Respiratory-System Cancers, Females, 1940-1988

• Table 52-A, Column A, shows the dramatic post-1940 rise in the female National MortRate from Respiratory-System Cancers. The relationship with cigarette smoking is reviewed in Chapter 48.

• Box 1 indicates in Columns D and I that a carcinogenic co-actor (smoking), which can contribute to female MortRates from Respiratory-System Cancers, is operating more strongly in the LowTrio than in the TopTrio. However, when post-1940 change is expressed by subtraction (Column K), the change is nearly the same in all Trios. By contrast, the comparable Column K for females in Chapters 50, 54, 55, 56, 58, 60, and 65, all clearly support the conclusion that a co-actor, which can contribute to female MortRates from cancer and IHD, is operating more strongly in the LowTrio than in the TopTrio. Therefore, despite Column K, below, we are convinced that female Respiratory Cancers are no exception.

• With respect to the LowTrio MortRates in Columns A and G of Box 1, below, we remind readers that these entries are not errors. Please see note in Table 17-A.

Table 52-A Respiratory Cancers, 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	3.3	97%		0.9625	0.0238	0.0018	13.4046	Chap.17
1950	4.6	76%		0.9420	0.0341	0.0032	10.6614	Tab 52-B
1960	5.3	85%		0.9521	0.0346	0.0029	11.7954	Tab 52-C
1970	11.7	83%		0.8987	0.0721	0.0091	7.8795	Tab 52-D
1980	18.0	81%		0.8624	0.1005	0.0152	6.6231	Tab 52-E
1988	24.5	83%		0.8975	0.1265	0.0162	7.8277	Tab 52-F

1950: The anomalous value in Col.B is probably related to the anomaly noted for 1950 in Table 17-A.

===

Box 1, Chap. 52
Respiratory Cancer, 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 17-A		Col.B 1960 MortRate Tab 17-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 17-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	3.8		5.9	1.553	Avg Chg	2.1	Avg Chg		27.8	7.316	Avg Chg	24.0	Avg Chg
NewE	4.1		5.6	1.366	TopTrio	1.5	TopTrio		26.9	6.561	TopTrio	22.8	TopTrio
MidAtl	4.2		6.0	1.429	1.449	1.8	1.8		25.8	6.143	6.673	21.6	22.8
WNoCen	3.1		4.4	1.419	Avg Chg	1.3	Avg Chg		23.1	7.452	Avg Chg	20.0	Avg Chg
ENoCen	3.2		5.1	1.594	MidTrio	1.9	MidTrio		26.4	8.250	MidTrio	23.2	MidTrio
Mtn	2.9		4.1	1.414	1.476	1.2	1.5		22.2	7.655	7.786	19.3	20.8
WSoCen	2.4		5.2	2.167	Avg Chg	2.8	Avg Chg		26.6	11.083	Avg Chg	24.2	Avg Chg
ESoCen	2.4		4.7	1.958	LowTrio	2.3	LowTrio		26.6	11.083	LowTrio	24.2	LowTrio
SoAtl	2.4		5.0	2.083	2.069	2.6	2.6		26.6	11.083	11.083	24.2	24.2

===

```
===============================================================================================
                                      Box 2, Chap. 52
                      Respiratory-System 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.
```

| | Col.A
1940 MR | Col.B
1940 Pop'n | Col.C
1940 Popn | Col.D
Col.A * | | Col.A
1950 MR | Col.B
1950 Pop'n | Col.C
1950 Popn | Col.D
Col.A * |
Census Div.	Tab 17-A	Tab 3-B	/45,710,039	Col.C	Census Div.	Tab 17-A	Tab 3-B	/53,964,513	Col.C
Pacific	3.8	9,733,262	0.2129	0.81	Pacific	4.4	14,486,527	0.2684	1.18
NewEng	4.1	8,437,290	0.1846	0.76	NewEng	4.1	9,314,453	0.1726	0.71
Mid-Atl	4.2	27,539,487	0.6025	2.53	Mid-Atl	5.0	30,163,533	0.5590	2.79
1940		Sum TopTrio 45,710,039	Sum 1.0000	TopTrio 4.096	1950		Sum TopTrio 53,964,513	Sum 1.0000	TopTrio 4.684

