

In summary, the majority of studies so far reported indicate that cigarette smokers run a higher risk of developing postoperative pulmonary complications than do nonsmokers, corroborating a long-held clinical impression. The risk of developing such complications appears to increase with increasing dosage of cigarette smoke.

### SUMMARY AND CONCLUSIONS

1. Cigarette smoking is the most important cause of chronic obstructive bronchopulmonary disease in the United States. Cigarette smoking increases the risk of dying from pulmonary emphysema and chronic bronchitis. Cigarette smokers show an increased prevalence of respiratory symptoms, including cough, sputum production, and breathlessness, when compared with nonsmokers. Ventilatory function is decreased in smokers when compared with nonsmokers.

2. Cigarette smoking does not appear to be related to death from bronchial asthma although it may increase the frequency and severity of asthmatic attacks in patients already suffering from this disease.

3. The risk of developing or dying from COPD among pipe and/or cigar smokers is probably higher than that among nonsmokers while clearly less than that among cigarette smokers.

4. Ex-cigarette smokers have lower death rates from COPD than do continuing smokers. The cessation of cigarette smoking is associated with improvement in ventilatory function and with a decrease in pulmonary symptom prevalence.

5. Young, relatively asymptomatic, cigarette smokers show measurably altered ventilatory function when compared with nonsmokers of the same age.

6. For the bulk of the population of the United States, the importance of cigarette smoking as a cause of COPD is much greater than that of atmospheric pollution or occupational exposure. However, exposure to excessive atmospheric pollution or dusty occupational materials, and cigarette smoking may act jointly to produce greater COPD morbidity and mortality.

7. The results of experiments in both animals and humans have demonstrated that the inhalation of cigarette smoke is associated with acute and chronic changes in ventilatory function and pulmonary histology. Cigarette smoking has been shown to alter the mechanism of pulmonary clearance and adversely affect ciliary function.

8. Pathological studies have shown that cigarette smokers who die of diseases other than COPD have histologic changes charac-

teristic of COPD in the bronchial tree and pulmonary parenchyma more frequently than do nonsmokers.

9. Respiratory infections are more prevalent and severe among cigarette smokers, particularly heavy smokers, than among nonsmokers.

10. Cigarette smokers appear to develop postoperative pulmonary complications more frequently than nonsmokers.

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BRONCHOPULMONARY

APPENDIX TABLES

TABLE A2.—*Smoking and chronic obstructive pulmonary disease symptoms<sup>1</sup>—percent prevalence*

(Numbers in parentheses represent total number of individuals in particular smoking group)

SM = Smokers. NS = Nonsmokers. EX = Ex-smokers.

Author, year, country, reference	Number and type of population	Cough	Sputum production	Breathlessness or dyspnea	Chest illnesses	Other	Comments
Short et al., 1939, U.S.A. (206).	2,031 male and female insurance policy holders.	NS ..... 1.6 (496) SM ..... 6.4 (1,293)			NS ..... 10.9 SM ..... 18.0		Chest illnesses as represented by frequent colds.
Oswald and Medvei, 1955, England (178).	3,602 male and 2,242 female clerical workers 40-65 years of age.					Chronic Bronchitis Males NS ..... 15.8 (474) SM ..... 18.4 (1,940) Females NS ..... 12.1 (619) SM ..... 13.8 (579)	Chronic bronchitis defined by habitual cough and sputum production.
Phillips et al., 1956, U.S.A. (185).	1,274 male factory workers without overt pulmonary disease or heart failure.	NS ..... 2.0 (451) SM ..... 51.0 (823)					
Higgins 1957, England (112).	301 male and 280 female rural dwellers 25-74 years of age.		Cough and sputum			Chronic Bronchitis	
			Males	Males	Males	Males	
			NS ..... 7.1 (28) SM ..... 53.9 (222)	NS ..... 7.1 SM ..... 19.8	NS ..... 3.6 SM ..... 17.1	NS ..... 3.6 SM ..... 9.9	
			Females	Females	Females	Females	
			NS ..... 4.5 (176) SM ..... 17.2 (93)	NS ..... 21.6 SM ..... 9.7	NS ..... 9.7 SM ..... 15.1	NS ..... 3.4 SM ..... 8.6	

TABLE A2.—Smoking and chronic obstructive pulmonary disease symptoms<sup>1</sup>—percent prevalence (cont.)

