

Morris et al., 1971). As can be seen, the data for the whites in this study compare very favorably with Michigan white males. (Had the non-mechanic garage workers been included, mean values from 1% to 2% lower would have been obtained (c.f. Table 30).

A variety of different research groups have produced regression equations for pulmonary function parameters on the basis of measurements on "normal" populations. The equations of Kory et al, 1961; Cherniak and Raber, 1972; and Morris, Koski, and Johnson, 1971, particularly, have gained widespread acceptance for comparative purposes. The populations utilized and the criteria for acceptable data are shown in Table 38 for these three studies along with five others that have also established regression equations for normal populations and this study. As can be seen, only two of these research groups included only nonsmokers in the study group. A third included individuals who smoked for less than six months and one included individuals who were ex-smokers of less than five-pack years of cigarettes. In some cases averages of best efforts were utilized; in others, values for all parameters were taken from the flow volume curve of the best effort as determined by forced vital capacity. Of most importance, a considerable diversity exists in the age distributions of the study populations selected. Values for FVC and FEV<sub>1</sub> increase until about age 25, then remain relatively unchanged until about age 35, and thereafter declining steadily with age. Because of this complexity, regression equations, based upon a wide range of ages and utilizing only a single linear term to account for age, can be significantly in error. The errors are such as to produce overestimates of pulmonary functions for young and older groups and underestimates for those in the middle years (see, e.g., Schoenberg et al., 1978). As the population in this study is largely between the ages of 40 and 70, most regression equations are likely to understate the values for these parameters. Additionally, lower predicted values will clearly be obtained from populations that include smokers or from studies that include averages of several expiratory efforts rather than the maximal ones. The use of standards from such populations can lead to underestimates of effect from agents in the workplace that can affect pulmonary function.