

CHAPTER 56

All-Cancers-Except-Genital, Females, 1940-1980

• All-Cancers-Except-Genital is a category which we examined in Chapter 20, because Chapter 14 revealed no detectable dose-response between PhysPop and the female MortRates in 1940 from Genital Cancers.

• In Table 56-A, below, Column A shows that the National female MortRate (All-Cancers-Except-Genital) barely changed from 1940 to 1980. However, rates were not steady everywhere. Box 1 shows that they FELL in the TopTrio while simultaneously RISING in the LowTrio. The facts in Box 1 mean that a carcinogenic co-actor which can contribute to female MortRates, from All-Cancers-Except-Genital, is operating more strongly in the LowTrio than in the TopTrio (Chapter 48, Part 5b). We must match the Census Divisions for this co-actor, regardless of its identity. We believe that its identity is smoking.

• Tables 56-B through 56-E have an extra calculation at the bottom, which yields Fractional Causation by medical radiation of ALL-Cancers, female. These results are discussed on a special page after Table 56-E, where they are compared with the results obtained in Chapter 50. The two sets of estimates are in very satisfactory agreement.

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	94.0	75 %	0.8675	0.5087	0.0751	6.7698	Chap.20
1950	96.0	69 %	0.8946	0.5012	0.0650	7.7074	Tab 56-B
1960	92.5	68 %	0.9084	0.4794	0.0575	8.3301	Tab 56-C
1970	93.7	67 %	0.9201	0.4658	0.0519	8.9763	Tab 56-D
1980	94.8	66 %	0.9290	0.4292	0.0448	9.5711	Tab 56-E
1988							None

Box 1, Chap. 56

All-Cancer-Except-Genital, 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.

1980 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 20-A	Col.B 1960 MortRate Tab 20-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 1980 MortRate Tab 20-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	94.3	90.1	0.955	Avg Chg	-4.2	Avg Chg	97.1	1.030	Avg Chg	2.8	Avg Chg
NewE	112.5	100.7	0.895	TopTrio	-11.8	TopTrio	103.0	0.916	TopTrio	-9.5	TopTrio
MidAtl	110.2	105.2	0.955	0.935	-5.0	-7.0	103.2	0.936	0.961	-7.0	-4.6
WNoCen	91.7	89.0	0.971	Avg Chg	-2.7	Avg Chg	87.7	0.956	Avg Chg	-4.0	Avg Chg
ENoCen	98.2	95.6	0.974	MidTrio	-2.6	MidTrio	97.5	0.993	MidTrio	-0.7	MidTrio
Mtn	84.0	82.6	0.983	0.976	-1.4	-2.2	83.2	0.990	0.980	-0.8	-1.8
WSoCen	69.8	80.8	1.158	Avg Chg	11.0	Avg Chg	87.6	1.255	Avg Chg	17.8	Avg Chg
ESoCen	69.3	80.1	1.156	LowTrio	10.8	LowTrio	88.9	1.283	LowTrio	19.6	LowTrio
SoAtl	74.4	83.4	1.121	1.145	9.0	10.3	91.5	1.230	1.256	17.1	18.2

Box 2, Chap. 56

All Cancers Except Genital, 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 20-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 20-A	Col.B 1950 Pop'n Tab 3-B	Col.C 1950 Popn /53,964,513	Col.D Col.A * Col.C
Pacific	94.3	9,733,262	0.2129	20.08	Pacific	92.2	14,486,527	0.2684	24.75
NewEng	112.5	8,437,290	0.1846	20.77	NewEng	107.0	9,314,453	0.1726	18.47
Mid-Atl	110.2	27,539,487	0.6025	66.39	Mid-Atl	109.8	30,163,533	0.5590	61.37
1940		Sum TopTrio 45,710,039	Sum 1.0000	TopTrio 107.239	1950		Sum TopTrio 53,964,513	Sum 1.0000	TopTrio 104.592

Census Div.	Col.A 1960 MR Tab 20-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 20-A	Col.B 1970 Pop'n Tab 3-B	Col.C 1970 Popn /75,017,000	Col.D Col.A * Col.C
Pacific	90.1	21,198,044	0.3218	28.99	Pacific	93.6	26,087,000	0.3477	32.55
NewEng	100.7	10,509,367	0.1595	16.06	NewEng	101.9	11,781,000	0.1570	16.00
Mid-Atl	105.2	34,168,452	0.5187	54.57	Mid-Atl	104.2	37,149,000	0.4952	51.60
1960		Sum TopTrio 65,875,863	Sum 1.0000	TopTrio 99.623	1970		Sum TopTrio 75,017,000	Sum 1.0000	TopTrio 100.153

