Childhood obesity is increasing worldwide, and all previous attempts to stop this epidemic have shown little success. There is now growing evidence that the risk of childhood obesity is strongly influenced by perinatal determinants, including prepregnancy body mass index (BMI), gestational weight gain, and—at least in animal studies—dietary factors during pregnancy and lactation. This review addresses the issue of whether modulation of fat intake and its composition in this early-life period has a potential for primary prevention of childhood obesity. Of particular interest is the question of whether supplementation with n-3 long-chain PUFAs (LC-PUFAs) may exert an antiobesity effect. Retrospective analysis of human randomized controlled trials with fish-oil intervention during pregnancy and lactation gave inconsistent results concerning BMI and obesity development in offspring. A recent prospective human intervention study aimed at reducing the n-6:n-3 LC-PUFA ratio did not show an effect on adipose tissue growth in offspring up to the age of 1 y. Therefore, there is currently little evidence to support the hypothesis that dietary intervention to modify fat composition during pregnancy and lactation would be a promising strategy to prevent childhood obesity in humans, but more research is clearly needed to address the question if and how the risk of developing obesity can be modified by dietary intervention early in life.