

SMOKING AND LUNG CANCER MORTALITY

Government statisticians in England (1970's) conducted a study of the relationship between smoking and lung cancer. They studied thousands of men from 25 occupational groups and reported data on smoking levels and lung cancer mortality.

The **Smoking Index** is the number of cigarettes smoked per day by men in each occupation relative to the number smoked by all men in all occupations. The smoking index is 100 if men in an occupation are exactly average in their smoking, below 100 if they smoke less than average and above 100 if they smoke more than average.

The **Mortality Index** is a standardized mortality ratio for deaths from lung cancer measured relative to the entire population of men of the same ages as those studied. If the mortality index is greater or less than 100 when there are more or fewer deaths from lung cancer than would be expected based on the experience of all English men.

Your tasks are to:

1. Determine if there is a correlation between the smoking index and mortality index by calculating a correlation coefficient of the data provided. Show your working in your lab book. Step by step directions for calculating a correlation are available at www.biologyforlife.com
2. Write 2-3 sentences to describe what your calculated correlation value tells you about the relationship between smoking and mortality.
3. Create a fully titled and labeled graph (hand drawn or computer generated) that illustrates the relationship between smoking and mortality given the data provided.
4. Write a paragraph explaining why smoking causes cancer, focusing on the biology of cancer formation. A helpful resource is the CancerResearchUK website (<http://www.cancerresearchuk.org/cancer-info/healthyliving/smoking-and-cancer/>)

Data Source: <http://lib.stat.cmu.edu/DASL/Datafiles/SmokingandCancer.html>

Moore, David S., and George P. McCabe (1989). Introduction to the Practice of Statistics. Original source: Occupational Mortality: The Registrar General's Decennial Supplement for England and Wales, 1970-1972, Her Majesty's Stationery Office, London, 1978.

Occupational Group	Smoking Index	Mortality Index
1. Farmers, foresters, and fisherman	77	84

Occupational Group	Smoking Index	Mortality Index
2. Miners and quarrymen	137	116
3. Gas, coke and chemical makers	117	123
4. Glass and ceramic makers	94	128
5. Furnace, forge, foundry, and rolling mill workers	116	155
6. Electrical and electronics workers	102	101
7. Engineering and allied trades	111	118
8. Wood workers	93	113
9. Leather workers	88	104
10. Textile workers	102	88
11. Clothing workers	91	104
12. Food, drink, and tobacco workers	104	129
13. Paper and printing workers	107	86
14. Makers of other products	112	96
15. Construction workers	113	144

Occupational Group	Smoking Index	Mortality Index
16. Painters and decorators	110	139
17. Drivers of stationary engines, cranes, etc.	125	113
18. Laborers not included elsewhere	133	146
19. Transport and communications workers	115	128
20. Warehousemen, storekeepers, packers, and bottlers	105	115
21. Clerical workers	87	79
22. Sales workers	91	85
23. Service, sport, and recreation workers	100	120
24. Administrators and managers	76	60
25. Professionals, technical workers, and artists	66	51