| | Col.A
1960 MR | Col.B
1960 Pop'n | Col.C
1960 Popn | Col.D
Col.A * | | Col.A
1970 MR | Col.B
1970 Pop'n | Col.C
1970 Popn | Col.D
Col.A * |
Census Div.	Tab 17-A	Tab 3-B	/65,875,863	Col.C	Census Div.	Tab 17-A	Tab 3-B	/75,017,000	Col.C
Pacific	5.9	21,198,044	0.3218	1.90	Pacific	13.6	26,087,000	0.3477	4.73
NewEng	5.6	10,509,367	0.1595	0.89	NewEng	12.1	11,781,000	0.1570	1.90
Mid-Atl	6.0	34,168,452	0.5187	3.11	Mid-Atl	12.3	37,149,000	0.4952	6.09
1960		Sum TopTrio 65,875,863	Sum 1.0000	TopTrio 5.904	1970		Sum TopTrio 75,017,000	Sum 1.0000	TopTrio 12.721

| | Col.A
1980 MR | Col.B
1980 Pop'n | Col.C
1980 Popn | Col.D
Col.A * | | Col.A
1988 MR | Col.B
1990 Pop'n | Col.C
1990 Popn | Col.D
Col.A * |
Census Div.	Tab 17-A	Tab 3-B	/80,615,000	Col.C	Census Div.	Tab 17-A	Tab 3-B	/88,495,000	Col.C
Pacific	21.2	31,523,000	0.3910	8.29	Pacific	27.8	37,837,000	0.4276	11.89
NewEng	18.5	12,322,000	0.1528	2.83	NewEng	26.9	12,998,000	0.1469	3.95
Mid-Atl	18.5	36,770,000	0.4561	8.44	Mid-Atl	25.8	37,660,000	0.4256	10.98
1980		Sum TopTrio 80,615,000	Sum 1.0000	TopTrio 19.556	1988		Sum TopTrio 88,495,000	Sum 1.0000	TopTrio 26.817

```
● 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	Col.E = Col.C * Col.D	RESPIRATORY CANCERS. Females.
				MidTrio		
1950	4.684	4.096	1.143	0.99	1.13	= MidTrio Adjustment Factor, 1950
1960	5.904	4.096	1.441	0.97	1.40	= MidTrio Adjustment Factor, 1960
1970	12.721	4.096	3.105	0.95	2.95	= MidTrio Adjustment Factor, 1970
1980	19.556	4.096	4.774	0.94	4.49	= MidTrio Adjustment Factor, 1980
1988	26.817	4.096	6.546	0.94	6.15	= MidTrio Adjustment Factor, 1988
				LowTrio		
1950	4.684	4.096	1.143	1.00	1.14	= LowTrio Adjustment Factor, 1950
1960	5.904	4.096	1.441	1.01	1.46	= LowTrio Adjustment Factor, 1960
1970	12.721	4.096	3.105	1.02	3.17	= LowTrio Adjustment Factor, 1970
1980	19.556	4.096	4.774	1.04	4.96	= LowTrio Adjustment Factor, 1980
1988	26.817	4.096	6.546	1.07	7.00	= LowTrio Adjustment Factor, 1988

```
===============================================================================================
```

```
================================================================================================
                                      Table 52-B
                    Respiratory 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.

