles. A related impact may be a requirement for a day care centre.

Nothing in Resolute itself, or in the reports from other projects using rotational systems of this type would lead to the conclusion that there will be a dramatic increase in alcohol consumption, or in crime as a result of mine employment. The company should be prepared to work with the community agencies to resolve any incidents or problems that may occur.

The company has indicated its intention of providing orientation programs for southern staff. These programs should extend beyond the work environment, to ensure southern workers are sensitive to the Inuit community environment. In discussions with residents, a number of suggestions were made as to how this might be accomplished. These types of suggestions should be considered in planning the overall working atmosphere, and where possible encouraged.

Job satisfaction is defined by Resolute residents as having a job you like, earning good money, and having variety and opportunity to learn. There appears to be some preference for the

"better than menial" jobs, although some people are not happy with a management role when decisions inevitably affect family and close friends.

To meet these job aspirations, upgrading and training will be required. If Cominco conducts a strong and sustained campaign to upgrade Inuit employees so that they can obtain "better than menial" jobs, the team concludes that the other indicators of job satisfaction wil be met by Polaris positions.

Although concerned about the separation of families during work periods at the mine, Resolute residents are not convinced a townsite at the mine is the answer. Although it was considered as an immediate solution to the problem, Resolute residents also recognized that a townsite would likely cause a further decline in the size and services in Resolute, and could have an effect on hunting and trapping harvests in their area.

Impacts of the Polaris Mine on Arctic Coastal Communities

Residents from Arctic coastal communities (Cambridge Bay, Coppermine, Holman Island, Gjoa Haven, Spence Bay and Pelly Bay) could hold from 38 to 66 Polaris Mine positions in 1985. The high estimate would apply only if travel was paid for residents in communities other than Cambridge Bay and Coppermine. This would represent a maximum of 12 percent of the total labour force in these six communities.

Polaris employment will have a moderating effect on the current and projected high unemployment rates, but at no time will the number of jobs exceed the labour supply in the Arctic coastal communities.

In total, from 47 to 81 jobs could be created for residents of these communities including jobs created as a result of respending effects of Polaris Mine employees.

Income from these jobs in 1985, in real 1979 dollars, could be as high as $1.5 million. In Cambridge Bay the addition of job opportunities is likely to have a positive effect, since the community depends on wage employment.

Pelly Bay would feel the greatest impact of mine employment with a potential 16 percent of the labour force working at the mine in 1985, depending on transportation policies. Because Pelly Bay has so few jobs now, and so few job prospects, the mine opportunities are considered a positive impact. Similar positive impacts will also result in the other communities, since unemployment is high in all communities surveyed, but particularly in Gjoa Haven, Spence Bay and Pelly Bay.

Although mine wages will be higher than those for community jobs, residents are not concerned that key community workers will be lured by mine employment. Community contacts indicated that lower paying jobs in the community would be more attractive because of the traditional Inuit regard for the family. This leads to the conclusion that Polaris jobs will attract young people who do not have full time jobs and are generally not full time trappers.

There could be a reduction in the amount of income generated by hunting and trapping; however, the impact is considered to be relatively minor. The study team concluded that if all

potential mine employees were trappers, this would only represent about 15 percent of the Arctic coastal community trappers. Residents generally feel that the rotation allows sufficient time for trapping during the period of 4 weeks at home.

There is concern in the communities that there will not be enough jobs for people, which indicates a high interest in mine employment.

As in Resolute, the major social impact of mine employment is expected to be the separation of families. There is concern in the communities about handling family problems when the man is away from home. The study team recommends that the company hire a part time recruiter/counsellor to facilitate hiring and the flow of accurate information in each community where Polaris employment is seriously considered.

Major movements of people from a more remote community to a hiring centre such as Cambridge Bay can be avoided by the application of appropriate hiring and transportation policies. Aside from a modest increase in the use of existing airline and accommodation capacity, no major effects are foreseen in the economy of the area apart from employment effects. A need is seen for a northbound connection between Cambridge Bay and Resolute to expedite the transfer of mine-bound employees.

The possibility of a mine townsite was discussed in each community. While people felt a townsite at the mine would lessen the strain on families, they appeared reluctant to move to the site for long periods, preferring their home areas.

A positive impact on educational and job aspirations in coastal communities is foreseen as a result of mine employment. Educational levels are presently quite low in these communities. To obtain training and better job opportunities, residents must leave the community for a larger centre. The mine will provide training opportunities while preserving the home community base.

Cambridge Bay has a severe alcohol problem and a high incidence of crime. Of all the communities reviewed, Cambridge Bay may suffer the greatest increase in these problems as a result of the separation of stable family units, and the movement of transients through the community. The study team recommends strongly that the community and the government agencies work together to examine the causes of the problems in Cambridge Bay. The company should be prepared to assist these efforts where possible, and make adjustments to hiring and travel plans if it appears current plans are likely to increase these problems.

