

NAME: Fitting Percentage of Body Fat to Simple Body Measurements
TYPE: Sample
SIZE: 252 observations, 19 variables

DESCRIPTIVE ABSTRACT:

Percentage of body fat, age, weight, height, and ten body circumference measurements (e.g., abdomen) are recorded for 252 men. Body fat, a measure of health, is estimated through an underwater weighing technique. Fitting body fat to the other measurements using multiple regression provides a convenient way of estimating body fat for men using only a scale and a measuring tape.

SOURCE:

The data were generously supplied by Dr. A. Garth Fisher, Human Performance Research Center, Brigham Young University, Provo, Utah 84602, who gave permission to freely distribute the data and use them for non-commercial purposes. Reference to the data is made in Penrose, et al. (1985).

VARIABLE DESCRIPTIONS:

Columns

3 - 5 Case Number
10 - 13 Percent body fat using Brozek's equation,
457/Density - 414.2
18 - 21 Percent body fat using Siri's equation,
495/Density - 450
24 - 29 Density (gm/cm³)
36 - 37 Age (yrs)
40 - 45 Weight (lbs)
49 - 53 Height (inches)
58 - 61 Adiposity index = Weight/Height² (kg/m²)
65 - 69 Fat Free Weight
= (1 - fraction of body fat) * Weight,
using Brozek's formula (lbs)
74 - 77 Neck circumference (cm)
81 - 85 Chest circumference (cm)
89 - 93 Abdomen circumference (cm) "at the umbilicus
and level with the iliac crest"
97 - 101 Hip circumference (cm)
106 - 109 Thigh circumference (cm)
114 - 117 Knee circumference (cm)
122 - 125 Ankle circumference (cm)
130 - 133 Extended biceps circumference (cm)
138 - 141 Forearm circumference (cm)
146 - 149 Wrist circumference (cm) "distal to the
styloid processes"

SPECIAL NOTES:

The data are as received from Dr. Fisher. Note, however, that there are a few errors. The body densities for cases 48, 76, and 96, for instance, each seem to have one digit in error as can be seen from the two body fat percentage values. Also note the presence of a man (case 42) over 200 pounds in weight who is less than 3 feet tall (the height should presumably be 69.5 inches, not 29.5 inches)! The percent body fat estimates are truncated to zero when negative (case 182).

PEDAGOGICAL NOTES:

These data can be used to show the utility of multiple regression and to provide practice in model building.

Additional information about these data can be found in the "Datasets and Stories" article "Fitting Percentage of Body Fat to Simple Body Measurements" in the Journal of Statistics Education (Johnson 1996).

REFERENCE:

Penrose, K., Nelson, A., and Fisher, A. (1985), "Generalized Body Composition Prediction Equation for Men Using Simple Measurement Techniques" (abstract), Medicine and Science in Sports and Exercise, 17(2), 189.

SUBMITTED BY:

Roger W. Johnson
Department of Mathematics and Computer Science
Carleton College
Northfield, MN 55057-4001
rjohnson@carleton.edu