Trio-Sequence	Col.A 1950 PopFrac Tab 3-B	Col.B 1950 Obs MR Tab 17-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 17-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1950 Adju MortRates	Col.G A * F
Pacific	0.0961	4.4	0.423			4.4	0.423
New England	0.0618	4.1	0.253			4.1	0.253
Mid-Atlantic	0.2002	5.0	1.001			5.0	1.001
WestNoCentral	0.0933	4.8	0.448	3.1	1.13	3.50	0.327
EastNoCentral	0.2017	4.5	0.908	3.2	1.13	3.62	0.729
Mountain	0.0337	4.2	0.142	2.9	1.13	3.28	0.110
WestSoCentral	0.0965	4.3	0.415	2.4	1.14	2.74	0.264
EastSoCentral	0.0762	4.7	0.358	2.4	1.14	2.74	0.208
SouthAtlantic	0.1406	4.7	0.661	2.4	1.14	2.74	0.385

```
                                        Sum =    4.6                                   Sum =
        1950 Observed Natl MR from Table 17-B =    4.6      1950 Natl Adjusted MR =    3.7010
```

Part 2. ---

Trio-Seq.	Col.A Mean1940 thru1950 PPs from Tab 47-A x'	Col.B 1950 Adju MRs from Col.F Part 1	Col.C Respiratory Ca, Females: 1950 Adjusted MortRates regressed on Mean 1940 thru 1950 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E Respiratory Ca, Females: 1950 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	154.16	4.4	Constant	0.2183	159.72	Constant	0.2144
NewEng	162.03	4.1	Std Err of Y Est	0.2669	161.55	Std Err of Y Est	0.2327
MidAtl	169.24	5.0	R Squared	0.9420	169.76	R Squared	0.9270
WNoCen	121.60	3.50	No. of Observation	9	123.14	No. of Observation	9
ENoCen	128.53	3.62	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	119.64	3.28			119.89		
WSoCen	102.64	2.74	X Coefficient(s)	0.0341	103.94	X Coefficient(s)	0.0261
ESoCen	84.44	2.74	Std Err of Coef.	0.0032	85.83	Std Err of Coef.	0.0028
SoAtl	99.91	2.74	XCoef / S.E. =	10.6614	100.74	XCoef / S.E.	9.4294

Part 3-A. Calculation of Fractional Causation from Averaged PhysPops		Part 3-B. Calculation of Fractional Causation from 1940 PhysPops	
1. Nonradiation rate is Adjusted Constant (Part 2, Col.C) =	0.2183	1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) =	0.2144
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 3.7010) minus Nonradiation rate (0.2183) =	3.4828	2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.G = 3.7010) minus Nonradiation rate (0.2144) =	3.4866
3. 1950 Fractional Causation is radiation rate (3.4828) divided by OBSERVED Natl MR Part 1,Col.C= 4.6 =	0.76	3. 1950 Fractional Causation is radiation rate (3.4866) divided by OBSERVED Natl MR Part 1, Col.C= 4.6 =	0.76

```
================================================================================================
                                       Table 52-C
                    Respiratory 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 17-A	Col.C A * B		Col.D 1940 MR Mid,Low Tab 17-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1960 Adju MortRates	Col.G A * F
Trio-Sequence								
Pacific	0.1182	5.9	0.697				5.9	0.697
New England	0.0586	5.6	0.328				5.6	0.328
Mid-Atlantic	0.1905	6.0	1.143				6.0	1.143
WestNoCentral	0.0858	4.4	0.378		3.1	1.40	4.34	0.372
EastNoCentral	0.2020	5.1	1.030		3.2	1.40	4.48	0.905
Mountain	0.0382	4.1	0.157		2.9	1.40	4.06	0.155
WestSoCentral	0.0945	5.2	0.491		2.4	1.46	3.50	0.331
EastSoCentral	0.0672	4.7	0.316		2.4	1.46	3.50	0.235
SouthAtlantic	0.1448	5.0	0.724		2.4	1.46	3.50	0.507

```
                                           Sum =    5.3                        Sum =
            1960 Observed Natl MR from Table 17-B =  5.3     1960 Natl Adjusted MR =    4.6749
```

