CHAPTER 65

Ischemic Heart Disease, Females, 1950–1993

• Table 65–A, Column A, shows a pattern of National MortRates similar to the male pattern in Table 64–A, but at half the magnitude. If we assume (reasonably) that dosage of medical radiation is approximately the same for males and females, the gender–difference in magnitude of the IHD MortRates is another example of a concept we have emphasized throughout this book: Medical radiation has been a NECESSARY contributor to most fatal cases of cancer and IHD in the Twentieth Century, and its impact per unit dose on MortRates is modulated by the levels of its co–actors. For IHD, such co–actors with medical radiation include smoking, and unfavorable patterns of blood lipid–levels, and other agents.

• Box 1 shows that, by 1960, the 1950 MortRates increase most in the LowTrio and least in the TopTrio. MortRates peak in the mid–1960s. By 1993, the decline from the 1950 MortRates is greatest in the TopTrio and least in the LowTrio. Such observations indicate that smoking has been most intense in the LowTrio and least intense in the TopTrio (Chapter 48, Part 5b). We must match the Census Divisions for smoking.

• Although Tables 65–B, 65–C, and 65–D produce negative Constants, their values are such a small fraction of the Observed and Adjusted MortRates that they could readily have fallen upon the Origin or on its positive side —— as does the positive Constant in 1993.

Table 65–A
Ischemic Heart Disease, Females: Fractional Causation by Medical Radiation over Time

Year	Col.A Natl MR	Col.B Frac.C	Col.C R–Sq	Col.D X–Coef	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	No data available						
1950	126.5	97%					No data
1960	152.5	89%	0.8669	0.9041	0.1339	6.7531	Chap. 41
1970	124.9	86%	0.8084	1.0346	0.1904	5.4353	Tab 65–B
1980	97.2	83%	0.7980	0.8074	0.1535	5.2593	Tab 65–C
1993	64.7	78%	0.7620	0.5620	0.1187	4.7340	Tab 65–D
			0.6816	0.3025	0.0782	3.8710	Tab 65–E

Box 1, Chap. 65
Ischemic Heart Disease, Females: Post–1940 Change in MortRates by Census Trios

1960 vs. 1950, by Trios: Col.D expresses change by ratios. Col.F expresses change by subtraction.
1993 vs. 1950, by Trios: Col.I expresses change by ratios. Col.K expresses change by subtraction.
MRs change inversely with PP. High–PP Trio has lowest growth–factor. Low–PP Trio has highest growth–factor.

	Col.A 1950 MortRate Tab 41–A	Col.B 1960 MortRate Tab 41–A	Col.C Ratio Col.B /Col.A	Col.D Input from Col.C	Col.E Diff: Col.B minus A	Col.F Input from Col.E	Col.G 1993 MortRate Tab 41–A	Col.H Ratio Col.G /Col.A	Col.I Input from Col.H	Col.J Diff: Col.G minus A	Col.K Input from Col.J
Pacif	125.0	133.4	1.067	Avg Chg	8.4	Avg Chg	57.7	0.462	Avg Chg	-67.3	Avg Chg
NewE	153.2	176.3	1.151	TopTrio	23.1	TopTrio	55.7	0.364	TopTrio	-97.5	TopTrio
MidAtl	169.4	189.7	1.120	1.113	20.3	17.3	78.8	0.465	0.430	-90.6	-85.1
WNoCen	104.1	135.8	1.305	Avg Chg	31.7	Avg Chg	58.3	0.560	Avg Chg	-45.8	Avg Chg
ENoCen	124.2	162.2	1.306	MidTrio	38.0	MidTrio	70.2	0.565	MidTrio	-54.0	MidTrio
Mtn	96.2	118.9	1.236	1.282	22.7	30.8	46.3	0.481	0.536	-49.9	-49.9
WSoCen	94.0	123.9	1.318	Avg Chg	29.9	Avg Chg	66.5	0.707	Avg Chg	-27.5	Avg Chg
ESoCen	84.7	126.2	1.490	LowTrio	41.5	LowTrio	67.7	0.799	LowTrio	-17.0	LowTrio
SoAtl	103.4	132.4	1.280	1.363	29.0	33.5	61.6	0.596	0.701	-41.8	-28.8

Box 2, Chap. 65

Ischemic Heart Disease, Females: Calculation of Adjustment Factor

This adjustment is discussed fully in Chapter 49.

