

CHAPTER 54

Difference-Cancers, Females, 1940-1988

- Difference Cancers are, of course, All-Cancers Minus Respiratory Cancers.
- Unlike the males (Chapter 53), the females enjoy a dramatic decline in post-1940 National MortRates from Difference Cancers, as shown in Table 54-A, Column A. But this decline does not happen with equal impact in all Census Divisions.
- Box 1 shows that the ratios in Columns D and I are below 1.00 in every Trio, because every Trio experiences a fall in the MortRates of 1940. In Column I, the lowest ratio (0.660) occurs in the TopTrio, while the highest fraction (0.843) occurs in the LowTrio. The 1988 MortRates in the TopTrio are down to 0.660 of their 1940 values, while the 1988 MortRates in the LowTrio are still at 0.843 of their 1940 values. Column K shows that the 1940 rates fell by 45.8 per 100,000 in the TopTrio and by only 15.9 per 100,000 in the LowTrio. The facts in Box 1 mean that a carcinogenic co-actor which can contribute to female MortRates, from Difference Cancers, is operating more strongly in the LowTrio than in the TopTrio (Chapter 48, Part 5b). We think this co-actor is cigarette smoke. Please see the text in Chapter 53.

Year	Col.A Natl MR	Col.B Frac.C	Col.C R-Sq	Col.D X-Coeff	Col.E StdErr	Col.F Coef/SE	Col.G Source
1940	122.8	57%	0.8528	0.5041	0.0792	6.3682	Chap.19
1950	118.6	53%	0.8601	0.4711	0.0718	6.5597	Tab 54-B
1960	109.6	52%	0.8528	0.4279	0.0672	6.3677	Tab 54-C
1970	100.1	53%	0.8499	0.3573	0.0567	6.2968	Tab 54-D
1980	90.5	51%	0.8561	0.3143	0.0487	6.4521	Tab 54-E
1988	86.8	48%	0.8437	0.2536	0.0413	6.1462	Tab 54-F

Box 1, Chap. 54

Difference-Cancers, Females: Post-1940 Change in MortRates by Census Trios

1960 vs. 1940, by Trios: Col.D expresses change by ratios. Col.F expresses change by subtraction.
 1988 vs. 1940, 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 1940 MortRate Tab 19-A	Col.B 1960 MortRate Tab 19-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 1988 MortRate Tab 19-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	123.6	104.2	0.843	Avg Chg	-19.4	Avg Chg	83.7	0.677	Avg Chg	-39.9	Avg Chg
NewE	141.2	116.8	0.827	TopTrio	-24.4	TopTrio	89.5	0.634	TopTrio	-51.7	TopTrio
MidAtl	138.7	121.4	0.875	0.849	-17.3	-20.4	92.8	0.669	0.660	-45.9	-45.8
WNoCen	117.0	104.9	0.897	Avg Chg	-12.1	Avg Chg	83.7	0.715	Avg Chg	-33.3	Avg Chg
ENoCen	128.2	114.7	0.895	MidTrio	-13.5	MidTrio	90.1	0.703	MidTrio	-38.1	MidTrio
Mtn	108.9	96.9	0.890	0.894	-12.0	-12.5	78.2	0.718	0.712	-30.7	-34.0
WSoCen	97.4	97.7	1.003	Avg Chg	0.3	Avg Chg	83.2	0.854	Avg Chg	-14.2	Avg Chg
ESoCen	100.1	100.1	1.000	LowTrio	0.0	LowTrio	86.1	0.860	LowTrio	-14.0	LowTrio
SoAtl	104.5	102.4	0.980	0.994	-2.1	-0.6	85.0	0.813	0.843	-19.5	-15.9

Box 2, Chap. 54

Difference-Cancers, 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.

Census Div.	Col.A 1940 MR Tab 19-A	Col.B 1940 Pop'n Tab 3-B	Col.C 1940 Popn /45,710,039	Col.D Col.A * Col.C	Census Div.	Col.A 1950 MR Tab 19-A	Col.B 1950 Pop'n Tab 3-B	Col.C 1950 Popn /53,964,513	Col.D Col.A * Col.C
Pacific	123.6	9,733,262	0.2129	26.32	Pacific	113.3	14,486,527	0.2684	30.41
NewEng	141.2	8,437,290	0.1846	26.06	NewEng	128.0	9,314,453	0.1726	22.09
Mid-Atl	138.7	27,539,487	0.6025	83.56	Mid-Atl	132.0	30,163,533	0.5590	73.78
1940		Sum TopTrio 45,710,039	Sum 1.0000	TopTrio 135.946	1950		Sum TopTrio 53,964,513	Sum 1.0000	TopTrio 126.290