Sensitivities

In order to effectively assess the data collected, a number of options or alternative cases were considered by the study team. Some were considered at commencement of the study, others were conducted to test conclusions reached.

1. Baffin and Keewatin were considered as additional sources of manpower. If transportation policies were amended the number of Northerners employed successfully by Polaris could increase by 35 percent. Costs of employment may also rise.

2. A shorter rotation schedule was considered for Resolute. This could be expected to increase Resolute hires by 4 to 6 people.

3. If a shorter rotation was applied to other communities, there would likely be a substantial gain in numbers of northern employees and in income for the N.W.T.

4. Paid transportation from all N.W.T. communities increases the number and likelihood of success of northern employees, since it is unlikely that potential employees would want to spend much of their earnings getting to and from one of three hiring centres.

5. A townsite at the mine was considered. While the townsite might lessen the impact on families, the cost, the social problems involved in establishing a new Arctic community, and the anticipated desertion of established communities, particularly Resolute, indicate a townsite should not be considered at this time.

6. If other major projects (Arctic Pilot, Polar Gas Project) were to go ahead at the same time, there may well be a scramble for the available labour force and particularly those with skills. This would be disruptive to community life, and in the long run unprofitable for the projects. It is strongly recommended that prospective employers work together to establish a systematic and co-operative approach to hiring and training northern employees.

Summary Conclusions

The Economy

On the broad scale of the N.W.T. economy, the Polaris Mine will have a small positive impact. This will be the case for most resource development projects until the N.W.T. develops a broader industrial base.

Resolute will benefit most from the mine, to the extent that now marginal businesses could return to a profitable position and some new business opportunities could arise. The major benefit for Resolute is increased employment income.

Arctic coastal communities will also receive employment benefits. The extent of these benefits will depend on whether transportation costs to and from the mine are paid for potential employees from all Arctic coastal communities.

The mine is not likely to have a significant impact on the hunting/trapping/fishing sector of community economies, since the residents indicate employment income will be used to some extent for improved equipment and the proposed work rotation system allows sufficient time for hunting and trapping.

Peak employment during construction of the mine will cause a relatively minor bump in the total number of jobs the project offers over the life span of the mine. This is a positive effect since the transition from construction to operation will not cause major dislocations in the N.W.T. work force.

Some increase in the number of houses constructed in Resolute may be caused by the mine. This would represent a possible re-allocation of government funds from one community to another, rather than an increase in costs to the government, since housing will have to be constructed somewhere for a growing population.

Social Impacts

Since cash income has become important to N.W.T. residents, measures to increase wage employment are of benefit to the N.W.T. The Polaris Mine "transitional" rotation schemes for Inuit workers will have a positive effect socially in that it permits employees to practice both the traditional and wage earning lifestyles. A further benefit offered by the mine is the opportunity for Inuit to acquire portable skills.

On the negative side, rotational employment will cause separation of families for extended periods of time.

In addition the rotation system itself can be considered in a negative light. Simply put, the existing economic and social situation demands that the Inuit workforce at Polaris accept an employment system most southern Canadians would not accept. The southern solution to obtaining a good job is that the employee moves to the job location. At the present time this is not socially or economically acceptable in the N.W.T. A larger population may make the development of more communities possible.

The study team concludes that with regard to rotation, Cominco is attempting to create the most positive result possible under the circumstances. It is hoped that continuing efforts will be made by the company and by other employers to find tune the system for the benefit of future N.W.T. rotational employees.

Overall, the extent to which the Polaris Mine will have a positive effect on the N.W.T. will relate to whether Cominco can and does successfully implement its plans as presently outlined.

Summary of Major Study Recommendations

A townsite should *not* be established at the Polaris Mine at this time.

Although a townsite would alleviate some of the negative effects of family separation, it would not lessen the effects of separation from the extended family. At the same time, a townsite could cause new negative effects, particularly related to the hunting and trapping activities of both new residents and the Resolute people who have traditionally used this area. Rather than a townsite, the study team recommends that work rotation scheules be altered if the impacts of family separation are having negative effects on the hiring and retention of Inuit people.

Work rotation schedules for Inuit should be monitored and adjusted where necessary.

Realizing that work rotation schedules have been established to allow proper training time for Inuit employees, to ensure an efficient mine operation, and to meet operating budgets, we recommend that the 6-4 work rotation be tried, with careful monitoring of the program through the first two years of operation. If it proves unsatisfactory, then Cominco should be

prepared to adjust the work rotation schedule to more closely meet the identified needs of Inuit employees.

Transportation costs between home communities and the mine site should be paid for all N.W.T. employees.

