"Study Designs and Analytic Strategies for Environmental and Policy Research on Obesity, Physical Activity, and Diet"
April 8, 2008, Washington, DC

Rationale for environmental and policy solutions to obesity, and research needed to inform policy

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This presentation emphasize that obesity must be framed as a complex systems problem, where obesity is seen as a function of biology, the social environment, the physical environment, and economics. Lang (2007) writes that "obesity is not only a function of nutrition transition in terms of changes in dietary patterns, but also the management of and human interface with the physical environment, as well as culture." The complexity of the obesity problem is well illustrated in the U.K Foresight Programme Report (2007), showing not only that all sectors in society have a role to play, but that there are complex feedback loops among many of the drivers of food and physical activity behavior. Although policymakers are often eager for simple solutions, such solutions cannot be arrived at unless there is at least an understanding of the complexity of the problem.

Environmental and policy factors do matter in the obesity problem. The emergence of various fields of science, such as epigenetics, brain imaging, and stress research, now provide us with the opportunity to explore the mechanisms by which macro-level drivers of behavior interact with biological processes to affect behavioral patterns. For example, epigenetic effects have linked maternal diets to offspring obesity. In addition, automatic brain responses to the reward value of food vs. non-food objects appear to be enhanced by marketing and chronic stress. Given these connections, one can then go another step further and ask, for example, whether the higher cost and unequal distribution of healthy foods in the U.S., as a result of food and agricultural policies in place, lead to financial and time stress in low-income households, which in turn leads to increased brain-mediated propensity to consume energy-dense but nutrient-poor foods. Increased obesity rates in this scenario can be further perpetuated in subsequent generations via epigenetic programming *in utero*.

By posing *a priori* questions and hypotheses that link variables above and beneath the human skin, we can begin conducting true cross-disciplinary research. In addition, sustainability of health benefits should be a criterion of both the quality and utility of research. There is currently inadequate capacity, both in terms of manpower and methodology, to conduct multilevel research in obesity. Resources are needed to create the tents of big science, within which modular studies can be embedded. Solution-oriented research requires a clear idea of where the research fits on the larger complex systems map and ultimately must make an impact on policy in order to have a population-level impact.