Census Div.	Col.A 1960 MR Tab 19-A	Col.B 1960 Pop'n Tab 3-B	Col.C 1960 Popn /65,875,863	Col.D Col.A * Col.C	Census Div.	Col.A 1970 MR Tab 19-A	Col.B 1970 Pop'n Tab 3-B	Col.C 1970 Popn /75,017,000	Col.D Col.A * Col.C
Pacific	104.2	21,198,044	0.3218	33.53	Pacific	96.7	26,087,000	0.3477	33.63
NewEng	116.8	10,509,367	0.1595	18.63	NewEng	107.4	11,781,000	0.1570	16.87
Mid-Atl	121.4	34,168,452	0.5187	62.97	Mid-Atl	110.2	37,149,000	0.4952	54.57
1960		Sum TopTrio 65,875,863	Sum 1.0000	TopTrio 115.131	1970		Sum TopTrio 75,017,000	Sum 1.0000	TopTrio 105.066

Census Div.	Col.A 1980 MR Tab 19-A	Col.B 1980 Pop'n Tab 3-B	Col.C 1980 Popn /80,615,000	Col.D Col.A * Col.C	Census Div.	Col.A 1988 MR Tab 19-A	Col.B 1990 Pop'n Tab 3-B	Col.C 1990 Popn /88,495,000	Col.D Col.A * Col.C
Pacific	89.2	31,523,000	0.3910	34.88	Pacific	83.7	37,837,000	0.4276	35.79
NewEng	97.9	12,322,000	0.1528	14.96	NewEng	89.5	12,998,000	0.1469	13.15
Mid-Atl	99.0	36,770,000	0.4561	45.16	Mid-Atl	92.8	37,660,000	0.4256	39.49
1980		Sum TopTrio 80,615,000	Sum 1.0000	TopTrio 95.000	1988		Sum TopTrio 88,495,000	Sum 1.0000	TopTrio 88.424

- Part 2: Take ratios of these TopTrio MortRates, with 1940 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 1940 TopTrio Mean MR	Col.C = Col.A / Col.B	Col.D ppAdju Tab 47-B MidTrio	Col.E = Col.C * Col.D	DIFFERENCE CANCERS. Females.
1950	126.290	135.946	0.929	0.99	0.92	= MidTrio Adjustment Factor, 1950
1960	115.131	135.946	0.847	0.97	0.82	= MidTrio Adjustment Factor, 1960
1970	105.066	135.946	0.773	0.95	0.73	= MidTrio Adjustment Factor, 1970
1980	95.000	135.946	0.699	0.94	0.66	= MidTrio Adjustment Factor, 1980
1988	88.424	135.946	0.650	0.94	0.61	= MidTrio Adjustment Factor, 1988
				LowTrio		
1950	126.290	135.946	0.929	1.00	0.93	= LowTrio Adjustment Factor, 1950
1960	115.131	135.946	0.847	1.01	0.86	= LowTrio Adjustment Factor, 1960
1970	105.066	135.946	0.773	1.02	0.79	= LowTrio Adjustment Factor, 1970
1980	95.000	135.946	0.699	1.04	0.73	= LowTrio Adjustment Factor, 1980
1988	88.424	135.946	0.650	1.07	0.70	= LowTrio Adjustment Factor, 1988

Table 54-B

Difference Cancers, Females: Fractional Causation in 1950

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.

	Col.A 1950 PopFrac Tab 3-B	Col.B 1950 Obs MR Tab 19-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 19-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1950 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.0961	113.3	10.888			113.3	10.888
New England	0.0618	128.0	7.910			128.0	7.910
Mid-Atlantic	0.2002	132.0	26.426			132.0	26.426
WestNoCentral	0.0933	112.3	10.478	117.0	0.92	107.64	10.043
EastNoCentral	0.2017	123.0	24.809	128.2	0.92	117.94	23.789
Mountain	0.0337	101.8	3.431	108.9	0.92	100.19	3.376
WestSoCentral	0.0965	105.0	10.133	97.4	0.93	90.58	8.741
EastSoCentral	0.0762	105.6	8.047	100.1	0.93	93.09	7.094
SouthAtlantic	0.1406	108.6	15.269	104.5	0.93	97.19	13.664
		Sum =	117.4			Sum =	
1950 Observed Natl MR from Table 19-B =			118.6	1950 Natl Adjusted MR =			111.9324

Part 2.