• Part 1: Calculate average population-weighted MortRate for the combined TopTrio Census Divs.

1940 Ischemic Heart Disease MortRates not available by Census Divisions and gender.

Census Div.	Col.A 1950 MR Tab 41-A	Col.B 1950 Pop'n Tab 3-B	Col.C 1950 Popn /53,964,513	Col.D Col.A * Col.C
Pacific	125.0	14,486,527	0.2684	33.56
NewEng	153.2	9,314,453	0.1726	26.44
Mid-Atl	169.4	30,163,533	0.5590	94.69
1950		Sum TopTrio 53,964,513	Sum	TopTrio 154.685

Census Div.	Col.A 1960 MR Tab 41-A	Col.B 1960 Pop'n Tab 3-B	Col.C 1960 Popn /65,875,863	Col.D Col.A * Col.C
Pacific	133.4	21,198,044	0.3218	42.93
NewEng	176.3	10,509,367	0.1595	28.13
Mid-Atl	189.7	34,168,452	0.5187	98.39
1960		Sum TopTrio 65,875,863	Sum	TopTrio 169.446

Census Div.	Col.A 1970 MR Tab 41-A	Col.B 1970 Pop'n Tab 3-B	Col.C 1970 Popn /75,017,000	Col.D Col.A * Col.C
Pacific	107.4	26,087,000	0.3477	37.35
NewEng	138.0	11,781,000	0.1570	21.67
Mid-Atl	154.9	37,149,000	0.4952	76.71
1970		Sum TopTrio 75,017,000	Sum	TopTrio 135.728

Census Div.	Col.A 1980 MR Tab 41-A	Col.B 1980 Pop'n Tab 3-B	Col.C 1980 Popn /80,615,000	Col.D Col.A * Col.C
Pacific	81.4	31,523,000	0.3910	31.83
NewEng	99.6	12,322,000	0.1528	15.22
Mid-Atl	120.1	36,770,000	0.4561	54.78
1980		Sum TopTrio 80,615,000	Sum	TopTrio 101.834

Census Div.	Col.A 1993 MR Tab 41-A	Col.B 1990 Pop'n Tab 3-B	Col.C 1990 Popn /88,495,000	Col.D Col.A * Col.C
Pacific	57.7	37,837,000	0.4276	24.67
NewEng	55.7	12,998,000	0.1469	8.18
Mid-Atl	78.8	37,660,000	0.4256	33.53
1993		Sum TopTrio 88,495,000	Sum	TopTrio 66.386

• Part 2: Take ratios of these TopTrio MortRates, with 1950 as the denominator of each ratio.
Col.D modifies Col.C by separate PhysPop adjustments for MidTrio and LowTrio Census Divisions.

	Col.A TopTrio Mean MR	Col.B 1950 TopTrio Mean MR	Col.C = Col.A / Col.B	Col.D ppAdju Tab 47-B	Col.E = Col.C * Col.D	ISCHEMIC HEART DISEASE. Females.
				MidTrio		
1960	169.446	154.685	1.095	0.97	1.06	= MidTrio Adjustment Factor, 1960
1970	135.728	154.685	0.877	0.95	0.83	= MidTrio Adjustment Factor, 1970
1980	101.834	154.685	0.658	0.94	0.62	= MidTrio Adjustment Factor, 1980
1993	66.386	154.685	0.429	0.94	0.40	= MidTrio Adjustment Factor, 1993
				LowTrio		
1960	169.446	154.685	1.095	1.01	1.11	= LowTrio Adjustment Factor, 1960
1970	135.728	154.685	0.877	1.02	0.89	= LowTrio Adjustment Factor, 1970
1980	101.834	154.685	0.658	1.04	0.68	= LowTrio Adjustment Factor, 1980
1993	66.386	154.685	0.429	1.07	0.46	= LowTrio Adjustment Factor, 1993

Table 65-B

Ischemic Heart Disease, Females: Fractional Causation in 1960

Part 1.

Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).

The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1960 PopFrac Tab 3-B	Col.B 1960 Obs MR Tab 41-A	Col.C A * B	Col.D 1950 MR Mid,Low Tab 41-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1960 Adju MortRates	Col.G A * F
Pacific	0.1182	133.4	15.768			133.4	15.768
New England	0.0586	176.3	10.331			176.3	10.331
Mid-Atlantic	0.1905	189.7	36.138			189.7	36.138
WestNoCentral	0.0858	135.8	11.652	104.1	1.06	110.346	9.468
EastNoCentral	0.2020	162.2	32.764	124.2	1.06	131.652	26.594
Mountain	0.0382	118.9	4.542	96.2	1.06	101.972	3.895
WestSoCentral	0.0945	123.9	11.709	94.0	1.11	104.340	9.860
EastSoCentral	0.0672	126.2	8.481	84.7	1.11	94.017	6.318
SouthAtlantic	0.1448	132.4	19.172	103.4	1.11	114.774	16.619
		Sum =	150.6				Sum =
1960 Observed MR from Table 41-B			152.5	1960 Natl Adjusted MR =			134.9910

Part 2.

Trio-Seq.	Col.A Mean1940 thru1960 PPs from Tab 47-A x'	Col.B 1960 Adju MRs from Col.F Part 1 y	Col.C Ischemic Ht. Dis. Females: 1960 Adjusted MortRates regressed on Mean 1940 thru 1960 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Ischemic Ht. Dis. Females: 1960 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	155.69	133.4	Constant	-1.9357	159.72	Constant	0.6663
NewEng	162.81	176.3	Std Err of Y Est	15.7446	161.55	Std Err of Y Est	17.1514
MidAtl	167.04	189.7	R Squared	0.8084	169.76	R Squared	0.7727
WNoCen	118.15	110.346	No. of Observation	9	123.14	No. of Observation	9
ENoCen	123.87	131.652	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	117.40	101.972			119.89		
WSoCen	102.31	104.340	X Coefficient(s)	1.0346	103.94	X Coefficient(s)	0.9936
ESoCen	85.63	94.017	Std Err of Coef.	0.1904	85.83	Std Err of Coef.	0.2037
SoAtl	101.72	114.774	XCoef / S.E. =	5.4353	100.74	XCoef / S.E.	4.8779

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = Negative 0.0

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 134.9910) minus Nonradiation rate (0.0) = 134.9910

3. 1960 Fractional Causation is radiation rate (134.9910) divided by OBSERVED Natl MR Part 1,Col.C= 152.5 = 0.89

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 0.6663

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 134.9910) minus Nonradiation rate (0.6663) = 134.3247

3. 1960 Fractional Causation is radiation rate (134.3247) divided by OBSERVED Natl MR Part 1, Col.C= 152.5 = 0.88

Table 65-C

Ischemic Heart Disease, Females: Fractional Causation in 1970

Part 1.

Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).

The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1970 PopFrac Tab 3-B	Col.B 1970 Obs MR Tab 41-A	Col.C A * B	Col.D 1950 MR Mid,Low Tab 41-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1970 Adju MortRates	Col.G A * F
Pacific	0.1293	107.4	13.887			107.4	13.887
New England	0.0584	138.0	8.059			138.0	8.059
Mid-Atlantic	0.1842	154.9	28.533			154.9	28.533
WestNoCentral	0.0805	111.0	8.936	104.1	0.83	86.403	6.955
EastNoCentral	0.1993	134.5	26.806	124.2	0.83	103.086	20.545
Mountain	0.0408	96.6	3.941	96.2	0.83	79.846	3.258
WestSoCentral	0.0948	105.5	10.001	94.0	0.89	83.660	7.931
EastSoCentral	0.0631	110.7	6.985	84.7	0.89	75.383	4.757
SouthAtlantic	0.1496	111.6	16.695	103.4	0.89	92.026	13.767
		Sum =	123.8				Sum =
1970 Observed MR from Table 41-B			124.9	1970 Natl Adjusted MR =			107.6915

Part 2.