(Numbers in parentheses represent total number of individuals in particular smoking group)

SM = Smokers. NS = Nonsmokers. EX = Ex-smokers.

Author, year, country, reference	Number and type of population	Cough	Sputum production		Breathlessness or dyspnea		Chest illnesses	Other	Comments
			Females Cough and sputum	Males	NS	SM			
Higgins and Cochran, 1958, England (114).	94 males and 92 females randomly chosen (members of an agricultural community.)		NS ..... SM ..... 24.0 (75)	(6) (64) (20)	NS ..... SM ..... 29.3	NS ..... SM ..... 16.0	NS ..... SM ..... 10.9 10.0	Chronic bronchitis Males 0.0 6.7 Females 0.0 5.0	
Edwards et al., 1959, England (74).	1,737 male out- patients on lists of general prac- titioners >60 years of age.							Chronic bronchitis NS ..... 16.6 (151) Cigarettes 29.7 (779) 1-9 .... 23.4 (235) 10-19 ... 31.2 (369) >20 .... 33.7 (175) Pipe .... 18.5 (340)	
Flick and Paton, 1959, U.S.A. (88).	222 male patients not suffering from overt cardio- pulmonary disease, 20-90 years of age.	NS ..... 10.0 (51) SM ..... 55.0 (157)	NS ..... 25.0 (49) SM ..... 65.0 (156)		NS ..... 30.0 (47) SM ..... 60.0 (138)				
Higgins et al., 1960, England (116).	776 males in various occupations 25-64 years of age.		Cough and sputum SM ..... 7.1 (85) NS ..... 36.9 (675)	NS ..... 9.4 SM ..... 24.9	NS ..... 7.1 SM ..... 20.2		Chronic bronchitis SM ..... 14.3 NS ..... 3.5		

TABLE A2.—Smoking and chronic obstructive pulmonary disease symptoms<sup>1</sup>—percent prevalence (cont.)

(Numbers in parentheses represent total number of individuals in particular smoking group)  
 SM = Smokers. NS = Nonsmokers. EX = Ex-smokers.

Author, year, country, reference	Number and type of population	Cough	Sputum production	Breathlessness or dyspnea	Chest illnesses	Other	Comments			
Higgins, 1959, England (119).	303 males in various occupations 65-64 years of age.	<i>Cough and sputum</i>				<i>Chronic bronchitis</i>	Chronic bronchitis defined as persistent sputum and at least 1 chest illness in past 3 years. Tobacco gram equivalents are: 1 cigarette = 1 gram, 1 cigar = 2-5 grams, 1 pipe = 10-25 grams.			
		NS	6.1 (33)	NS	18.2	NS		3.0	NS	0.0
		1-14 g./day	9.7 (173)	1-14 g./day	30.1	1-14 g./day		23.7	1-14 g./day	13.9
		>15	42.3 (142)	>15	33.8	>15	23.9	>15	17.6	
Liebeschuetz, 1959, England (156).	147 male soldiers 20-30 years of age.	NS	0.0 (52)							
		SM	13.0 (83)							
Ashford et al., 1961, England (11).	4,014 male coal workers.					<i>Respiratory symptoms</i>	Respiratory symptoms—"bronchitis and/or asthma". No dose relationship found.			
		NS	10.3 (677)			NS		10.3 (677)		
		EX	19.5 (123)			EX		19.5 (123)		
		Cigarettes	21.1 (1,504)			Cigarettes		21.1 (1,504)		
		Pipe only	35.1 (202)			Pipe only		35.1 (202)		
				Cigarettes and pipe	37.1 (90)					
				All SM	21.7 (3,214)					

TABLE A2.—*Smoking and chronic obstructive pulmonary disease symptoms<sup>1</sup>—percent prevalence (cont.)*(Numbers in parentheses represent total number of individuals in particular smoking group)  
SM = Smokers. NS = Nonsmokers. EX = Ex-smokers.