Trio-Seq.	Col.A Mean1940 thru1950 PPs from Tab 47-A	Col.B 1950 Adju MRs from Col.F Part 1	Col.C Difference Ca., Females: 1950 Adjusted MortRates regressed on Mean 1940 thru 1950 PPs Regression Output: Constant Std Err of Y Est R Squared No. of Observation Degrees of Freedom X Coefficient(s) Std Err of Coef. XCoef / S.E. =	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Difference Ca., Females: 1950 Adjusted MortRates regressed on 1940 PhysPops Regression Output: Constant Std Err of Y Est R Squared No. of Observation Degrees of Freedom X Coefficient(s) Std Err of Coef. XCoef / S.E. =
Pac	x' 154.16	y 113.3	49.0882	159.72	49.0527
NewEng	162.03	128.0	5.9977	161.55	6.1704
MidAtl	169.24	132.0	0.8601	169.76	0.8519
WNoCen	121.60	107.64	9	123.14	9
ENoCen	128.53	117.94	7	133.36	7
Mtn	119.64	100.19		119.89	
WSoCen	102.64	90.58	0.4711	103.94	0.4650
ESoCen	84.44	93.09	0.0718	85.83	0.0733
SoAtl	99.91	97.19	6.5597	100.74	6.3458

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 49.0882
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 111.9324) minus Nonradiation rate (49.0882) = 62.8442
3. 1950 Fractional Causation is radiation rate (62.8442) divided by OBSERVED Natl MR Part 1, Col.C= 118.6 = 0.53

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 49.0527
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 111.9324) minus Nonradiation rate (49.0527) = 62.8798
3. 1950 Fractional Causation is radiation rate (62.8798) divided by OBSERVED Natl MR Part 1, Col.C= 118.6 = 0.53

Table 54-C

Difference Cancers, 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.

	Col.A 1960 PopFrac Tab 3-B	Col.B 1960 Obs MR Tab 19-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 19-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1960 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.1182	104.2	12.316			104.2	12.316
New England	0.0586	116.8	6.844			116.8	6.844
Mid-Atlantic	0.1905	121.4	23.127			121.4	23.127
WestNoCentral	0.0858	104.9	9.000	117.0	0.82	95.94	8.232
EastNoCentral	0.2020	114.7	23.169	128.2	0.82	105.12	21.235
Mountain	0.0382	96.9	3.702	108.9	0.82	89.30	3.411
WestSoCentral	0.0945	97.7	9.233	97.4	0.86	83.76	7.916
EastSoCentral	0.0672	100.1	6.727	100.1	0.86	86.09	5.785
SouthAtlantic	0.1448	102.4	14.828	104.5	0.86	89.87	13.013
		Sum =	108.9			Sum =	
	1960 Observed Natl MR from Table 19-B =		109.6	1960 Natl Adjusted MR =			101.8794

Part 2.

	Col.A Mean1940 thru1960 PPs from Tab 47-A	Col.B 1960 Adju MRs Part 1 x'	Col.C Difference Ca., Females: 1960 Adjusted MortRates regressed on Mean 1940 thru 1960 PPs Regression Output: Constant Std Err of Y Est R Squared No. of Observation Degrees of Freedom X Coefficient(s) Std Err of Coef. XCoef / S.E. =	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Difference Ca., Females: 1960 Adjusted MortRates regressed on 1940 PhysPops Regression Output: Constant Std Err of Y Est R Squared No. of Observation Degrees of Freedom X Coefficient(s) Std Err of Coef. XCoef / S.E. =
Trio-Seq.					
Pac	155.69	104.2	45.2239	159.72	45.0348
NewEng	162.81	116.8	5.5577	161.55	5.5244
MidAtl	167.04	121.4	0.8528	169.76	0.8545
WNoCen	118.15	95.94	9	123.14	9
ENoCen	123.87	105.12	7	133.36	7
Mtn	117.40	89.30		119.89	
WSoCen	102.31	83.76	0.4279	103.94	0.4207
ESoCen	85.63	86.09	0.0672	85.83	0.0656
SoAtl	101.72	89.87	6.3677	100.74	6.4127

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 45.2239
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 101.8794) minus Nonradiation rate (45.2239) = 56.6554
3. 1960 Fractional Causation is radiation rate (56.6554) divided by OBSERVED Natl MR Part 1, Col.C= 109.6 = 0.52

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 45.0348
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 101.8794) minus Nonradiation rate (45.0348) = 56.8446
3. 1960 Fractional Causation is radiation rate (56.8446) divided by OBSERVED Natl MR Part 1, Col.C= 109.6 = 0.52

Table 54-E

Difference Cancers, 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 19-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 19-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1980 Adju MortRates	Col.G A * F
Pacific	0.1398	89.2	12.470			89.2	12.470
New England	0.0546	97.9	5.345			97.9	5.345
Mid-Atlantic	0.1630	99.0	16.137			99.0	16.137
WestNoCentral	0.0759	86.0	6.527	117.0	0.66	77.22	5.861
EastNoCentral	0.1846	93.9	17.334	128.2	0.66	84.61	15.619
Mountain	0.0502	80.0	4.016	108.9	0.66	71.87	3.608
WestSoCentral	0.1049	82.8	8.686	97.4	0.73	71.10	7.459
EastSoCentral	0.0646	86.2	5.569	100.1	0.73	73.07	4.721
SouthAtlantic	0.1624	87.1	14.145	104.5	0.73	76.29	12.389
		Sum =	90.2			Sum =	
1980 Observed Natl MR from Table 19-B =			90.5	1980 Natl Adjusted MR =			83.6087

Part 2.

