APPENDIX-M

Fractional Causation, 1980-1993, after an Alternative Smoking Adjustment

Part 1. Purpose of Appendix-M, and Overview of Results
Part 2. Explanation of Table M-1: All-Cancers, Males, 1988
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Box 1. Difference Method: Fractional Causation, by Medical Radiation, of Cancer + IHD

● **Part 1. Purpose of Appendix-M, and Overview of Results**

Appendix-M uses an alternative method to calculate Smoking Adjusted MortRates. This alternative method can be called the Difference Method, to distinguish it from the method used in Chapters 49 through 65, which we can call the Factor Method. Appendix-M uses the alternative set of Adjusted MortRates in calculating an alternative set of Fractional Causations.

The results are summarized in Box 1 of this Appendix. Like the results summarized in Box 1 of Chapter 66, the results here strongly support Hypotheses One and Two. Our opinion is that the Factor Method is more reasonable, biologically, than the Difference Method for making the Smoking Adjustment. But we wondered if validation of Hypothesis-1 depends on that opinion. Appendix-M shows that Hypothesis-1 does NOT depend on that opinion.

● **Part 2. Explanation of Table M-1: All-Cancers, Males, 1988**

Column G in Table M-1 is the feature which distinguishes the Difference Method from the Factor Method. Readers who have studied the Factor Method will easily comprehend the distinction.

2a. Column G: The Essential Distinction between Methods

The header of Column G says that Col.G adds the value of +28.2 to every value in Col.F. The value of +28.2 comes from Chapter 49, for All-Cancers, males. Specifically, +28.2 is the value found for the TopTrio in Box 1, Column K, of Chapter 49. (In the successive tables of Appendix-M, one visits the comparable place in Chapter 50, 51, 52, etc.)

What is +28.2? It is the average DIFFERENCE in MortRate per 100,000 population, if one moves from the TopTrio's 1940 All-Cancer MortRates to the TopTrio's 1988 All-Cancer MortRates. The Smoking Adjustment in Table M-1 is based on the DIFFERENCE per 100K which developed between the TopTrio's Observed 1940 MortRates and its Observed MortRates in subsequent decades.

The Difference Method permits the post-1940 MortRates in the MidTrio and LowTrio Census Divisions to increase (or decrease) relative to their Observed 1940 values, but the change (in cases/100K population) will be adjusted to have the same size and direction in the MidTrio and LowTrio as in the TopTrio. The Difference Method and Factor Method each leave the Observed Post-1940 MortRates in the TopTrio intact. Thus both methods are designed to eliminate only the effect of EXTRA smoking in the MidTrio and LowTrio, relative to the TopTrio.

In Table M-1, Column G adds exactly the same value (+28.2) to the MortRates in Col.F, regardless of the PhysPop level. This is equivalent to doing what we discussed in Chapter 5, Part 6a --- where we added +20 cases/100K to MortRates which were perfectly proportional to PhysPop. In Figure 5-C, all 20 of the additional cases became part of the Constant --- the "non-radiation rate." Likewise, when one uses the Difference Method to make the Smoking Adjustment in Table M-1, the underlying assumption is that medical radiation is NOT a co-actor in the 28.2 fatal cases/100K added in Col.G. Such cases should not be multiplied by the PhysPop Adjustment from Table 47-B. Therefore, Col.E (the PhysPop Adjustment) occurs BEFORE addition of the 28.2 cases in Col.G.

The other steps in Table M-1 are exactly like the steps in Table 49-B. We have done Difference Tables only for the most recent years, because we are confident that the most recent years must be the LEAST favorable to Hypothesis-1. Box 1 of Appendix-M summarizes the results from 16 tables, in exactly the same format as Box 1 of Chapter 66, to facilitate comparisons.

2b. Two Comments on the Output of the M-Tables

ONE. Box 1, Column C, shows a series of very high Fractional Causations for the 1980-1993 period --- with one expected exception. The relatively low Fractional Causations for Respiratory-System Cancers (male, female) are expected because the largest impact of smoking is upon that system. Thus, Table M-3 adds 40.6 cases/100K (Col.G) to 1940 rates which are in the ballpark of 8 cases/100K (Col.D). Table M-4 adds 22.8 cases/100K to 1940 rates which are in the ballpark of 3 cases/100K. By contrast, the change for other Cancers does not even approach the magnitude of their 1940 levels. Moreover, the Difference Method assumes (mistakenly, in our opinion) that the entire impact of smoking should be distributed to the Constant (meaning no co-action between smoking and xrays). So for Respiratory-System Cancers, the Constants rise to become a large share of the 1988 National Observed MortRates, and the calculations yield relatively low Fractional Causations by medical radiation for Respiratory-System Cancers.

TWO. We note that the Smoking Adjustment by the Difference Method produces negative Constants which are large fractions of the National MortRates for two important entities: Digestive-System Cancers in 1988 (Tables M-9 and M-10) and of the National MortRates for Ischemic Heart Disease in 1993 (Tables M-15 and M-16). This occurs because both entities experience steep NET declines in their TopTrio MortRates, despite the impact of smoking. Thus, the Difference Method requires subtraction of large numbers of fatal cases/100K from the mid-century observed MortRates in the MidTrio and LowTrio. The result is a slope so steep that it intersects the y-axis below zero.

In our opinion, some negative Constants are to be expected on the basis of occasional anomalies in the observations (Chapter 22, Part 3). The presumed anomaly occurs in the observations for the TopTrio, which supplies the change-factor for the Factor Method and supplies the change-difference for the Difference Method. In Table M-15, a relatively small modification --- reducing the change-difference from 170.8 to 130.0 in Col.G --- would eliminate the negative Constant. (Also, the modification would raise Fractional Causation to 80%, reduce R-squared to 0.6464, and reduce Xcoef/SE to 3.5770). Because we do not accept the premise of the Difference Method (which denies co-action), we do not devote any pages to modified M-tables.

● Part 3. Biological Premises: Factor vs. Difference Methods of Smoking Adjustment

In a dose-response study of medical radiation (PhysPop), the dose-cohorts (the populations of the Nine Census Divisions) must be matched for all non-xray carcinogens. If matching exists at the outset of a 50-year study like ours, various non-xray carcinogens can subsequently increase or decrease in intensity, and yet the matching persists PROVIDED that all Nine Census Divisions experience the SAME changes in the non-xray carcinogens.

Both the Factor Method and the Difference Method, for making the Smoking Adjustment, address the question: What would the post-1940 MortRates have been, if there had not been EXTRA smoking in the LowTrio and MidTrio, relative to the TopTrio? To eliminate the effect of EXTRA smoking on the LowTrio and MidTrio post-1940 MortRates, each method evaluates how much the Observed 1940 MortRates in the TopTrio changed during subsequent decades, and then applies the SAME change to the Observed 1940 MortRates of the LowTrio and MidTrio. But the Factor Method measures "change" in the TopTrio by the ratio of a later MortRate over the 1940 MortRate, while the Difference Method measures "change" by finding the difference in cases/100,000 in moving from 1940 to later years. The distinction has biological implications.

3a. The Factor Method

The underlying biological premise of the Factor Method is that an elevated level of co-actors can make each rad of medical radiation more potent --- and that a diminished level of co-actors can make each rad of medical radiation less potent. Milieu matters. The premise that carcinogenic co-actors modulate (regulate) each other's potency is not exotic. Its foundations are presented in the

Introduction (Part 4), Chapter 6 (Part 6), Chapter 49 (Part 2), and Chapter 67 (Part 2b).

If milieu matters, how does it affect expectations regarding the introduction of cigarette smoking?

Illustration: Let the Census Divisions be matched for non-xray co-actors, and let no one smoke cigarettes. Then let everything be held constant --- except that cigarette smoking joins the mix of non-xray co-actors, and joins at equal intensity per capita in all Census Divisions. Expectation: In this new milieu, each rad of medical radiation (each PhysPop unit) would become more potent in every Census Division. Therefore, the new milieu would cause cancer MortRates to rise by a greater absolute number in the high-dose Census Divisions (TopTrio) than in the low-dose Census Divisions (LowTrio).

Revision of Circumstances: Let the smoking-intensity NOT be matched across the Census Divisions. Let it be greater in the LowTrio than in the TopTrio --- which actually happened (Chapter 48). This would cause the potency of each medical rad to DIFFER across the Census Divisions --- to be higher in the LowTrio than in the TopTrio. The LowTrio would still have fewer rads than the TopTrio, but would develop more Cancer and IHD deaths than the TopTrio PER RAD (per PhysPop unit). The difference in MortRates would diminish, between TopTrio and LowTrio. For male Respiratory-System Cancers in 1940, the TopTrio MortRates very clearly exceeded the LowTrio MortRates (Figure 16-A). By about 1970, a reversal had occurred: Table 16-A shows that LowTrio MortRates actually exceed TopTrio MortRates by then. (Reminder: Mid-Atlantic is in the TopTrio; Chapter 3, Box 1, Part 2).

