Figure 1: Body mass index in relation to the level of body fat measured by DXA. Data generated in NHANES and published by Romero-Corral et al. (2008). Two things are clear from this picture. (a) At any given level of BMI the level of body fatness varies enormously. Yet (b) the average population level of body fatness (in red) tracks the level of BMI closely (if not via a linear model).

For MEN:

N = 6,580 Adjusted rho (ρ) = 0.65, p < 0.0001

For WOMEN:

N = 7,021 Adjusted rho (ρ) = 0.87, p < 0.0001