Trio-Seq.	Col.A Mean1940 thru1980 PPs from Tab 47-A	Col.B 1980 Adju MRs Part 1	Col.C Difference Ca., 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 Difference Ca., Females: 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:
Pac	x' 177.35	y 89.2	Constant 37.4145	159.72	Constant 38.9905
NewEng	185.86	97.9	Std Err of Y Est 4.4348	161.55	Std Err of Y Est 4.7021
MidAtl	186.11	99.0	R Squared 0.8561	169.76	R Squared 0.8382
WNoCen	128.82	77.22	No. of Observation 9	123.14	No. of Observation 9
ENoCen	133.71	84.61	Degrees of Freedom 7	133.36	Degrees of Freedom 7
Mtn	133.45	71.87		119.89	
WSoCen	114.66	71.10	X Coefficient(s) 0.3143	103.94	X Coefficient(s) 0.3362
ESoCen	99.46	73.07	Std Err of Coef. 0.0487	85.83	Std Err of Coef. 0.0558
SoAtl	124.62	76.29	XCoef / S.E. = 6.4521	100.74	XCoef / S.E. 6.0213

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 37.4145
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 83.6087) minus Nonradiation rate (37.4145) = 46.1942
3. 1980 Fractional Causation is radiation rate (46.1942) divided by OBSERVED Natl MR Part 1, Col.C = 90.5 = 0.51

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 38.9905
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 83.6087) minus Nonradiation rate (38.9905) = 44.6183
3. 1980 Fractional Causation is radiation rate (44.6183) divided by OBSERVED Natl MR Part 1, Col.C = 90.5 = 0.49

Table 54-F

Difference Cancers, Females: Fractional Causation in 1988

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 1988 Obs MR Tab 19-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 19-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1988 Adju MortRates	Col.G A * F
Pacific	0.1535	83.7	12.848			83.7	12.848
New England	0.0527	89.5	4.717			89.5	4.717
Mid-Atlantic	0.1527	92.8	14.171			92.8	14.171
WestNoCentral	0.0721	83.7	6.035	117.0	0.61	71.37	5.146
EastNoCentral	0.1713	90.1	15.434	128.2	0.61	78.20	13.396
Mountain	0.0543	78.2	4.246	108.9	0.61	66.43	3.607
WestSoCentral	0.1087	83.2	9.044	97.4	0.70	68.18	7.411
EastSoCentral	0.0621	86.1	5.347	100.1	0.70	70.07	4.351
SouthAtlantic	0.1725	85.0	14.663	104.5	0.70	73.15	12.618
		Sum =	86.5			Sum =	
	1988 Observed Natl MR from Table 19-B =		86.8	1988 Natl Adjusted MR =		78.2649	

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A	Col.B 1988 Adju MRs from Col.F Part 1	Col.C Difference Ca., Females: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PPs Regression Output:	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Difference Ca., Females: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:
Pac	x' 191.97	y 83.7	Constant 37.0164	159.72	Constant 40.3826
NewEng	208.20	89.5	Std Err of Y Est 4.0551	161.55	Std Err of Y Est 4.7895
MidAtl	204.72	92.8	R Squared 0.8437	169.76	R Squared 0.7819
WNoCen	141.14	71.37	No. of Observation 9	123.14	No. of Observation 9
ENoCen	146.19	78.20	Degrees of Freedom 7	133.36	Degrees of Freedom 7
Mtn	145.91	66.43		119.89	
WSoCen	126.28	68.18	X Coefficient(s) 0.2536	103.94	X Coefficient(s) 0.2850
ESoCen	113.28	70.07	Std Err of Coef. 0.0413	85.83	Std Err of Coef. 0.0569
SoAtl	142.93	73.15	XCoef / S.E. = 6.1462	100.74	XCoef / S.E. = 5.0097

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted
Constant (Part 2, Col.C) = 37.0164
2. Radiation rate is Natl Adjusted
MortRate (Part 1, Col.G = 78.2649)
minus Nonradiation rate (37.0164) = 41.2485
3. 1988 Fractional Causation is radiation
rate (41.2485) divided by OBSERVED
Natl MR Part 1, Col.C= 86.8 = 0.48

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted
Constant (Part 2, Col.E) = 40.3826
2. Radiation rate is Natl Adjusted
MortRate (Part 1, Col.G = 78.2649)
minus Nonradiation rate (40.3826) = 37.8823
3. 1988 Fractional Causation is radiation
rate (37.8823) divided by OBSERVED
Natl MR Part 1, Col.C= 86.8 = 0.44