3b. The Difference Method

By contrast with the Factor Method, the underlying biological premise of the Difference Method is that an elevated or diminished level of non-xray carcinogens has no effect on the potency of each rad of medical radiation. Milieu does NOT matter.

Expectation: Again, let the Census Divisions be matched for non-xray carcinogens, and let no one smoke cigarettes. Then let everything be held constant --- except that cigarette smoking (matched across the Census Divisions) joins the mix. The new carcinogenic milieu remains matched across the Census Divisions. If we say (for illustrative purposes) that addition of smoking to the milieu adds +20 fatal cancers/100,000 population in the TopTrio, then addition of smoking would add +20 cases/100K in every Census Division --- in the Difference Method. This outcome is depicted in Chapter 5 by comparison of Figure 5-B with Figure 5-C. The Difference Method reflects what we regard as a biologically improbable premise: That carcinogens co-produce the cancer MortRate of each Census Division in an exclusively additive way, without co-action.

3c. Co-Action: Cigarettes Modulate Xray Potency, and Xrays Modulate Cigarette Potency

If we hold ALL non-xray carcinogenic co-actors, cigarette smoking included, constant at some level (any level), matched in all Census Divisions, while ONLY the number of PhysPop units (dose of medical radiation) differs per Census Division, then co-actors modulate the potency of each PhysPop unit by the same force in all Census Divisions. (Reminder: Per-PATIENT dose is very similar in all Census Divisions --- Chapter 5, Part 5d.) Because matching gives co-actors equal modulating force in all the Census Divisions, the potency per PhysPop unit is the SAME in all the Census Divisions --- which results in a tight linear and positive dose-response between medical radiation and cancer MortRates, by Census Divisions.

On the other hand, if the dose of medical radiation and dose of other non-smoking carcinogens are the SAME (matched) across the Census Divisions, while the dose ONLY of smoking-induced co-actors differs among the Census Divisions, one would see a positive dose-response between SMOKING and cancer MortRates. And the xray-induced mutations --- present at EQUAL frequency in all the Census Divisions --- would modulate the carcinogenic potency of each cigarette.

● Part 4. Additional Features Which Recommend the Factor Method

Our prediction, that evidence will firmly establish that carcinogenic co-actors modulate each

other's potency, is one reason that we consider the Factor Method to be superior to the Difference Method of making the Smoking Adjustment. There are two additional features (described in Parts 4a + 4b) which recommend the Factor Method.

4a. Accommodation of the "Drive" toward Equilibrium

The Factor Method accommodates the likelihood that equilibrium has not yet been reached in 1940. Chapter 5, Part 2, explains the equilibrium concept. A new carcinogen, medical radiation, is introduced into human experience in 1896. If annual exposure to this new carcinogen AND exposure to carcinogenic co-actors occur at steady levels over time, ultimately the annual PRODUCTION-rate of radiation-induced Cancers will equal the annual DELIVERY-rate of radiation-induced Cancers (on an age-adjusted basis). This is equilibrium. Until equilibrium is attained, the radiation-induced cancer MortRate is continuously increasing (Figure 5-A).

Equilibrium is a useful concept, even though we doubt very much that annual xray doses have been steady since 1896 (Part 4b, below), and we know that exposure to carcinogenic co-actors has not been steady since 1896 (cigarette smoking constitutes a prime example).

It is likely that an approximation of equilibrium was NOT reached by 1940, because it is very likely that the carcinogenic effect from radiation-induced mutations lasts for a population's remaining lifespan (Chapter 2, Parts 8b and 8c). If so, then deliveries of Cancer --- from mutations which were induced by xrays in 1896 --- contribute to the annual cancer MortRate until virtually everyone who received medical radiation in 1896 has died. Such deliveries occur in proportion to PhysPop values, because the xray-induced mutations occur in proportion to PhysPop values.

4b. Accommodation of Changes in Averge Rads per Capita

The Factor Method also accommodates the likelihood that average annual per capita xray dose (in rads) has changed somewhat since 1940.

PhysPop is approximately proportional to average per capita dose from medical radiation. Table 47-A reveals that the Averaged PhysPops of the Nine Census retained their 1940 proportions very well over the subsequent 50 years. Those proportions were only minimally affected by the dramatic rise, after the mid-1960s, in the absolute number of physicians per 100,000 population. But steady PhysPop PROPORTIONS do not rule out the likelihood that the average per capita radiation dose (in rads per year), caused per physician, changed from its 1940 level. Some post-1940 forces would help to lower the average annual population dose per capita, and others would help to raise it (Chapter 2, Part 3). It is not possible to quantify the net change. Whatever the net result (probably somewhat downward), the resulting cancer MortRates would remain proportional to PhysPop values.

4c. Proportionality with the Nine PhysPop Values

Parts 4a and 4b indicate that it is likely that NOT ALL of the observed change in the TopTrio's cancer MortRate, 1988 compared with 1940, is due to post-1940 changes in various non-xray co-actors. The post-1940 changes in the TopTrio's 1940 MortRate are probably the NET effect of (a) upward pressure from the "drive" toward equilibrium, (b) downward pressure from a somewhat reduced annual per capita dose from medical radiation, (c) upward pressure from smoking-induced co-actors, and (d) pressures both upward and downward from changes in other non-xray co-actors.

Nonetheless, the observed change-FACTORS in the TopTrio's post-1940 cancer MortRates (relative to the TopTrio's 1940 MortRates) are reasonable guides to what would have happened to cancer MortRates in the LowTrio and MidTrio --- if non-xray co-actors had been matched with the TopTrio. In that case, the effects of (a), (b), (c), and (d) in every Census Division would each be proportional to the Division's PhysPop value. Thus, when we use the Factor Method to adjust the MidTrio and LowTrio MortRates --- by multiplying their Observed 1940 MortRates by the same change-factor observed in the TopTrio --- we appropriately accommodate (a), (b), (c) and (d) --- at the same time that we eliminate the effect of EXTRA smoking in the MidTrio and LowTrio.

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Box 1 of Appendix-M
Difference Method: Fractional Causation, by Medical Radiation, of Cancer and Ischemic Heart Disease.

● – The range of values below represents the earliest year and the most recent year named in Col.A.

● – Again, Column C strongly supports the validity of Hypotheses-1 & 2 — as it does in Chapter 66, Box 1.

Col.A: M = Male. F = Fem.	Col.B: Nat'l Age–Adjusted Mortality Rate	Col.C: Frac. Causation by Medical Radn	Col.D: R-squared	Col.E: X–Coefficient	Col.F: Ratio of XCoef/Std.Error
Ch49, 1940-88, All–Cancer: M	Big net rise. 115.0 —> 162.7	90% —> 58%	0.95 —> 0.91	0.76 —> 0.58	11.6 —> 8.3
Ch50, 1940-88, All–Cancer: F	Net decline. 126.1 —> 111.3	58% —> 56%	0.86 —> 0.86	0.53 —> 0.38	6.6 —> 6.6
Ch51, 1940-88, Resp'y Ca: M	Enormous rise. 11.0 —> 59.7	~100% —> 27%	0.87 —> 0.81	0.12 —> 0.10	6.8 —> 5.5
Ch52, 1940-88, Resp'y Ca: F	Enormous rise. 3.3 —> 24.5	97% —> 11%	0.96 —> 0.52	0.02 —> 0.02	13.4 —> 2.7
Ch53, 1940-88, Diff–Ca: M	Approx. flat. 104.0 —> 103.0	84% —> 75%	0.93 —> 0.90	0.64 —> 0.48	10.0 —> 8.1
Ch54, 1940-88, Diff–Ca: F	Big decline. 122.8 —> 86.8	57% —> 69%	0.85 —> 0.85	0.50 —> 0.37	6.3 —> 6.3
Ch55, 1940-90, Breast-Ca: F	Flat. 23.3 —> 23.1	~100% —> 82%	0.92 —> 0.89	0.19 —> 0.14	8.7 —> 7.7
Ch56, 1940-80, AllExcGen: F	Flat. 94.0 —> 94.8	75% —> 66%	0.87 —> 0.92	0.51 —> 0.43	6.8 —> 8.8
Ch57, 1940-88, Digest-Ca: M	Big decline. 60.4 —> 38.8	97% —> 73%	0.91 —> 0.87	0.43 —> 0.32	8.3 —> 6.9
Ch58, 1940-88, Digest-Ca: F	Big decline. 50.1 —> 23.5	80% —> 69%	0.76 —> 0.86	0.29 —> 0.21	4.6 —> 6.4
Ch59, 1940-80, Urinary-Ca: M	Approx. flat. 7.4 —> 8.2	~100% —> 81%	0.92 —> 0.89	0.08 —> 0.07	9.0 —> 7.6
Ch60, 1940-80, Urinary-Ca: F	Decline. 4.0 —> 3.0	86% —> 79%	0.94 —> 0.92	0.02 —> 0.02	10.4 —> 9.0
Ch61, 1940-90, Genital-Ca: M	Some rise. 15.2 —> 16.9	79% —> 53%	0.77 —> 0.84	0.09 —> 0.06	4.9 —> 6.1
Ch63, 1940-80, Buccal-Phar: M	Approx. flat. 5.1 —> 4.6	~100% —> 79%	0.72 —> 0.70	0.04 —> 0.03	4.3 —> 4.1
Ch64, 1950-93, IHD: M	Enormous fall. 256.4 —> 131.0	79% —> 62%	0.95 —> 0.87	1.49 —> 1.18	11.2 —> 6.9
Ch65, 1950-93, IHD: F	Enormous fall. 126.5 —> 64.7	97% —> 57%	0.87 —> 0.84	0.90 —> 0.69	6.8 —> 6.2