Census Div.	Col.A 1980 MR Tab 20-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 20-A	Col.B 1990 Pop'n Tab 3-B	Col.C 1990 Popn /88,495,000	Col.D Col.A * Col.C
Pacific	97.1	31,523,000	0.3910	37.97	Pacific	--	37,837,000	0.4276	0.00
NewEng	103.0	12,322,000	0.1528	15.74	NewEng	--	12,998,000	0.1469	0.00
Mid-Atl	103.2	36,770,000	0.4561	47.07	Mid-Atl	--	37,660,000	0.4256	0.00
1980		Sum TopTrio 80,615,000	Sum 1.0000	TopTrio 100.784	1988		Sum TopTrio 88,495,000	Sum 1.0000	TopTrio 0.000

● 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	ALL CANCERS, EXCEPT GENITAL. Females.
1950	104.592	107.239	0.975	0.99	0.97	= MidTrio Adjustment Factor, 1950
1960	99.623	107.239	0.929	0.97	0.90	= MidTrio Adjustment Factor, 1960
1970	100.153	107.239	0.934	0.95	0.89	= MidTrio Adjustment Factor, 1970
1980	100.784	107.239	0.940	0.94	0.88	= MidTrio Adjustment Factor, 1980
1988	--	107.239	--	0.94	--	= MidTrio Adjustment Factor, 1988
				LowTrio		
1950	104.592	107.239	0.975	1.00	0.98	= LowTrio Adjustment Factor, 1950
1960	99.623	107.239	0.929	1.01	0.94	= LowTrio Adjustment Factor, 1960
1970	100.153	107.239	0.934	1.02	0.95	= LowTrio Adjustment Factor, 1970
1980	100.784	107.239	0.940	1.04	0.98	= LowTrio Adjustment Factor, 1980
1988	--	107.239	--	1.07	--	= LowTrio Adjustment Factor, 1988

Table 56-B  
All-Cancers-Except-Genital, 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.

Trio-Sequence	Col.A 1950 PopFrac Tab 3-B	Col.B 1950 Obs MR Tab 20-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 20-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1950 Adju MortRates	Col.G A * F
Pacific	0.0961	92.2	8.860			92.2	8.860
New England	0.0618	107.0	6.613			107.0	6.613
Mid-Atlantic	0.2002	109.8	21.982			109.8	21.982
WestNoCentral	0.0933	93.7	8.742	91.7	0.97	88.95	8.299
EastNoCentral	0.2017	99.2	20.009	98.2	0.97	95.25	19.213
Mountain	0.0337	82.4	2.777	84.0	0.97	81.48	2.746
WestSoCentral	0.0965	81.9	7.903	69.8	0.98	68.40	6.601
EastSoCentral	0.0762	80.6	6.142	69.3	0.98	67.91	5.175
SouthAtlantic	0.1406	83.4	11.726	74.4	0.98	72.91	10.251
		Sum =	94.8			Sum =	
	1950 Observed MR from Table 20-A		96.0			1950 Natl Adjusted MR =	89.7400

Part 2.

Trio-Seq.	Col.A Mean1940 thru1950 PPs from Tab 47-A x'	Col.B 1950 Adju MRs from Col.F Part 1 y	Col.C (All Minus Genital) Ca. Females: 1950 Adjusted MortRates regressed on Mean 1940 thru 1950 PPs Regression Output: Constant 23.4999 Std Err of Y Est 5.4298 R Squared 0.8946 No. of Observation 9 Degrees of Freedom 7	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E (All Minus Gen) Ca. Females 1950 Adjusted Mort-Rates regressed on 1940 PhysPops Regression Output: Constant 23.5299 Std Err of Y Est 5.6911 R Squared 0.8842 No. of Observation 9 Degrees of Freedom 7
Pac	154.16	92.2		159.72	
NewEng	162.03	107.0		161.55	
MidAtl	169.24	109.8		169.76	
WNoCen	121.60	88.95		123.14	
ENoCen	128.53	95.25		133.36	
Mtn	119.64	81.48		119.89	
WSoCen	102.64	68.40	X Coefficient(s) 0.5012	103.94	X Coefficient(s) 0.4941
ESoCen	84.44	67.91	Std Err of Coef. 0.0650	85.83	Std Err of Coef. 0.0676
SoAtl	99.91	72.91	XCoef / S.E. = 7.7074	100.74	XCoef / S.E. 7.3107