Trio-Seq.	Col.A Mean1940 thru1970 PPs from Tab 47-A x'	Col.B 1970 Adju MRs from Col.F Part 1 y	Col.C Ischemic Ht. Dis. Females: 1970 Adjusted MortRates regressed on Mean 1940 thru 1970 PPs		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Ischemic Ht. Dis. Females: 1970 Adjusted MortRates regressed on 1940 PhysPops	
			Regression Output:			Regression Output:	
Pac	162.72	107.4	Constant	-3.0913	159.72	Constant	-0.8291
NewEng	168.74	138.0	Std Err of Y Est	13.1597	161.55	Std Err of Y Est	14.3762
MidAtl	173.28	154.9	R Squared	0.7980	169.76	R Squared	0.7590
WNoCen	119.56	86.403	No. of Observation	9	123.14	No. of Observation	9
ENoCen	124.70	103.086	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	122.37	79.846			119.89		
WSoCen	105.03	83.660	X Coefficient(s)	0.8074	103.94	X Coefficient(s)	0.8016
ESoCen	89.44	75.383	Std Err of Coef.	0.1535	85.83	Std Err of Coef.	0.1707
SoAtl	108.97	92.026	XCoef / S.E. =	5.2593	100.74	XCoef / S.E.	4.6949

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = Negative 0.0

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 107.6915) minus Nonradiation rate (0.0) = 107.6915

3. 1970 Fractional Causation is radiation rate (107.6915) divided by OBSERVED Natl MR Part 1,Col.C= 124.9 = 0.86

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = NEGATIVE 0.0

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 107.6915) minus Nonradiation rate (0.0) = 107.6915

3. 1970 Fractional Causation is radiation rate (107.6915) divided by OBSERVED Natl MR Part 1, Col.C= 124.9 = 0.86

Table 65-D

Ischemic Heart Disease, Females: Fractional Causation in 1980

Part 1.

Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).

The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 41-A	Col.C A * B	Col.D 1950 MR Mid,Low Tab 41-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1980 Adju MortRates	Col.G A * F
Pacific	0.1398	81.4	11.380			81.4	11.380
New England	0.0546	99.6	5.438			99.6	5.438
Mid-Atlantic	0.1630	120.1	19.576			120.1	19.576
WestNoCentral	0.0759	86.1	6.535	104.1	0.62	64.542	4.899
EastNoCentral	0.1846	106.8	19.715	124.2	0.62	77.004	14.215
Mountain	0.0502	74.2	3.725	96.2	0.62	59.644	2.994
WestSoCentral	0.1049	87.1	9.137	94.0	0.68	63.920	6.705
EastSoCentral	0.0646	95.2	6.150	84.7	0.68	57.596	3.721
SouthAtlantic	0.1624	90.8	14.746	103.4	0.68	70.312	11.419
		Sum =	96.4				Sum =
1980 Observed MR from Table 41-B			97.2	1980 Natl Adjusted MR =			80.3466

Part 2.

Trio-Seq.	Col.A Mean1940 thru1980 Adju MRs PPs from Tab 47-A x'	Col.B 1980 MRs from Col.F Part 1 y	Col.C Ischemic Ht. Dis. Females: 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Ischemic Ht. Dis. Females: 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	177.35	81.4	Constant	-3.0605	159.72	Constant	0.6652
NewEng	185.86	99.6	Std Err of Y Est	10.8092	161.55	Std Err of Y Est	11.5409
MidAtl	186.11	120.1	R Squared	0.7620	169.76	R Squared	0.7287
WNoCen	128.82	64.542	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	77.004	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	59.644			119.89		
WSoCen	114.66	63.920	X Coefficient(s)	0.5620	103.94	X Coefficient(s)	0.5943
ESoCen	99.46	57.596	Std Err of Coef.	0.1187	85.83	Std Err of Coef.	0.1371
SoAtl	124.62	70.312	XCoef / S.E. =	4.7340	100.74	XCoef / S.E.	4.3359