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                                        Table M-1
              All-Cancers, Males, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 49-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (+28.2 cases) which we obtain from
Chap.49, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.49, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio- Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 6-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 6-A	Col.E= PP Adju Factor Tab 47-B	Col.F= D * E	Col.G= Col.F + 28.2	Col.H= Adju MortRate (TopTrio,		Col.I = A * H
Pac	0.1535	148.5	22.795					Bx1,ColK)	148.5	22.795
NewEng	0.0527	167.1	8.806						167.1	8.806
MidAtl	0.1527	168.4	25.715						168.4	25.715
WNoCen	0.0721	155.9	11.240	110.9	0.94	104.2	132.4	132.446		9.549
ENoCen	0.1713	171.2	29.327	119.6	0.94	112.4	140.6	140.624		24.089
Mtn	0.0543	139.1	7.553	99.8	0.94	93.8	122.0	122.012		6.625
WSoCen	0.1087	172.9	18.794	86.9	1.07	93.0	121.2	121.183		13.173
ESoCen	0.0621	188.2	11.687	73.6	1.07	78.8	107.0	106.952		6.642
SoAtl	0.1725	175.8	30.325	88.9	1.07	95.1	123.3	123.323		21.273
Weighted avg. Col.C =		166.2							Sum =	
1988 Obs.Natl MR, Tab 6-B=		162.7				1988 Natl Adju MR =			138.6666	

Part 2.

Trio- Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 AdjuMRs Col.H Part 1	Col.C All-Cancers, Males: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E All-Cancers, Males: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	148.5	Constant	44.6445	159.72	Constant	48.3344
NewEng	208.20	167.1	Std Err of Y Est	6.9167	161.55	Std Err of Y Est	6.2743
MidAtl	204.72	168.4	R Squared	0.9075	169.76	R Squared	0.9239
WNoCen	141.14	132.446	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	140.624	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	122.012			119.89		
WSoCen	126.28	121.183	X Coefficient(s)	0.5834	103.94	X Coefficient(s)	0.6870
ESoCen	113.28	106.952	Std Err of Coef.	0.0704	85.83	Std Err of Coef.	0.0745
SoAtl	142.93	123.323	XCoef / S.E. =	8.2894	100.74	XCoef / S.E.	9.2201

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) =   44.6445 | Constant (Part 2, Col.E) =   48.3344

2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
     MortRate (Part 1, Col.I = 138.6666) | MortRate (Part 1, Col.I = 138.6666)
     minus Nonradiation rate (44.6445) = 94.0221 | minus Nonradiation rate (48.3344) = 90.3322

3. 1988 Fractional Causation is radiation | 3. 1988 Fractional Causation is radiation
     rate (94.0221) divided by OBSERVED | rate (90.3322) divided by OBSERVED
     Natl MR Part 1,Col.C= 162.7   =   0.58 | Natl MR Part 1, Col.C= 162.7   0.56
4. Comparable est. = 0.74 from Table 49-F. |

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                                       Table M-2
             All-Cancers, Females, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 50-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-23.0 cases) which we obtain from
Chap.50, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.50, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

	Col.A	Col.B	Col.C		Col.D =	Col.E=	Col.F=	Col.G=	Col.H=	Col.I =
Trio-	1990	1988			1940 MRs	PPAdju	D * E	Col.F	Adju	A * H
Seq.	PopFrac	Obs MR	A * B		Mid,Low	Factor		- 23.0	MortRate	
	Tab 3-B	Tab 7-A			Tab 7-A	Tab47-B		(TopTrio,		
Pac	0.1535	111.5	17.115					Bx1,ColK)	111.5	17.115
NewEng	0.0527	116.4	6.134						116.4	6.134
MidAtl	0.1527	118.6	18.110						118.6	18.110
WNoCen	0.0721	106.8	7.700		120.1	0.94	112.9	89.894	89.894	6.481
ENoCen	0.1713	116.5	19.956		131.4	0.94	123.5	100.516	100.516	17.218
Mtn	0.0543	100.4	5.452		111.8	0.94	105.1	82.092	82.092	4.458
WSoCen	0.1087	109.8	11.935		99.8	1.07	106.8	83.786	83.786	9.108
ESoCen	0.0621	112.7	6.999		102.5	1.07	109.7	86.675	86.675	5.383
SoAtl	0.1725	111.6	19.251		106.9	1.07	114.4	91.383	91.383	15.764
Weighted avg. Col.C =			112.7						Sum =	
1988 Obs.Natl MR, Tab 7-B=			111.3				1988 Natl Adju MR =		99.7707	

Part 2. ---

	Col.A	Col.B	Col.C		Col.D	Col.E	
	Mean1940	1988	All-Cancers, Females:		1940	All-Cancers, Females:	
	thru1990	AdjuMRs	1988 Adjusted MortRates		PPs from	1988 Adjusted MortRates	
Trio-	PPs from	Col.H	regressed on		Table 3-A	regressed on	
Seq.	Tab 47-A	Part 1	Mean 1940 thru 1990 PhysPops		TrioSeq.	1940 PhysPops	
	x'		Regression Output:		x''	Regression Output:	
Pac	191.97	111.5	Constant	37.3965	159.72	Constant	41.8295
NewEng	208.20	116.4	Std Err of Y Est	5.6859	161.55	Std Err of Y Est	6.5349
MidAtl	204.72	118.6	R Squared	0.8624	169.76	R Squared	0.8182
WNoCen	141.14	89.894	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	100.516	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	82.092			119.89		
WSoCen	126.28	83.786	X Coefficient(s)	0.3831	103.94	X Coefficient(s)	0.4356
ESoCen	113.28	86.675	Std Err of Coef.	0.0579	85.83	Std Err of Coef.	0.0776
SoAtl	142.93	91.383	XCoef / S.E. =	6.6225	100.74	XCoef / S.E. =	5.6126

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) =   37.3965 | Constant (Part 2, Col.E) =   41.8295
                                                    |
2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
     MortRate (Part 1, Col.I = 99.7707) | MortRate (Part 1, Col.I = 99.7707)
     minus Nonradiation rate (37.3965) =   62.3743 | minus Nonradiation rate (41.8295) =   57.9412
                                                    |
3. 1988 Fractional Causation is radiation | 3. 1988 Fractional Causation is radiation
     rate (62.3743) divided by OBSERVED | rate (57.9412) divided by OBSERVED
     Natl MR Part 1,Col.C=   111.3   =   0.56 | Natl MR Part 1, Col.C=   111.3   0.52
4. Comparable est. = 0.50 from Table 50-F. |

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                                      Table M-3
         Respiratory-System Cancers, Males, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 51-FF, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (+40.6 cases) which we obtain from
Chap.51, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.51, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

	Col.A 1990	Col.B 1988	Col.C		Col.D = 1940 MRs	Col.E = PP Adju	Col.F = D * E	Col.G = Col.F	Col.H = Adju	Col.I = A * H
Trio- Seq.	PopFrac Tab 3-B	Obs MR Tab 16-A	A * B		Mid,Low Tab 16-A	Factor Tab 47-B		+ 40.6 (TopTrio,	MortRate	
Pac	0.1535	50.7	7.782					Bx1,ColK)	50.7	7.782
NewEng	0.0527	56.3	2.967						56.3	2.967
MidAtl	0.1527	57.5	8.780						57.5	8.780
WNoCen	0.0721	56.2	4.052		7.7	0.94	7.2	47.8	47.838	3.449
ENoCen	0.1713	62.3	10.672		10.6	0.94	10.0	50.6	50.564	8.662
Mtn	0.0543	44.2	2.400		7.8	0.94	7.3	47.9	47.932	2.603
WSoCen	0.1087	67.9	7.381		7.6	1.07	8.1	48.7	48.732	5.297
ESoCen	0.0621	79.1	4.912		4.9	1.07	5.2	45.8	45.843	2.847
SoAtl	0.1725	68.5	11.816		8.3	1.07	8.9	49.5	49.481	8.535
Weighted avg. Col.C =			60.8						Sum =	
1988 Obs.Natl MR, Tab 16-B=			59.7				1988 Natl Adju MR =			50.9226