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 23.4999
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 89.7400) minus Nonradiation rate (23.4999) = 66.2401
3. 1950 Fractional Causation is radiation rate (66.2401) divided by OBSERVED Natl MR Part 1, Col.C= 96.0 = 0.69

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 23.5299
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 89.7400) minus Nonradiation rate (23.5299) = 66.2101
3. 1950 Fractional Causation is radiation rate (66.2101) divided by OBSERVED Natl MR Part 1, Col.C= 96.0 = 0.69

4. Calculation for Table 56-AA at the end of this chapter:

(Radiation rate of 66.2401 / Obs. Natl. female All-Cancer MortRate of 123.2) = 0.54 .

Table 56-C

All-Cancers-Except-Genital, 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 20-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 20-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1960 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.1182	90.1	10.650			90.1	10.650
New England	0.0586	100.7	5.901			100.7	5.901
Mid-Atlantic	0.1905	105.2	20.041			105.2	20.041
WestNoCentral	0.0858	89.0	7.636	91.7	0.90	82.53	7.081
EastNoCentral	0.2020	95.6	19.311	98.2	0.90	88.38	17.853
Mountain	0.0382	82.6	3.155	84.0	0.90	75.60	2.888
WestSoCentral	0.0945	80.8	7.636	69.8	0.94	65.61	6.200
EastSoCentral	0.0672	80.1	5.383	69.3	0.94	65.14	4.378
SouthAtlantic	0.1448	83.4	12.076	74.4	0.94	69.94	10.127
		Sum =	91.8			Sum =	
1960 Observed MR from Table 20-A			92.5	1960 Natl Adjusted MR =		85.1178	

Part 2.

	Col.A Mean1940 thru1960 PPs from Tab 47-A	Col.B 1960 Adju MRs from Col.F Part 1	Col.C (All Minus Genital) Ca. 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 (All Minus Gen) Ca. Females 1960 Adjusted Mort-Rates regressed on 1940 PhysPops Regression Output:
Trio-Seq.	x'	y	Constant	159.72	Constant
Pac	155.69	90.1	Std Err of Y Est	161.55	21.4743
NewEng	162.81	100.7	R Squared	169.76	4.3352
MidAtl	167.04	105.2	No. of Observation	123.14	0.9240
WNoCen	118.15	82.53	Degrees of Freedom	133.36	9
ENoCen	123.87	88.38	X Coefficient(s)	119.89	0.4749
Mtn	117.40	75.60	Std Err of Coef.	103.94	0.0515
WSoCen	102.31	65.61	XCoef / S.E. =	85.83	9.2246
ESoCen	85.63	65.14		100.74	
SoAtl	101.72	69.94			

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 22.1426
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 85.1178) minus Nonradiation rate (22.1426) = 62.9752
3. 1960 Fractional Causation is radiation rate (62.9752) divided by OBSERVED Natl MR Part 1, Col.C= 92.5 = 0.68

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 21.4743
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 85.1178) minus Nonradiation rate (21.4743) = 63.6435
3. 1960 Fractional Causation is radiation rate (63.6435) divided by OBSERVED Natl MR Part 1, Col.C= 92.5 = 0.69

4. Calculation for Table 56-AA at the end of this chapter:

(Radiation rate of 62.9752 / Obs. Natl. female All-Cancer MortRate of 114.9) = 0.55 .

Table 56-E

All-Cancers-Except-Genital, 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.

	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 20-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 20-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1980 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.1398	97.1	13.575			97.1	13.575
New England	0.0546	103.0	5.624			103.0	5.624
Mid-Atlantic	0.1630	103.2	16.822			103.2	16.822
WestNoCentral	0.0759	87.7	6.656	91.7	0.88	80.70	6.125
EastNoCentral	0.1846	97.5	17.999	98.2	0.88	86.42	15.952
Mountain	0.0502	83.2	4.177	84.0	0.88	73.92	3.711
WestSoCentral	0.1049	87.6	9.189	69.8	0.98	68.40	7.176
EastSoCentral	0.0646	88.9	5.743	69.3	0.98	67.91	4.387
SouthAtlantic	0.1624	91.5	14.860	74.4	0.98	72.91	11.841
		Sum =	94.6			Sum =	
1980 Observed MR from Table 20-A			94.8	1980 Natl Adjusted MR =		85.2117	

Part 2.