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = Negative 0.0

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 80.3466) minus Nonradiation rate (0.0) = 80.3466

3. 1980 Fractional Causation is radiation rate (80.3466) divided by OBSERVED Natl MR Part 1,Col.C= 97.2 = 0.83

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 0.6652

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 80.3466) minus Nonradiation rate (0.6652) = 79.6814

3. 1980 Fractional Causation is radiation rate (79.6814) divided by OBSERVED Natl MR Part 1, Col.C= 97.2 = 0.82

Table 65-E

Ischemic Heart Disease, Females: Fractional Causation in 1993

Part 1.

Calculation of the 6 Adjusted MortRates (Col.F) and the National Adjusted MortRate (Col.G).
The last six entries in Part 1, Col.F, are the products of (Col.D * Col.E), as discussed in Chap. 49.

Trio-Sequence	Col.A 1990 PopFrac Tab 3-B	Col.B 1993 Obs MR Tab 41-A	Col.C A * B	Col.D 1950 MR Mid,Low Tab 41-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1993 Adju MortRates	Col.G A * F
Pacific	0.1535	57.7	8.857			57.7	8.857
New England	0.0527	55.7	2.935			55.7	2.935
Mid-Atlantic	0.1527	78.8	12.033			78.8	12.033
WestNoCentral	0.0721	58.3	4.203	104.1	0.40	41.640	3.002
EastNoCentral	0.1713	70.2	12.025	124.2	0.40	49.680	8.510
Mountain	0.0543	46.3	2.514	96.2	0.40	38.480	2.089
WestSoCentral	0.1087	66.5	7.229	94.0	0.46	43.240	4.700
EastSoCentral	0.0621	67.7	4.204	84.7	0.46	38.962	2.420
SouthAtlantic	0.1725	61.6	10.626	103.4	0.46	47.564	8.205
		Sum =	64.6				Sum =
1993 Observed Natl MR from Table 41-B =			64.7	1993 Natl Adjusted MR =			52.7515

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1993 Adju MRs from Col.F Part 1 y	Col.C Ischemic Ht. Dis. Females: 1993 Adjusted MortRates regressed on Mean 1940 thru 1990 PPs	
			Regression Output:	
Pac	191.97	57.7	Constant	2.4435
NewEng	208.20	55.7	Std Err of Y Est	7.6810
MidAtl	204.72	78.8	R Squared	0.6816
WNoCen	141.14	41.640	No. of Observation	9
ENoCen	146.19	49.680	Degrees of Freedom	7
Mtn	145.91	38.480		
WSoCen	126.28	43.240	X Coefficient(s)	0.3025
ESoCen	113.28	38.962	Std Err of Coef.	0.0782
SoAtl	142.93	47.564	XCoef / S.E. =	3.8710

Trio-Seq.	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Ischemic Ht. Dis. Females: 1993 Adjusted MortRates regressed on 1940 PhysPops	
		Regression Output:	
Pac	159.72	Constant	5.4867
NewEng	161.55	Std Err of Y Est	7.9358
MidAtl	169.76	R Squared	0.6601
WNoCen	123.14	No. of Observation	9
ENoCen	133.36	Degrees of Freedom	7
Mtn	119.89		
WSoCen	103.94	X Coefficient(s)	0.3475
ESoCen	85.83	Std Err of Coef.	0.0942
SoAtl	100.74	XCoef / S.E.	3.6872

Part 3-A.
Calculation of Fractional Causation
from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 2.4435

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 52.7515) minus Nonradiation rate (2.4435) = 50.3080

3. 1993 Fractional Causation is radiation rate (50.3080) divided by OBSERVED Natl MR Part 1,Col.C= 64.7 = 0.78

Part 3-B.
Calculation of Fractional Causation
from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 5.4867

2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 52.7515) minus Nonradiation rate (5.4867) = 47.2648

3. 1993 Fractional Causation is radiation rate (47.2648) divided by OBSERVED Natl MR Part 1, Col.C= 64.7 = 0.73