Appendix Eleven
Statistical Tests

A range of statistical tests were available with the SPSS programmes for use with the PDP 10 computer at the University of Essex in the latter stages of the preparation of this report, and we computed chi-square, lamda (asymmetric) and gamma when a number of sets of tables were printed. Chi-square is used in inferential statistics as a basis for a test of significance called the chi-square test. It has the advantage of working for nominal variables and compares expected with actual cell frequencies. The larger the values of chi-square (and the fewer the degrees of freedom), the greater is the probability of a relationship between two variables. When the computed chi-square is large, it does not mean that there is a strong relationship between the variables. It merely means that we can be more confident about rejecting the null hypothesis and concluding that the variables are related. Lamda is another measure of association suitable for nominal variables. Lamda is a measure of the proportionate reduction of error in predicting modal values from knowing not only the distribution of a dependent variable but of the way that dependent variable is distributed within the categories of an independent variable. It varies in magnitude from 0.0 to +1.0. Unlike chi-square it *is* a measure of the strength of a relationship. Gamma is a third measure of association, suitable for ordinal data, and measures the proportionate reduction in errors in predicting the ranking of pairs drawn from both of two variables when the known distribution is compared with a random distribution. It varies in magnitude from -1.0 to +1.0.

All statistical tests require care, because assumptions are made in applying them. Thus, in the computation of chi-square it is assumed that the data analysed are a simple random sample of the population, that the observations are independent, that no expected frequency in the contingency table being analysed will be less than 5, and that the underlying distribution of the computed chi-square statistic is continuous.[1] The poverty survey was not based on a simple random sample but, especially in view of the evidence on representativeness, has been assumed to be so for purposes of statistical testing. This assumption has been made in much other research.

An example is given in Table A11.1. Our object in this example is not simply to test the strength of the association between two variables, but to find whether the association between occupational class and income net worth is stronger than between occupational class and net disposable income, and by how much. The gamma test shows that the association is stronger, and markedly so.

[1] Examples of the warnings that need to be observed in using tests are given in Loether, H. J., and McTavish, D. G., *Inferential Statistics for Sociologists: An introduction,* Allyn & Bacon, Boston, 1974, Chapter 8.

Table A11.1. *Percentages and number of chief wage-earners or heads of households and housewives of different occupational class, according to the net disposable income and income net worth of the income unit, expressed as a percentage of the state's poverty standard* (*married couples only*).

Income/income net worth as % of supplementary benefit scale plus housing cost	*Professional*	*Managerial*	*Supervisory*		*Routine non-manual*	*Skilled manual*	*Partly skilled manual*	*Unskilled manual*
			High	*Low*				
A. *Net disposable income of income unit*								
Under 140	6	7	8	18	15	24	27	48
140-99	13	15	30	30	29	35	35	18
200+	81	77	62	52	55	42	38	34
Total	100	100	100	100	100	100	100	100
Number	106	80	192	230	112	682	306	172
B. *Income net worth*								
Under 140	7		3	6	5	15	20	41
140-99	6		13	15	30	31	29	17
200+	87		83	79	64	54	50	42
Total	100	100	100	100	100	100	100	100
Number	106	80	192	230	112	682	306	172

NOTE: Income units which did not give information about *both* A *and* B in full have been excluded from this table.

TESTS: Gamma A = -0.327 B = -0.415

Lamda = 0.024 with income dependent = 0.0000 with income dependent

= 0.0000 with class dependent = 0.0000 with class dependent

Chi-square = 200.05 with 14 degrees of freedom (or significant at 0.0001 level) = 264.365 with 14 degrees of freedom (or significant at 0.00001 level)