	Col.A Mean1940 thru1980 PPs from Tab 47-A	Col.B 1980 Adju MRs from Col.F Part 1 x'	Col.C (All Minus Genital) Ca. Females: 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PPs Regression Output: Constant 22.4922 Std Err of Y Est 4.0831 R Squared 0.9290 No. of Observation 9 Degrees of Freedom 7 X Coefficient(s) 0.4292 Std Err of Coef. 0.0448 XCoef / S.E. = 9.5711	Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E (All Minus Gen) Ca. Females: 1980 Adjusted Mort-Rates regressed on 1940 PhysPops Regression Output: Constant 23.4300 Std Err of Y Est 3.5151 R Squared 0.9474 No. of Observation 9 Degrees of Freedom 7 X Coefficient(s) 0.4687 Std Err of Coef. 0.0417 XCoef / S.E. 11.2269
Trio-Seq.					
Pac	177.35	97.1		159.72	
NewEng	185.86	103.0		161.55	
MidAtl	186.11	103.2		169.76	
WNoCen	128.82	80.70		123.14	
ENoCen	133.71	86.42		133.36	
Mtn	133.45	73.92		119.89	
WSoCen	114.66	68.40		103.94	
ESoCen	99.46	67.91		85.83	
SoAtl	124.62	72.91		100.74	

Part 3-A.

Calculation of Fractional Causation from Averaged PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) = 22.4922
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 85.2117) minus Nonradiation rate (22.4922) = 62.7195
3. 1980 Fractional Causation is radiation rate (62.7195) divided by OBSERVED Natl MR Part 1, Col.C= 94.8 = 0.66

Part 3-B.

Calculation of Fractional Causation from 1940 PhysPops

1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = 23.4300
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 85.2117) minus Nonradiation rate (23.4300) = 61.7817
3. 1980 Fractional Causation is radiation rate (61.7817) divided by OBSERVED Natl MR Part 1, Col.C= 94.8 = 0.65

4. Calculation for Table 56-AA at the end of this chapter:

(Radiation rate of 62.7195 / Obs. Natl. female All-Cancer MortRate of 108.5) = 0.58 .

### Female All-Cancers: Another "Path" to Fractional Causation

Female Genital Cancers are the single cancer-group for which there is no apparent dose-response with PhysPop (Chapters 14 and 62). This finding may be "taken at face value" (accepted without challenge), or it might be misleading --- for example, if the Census Divisions are badly matched for an important carcinogenic co-actor which is specific for female Genital Cancers.

If we take the lack of dose-response at face value, we can divide the 1950 radiation rate of 66.24 for All-Except-Genital (Table 56-B, Part 3-A) by the 1950 National MortRate for All-Cancers (123.2) instead of by the National MortRate for All-Except-Genital (96.0). We can make this substitution because we assume that no female Genital Cancers are induced by medical radiation. Thus, when Table 56-B uncovers a 1950 rate of 66.24 radiation-induced cancer-deaths/100K, we "know" that inclusion of female Genital Cancers would add nothing to that rate of radiation-induced cancers.

In such a case, 66.24/100K should still be the radiation rate when we study female All-Cancers. And indeed, in Table 50-B (Part 3-A), the radiation rate for female All-Cancers is extremely close: 65.3/100K. In Tables 50-C and 56-C, in Tables 50-D and 56-D (not shown), and in Tables 50-E and 56-E, radiation rates also are in very reasonable agreement with each other.

In Table 56-AA, below, we collect the estimates of Fractional Causation by medical radiation of female All-Cancers, located as (4) at the very bottom of Tables 56-B through 56-E. Table 56-AA also lists the corresponding estimates from Chapter 50, for easy comparison. The two sets of estimates are quite similar.

Year	Col.A Estimates via the "All-Except-Genital" Path	Col.B Estimates from Chap.50, Table 50-A
1940	56%	58%
1950	54%	53%
1960	55%	54%
1970	57%	52%
1980	58%	52%
1988	--	50%