Part 2.
	Col.A Mean1940 thru1990	Col.B 1988 AdjuMRs	Col.C Respiratory-Ca, Males: 1988 Adjusted MortRates regressed on		Col.D 1940 PPs from	Col.E Respiratory-Ca, Males: 1988 Adjusted MortRates regressed on	
Trio- Seq.	PPs from Tab 47-A x'	Col.H Part 1	Mean 1940 thru 1990 PhysPops Regression Output:		Tab 3-A TrioSeq x''	1940 PhysPops Regression Output:	
Pac	191.97	50.7	Constant	34.5305	159.72	Constant	36.1389
NewEng	208.20	56.3	Std Err of Y Est	1.8044	161.55	Std Err of Y Est	2.1820
MidAtl	204.72	57.5	R Squared	0.8135	169.76	R Squared	0.7273
WNoCen	141.14	47.838	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	50.564	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	47.932			119.89		
WSoCen	126.28	48.732	X Coefficient(s)	0.1014	103.94	X Coefficient(s)	0.1120
ESoCen	113.28	45.843	Std Err of Coef.	0.0184	85.83	Std Err of Coef.	0.0259
SoAtl	142.93	49.481	XCoef / S.E. =	5.5257	100.74	XCoef / S.E.	4.3206

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

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.C) =
	34.5305		1. Nonradiation rate is Adjusted
			    Constant (Part 2, Col.E) =
				36.1389

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 50.9226)
    minus Nonradiation rate (34.5305) =
	16.3922		2. Radiation rate is Natl Adjusted
			    MortRate (Part 1, Col.I = 50.9226)
			    minus Nonradiation rate (36.1389) =
				14.7838

3. 1988 Fractional Causation is radiation
    rate (16.3922) divided by OBSERVED
    Natl MR Part 1,Col.C=   59.7   =
	0.27		3. 1988 Fractional Causation is radiation
			    rate (14.7838) divided by OBSERVED
			    Natl MR Part 1, Col.C= 59.7
				0.25

4. Comparable est. = 0.74 from Table 51-FF.				
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### Table M-4
### Respiratory-System Cancers, Females, 1988:  Alternative Smoking Adju and Fractional Causation

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This table is like Table 52-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940 MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (+22.8 cases) which we obtain from Chap.52, Box 1, Col.K.  Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.52, Box 2, Part 2, Col.D).

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Part 1.  Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

| Trio-Seq. | Col.A 1990 PopFrac Tab 3-B | Col.B 1988 Obs MR Tab 17-A | Col.C A * B | Col.D = 1940 MRs Mid,Low Tab 17-A | Col.E= PPAdju Factor Tab47-B | Col.F= D * E | Col.G= Col.F + 22.8 (TopTrio, Bx1,ColK) | Col.H= Adju MortRate | Col.I = A * H |
|---|---|---|---|---|---|---|---|---|---|
| Pac | 0.1535 | 27.8 | 4.267 | | | | | 27.8 | 4.267 |
| NewEng | 0.0527 | 26.9 | 1.418 | | | | | 26.9 | 1.418 |
| MidAtl | 0.1527 | 25.8 | 3.940 | | | | | 25.8 | 3.940 |
| WNoCen | 0.0721 | 23.1 | 1.666 | 3.1 | 0.94 | 2.9 | 25.714 | 25.714 | 1.854 |
| ENoCen | 0.1713 | 26.4 | 4.522 | 3.2 | 0.94 | 3.0 | 25.808 | 25.808 | 4.421 |
| Mtn | 0.0543 | 22.2 | 1.205 | 2.9 | 0.94 | 2.7 | 25.526 | 25.526 | 1.386 |
| WSoCen | 0.1087 | 26.6 | 2.891 | 2.4 | 1.07 | 2.6 | 25.368 | 25.368 | 2.758 |
| ESoCen | 0.0621 | 26.6 | 1.652 | 2.4 | 1.07 | 2.6 | 25.368 | 25.368 | 1.575 |
| SoAtl | 0.1725 | 26.6 | 4.589 | 2.4 | 1.07 | 2.6 | 25.368 | 25.368 | 4.376 |

Weighted avg. Col.C =  26.1
1988 Obs.Natl MR, Tab 17-B=  24.5

1988 Natl Adju MR =  Sum = 25.9944

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Part 2.

| Trio-Seq. | Col.A Mean1940 thru1990 PPs from Tab 47-A x' | Col.B 1988 AdjuMRs Col.H Part 1 | Col.C Respiratory-Ca, Females: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops | | Col.D 1940 PPs from Table 3-A TrioSeq. x'' | Col.E Respiratory-Ca, Females: 1988 Adjusted MortRates regressed on 1940 PhysPops | |
|---|---|---|---|---|---|---|---|
| Pac | 191.97 | 27.8 | Regression Output: | | 159.72 | Regression Output: | |
| NewEng | 208.20 | 26.9 | Constant | 23.2229 | 161.55 | Constant | 23.3763 |
| MidAtl | 204.72 | 25.8 | Std Err of Y Est | 0.6223 | 169.76 | Std Err of Y Est | 0.6274 |
| WNoCen | 141.14 | 25.714 | R Squared | 0.5175 | 123.14 | R Squared | 0.5095 |
| ENoCen | 146.19 | 25.808 | No. of Observation | 9 | 133.36 | No. of Observation | 9 |
| Mtn | 145.91 | 25.526 | Degrees of Freedom | 7 | 119.89 | Degrees of Freedom | 7 |
| WSoCen | 126.28 | 25.368 | | | 103.94 | | |
| ESoCen | 113.28 | 25.368 | X Coefficient(s) | 0.0173 | 85.83 | X Coefficient(s) | 0.0201 |
| SoAtl | 142.93 | 25.368 | Std Err of Coef. | 0.0063 | 100.74 | Std Err of Coef. | 0.0075 |
| | | | XCoef / S.E. = | 2.7400 | | XCoef / S.E. | 2.6964 |

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.C) =  23.2229

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 25.9944)
   minus Nonradiation rate (23.2229) =  2.7715

3. 1988 Fractional Causation is radiation
   rate (2.7715) divided by OBSERVED
   Natl MR Part 1,Col.C=  24.5  =  0.11

4. Comparable est. = 0.83 from Table 52-F.

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.E) =  23.3763

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 25.9944)
   minus Nonradiation rate (23.3763) =  2.6181

3. 1988 Fractional Causation is radiation
   rate (2.6181) divided by OBSERVED
   Natl MR Part 1, Col.C=  24.5  =  0.11

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                                     Table M-5
          Difference-Cancers, Males, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 53-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-12.4 cases) which we obtain from
Chap.53, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.53, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 18-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 18-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -12.4 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1535	97.8	15.012					97.8	15.012
NewEng	0.0527	110.8	5.839					110.8	5.839
MidAtl	0.1527	110.9	16.934					110.9	16.934
WNoCen	0.0721	99.7	7.188	103.2	0.94	97.0	84.608	84.608	6.100
ENoCen	0.1713	108.9	18.655	109.0	0.94	102.5	90.06	90.060	15.427
Mtn	0.0543	94.9	5.153	92.0	0.94	86.5	74.08	74.080	4.023
WSoCen	0.1087	105.0	11.414	79.3	1.07	84.9	72.451	72.451	7.875
ESoCen	0.0621	109.1	6.775	68.7	1.07	73.5	61.109	61.109	3.795
SoAtl	0.1725	107.3	18.509	80.6	1.07	86.2	73.842	73.842	12.738

Weighted avg. Col.C =   105.5   Sum =
1988 Obs.Natl MR, Tab 18-B= 103.0   1988 Natl Adju MR =   87.7440

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 AdjuMRs Col.H Part 1	Col.C Difference-Ca, Males: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Difference-Ca, Males: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	97.8	Constant	10.1140	159.72	Constant	12.1956
NewEng	208.20	110.8	Std Err of Y Est	5.8803	161.55	Std Err of Y Est	4.4832
MidAtl	204.72	110.9	R Squared	0.9026	169.76	R Squared	0.9434
WNoCen	141.14	84.608	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	90.060	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	74.080			119.89		
WSoCen	126.28	72.451	X Coefficient(s)	0.4819	103.94	X Coefficient(s)	0.5751
ESoCen	113.28	61.109	Std Err of Coef.	0.0598	85.83	Std Err of Coef.	0.0532
SoAtl	142.93	73.842	XCoef / S.E. =	8.0547	100.74	XCoef / S.E.	10.8008

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

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.C) =   10.1140

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 87.7440)
    minus Nonradiation rate (10.1140) =   77.6300

3. 1988 Fractional Causation is radiation
    rate (77.6300) divided by OBSERVED
    Natl MR Part 1,Col.C=   103.0   =   0.75
4. Comparable est. = 0.72 from Table 53-F.