It is unlikely that many people outside the hiring centres of Coppermine, Cambridge Bay and Yellowknife will work at the Polaris Mine if they have to pay their way to these hiring centres, since this extra cost would negate much of the positive effects of mine employment. Since payment of travel costs to all N.W.T. employees could add to the total operating costs of the mine, we suggest that an arrangement be worked out between Cominco and the government, based on the net additional costs to Cominco and the related economic gains to the N.W.T. in general and to specific communities.

The Polaris administrative/operating office should be located in Yellowknife.

Much of the economic benefit to the North will result from the location of the administrative/operating office in Yellowknife. For this reason we recommend that the office be located in Yellowknife, to maximize benefits resulting not only from direct employment, but also from employment resulting from the purchases of supplies and services and respending effects.

Cominco should implement a northern purchase policy for the Polaris Mine.

In this policy "northern preference" should be defined, and the policy should be designed in such a way, that northern businesses can be more competitive with southern businesses, and have the opportunity to submit tenders for jobs they are equipped to handle.

Government's small business development policies should take into account the requirements of proposed major resource development projects.

Many of the supplies and services of the Polaris Mine will require are simply not available in the N.W.T., although many could be developed in the territories as the market for these services expands. Small business development programs should be in tune with the needs of major resource development projects, so northern businesses can benefit from these projects.

Cominco should give recruitment and training of northern employees high priority to ensure employment benefits of the mine remain in the N.W.T.

Cominco should establish goals for employment of Northerners and should employ a co-ordinator for native recruitment/training. There should also be a full time recruiter/-counsellor in Resolute and part time recruiters/counsellors in other communities showing high interest in Polaris employment.

Where possible, Cominco should work with government to set up pre-employment training programs in home communities, or home regions. This could encourage participation. Having to attend courses at the Adult Vocational Training Centre in Fort Smith, often discourages potential trainees from taking the required courses.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

LIST OF APPENDICES

ALASKA NATIVE HEALTH BOARD, INC.

RURAL RESOURCE CENTER

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Kathleen Sutcliffe, Health Director

Bristol Bay Area Health Corporation
Ida Apokedak, Levelock
Robert Clark, Executive Director

Cook Inlet Native Association
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Copper River Health Department
Lorraine Jackson, Gakona
Clara (Billie) Peters, Health Director

Kodiak Area Native Association
Ed Brown, Kodiak
William Wolf, Health Director

Maniilaq Association
Suzy Erlich, Kotzebue
Nina Dahl, Health Director

The North Pacific Rim
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John Jemewouk, Elim
Carolyn Michels, Executive Director

Southeast Alaska Regional Health Corporation
Ethel Lund, Juneau
Niles Cesar, Executive Director

Tanana Chiefs Conference, Inc.
Kenneth B. Charlie, Minto
Paul Sherry, Health Director

Yukon-Kuskokwim Health Corporation
Bill Morgan, Aniak
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INTRODUCTION

The Alaska Native Health Board (ANHB) was formed in 1968, and was made up of representatives from each of the seven Indian Health Service hospitals (service units) within Alaska. In 1973, the ANHB was reorganized to reflect the twelve Alaska Native regions formed as a result of the Alaska Native Claims Settlement Act.

The ANHB is first and foremost an advocacy agency, working to improve the health of Alaska Natives, and to improve the health services provided to Alaska Natives. In the early 1970s, the ANHB questioned the effectiveness of alcoholism services, which resulted in an indepth study of those services. Among other projects, ANHB was actively involved in the ATS-6 satellite project; examined health care delivery systems that were paying too little attention to cultural differences and geographic barriers; dealt with patient grievances; and helped form the National Indian Health Board.

In 1978, the Alaska Federation of Natives designated the ANHB as its Standing Committee on Health and, in 1979, the ANHB signed a Memorandum of Agreement with the Indian Health Service strengthening and clarifying the ANHB's leadership roles in program planning, evaluation of services and programs, procurement, budget review, and the hiring of top level IHS Area executives.

More recently, the ANHB has been actively involved in the eradication of Hepatitis B, research, evaluation, and the replacement of the Alaska Native Medical Center in Anchorage. In 1984 and 1985, the ANHB has been involved in execution of a Rural Health Issues Study and Statewide Suicide Evaluation Project for the Alaska State Legislature. It was in the conduct of these two activities that much of the information and vision contained in this document had their origins.

The final report of the 1985 ANHB Rural Health Issues Study and the Statewide Suicide Evaluation Project expressed the need for a rural health services methodology for Alaska. While that document looks at the major health problems experienced by rural Alaskans, it especially identifies the underlying connection of behavioral health problems, to the majority of physical health issues. As a direct result of the analysis of those physical and behavioral health problems the ANHB has developed the concept of the Rural Resource Center.

Several action proposals have been developed to address the proposed changes in services delivery (especially in behavioral health areas) in rural Alaska. New program models containing innovative philosophies and methodolgies are in various stages of development. In attempting to correct deficits in rural behavioral health services delivery, the ANHB Rural Resource Center contains nine interrelated components/functions which represent practical strategies for ameliorating those deficits.

