CHAPTER 25

All Causes of Death Except (Cancer-and-IHD): Relation with Medical Radiation

• Part 1. MortRate-PhysPop Correlations for NonCancer NonIHD Causes of Death

Chapter 24 revealed that MortRates from the disease, Cancer --- known to be inducible by ionizing radiation --- had a very different relationship in 1940 with PhysPop than all the remaining causes of death. We could have stopped there. To have a shorter book was a great temptation. But so was another temptation. It is almost as compelling, to look for information carried in abstract MortRates, as it has been for us to look for information carried in various molecules and chromosomes in our experimental laboratories. So we undertook to find out what might be the relationship between PhysPop and DISTINCT NonCancer causes of death. The findings are summarized in Chapter 38, Box 1.

1a. Large Surprise from a Closer Look at the NonCancer MortRates

To our astonishment, our closer look at the NonCancer MortRates revealed that Ischemic Heart Disease (IHD) --- also called Coronary Heart Disease and Coronary Atherosclerosis and Coronary Artery Disease --- is a cause of death whose relationship with PhysPop closely resembles the relationship of CANCER with PhysPop.

The results for Ischemic Heart Disease are the last entries in Chapter 38, Box 1. The regression analyses themselves, of IHD MortRates regressed on PhysPop, are fully shown in Chapters 40 and 41 of this book.

The finding, of a strong positive correlation between IHD MortRates and PhysPop, compelled us to return to the MortRates in Table 24-A, and to subtract from them the MortRates for Ischemic Heart Disease from Chapters 40 and 41. The subtractions create Table 25-A: MortRates for All Causes of Death Except (Cancer+IHD) --- more simply called the NonCancer NonIHD MortRates.

Because 1950 is the first year for which mortality rates by states or by Census Divisions are available for Ischemic Heart Disease, Table 25-A necessarily excludes 1940. Also it excludes 1990, because Table 23-A (All Causes) lacks the required entries.

1b. Summary: The NonCancer NonIHD MortRates Regressed on PhysPop

Following the patterns of Chapters 23 and 24, we regressed the NonCancer NonIHD MortRates of Table 25-A upon the PhysPops indicated in Box 1, where the results are presented.

Figures 25-A and 25-B depict the best-fit line when the 1950 NonCancer NonIHD MortRates (male, female) are regressed upon the 1940 PhysPops. The slopes are clearly negative, and the nine boxy symbols all lie close to the best-fit line. The strength of the negative correlation is quite high. For males, the R-squared value is 0.7933, and the ratio of X-Coefficent/StandardError is -5.1831. For females, the R-squared value is 0.7037 and the ratio of the X-Coefficient/StandardError is -4.0771.

The very sharp contrast of these findings for NonCancer NonIHD MortRates, versus the findings for All-Cancers and for Ischemic Heart Disease, are shown on the first page of Chapter 38.

• Part 2. The BENEFIT of High PhysPops for NonCancer NonIHD Afflictions

The signficant NEGATIVE correlation, by Census Divisions, of the NonCancer NonIHD MortRates with PhysPop, supports what many physicians may regard as self-evident: The more physicians there are per 100,000 population, the better a population fares with many health problems.

The fact, that more physicians per 100,000 population means more radiation procedures per 100,000 population (Chapter 3, Part 1a), probably helps to explain the negative correlations in Box 1 of this chapter with respect to NonCancer NonIHD death-rates. We certainly concur that diagnostic and interventional medical radiation can supply life-extending information in the appropriate circumstances. It is likely that medical radiation should claim part of the CREDIT for the beneficial negative correlations uncovered in this chapter.

Because PhysPop is approximately proportional to average per capita accumulated dose of medical radiation, there is no conflict between observing a strong NEGATIVE dose-response between PhysPop and NonCancer NonIHD causes of death --- causes which are thought NOT inducible by ionizing radiation --- while simultaneously observing strong POSITIVE dose-responses between PhysPop and Cancer (known to be radiation-inducible) and between PhysPop and Ischemic Heart Disease (proposed in this book to be radiation-inducible).

Indeed, the FACT that Cancer and Ischemic Heart Disease behave differently from the combined NonCancer NonIHD causes of death, with respect to PhysPop, is an observation which "demands" an explanation. In addition to Hypothesis-1, we propose Hypothesis-2: Radiation-induced mutations of genes and chromosomes have a causal role in Ischemic Heart Disease (as they do in Cancer). In Chapter 45, we suggest a model of how mutations may work, causally, in IHD mortality.

>>>>>>>>>>

Box 1 of Chapter 25

Summary: Regression Outputs, All Causes of Death Minus (Cancer + IHD) Deaths.

Below are the summary-results from all the regressions of MortRates upon PhysPops. MortRates are from Table 25-A, and PhysPops are from Table 3-A.