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

1. Nonradiation rate is Adjusted
    Constant (Part 2, Col.E) =   12.1956

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 87.7440)
    minus Nonradiation rate (12.1956) =   75.5484

3. 1988 Fractional Causation is radiation
    rate (75.5484) divided by OBSERVED
    Natl MR Part 1, Col.C=   103.0   0.73

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                                      Table M-6
              Difference-Cancers, Females, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 54-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940 MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-45.8 cases) which we obtain from Chap.54, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.54, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 19-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 19-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -45.8 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1535	83.7	12.848					83.7	12.848
NewEng	0.0527	89.5	4.717					89.5	4.717
MidAtl	0.1527	92.8	14.171					92.8	14.171
WNoCen	0.0721	83.7	6.035	117.0	0.94	110.0	64.180	64.180	4.627
ENoCen	0.1713	90.1	15.434	128.2	0.94	120.5	74.708	74.708	12.797
Mtn	0.0543	78.2	4.246	108.9	0.94	102.4	56.566	56.566	3.072
WSoCen	0.1087	83.2	9.044	97.4	1.07	104.2	58.418	58.418	6.350
ESoCen	0.0621	86.1	5.347	100.1	1.07	107.1	61.307	61.307	3.807
SoAtl	0.1725	85.0	14.663	104.5	1.07	111.8	66.015	66.015	11.388

Weighted avg. Col.C = 86.5

1988 Obs.Natl MR, Tab 19-B= 86.8

1988 Natl Adju MR =   Sum =   73.7763

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 AdjuMRs Col.H Part 1	Col.C Difference-Ca, Females: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Difference-Ca, Females: 1988 Adjusted MortRates regressed on 1940 PhysPops	
Pac	191.97	83.7	Regression Output:		159.72	Regression Output:	
NewEng	208.20	89.5	Constant	14.1736	161.55	Constant	18.4532
MidAtl	204.72	92.8	Std Err of Y Est	5.6649	169.76	Std Err of Y Est	6.4698
WNoCen	141.14	64.180	R Squared	0.8519	123.14	R Squared	0.8069
ENoCen	146.19	74.708	No. of Observation	9	133.36	No. of Observation	9
Mtn	145.91	56.566	Degrees of Freedom	7	119.89	Degrees of Freedom	7
WSoCen	126.28	58.418			103.94		
ESoCen	113.28	61.307	X Coefficient(s)	0.3658	85.83	X Coefficient(s)	0.4155
SoAtl	142.93	66.015	Std Err of Coef.	0.0576	100.74	Std Err of Coef.	0.0768
			XCoef / S.E. =	6.3460		XCoef / S.E.	5.4076

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.C) =   14.1736

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 73.7763)
   minus Nonradiation rate (14.1736) =   59.6028

3. 1988 Fractional Causation is radiation
   rate (59.6028) divided by OBSERVED
   Natl MR Part 1,Col.C=   86.8   =   0.69
4. Comparable est. = 0.48 from Table 54-F.

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.E) =   18.4532

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 73.7763)
   minus Nonradiation rate (18.4532) =   55.3231

3. 1988 Fractional Causation is radiation
   rate (55.3231) divided by OBSERVED
   Natl MR Part 1, Col.C=   86.8   0.64

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                                        Table M-7
              Breast-Cancers, Females, 1990:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 55-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940 MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-3.5 cases) which we obtain from Chap.45, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.45, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1990 Obs MR Tab 8-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 8-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -3.5 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1535	22.7	3.484					22.7	3.484
NewEng	0.0527	24.3	1.281					24.3	1.281
MidAtl	0.1527	25.8	3.940					25.8	3.940
WNoCen	0.0721	22.6	1.629	22.6	0.94	21.2	17.744	17.744	1.279
ENoCen	0.1713	24.1	4.128	24.3	0.94	22.8	19.342	19.342	3.313
Mtn	0.0543	21.0	1.140	18.6	0.94	17.5	13.984	13.984	0.759
WSoCen	0.1087	20.8	2.261	15.1	1.07	16.2	12.657	12.657	1.376
ESoCen	0.0621	21.4	1.329	15.1	1.07	16.2	12.657	12.657	0.786
SoAtl	0.1725	22.6	3.899	18.3	1.07	19.6	16.081	16.081	2.774

Weighted avg. Col.C = 23.1
1990 Obs.Natl MR, Tab 8-B= 23.1

1990 Natl Adju MR =   Sum = 18.9925

Part 2.

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1990 AdjuMRs Col.H Part 1	Col.C Breast Cancer, Females: 1990 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Breast Cancer, Females: 1990 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	22.7	Constant	-3.1287	159.72	Constant	-2.1643
NewEng	208.20	24.3	Std Err of Y Est	1.7378	161.55	Std Err of Y Est	1.6787
MidAtl	204.72	25.8	R Squared	0.8944	169.76	R Squared	0.9015
WNoCen	141.14	17.744	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	19.342	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	13.984			119.89		
WSoCen	126.28	12.657	X Coefficient(s)	0.1362	103.94	X Coefficient(s)	0.1595
ESoCen	113.28	12.657	Std Err of Coef.	0.0177	85.83	Std Err of Coef.	0.0199
SoAtl	142.93	16.081	XCoef / S.E. =	7.7005	100.74	XCoef / S.E.	8.0026

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

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

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 18.9925)
   minus Nonradiation rate (0.0) =   18.9925

3. 1990 Fractional Causation is radiation
   rate (18.9925) divided by OBSERVED
   Natl MR Part 1,Col.C=   23.1   =   0.82
4. Comparable est. = 0.83 from Table 55-F.

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

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

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 18.9925)
   minus Nonradiation rate (0.0) =   18.9925

3. 1990 Fractional Causation is radiation
   rate (18.9925) divided by OBSERVED
   Natl MR Part 1, Col.C=   23.1   0.82

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Table M-8
All-Cancers-Except-Genital, Females, 1980: Alternative Smoking Adju and Fractional Causation

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This table is like Table 56-E, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940 MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-4.6 cases) which we obtain from Chap.56, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.56, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 20-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 20-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -4.6	Col.H= Adju MortRate (TopTrio, Bx1,ColK)	Col.I = A * H
Pac	0.1398	97.1	13.575					97.1	13.575
NewEng	0.0546	103.0	5.624					103.0	5.624
MidAtl	0.1630	103.2	16.822					103.2	16.822
WNoCen	0.0759	87.7	6.656	91.7	0.94	86.2	81.598	81.598	6.193
ENoCen	0.1846	97.5	17.999	98.2	0.94	92.3	87.708	87.708	16.191
Mtn	0.0502	83.2	4.177	84.0	0.94	79.0	74.360	74.360	3.733
WSoCen	0.1049	87.6	9.189	69.8	1.04	72.6	67.992	67.992	7.132
ESoCen	0.0646	88.9	5.743	69.3	1.04	72.1	67.472	67.472	4.359
SoAtl	0.1624	91.5	14.860	74.4	1.04	77.4	72.776	72.776	11.819

Weighted avg. Col.C =   94.6
1980 Obs.Natl MR, Tab 20-A= 94.8

1980 Natl Adju MR =   Sum = 85.4469

Part 2. --

Trio-Seq.	Col.A Mean1940 thru1980 PPs from Tab 47-A x'	Col.B 1980 AdjuMRs Col.H Part 1	Col.C All-Except-Genital, Fems: 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PhysPops	Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E All-Except-Genital, Fems: 1980 Adjusted MortRates regressed on 1940 PhysPops
Pac	177.35	97.1	Regression Output:	159.72	Regression Output:
NewEng	185.86	103.0	Constant 22.5894	161.55	Constant 23.0656
MidAtl	186.11	103.2	Std Err of Y Est 4.4334	169.76	Std Err of Y Est 3.4487
WNoCen	128.82	81.598	R Squared 0.9176	123.14	R Squared 0.9501
ENoCen	133.71	87.708	No. of Observation 9	133.36	No. of Observation 9
Mtn	133.45	74.360	Degrees of Freedom 7	119.89	Degrees of Freedom 7
WSoCen	114.66	67.992		103.94	
ESoCen	99.46	67.472	X Coefficient(s) 0.4298	85.83	X Coefficient(s) 0.4729
SoAtl	124.62	72.776	Std Err of Coef. 0.0487	100.74	Std Err of Coef. 0.0410
			XCoef / S.E. = 8.8271		XCoef / S.E. 11.5470

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.C) =   22.5894

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 85.4469)
   minus Nonradiation rate (22.5894) =   62.8575

3. 1980 Fractional Causation is radiation
   rate (62.8575) divided by OBSERVED
   Natl MR Part 1,Col.C= 94.8   =   0.66
4. Comparable est. = 0.66 from Table 56-E.