```
Part 2.  -------------------------------------------------------------------------------------
```

	Col.A Mean1940 thru1960 PPs from Tab 47-A x'	Col.B 1960 Adju MRs from Col.F Part 1	Col.C Respiratory 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 Respiratory Ca, Females: 1960 Adjusted MortRates regressed on 1940 PhysPops Regression Output:
Trio-Seq.						
Pac	155.69	5.9	Constant	0.1825	159.72	Constant	0.1694
NewEng	162.81	5.6	Std Err of Y Est	0.2426	161.55	Std Err of Y Est	0.2401
MidAtl	167.04	6.0	R Squared	0.9521	169.76	R Squared	0.9531
WNoCen	118.15	4.34	No. of Observation	9	123.14	No. of Observation	9
ENoCen	123.87	4.48	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	117.40	4.06			119.89		
WSoCen	102.31	3.50	X Coefficient(s)	0.0346	103.94	X Coefficient(s)	0.0340
ESoCen	85.63	3.50	Std Err of Coef.	0.0029	85.83	Std Err of Coef.	0.0029
SoAtl	101.72	3.50	XCoef / S.E. =	11.7954	100.74	XCoef / S.E.	11.9244

```
------------------------------------------------------------------------------------------------
Part 3-A.                                         |  Part 3-B.
Calculation of Fractional Causation              |  Calculation of Fractional Causation
from Averaged PhysPops                            |  from 1940 PhysPops
                                                  |
1.  Nonradiation rate is Adjusted                 |  1.  Nonradiation rate is Adjusted
      Constant (Part 2, Col.C) =        0.1825    |        Constant (Part 2, Col.E) =        0.1694
                                                  |
2.  Radiation rate is Natl Adjusted               |  2.  Radiation rate is Natl Adjusted
      MortRate (Part 1, Col.G = 4.6749)           |        MortRate (Part 1, Col.G = 4.6749)
      minus Nonradiation rate (0.1825) =  4.4925  |        minus Nonradiation rate (0.1694) =  4.5055
                                                  |
3.  1960 Fractional Causation is radiation        |  3.  1960 Fractional Causation is radiation
      rate (4.4925) divided by OBSERVED           |        rate (4.5055) divided by OBSERVED
      Natl MR Part 1,Col.C=    5.3    =    0.85    |        Natl MR Part 1, Col.C=    5.3    =    0.85
------------------------------------------------------------------------------------------------
```

```
=====================================================================================================
                                        Table 52-E
                    Respiratory 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.
```

	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 17-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 17-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1980 Adju MortRates	Col.G A * F
Trio-Sequence							
Pacific	0.1398	21.2	2.964			21.2	2.964
New England	0.0546	18.5	1.010			18.5	1.010
Mid-Atlantic	0.1630	18.5	3.016			18.5	3.016
WestNoCentral	0.0759	15.0	1.138	3.1	4.49	13.92	1.056
EastNoCentral	0.1846	18.1	3.341	3.2	4.49	14.37	2.652
Mountain	0.0502	14.9	0.748	2.9	4.49	13.02	0.654
WestSoCentral	0.1049	17.3	1.815	2.4	4.96	11.90	1.249
EastSoCentral	0.0646	17.0	1.098	2.4	4.96	11.90	0.769
SouthAtlantic	0.1624	17.9	2.907	2.4	4.96	11.90	1.933

```
                                        Sum =    18.0                              Sum =
            1980 Observed Natl MR from Table 17-B =    18.0      1980 Natl Adjusted MR =    15.3027
```

```
Part 2.  -----------------------------------------------------------------------------------------
```

	Col.A Mean1940 thru1980 PPs from Tab 47-A x'	Col.B 1980 Adju MRs from Col.F Part 1	Col.C Respiratory 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 Respiratory Ca, Females: 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Trio-Seq.							
Pac	177.35	21.2	Constant	0.6797	159.72	Constant	1.0980
NewEng	185.86	18.5	Std Err of Y Est	1.3822	161.55	Std Err of Y Est	1.4193
MidAtl	186.11	18.5	R Squared	0.8624	169.76	R Squared	0.8549
WNoCen	128.82	13.92	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	14.37	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	13.02			119.89		
WSoCen	114.66	11.90	X Coefficient(s)	0.1005	103.94	X Coefficient(s)	0.1082
ESoCen	99.46	11.90	Std Err of Coef.	0.0152	85.83	Std Err of Coef.	0.0169
SoAtl	124.62	11.90	XCoef / S.E. =	6.6231	100.74	XCoef / S.E.	6.4216