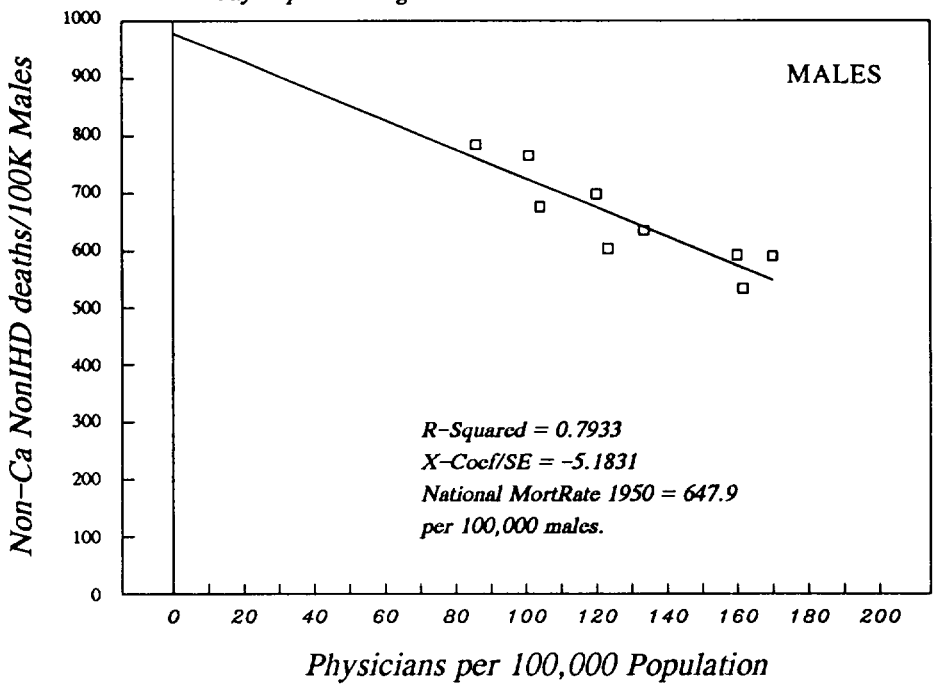
MALES

Year MortRate	Year PhysPop	R-squared	Constant	Coeff.	Std Err	Coeff/S.E
1950	1921	0.5985	1219.035	-4.1998	1.3001	-3.2305
1950	1923	0.6286	1179.090	-4.0129	1.1658	-3.4423
1950	1925	0.6806	1144.522	-3.8717	1.0025	-3.8619
1950	1927	0.7393	1135.594	-3.8660	0.8677	-4.4558
1950	1929	0.7525	1120.106	-3.7731	0.8179	-4.6130
1950	1931	0.7668	1085.387	-3.4736	0.7241	-4.7970
1950	1934	0.8145	1047.616	-3.1517	0.5685	-5.5439
1950	1936	0.8106	1033.875	-3.0237	0.5524	-5.4736
1950	1938	0.8079	1012.178	-2.8342	0.5224	-5.4254
1950	1940	0.7933	978.617	-2.5282	0.4878	-5.1830
1950	1950	0.7832	971.485	-2.5419	0.5055	-5.0281
1960	1960	0.6340	766.815	-1.7513	0.5030	-3.4821
1970	1970	0.5343	633.823	-1.1346	0.4004	-2.8337
1980	1980	0.4965	536.879	-0.7576	0.2883	-2.6275
1990	1990	--	--	--	--	--

FEMALES

Year MortRate	Year PhysPop	R-squared	Constant	Coeff.	Std Err	Coeff/S.E
1950	1921	0.7430	915.173	-3.2292	0.7179	-4.4984
1950	1923	0.7534	877.381	-3.0315	0.6556	-4.6242
1950	1925	0.7850	844.257	-2.8696	0.5676	-5.0555
1950	1927	0.7922	824.712	-2.7618	0.5346	-5.1658
1950	1929	0.7929	810.869	-2.6729	0.5163	-5.1768
1950	1931	0.8050	785.715	-2.4563	0.4569	-5.3757
1950	1934	0.7971	749.385	-2.1517	0.4103	-5.2443
1950	1936	0.7716	736.427	-2.0359	0.4186	-4.8632
1950	1938	0.7390	717.055	-1.8707	0.4202	-4.4519
1950	1940	0.7037	691.625	-1.6432	0.4030	-4.0771
1950	1950	0.6650	682.530	-1.6165	0.4336	-3.7280
1960	1960	0.5617	501.286	-0.9511	0.3176	-2.9950
1970	1970	0.4823	385.722	-0.5845	0.2289	-2.5535
1980	1980	0.4056	288.360	-0.3566	0.1632	-2.1857
1990	1990	--	--	--	--	--

1950 MortRate, Males, All-Cause-(CA+IHD), versus
1940 PhysPop Values for the 9 Census Divisions, USA.
Highly Significant INVERSE Relationship.
PhysPop is a surrogate for accumulated dose from medical irradiation.