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

1. Nonradiation rate is Adjusted
   Constant (Part 2, Col.E) =   23.0656

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 85.4469)
   minus Nonradiation rate (23.0656) =   62.3813

3. 1980 Fractional Causation is radiation
   rate (62.3813) divided by OBSERVED
   Natl MR Part 1, Col.C= 94.8   0.66

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Table M-9
Digestive-System Cancers, Males, 1988: Alternative Smoking Adju and Fractional Causation

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This table is like Table 57-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940 MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-29.4 cases) which we obtain from Chap.57, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.57, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio- Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 9-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 9-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -29.4 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1535	36.3	5.572					36.3	5.572
NewEng	0.0527	42.1	2.219					42.1	2.219
MidAtl	0.1527	43.3	6.612					43.3	6.612
WNoCen	0.0721	35.8	2.581	59.9	0.94	56.3	26.906	26.906	1.940
ENoCen	0.1713	40.2	6.886	64.9	0.94	61.0	31.606	31.606	5.414
Mtn	0.0543	33.0	1.792	52.1	0.94	49.0	19.574	19.574	1.063
WSoCen	0.1087	36.5	3.968	42.3	1.07	45.3	15.861	15.861	1.724
ESoCen	0.0621	38.0	2.360	38.2	1.07	40.9	11.474	11.474	0.713
SoAtl	0.1725	38.5	6.641	43.4	1.07	46.4	17.038	17.038	2.939
Weighted avg. Col.C =		38.6						Sum =	
1988 Obs.Natl MR, Tab 9-B=		38.8				1988 Natl Adju MR =			28.1952

Part 2. --

Trio- Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 AdjuMRs Col.H Part 1	Col.C Digestive-Ca, Males: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Digestive-Ca, Males: 1988 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	36.3	Constant	-23.0444	159.72	Constant	-22.9761
NewEng	208.20	42.1	Std Err of Y Est	4.5486	161.55	Std Err of Y Est	2.5486
MidAtl	204.72	43.3	R Squared	0.8708	169.76	R Squared	0.9594
WNoCen	141.14	26.906	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	31.606	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	19.574			119.89		
WSoCen	126.28	15.861	X Coefficient(s)	0.3179	103.94	X Coefficient(s)	0.3894
ESoCen	113.28	11.474	Std Err of Coef.	0.0463	85.83	Std Err of Coef.	0.0303
SoAtl	142.93	17.038	XCoef / S.E. =	6.8682	100.74	XCoef / S.E.	12.8668

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) = NEG =	0.0	1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = NEG =	0.0
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.I = 28.1952) minus Nonradiation rate (0.0) =	28.1952	2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.I = 28.1952) minus Nonradiation rate (0.0) =	28.1952
3. 1988 Fractional Causation is radiation rate (28.1952) divided by OBSERVED Natl MR Part 1,Col.C= 38.8 =	0.73	3. 1988 Fractional Causation is radiation rate (28.1952) divided by OBSERVED Natl MR Part 1, Col.C= 38.8	0.73
4. Comparabe est. = 0.82 from Table 57-F.			

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                                       Table M-10
           Digestive-System Cancers, Females, 1988:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 58-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-31.6 cases) which we obtain from
Chap.58, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.58, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1990 PopFrac Tab 3-B	Col.B 1988 Obs MR Tab 10-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 10-A	Col.E= PP Adju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -31.6	Col.H= Adju MortRate (TopTrio, Bx1,ColK)	Col.I = A * H
Pac	0.1535	22.8	3.500					22.8	3.500
NewEng	0.0527	24.7	1.302					24.7	1.302
MidAtl	0.1527	26.0	3.970					26.0	3.970
WNoCen	0.0721	21.8	1.572	49.7	0.94	46.7	15.118	15.118	1.090
ENoCen	0.1713	24.2	4.145	53.1	0.94	49.9	18.314	18.314	3.137
Mtn	0.0543	21.1	1.146	47.7	0.94	44.8	13.238	13.238	0.719
WSoCen	0.1087	21.5	2.337	34.5	1.07	36.9	5.315	5.315	0.578
ESoCen	0.0621	23.3	1.447	36.3	1.07	38.8	7.241	7.241	0.450
SoAtl	0.1725	22.8	3.933	37.3	1.07	39.9	8.311	8.311	1.434

```
Weighted avg. Col.C =              23.4                                          Sum =
1988 Obs.Natl MR, Tab 10-B=        23.5                    1988 Natl Adju MR =   16.1788
```