```
-----------------------------------------------------------------------------------------------------
```

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

1. Nonradiation rate is Adjusted | 1. Nonradiation rate is Adjusted
      Constant (Part 2, Col.C) =   0.6797 | Constant (Part 2, Col.E) =   1.0980

2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
      MortRate (Part 1, Col.G = 15.3027) | MortRate (Part 1, Col.G = 15.3027)
      minus Nonradiation rate (0.6797) = 14.6230 | minus Nonradiation rate (1.0980) = 14.2048

3. 1980 Fractional Causation is radiation | 3. 1980 Fractional Causation is radiation
      rate (14.623) divided by OBSERVED | rate (14.2048) divided by OBSERVED
      Natl MR Part 1,Col.C=   18.0   =   0.81 | Natl MR Part 1, Col.C=   18.0   =   0.79

```
-----------------------------------------------------------------------------------------------------
```

```
=====================================================================================================
                                          Table 52-F
                    Respiratory 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 17-A	Col.C A * B	Col.D 1940 MR Mid,Low Tab 17-A	Col.E AdjuFact Bx2,Pt2 Col.E	Col.F 1988 Adju MortRates	Col.G A * F
Pacific	0.1535	27.8	4.267			27.8	4.267
New England	0.0527	26.9	1.418			26.9	1.418
Mid-Atlantic	0.1527	25.8	3.940			25.8	3.940
WestNoCentral	0.0721	23.1	1.666	3.1	6.15	19.07	1.375
EastNoCentral	0.1713	26.4	4.522	3.2	6.15	19.68	3.371
Mountain	0.0543	22.2	1.205	2.9	6.15	17.84	0.968
WestSoCentral	0.1087	26.6	2.891	2.4	7.00	16.80	1.826
EastSoCentral	0.0621	26.6	1.652	2.4	7.00	16.80	1.043
SouthAtlantic	0.1725	26.6	4.589	2.4	7.00	16.80	2.898

```
                                   Sum =   26.1                            Sum =
         1988 Observed Natl MR from Table 17-B =   24.5     1988 Natl Adjusted MR =   21.1062
```

Part 2. ---

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 Adju MRs from Col.F Part 1	Col.C Respiratory 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 Respiratory Ca, Females: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	27.8	Constant	0.8622	159.72	Constant	2.0364
NewEng	208.20	26.9	Std Err of Y Est	1.5884	161.55	Std Err of Y Est	1.7301
MidAtl	204.72	25.8	R Squared	0.8975	169.76	R Squared	0.8784
WNoCen	141.14	19.07	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	19.68	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	17.84			119.89		
WSoCen	126.28	16.80	X Coefficient(s)	0.1265	103.94	X Coefficient(s)	0.1461
ESoCen	113.28	16.80	Std Err of Coef.	0.0162	85.83	Std Err of Coef.	0.0205
SoAtl	142.93	16.80	XCoef / S.E. =	7.8277	100.74	XCoef / S.E.	7.1096

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

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.C) =   0.8622

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.G = 21.1062)
    minus Nonradiation rate (0.8622) =   20.2440

3. 1988 Fractional Causation is radiation
    rate (20.2440) divided by OBSERVED
    Natl MR Part 1,Col.C=   24.5   =   0.83

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

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.E) =   2.0364

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.G = 21.1062)
    minus Nonradiation rate (2.0364)) =   19.0699

3. 1988 Fractional Causation is radiation
    rate (19.0699) divided by OBSERVED
    Natl MR Part 1, Col.C=   24.5   0.78