1950 MortRate, Females, All-Causes - (CA+IHD), versus
1940 PhysPop Values for the 9 Census Divisions, USA.
Highly Significant INVERSE Relationship
PhysPop is a surrogate for accumulated dose from medical irradiation

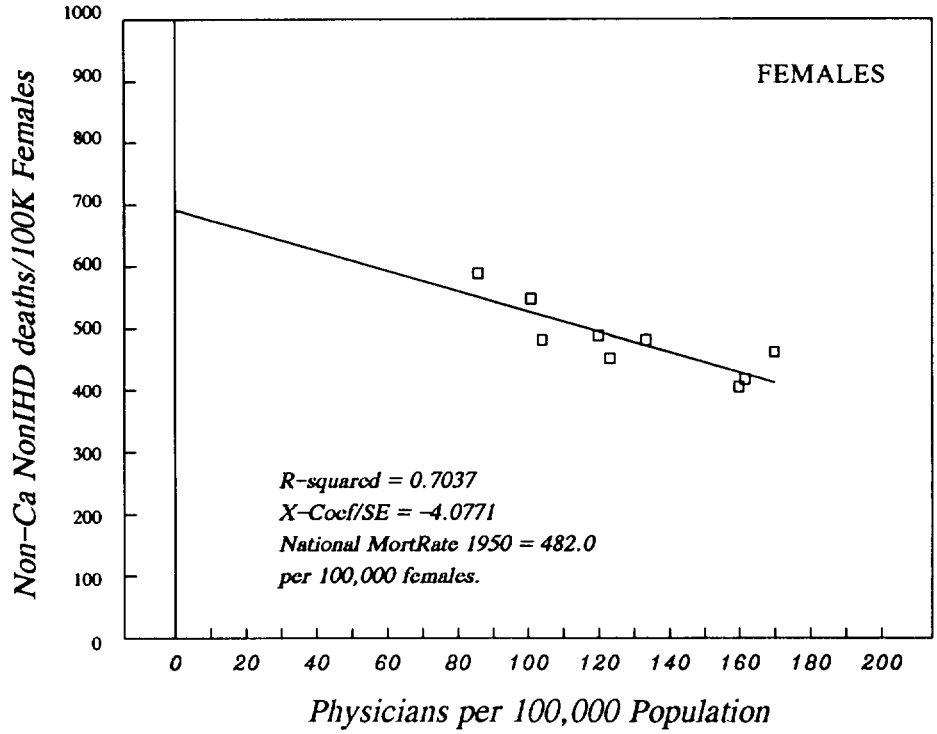


Table 25-A

All Causes of Death except (Cancer + IHD Deaths): Rates by Census Divisions and National.

These annual MortRates are the "All Causes of Death Minus Cancer" MortRates in Table 24-A, minus the annual Ischemic Heart Disease MortRates in Table 40-A (males) or Table 41-A (females). The net result is "All Causes of Death Except (Cancer + IHD Deaths) --- which we generally call "All NonCancer NonIHD MortRates." Rates are per 100,000 population, age-adjusted to the 1940 reference year. There are no exclusions by color or "race."

	1940	1950	1960	1970	1980	1990
Pacific	--	592.3	509.3	442.5	375.7	--
New England	--	534.1	479.4	403.8	328.2	--
West North Central	--	603.4	504.0	426.2	348.4	--
Mid-Atlantic	--	590.6	488.2	424.8	361.4	--
East North Central	--	635.2	515.4	448.1	380.8	--
Mountain	--	698.1	582.1	492.0	401.9	--
West South Central	--	675.9	576.4	510.8	445.0	--
East South Central	--	784.9	656.2	554.2	452.1	--
South Atlantic	--	765.6	629.7	532.3	434.7	--
Average, ALL	--	653.3	549.0	470.5	392.0	--
Average, High-5	--	591.1	499.3	429.1	358.9	--
Average, Low-4	--	731.1	611.1	522.3	433.4	--
Ratio, Hi5/Lo4	--	0.81	0.82	0.82	0.83	--

FEMALES .....

	1940	1950	1960	1970	1980	1990
Pacific	--	404.7	350.2	283.6	216.8	--
New England	--	417.3	350.0	267.3	184.5	--
West North Central	--	451.0	356.2	274.5	192.6	--
Mid-Atlantic	--	461.2	361.0	284.0	206.9	--
East North Central	--	481.3	370.5	294.2	217.8	--
Mountain	--	489.2	380.2	302.8	225.2	--
West South Central	--	481.3	393.0	319.3	245.6	--
East South Central	--	588.6	453.6	350.7	247.8	--
South Atlantic	--	547.3	432.1	338.2	244.3	--
Average ALL	--	480.2	383.0	301.6	220.2	--
Average High-Five	--	443.1	357.6	280.7	203.7	--
Average Low-Four	--	526.6	414.7	327.7	240.7	--
Ratio (High/Low)	--	0.84	0.86	0.86	0.85	--

NATIONAL RATES .....

Rates are age-adjusted to the 1940 reference year. Both sexes: Deaths per 100,000 population (males + females). Males: Deaths per 100,000 male population. Females: Deaths per 100,000 female population. No exclusions by color or "race."

	1940	1950	1960	1970	1980	1990
Both Sexes	--	563.8	456.9	377.6	298.3	--
Males	--	647.9	538.2	464.5	390.8	--
Females	--	482.0	380.8	300.8	220.7	--