Part 2. --

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1988 AdjuMRs Col.H Part 1	Col.C Digestive-Ca, Females: 1988 Adjusted MortRates regressed on Mean 1940 thru 1990 PhysPops		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Digestive-Ca, Females: 1988 Adjusted MortRates regressed on 1940 PhysPops	
			Regression Output:			Regression Output:	
Pac	191.97	22.8	Constant	-17.0424	159.72	Constant	-17.0334
NewEng	208.20	24.7	Std Err of Y Est	3.1585	161.55	Std Err of Y Est	1.9494
MidAtl	204.72	26.0	R Squared	0.8559	169.76	R Squared	0.9451
WNoCen	141.14	15.118	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	18.314	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	13.238			119.89		
WSoCen	126.28	5.315	X Coefficient(s)	0.2072	103.94	X Coefficient(s)	0.2542
ESoCen	113.28	7.241	Std Err of Coef.	0.0321	85.83	Std Err of Coef.	0.0232
SoAtl	142.93	8.311	XCoef / S.E. =	6.4489	100.74	XCoef / S.E.	10.9799

```
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) = NEG =      0.0      |       Constant (Part 2, Col.E) = NEG =      0.0
                                                  |
2.  Radiation rate is Natl Adjusted              |   2.  Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 16.1788)           |       MortRate (Part 1, Col.I = 16.1788)
    minus Nonradiation rate (0.0) =     16.1788   |       minus Nonradiation rate (0.0) =     16.1788
                                                  |
3.  1988 Fractional Causation is radiation       |   3.  1988 Fractional Causation is radiation
    rate (16.1788) divided by OBSERVED           |       rate (16.1788) divided by OBSERVED
    Natl MR Part 1,Col.C=    23.5    =    0.69     |       Natl MR Part 1, Col.C=    23.5          0.69
4.  Comparable est. = 0.68 from Table 58-F.       |
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                                          Table M-11
              Urinary-System Cancers, Males, 1980:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 59-EE, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-0.3 case) which we obtain from
Chap.59, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.59, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 11-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 11-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -0.3 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1398	7.7	1.076					7.7	1.076
NewEng	0.0546	9.5	0.519					9.5	0.519
MidAtl	0.1630	9.2	1.500					9.2	1.500
WNoCen	0.0759	7.9	0.600	6.7	0.94	6.3	5.998	5.998	0.455
ENoCen	0.1846	8.7	1.606	8.1	0.94	7.6	7.314	7.314	1.350
Mtn	0.0502	7.0	0.351	6.5	0.94	6.1	5.810	5.810	0.292
WSoCen	0.1049	7.0	0.734	4.3	1.04	4.5	4.172	4.172	0.438
ESoCen	0.0646	7.3	0.472	3.0	1.04	3.1	2.820	2.820	0.182
SoAtl	0.1624	7.8	1.267	5.3	1.04	5.5	5.212	5.212	0.846
Weighted avg. Col.C =		8.1						Sum =	
1980 Obs.Natl MR, Tab 11-B=		8.2				1980 Natl Adju MR =			6.6581

Part 2. ---

Trio-Seq.	Col.A Mean1940 thru1980 PPs from Tab 47-A x'	Col.B 1980 AdjuMRs Col.H Part 1	Col.C Urinary-System Ca: Males 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Urinary-System Ca: Males 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	177.35	7.7	Constant	-2.9136	159.72	Constant	-2.8529
NewEng	185.86	9.5	Std Err of Y Est	0.7785	161.55	Std Err of Y Est	0.6428
MidAtl	186.11	9.2	R Squared	0.8931	169.76	R Squared	0.9271
WNoCen	128.82	5.998	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	7.314	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	5.810			119.89		
WSoCen	114.66	4.172	X Coefficient(s)	0.0654	103.94	X Coefficient(s)	0.0720
ESoCen	99.46	2.820	Std Err of Coef.	0.0086	85.83	Std Err of Coef.	0.0076
SoAtl	124.62	5.212	XCoef / S.E. =	7.6461	100.74	XCoef / S.E.	9.4354

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) = NEG = 0.0	1. Nonradiation rate is Adjusted Constant (Part 2, Col.E) = NEG = 0.0
2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.I = 6.6581) minus Nonradiation rate (0.0) = 6.6581	2. Radiation rate is Natl Adjusted MortRate (Part 1, Col.I = 6.6581) minus Nonradiation rate (0.0) = 6.6581
3. 1980 Fractional Causation is radiation rate (6.6581) divided by OBSERVED Natl MR Part 1,Col.C= 8.2 = 0.81	3. 1980 Fractional Causation is radiation rate (6.6581) divided by OBSERVED Natl MR Part 1, Col.C= 8.2 0.81
4. Comparable est. = 0.83 from Table 59-EE.	

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                                         Table M-12
             Urinary-System Cancers, Females, 1980:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 60-E, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-1.4 case) which we obtain from
Chap.60, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.60, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Seq.	Col.A 1980 PopFrac Tab 3-B	Col.B 1980 Obs MR Tab 12-A	Col.C A * B	Col.D = 1940 MRs Mid,Low Tab 12-A	Col.E= PPAdju Factor Tab47-B	Col.F= D * E	Col.G= Col.F -1.4 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * H
Pac	0.1398	2.8	0.391					2.8	0.391
NewEng	0.0546	3.4	0.186					3.4	0.186
MidAtl	0.1630	3.2	0.522					3.2	0.522
WNoCen	0.0759	3.0	0.228	3.7	0.94	3.5	2.078	2.078	0.158
ENoCen	0.1846	3.0	0.554	4.1	0.94	3.9	2.454	2.454	0.453
Mtn	0.0502	2.5	0.126	3.5	0.94	3.3	1.890	1.890	0.095
WSoCen	0.1049	2.8	0.294	3.1	1.04	3.2	1.824	1.824	0.191
ESoCen	0.0646	2.8	0.181	2.7	1.04	2.8	1.408	1.408	0.091
SoAtl	0.1624	2.9	0.471	3.0	1.04	3.1	1.720	1.720	0.279

Weighted avg. Col.C =   3.0   Sum =
1980 Obs.Natl MR, Tab 12-B=   3.0   1980 Natl Adju MR =   2.3659

Part 2.

Trio-Seq.	Col.A Mean1940 thru1980 PPs from Tab 47-A x'	Col.B 1980 AdjuMRs Col.H Part 1	Col.C Urinary-System Ca: Females 1980 Adjusted MortRates regressed on Mean 1940 thru 1980 PhysPops Regression Output:		Col.D 1940 PPs from Table 3-A TrioSeq. x''	Col.E Urinary-System Ca: Females 1980 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	177.35	2.8	Constant	-0.6480	159.72	Constant	-0.6026
NewEng	185.86	3.4	Std Err of Y Est	0.2105	161.55	Std Err of Y Est	0.1852
MidAtl	186.11	3.2	R Squared	0.9199	169.76	R Squared	0.9380
WNoCen	128.82	2.078	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	2.454	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	1.890			119.89		
WSoCen	114.66	1.824	X Coefficient(s)	0.0207	103.94	X Coefficient(s)	0.0226
ESoCen	99.46	1.408	Std Err of Coef.	0.0023	85.83	Std Err of Coef.	0.0022
SoAtl	124.62	1.720	XCoef / S.E. =	8.9631	100.74	XCoef / S.E.	10.2876

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

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

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 2.3659)
   minus Nonradiation rate (0.0) =   2.3659

3. 1980 Fractional Causation is radiation
   rate (2.3659) divided by OBSERVED
   Natl MR Part 1,Col.C=   3.0   =   0.79
4. Comparable est. = 0.78 from Table 60-E.

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

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

2. Radiation rate is Natl Adjusted
   MortRate (Part 1, Col.I = 2.3659)
   minus Nonradiation rate (0.0) =   2.3659

3. 1980 Fractional Causation is radiation
   rate (2.3659) divided by OBSERVED
   Natl MR Part 1, Col.C=   3.0   0.79

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                                          Table M-13
             Genital Cancers, Males, 1990:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 61-F, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-0.6 case) which we obtain from
Chap.61, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.61, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

	Col.A	Col.B	Col.C		Col.D =	Col.E=	Col.F=	Col.G=	Col.H=	Col.I =
Trio-	1990	1990			1940 MRs	PP Adju	D * E	Col.F	Adju	A * H
Seq.	PopFrac	Obs MR	A * B		Mid,Low	Factor		-0.6	MortRate	
	Tab 3-B	Tab 13-A			Tab 13-A	Tab47-B		(TopTrio,		
Pac	0.1535	15.9	2.441					Bx1,ColK)	15.9	2.441
NewEng	0.0527	16.6	0.875						16.6	0.875
MidAtl	0.1527	16.8	2.565						16.8	2.565
WNoCen	0.0721	16.3	1.175		16.5	0.94	15.5	14.91	14.910	1.075
ENoCen	0.1713	17.2	2.946		15.8	0.94	14.9	14.252	14.252	2.441
Mtn	0.0543	16.6	0.901		15.8	0.94	14.9	14.252	14.252	0.774
WSoCen	0.1087	16.7	1.815		11.6	1.07	12.4	11.812	11.812	1.284
ESoCen	0.0621	17.5	1.087		10.4	1.07	11.1	10.528	10.528	0.654
SoAtl	0.1725	18.6	3.209		12.8	1.07	13.7	13.096	13.096	2.259
Weighted avg. Col.C =			17.0						Sum =	
1990 Obs.Natl MR, Tab 13-B=			16.9				1990 Natl Adju MR =		14.3679	

Part 2. --

	Col.A	Col.B		Col.C		Col.D		Col.E	
	Mean1940	1990		Genital-Ca, Males:		1940		Genital-Ca, Males:	
	thru1990	AdjuMRs		1990 Adjusted MortRates		PPs from		1990 Adjusted MortRates	
Trio-	PPs from	Col.H		regressed on		Table 3-A		regressed on	
Seq.	Tab 47-A	Part 1		Mean 1940 thru 1990 PhysPops		TrioSeq.		1940 PhysPops	
	x'				Regression Output:	x''			Regression Output:
Pac	191.97	15.9		Constant	5.3635	159.72		Constant	5.4998
NewEng	208.20	16.6		Std Err of Y Est	0.9080	161.55		Std Err of Y Est	0.7170
MidAtl	204.72	16.8		R Squared	0.8411	169.76		R Squared	0.9009
WNoCen	141.14	14.910		No. of Observation	9	123.14		No. of Observation	9
ENoCen	146.19	14.252		Degrees of Freedom	7	133.36		Degrees of Freedom	7
Mtn	145.91	14.252				119.89			
WSoCen	126.28	11.812		X Coefficient(s)	0.0562	103.94		X Coefficient(s)	0.0679
ESoCen	113.28	10.528		Std Err of Coef.	0.0092	85.83		Std Err of Coef.	0.0085
SoAtl	142.93	13.096		XCoef / S.E. =	6.0861	100.74		XCoef / S.E.	7.9766

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) =   5.3635 | Constant (Part 2, Col.E) =   5.4998
                                                       |