Author, year, country, reference	Number and type of population	Cough	Sputum production	Breathlessness or dyspnea	Chest illnesses	Other	Comments
Dower, 1961, U.S.A. (41).	95 male and 77 female bank employees 40-70 years of age.	NS ..... 4.1 (49)	NS ..... 20.4		NS ..... 34.7		Chest illness—chest colds during each of last 2 winters.
		SM ..... 27.6 (76)	SM ..... 34.2		SM ..... 88.2		
		Pipe, cigar .. (13)	Pipe, cigar 15.4		Pipe, cigar 63.9		
Fletcher and Tinker, 1961, England (85).	303 male London transport employees 40-60 years of age.	NS ..... .. (80)	NS ..... 8.7	NS ..... ..	NS ..... 4.8		
		1-14 g./day 16.5 (156)	1-14 g./day .. 29.9	1-14 g./day .. 8.2	1-14 g./day .. 8.2		
		>15 ..... 27.3 (116)	>15 ..... 36.9	>15 ..... 8.0	>15 .... 10.7		
Read and Selby, 1961, Australia (191).	170 male and 132 female individuals interviewed in an out-patient clinic (not all patients).	<i>Males</i>					
		NS ..... 4.4	SM ..... 23.1				
		<i>Females</i>					
		NS ..... 4.9	SM ..... 18.5				
Balchum et al., 1962, U.S.A. (24).	1,451 male light industry employees in California.	NS ..... 10.2 (258)	NS ..... 11.0	NS ..... 9.8			
		SM ..... 23.3 (1,108)	SM ..... 30.4	SM ..... 14.5			
		<1 pack-year ..... 11.0 (257)	<1 pack-year ..... 12.0	<1 pack-year ..... 10.0			
		1-9 ..... 17.0 (263)	1-9 ..... 18.0	1-9 ..... 12.0			
		10-19 ..... 25.0 (303)	10-19 ..... 32.0	10-19 ..... 11.0			
		20-29 ..... 21.0 (236)	20-29 ..... 34.0	20-29 ..... 18.0			
		30-39 ..... 28.0 (144)	30-39 ..... 40.0	30-39 ..... 21.0			
		40-49 ..... 39.0 (92)	40-49 ..... 37.0	40-49 ..... 18.0			
		50-59 ..... 34.0 (29)	50-59 ..... 45.0	50-59 ..... 38.0			
		>60 ..... 30.0 (24)	>60 ..... 62.0	>60 ..... 29.0			

TABLE A2.—Smoking and chronic obstructive pulmonary disease symptoms<sup>1</sup>—percent prevalence (cont.)

(Numbers in parentheses represent total number of individuals in particular smoking group)

SM = Smokers. NS = Nonsmokers. EX = Ex-smokers.

Author, year, country, reference	Number and type of population	Cough	Sputum production	Breathlessness or dyspnea	Chest illnesses	Other	Comments
Boucot et al., 1962, U.S.A. (36).	6,137 males enrolling in pulmonary neoplasm project.	NS ..... 13.0 (806) SM ..... 31.6 (5,331)					
Ferris et al., 1962, U.S.A. (82).	90 male and 71 female flax mill-workers.					<i>Chronic Nonspecific Respiratory Disease</i> Males Females NS .16.0 (20) 10.0 (60) EX .12.5 (16) .. 1-20 .27.3 (22) .. >20 .53.1 (32) 60.0 (4)	
Ferris and Anderson, 1962, U.S.A. (81).	542 male and 625 female residents of New Hampshire town chosen by random sampling of census.					<i>Chronic bronchitis</i> Males NS ..... 13.8 (125) EX ..... 11.0 (77) Cigarettes 40.3 (340) 1-10 .... 29.8 11-20 .... 34.2 21-30 .... 42.3 31-40 .... 51.1 >41 ..... 76.3 Females NS ..... 9.4 (378) EX ..... 10.8 (37) Cigarettes 19.8 (208) 1-10 .... 13.1 11-20 .... 22.2 21-30 ..... .. 31-40 .... 27.3 >41 ..... ..	Age-specific rates.