ALASKA NATIVE BEHAVIORAL HEALTH CONCERNS: CULTURAL DISLOCATION

Changing Lifestyles: Rural Alaska villages are moving from a subsistence lifestyle toward a cash economy. All forms of technology are changing rapidly, creating difficult challenges to the more traditional Native culture. The revolution in communication systems and the advent of modern media have changed expectations among residents, creating depression and a wide variety of negative health problems.

Negative Changes in Native Culture: Several generations of Native people have gone through the boarding school process which took people from villages to schools "outside," creating a schism between Native elders and youth. A major result of this has been the loss of parenting skills.

Rural Alaska residents, and especially Alaska Natives, suffer inordinately high rates of suicide and other forms of violence and abuse. Death and illness associated with injuries from external causes (snowmachines, three-wheelers, boats, airplanes and automobiles) are extremely high. The rates are many times higher than for Americans generally, and also for urban Alaskans. Rural Alaska Natives suffer greatly from all forms of substance abuse, with the abuse of alcohol designated by virtually every state and federal health agency as the most serious health problem in Alaska.

Many of the Native villages in Alaska are psychologically depressed in the sense that they suffer from a general malaise resulting in the negative health status described above. At present, health promotion and disease prevention strategies are virtually non-existent in most villages. Because state and federal treatment and prevention resources are becoming more difficult to secure and, even if there were unlimited resources, the vast geographic reality of Alaska would make delivery of those services difficult under the best of circumstances. Local resources must be explored, developed and used, with local health promotion and prevention capability being developed through work with elders and possible resurrection of traditional Native health philosophies and behaviors.

THE CONCEPT OF COMMUNITY

It is important to assess and evaluate rural health service delivery within the context of rural attitudes and value systems. Too frequently assessment and evaluation are derived from standards developed for urban communities. Rural value systems tend toward wholistic approaches to life. The community and its members are perceived as a unified entity. Rural Alaskan communities have been described as a family of families.

Improvements in the health of villagers will require an active searching with all members (elders, adults, youth) of their physical, emotional, intellectual, spiritual and interpersonal lives for causes and symptoms of disease.

Economic, health and social development are interrelated. The expansion of one without the other may lead to greater dependency and destroy efforts aimed at self-sufficiency. During 1985, the ANHB surveyed all villages in Alaska regarding suicide prevention, adolescent health needs, major rural health issues and the roles of various governmental entities. As a primary suicide prevention strategy, villages recommended the development of additional economic opportunities at the village level.

It is imperative that the community enhancement process include the improvement of health of all residents. Once they feel more in control of the health of themselves and their families, community leaders will feel capable and supported to tackle the outside negative forces on their communities, such as bootlegging, environmental destruction of traditional lands, drug trafficing, etc. Healthy, non-abusive residents will be more capable of making realistic decisions regarding economic opportunities as well as community health and social issues.

The community must be seen as both the client and the agent of support and sanction in rural Alaska. A community wellness model that allows for positive preventive and educational tasks is more consistent with rural values than is a treatment model that focuses primarily upon illness.

ETHNIC AND MINORITY CONCERNS

The specific problems of rural Alaskan ethnic groups vary with region, economic circumstances, and rate of social change. These populations often experience heightened stresses as a result of poverty and lack of power.

Rural Alaskans are typically subjected to both urban and majority cultural biases in planning and implementation of health services. An issue affecting the delivery of quality behavioral health services to rural communities is that of non-local control of planning. The cross-cultural, bilingual and socio-economic components of behavioral health problems demand a flexibility and a sensitivity to local needs that is difficult to achieve in any centralized, bureaucratic system of medical care.

Today the dominant health issues among Alaska Natives are behavioral. It is important to realize that health problems are as much a function of the context in which they occur as they are of the person.

Capacity Building for Policy Boards:

Boards of Directors of regional corporations are rapidly gaining experience in working within western corporate models. However, these models of doing business are vertical, linear constructs which were, prior to the Alaska Native Claims Settlement Act (ANCSA), somewhat alien to rural and Native ways of doing business.

Additionally, regional and community policy boards typically must represent vast geographic areas and are able to meet infrequently, due to the high cost and great distances involved. It is paramount that, when such boards assemble, they be able to conduct business within the bounds defined by appropriate corporate rules.

The regional and community policy boards, because they have been in the "trenches" almost from the start, have had little formal training in the "how to" of being effective boards. Even non-profit boards situated in urban areas of the United States, populated by persons steeped in Western lore, find they must dedicate a certain amount of board meeting time to training on how to conduct meetings, communications and decision-making, board/staff relationships, and planning and problem-solving. For rural Native boards, unfamiliar with corporate expectations, training is essential.