2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
     MortRate (Part 1, Col.I = 14.3679) | MortRate (Part 1, Col.I = 14.3679)
     minus Nonradiation rate (5.3635) =   9.0044 | minus Nonradiation rate (5.4998) =   8.8681
                                                       |
3. 1990 Fractional Causation is radiation | 3. 1990 Fractional Causation is radiation
     rate (9.0044) divided by OBSERVED | rate (8.8681) divided by OBSERVED
     Natl MR Part 1,Col.C=   16.9   =   0.53 | Natl MR Part 1, Col.C=   16.9   0.52
4. Comparable est. = 0.47 from Table 61-F. |

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                                        Table M-14
           Buccal-Pharynx Cancers, Males, 1980:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 63-EE, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-1.2 case) which we obtain from
Chap.63, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.63, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

	Col.A	Col.B	Col.C		Col.D =	Col.E=	Col.F=	Col.G=	Col.H=	Col.I =
Trio-	1980	1980			1940 MRs	PPAdju	D * E	Col.F	Adju	A * H
Seq.	PopFrac	Obs MR	A * B		Mid,Low	Factor		-1.2	MortRate	
	Tab 3-B	Tab 15-A			Tab 15-A	Tab47-B		(TopTrio,		
Pac	0.1398	4.2	0.587					Bx1,ColK)	4.2	0.587
NewEng	0.0546	5.7	0.311						5.7	0.311
MidAtl	0.1630	5.1	0.831						5.1	0.831
WNoCen	0.0759	3.5	0.266		4.6	0.94	4.3	3.124	3.124	0.237
ENoCen	0.1846	4.6	0.849		4.8	0.94	4.5	3.312	3.312	0.611
Mtn	0.0502	2.9	0.146		2.8	0.94	2.6	1.432	1.432	0.072
WSoCen	0.1049	4.2	0.441		4.0	1.04	4.2	2.960	2.960	0.311
ESoCen	0.0646	4.4	0.284		3.3	1.04	3.4	2.232	2.232	0.144
SoAtl	0.1624	5.0	0.812		4.3	1.04	4.5	3.272	3.272	0.531
Weighted avg. Col.C =			4.5						Sum =	
1980 Obs.Natl MR, Tab 15-B=			4.6				1980 Natl Adju MR =		3.6361	

Part 2. ---

	Col.A	Col.B	Col.C		Col.D	Col.E	
	Mean1940	1980	Buccal-Pharynx Ca: Males		1940	Buccal-Pharynx Ca: Males	
	thru1980	AdjuMRs	1980 Adjusted MortRates		PPs from	1980 Adjusted MortRates	
Trio-	PPs from	Col.H	regressed on		Table 3-A	regressed on	
Seq.	Tab 47-A	Part 1	Mean 1940 thru 1980 PhysPops		TrioSeq.	1940 PhysPops	
	x'		Regression Output:		x''	Regression Output:	
Pac	177.35	4.2	Constant	-1.4889	159.72	Constant	-1.1135
NewEng	185.86	5.7	Std Err of Y Est	0.7775	161.55	Std Err of Y Est	0.8659
MidAtl	186.11	5.1	R Squared	0.7039	169.76	R Squared	0.6327
WNoCen	128.82	3.124	No. of Observation	9	123.14	No. of Observation	9
ENoCen	133.71	3.312	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	133.45	1.432			119.89		
WSoCen	114.66	2.960	X Coefficient(s)	0.0348	103.94	X Coefficient(s)	0.0357
ESoCen	99.46	2.232	Std Err of Coef.	0.0085	85.83	Std Err of Coef.	0.0103
SoAtl	124.62	3.272	XCoef / S.E. =	4.0797	100.74	XCoef / S.E.	3.4728

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) = NEG =   0.0 | Constant (Part 2, Col.E) = NEG =   0.0
                                                   |
2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
      MortRate (Part 1, Col.I = 3.6361) | MortRate (Part 1, Col.I = 3.6361)
      minus Nonradiation rate (0.0) =   3.6361 | minus Nonradiation rate (0.0) =   3.6361
                                                   |
3. 1980 Fractional Causation is radiation | 3. 1980 Fractional Causation is radiation
      rate (3.6361) divided by OBSERVED | rate (3.6361) divided by OBSERVED
      Natl MR Part 1,Col.C=   4.6   =   0.79 | Natl MR Part 1, Col.C=   4.6   0.79
4. Comparable est. = 0.81 from Table 63-EE. |

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                                      Table M-15
          Ischemic Heart Disease, Males, 1993:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 64-E, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-170.8 cases) which we obtain from
Chap.64, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.64, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

Trio-Sequence	Col.A 1990 PopFrac Tab 3-B	Col.B 1993 Obs MR Tab 40-A	Col.C A * B	Col.D 1950 MR Mid,Low Tab 40-A	Col.E= PP Adju Factor Tab 47-B	Col.F= D * E	Col.G= Col.F -170.8 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * G
Pacific	0.1535	112.4	17.253					112.4	17.253
New England	0.0527	117.8	6.208					117.8	6.208
Mid-Atlantic	0.1527	147.9	22.584					147.9	22.584
WestNoCentral	0.0721	129.9	9.366	228.4	0.94	214.696	43.90	43.896	3.165
EastNoCentral	0.1713	140.5	24.068	258.9	0.94	243.366	72.57	72.566	12.431
Mountain	0.0543	101.2	5.495	214.8	0.94	201.912	31.11	31.112	1.689
WestSoCentral	0.1087	137.6	14.957	206.1	1.07	220.527	49.73	49.727	5.405
EastSoCentral	0.0621	145.8	9.054	176.8	1.07	189.176	18.38	18.376	1.141
SouthAtlantic	0.1725	128.7	22.201	222.0	1.07	237.540	66.74	66.740	11.513
		Sum =	131.2						Sum
1993 Observed Natl MR from Table 40-B =			131.0				1993 Natl Adjusted MR =		81.3898

Part 2. --

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1993 Adju MRs from Col.H Part 1	Col.C IHD, Males: 1993 Adjusted MortRates regressed on Mean 1940 thru 1990 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E IHD, Males: 1993 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	112.4	Constant	-112.3211	159.72	Constant	-97.0234
NewEng	208.20	117.8	Std Err of Y Est	16.7476	161.55	Std Err of Y Est	20.3378
MidAtl	204.72	147.9	R Squared	0.8720	169.76	R Squared	0.8112
WNoCen	141.14	43.896	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	72.566	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	31.112			119.89		
WSoCen	126.28	49.727	X Coefficient(s)	1.1765	103.94	X Coefficient(s)	1.3245
ESoCen	113.28	18.376	Std Err of Coef.	0.1704	85.83	Std Err of Coef.	0.2415
SoAtl	142.93	66.740	XCoef / S.E. =	6.9045	100.74	XCoef / S.E. =	5.4839

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) = NEG. =   0.0000 | Constant (Part 2, Col.E) = NEG. =   0.0
                                                                 |
2. Radiation rate is Natl Adjusted | 2. Radiation rate is Natl Adjusted
      MortRate (Part 1, Col.I = 81.3898) | MortRate (Part 1, Col.I = 81.3898)
      minus Nonradiation rate (0.0) =   81.3898 | minus Nonradiation rate (0.0) =   81.3898
                                                                 |
3. 1993 Fractional Causation is radiation | 3. 1993 Fractional Causation is radiation
      rate (81.3898) divided by OBSERVED | rate (81.3898) divided by OBSERVED
      Natl MR Part 1,Col.C=   131.0   =   0.62 | Natl MR Part 1, Col.C=   131.0   0.62
4. Comparable est. = 0.63 from Table 64-E. |

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                                      Table M-16
           Ischemic Heart Disease, Females, 1993:  Alternative Smoking Adju and Fractional Causation
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This table is like Table 65-E, except for the Smoking Adjustment. Here in Part 1, we do not multiply the 1940
MidTrio and LowTrio MortRates by a factor; we adjust them by the DIFFERENCE (-85.1 cases) which we obtain from
Chap.65, Box 1, Col.K. Of course, Col.E below keeps the PP Adju (see Tab 47-B & Chap.65, Box 2, Part 2, Col.D).

Part 1. Calculation of the Alternative Smoking Adjustment (Col.G) and the National Adjusted MortRate (Col.I).

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= PP Adju Factor Tab 47-B	Col.F= D * E	Col.G= Col.F -85.1 (TopTrio, Bx1,ColK)	Col.H= Adju MortRate	Col.I = A * G
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	0.94	97.854	12.754	12.754	0.920
EastNoCentral	0.1713	70.2	12.025	124.2	0.94	116.748	31.648	31.648	5.421
Mountain	0.0543	46.3	2.514	96.2	0.94	90.428	5.328	5.328	0.289
WestSoCentral	0.1087	66.5	7.229	94.0	1.07	100.580	15.480	15.480	1.683
EastSoCentral	0.0621	67.7	4.204	84.7	1.07	90.629	5.529	5.529	0.343
SouthAtlantic	0.1725	61.6	10.626	103.4	1.07	110.638	25.538	25.538	4.405
		Sum =	64.6						Sum =
1993 Observed Natl MR from Table 41-B =			64.7				1993 Natl Adjusted MR =		36.8866

Part 2. --

Trio-Seq.	Col.A Mean1940 thru1990 PPs from Tab 47-A x'	Col.B 1993 Adju MRs from Col.H Part 1	Col.C IHD, Females: 1993 Adjusted MortRates regressed on Mean 1940 thru 1990 PPs Regression Output:		Col.D 1940 PPs from Table 3-A (TrioSeq) x''	Col.E IHD, Females: 1993 Adjusted MortRates regressed on 1940 PhysPops Regression Output:	
Pac	191.97	57.7	Constant	-77.5231	159.72	Constant	-68.8802
NewEng	208.20	55.7	Std Err of Y Est	11.0499	161.55	Std Err of Y Est	12.7956
MidAtl	204.72	78.8	R Squared	0.8449	169.76	R Squared	0.7920
WNoCen	141.14	12.754	No. of Observation	9	123.14	No. of Observation	9
ENoCen	146.19	31.648	Degrees of Freedom	7	133.36	Degrees of Freedom	7
Mtn	145.91	5.328			119.89		
WSoCen	126.28	15.480	X Coefficient(s)	0.6942	103.94	X Coefficient(s)	0.7845
ESoCen	113.28	5.529	Std Err of Coef.	0.1124	85.83	Std Err of Coef.	0.1520
SoAtl	142.93	25.538	XCoef / S.E. =	6.1745	100.74	XCoef / S.E.	5.1625

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

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

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 36.8866)
    minus Nonradiation rate (0.0) =   36.8866

3. 1993 Fractional Causation is radiation
    rate (36.8866) divided by OBSERVED
    Natl MR Part 1,Col.C=   64.7   =   0.57
4. Comparable est. = 0.78 from Table 65-E.

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

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

2. Radiation rate is Natl Adjusted
    MortRate (Part 1, Col.I = 36.8866)
    minus Nonradiation rate (0.0) =   36.8866

3. 1993 Fractional Causation is radiation
    rate (36.8866) divided by OBSERVED
    Natl MR Part 1, Col.C=   64.7   0.57