

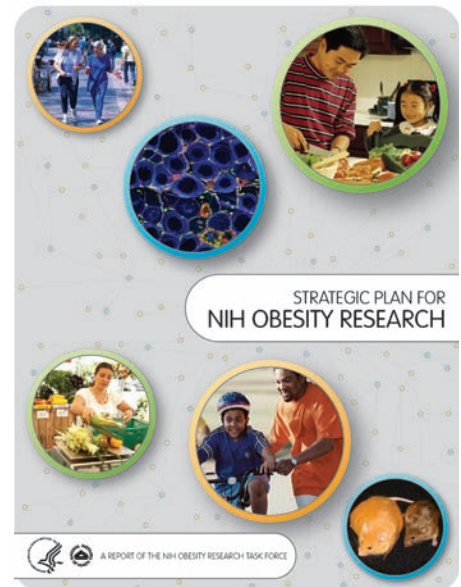
Strategic Plan For NIH Obesity Research

Summary

Introduction – Obesity and National Institutes of Health (NIH) Research

Obesity is a major contributor to serious health conditions in children and adults, including type 2 diabetes, cardiovascular disease, many forms of cancer, and numerous other diseases and conditions. Individuals who are obese also may experience stigma and discrimination. Obesity takes a substantial economic toll due to increased healthcare costs and lost productivity. As rates of obesity have soared in the past three decades, it is clear that increasing the number of people who achieve and maintain a healthy weight is a critical public health goal, although one that faces formidable challenges. Reducing the prevalence of obesity and its associated health consequences will require broad-based efforts by government, the private and nonprofit sectors, businesses, community organizations, healthcare professionals, schools, families, and individuals. Recognizing that simply telling people to “eat less and exercise more” is not enough, many individuals and groups are taking action to decrease the burden of obesity.

At the foundation of these efforts is research to understand the causes and consequences of obesity, develop and evaluate new prevention and treatment strategies, and inform policies. Researchers are trying to answer many questions: How can we augment and use our knowledge of human biology and behavior to develop better and more targeted prevention and treatment approaches for obesity? What factors in our community environments and daily lives contribute to unhealthy eating and insufficient physical activity, and what can we modify so that people could more feasibly attain and maintain a healthy weight? How can we rigorously evaluate interventions—whether based on individual lifestyle changes, pharmacological or surgical



approaches, community-based programs, local or national policy changes, or a combination of strategies—to determine which really work, and who could most benefit? When and how do we best intervene to prevent the development of obesity? What are the challenges and opportunities for obesity prevention and treatment throughout the lifespan, from very young children to older adults? How do we reduce health disparities in obesity and its health consequences? How do we scale up the approaches that show promise, and implement or expand those proven effective, to reach more people? Given that no single intervention will solve this complex problem, how can we continue identifying new opportunities to spark innovative approaches?

As the nation’s biomedical research agency, the National Institutes of Health (NIH) funds a broad spectrum of research on obesity. These studies are conducted throughout the country and around the world at universities, medical centers, and companies, often in partnership with schools, businesses, and other community organizations. The *Strategic Plan for NIH Obesity Research* will serve as a guide to accelerate research to reduce the prevalence of obesity, so that people can look forward to healthier lives.



body burns to fuel basic life functions, physical activity, and normal childhood growth. A complex interplay of forces contributes to the development of obesity, from our innate biology to environmental factors such as the characteristics of the neighborhoods in which we live. Thus, multifaceted approaches are needed to combat obesity.

New Scientific Opportunities, Renewed Commitment to Obesity Research: The current *Strategic Plan for NIH Obesity Research*, published in 2011, reflects both the complexity of obesity and the exciting opportunities that have emerged from research advances since the NIH published its first strategic plan on this major public health challenge in 2004.

The NIH Obesity Research Task Force developed the updated *Strategic Plan for NIH Obesity Research* with crucial input from researchers external to the NIH, professional and other health-focused associations, scientific societies, healthcare providers, and the public, representing a broad range of expertise and areas of interest. Research advances and opportunities published in the scientific literature and presented at NIH workshops and national meetings also helped shape the *Strategic Plan* and will continue to inform NIH research planning.

Development of the *Strategic Plan*

A Multifaceted Approach to a Multifaceted Problem: Defined as an excess of body fat, obesity develops when there is a disruption of “energy balance”—that is, when the number of calories (energy) consumed in food and beverages exceeds the number of calories that the

Obesity is characterized by a large excess of body fat. A common way to screen for obesity uses body mass index (BMI), a measure of weight relative to height. In adults, obesity is defined as a BMI of 30 kilograms/meters² or greater, and in children and youth as a BMI at or greater than the 95th percentile for age and gender (based on previous national growth charts).

The *Strategic Plan for NIH Obesity Research* is available in two versions. This version is intended as a non-technical summary. It is a companion to the full *Strategic Plan*, which is targeted to researchers. Both are available on the NIH Web site at <http://obesityresearch.nih.gov/About/strategic-plan.htm>.

Research Opportunities

The *Strategic Plan* is framed around the following overarching themes:

- Discover fundamental biologic processes that regulate body weight and influence behavior
- Understand the factors that contribute to obesity and its consequences
- Design and test new interventions for achieving and maintaining a healthy weight
- Evaluate promising strategies for obesity prevention and treatment in real-world settings and diverse populations
- Harness technology and tools to advance obesity research and improve healthcare delivery
- Facilitate integration of research results into community programs and medical practice

Research to identify and reduce health disparities is essential to all themes of the *Strategic Plan*. Populations at disproportionate risk for obesity include: racial and ethnic minority groups, such as African Americans, Hispanic/Latino Americans, American Indians/Alaska Natives, and Pacific Islanders; people who are socioeconomically disadvantaged and who have limited access to affordable healthy foods, safe places for physical activity, and

health care; people with low literacy; and people who have physical, intellectual, or developmental disabilities.

Several additional topics span the themes of the *Strategic Plan*. An important area is translational research to bridge scientific discovery to improvements

in public health:

from fundamental

insights gained

in the labora-

tory into inter-

ventions that

can be tested

in clinical trials,

and from results

of clinical studies

into research that ex-

plores implementation in real-world settings.

A number of areas of NIH-supported obesity

research may benefit from public-private part-

nerships and other collaborative efforts involv-

ing industries, schools, healthcare providers,

community organizations, other government

agencies, and other partners. Because obe-

sity is increasing globally, studies in interna-

tional settings may inform the development of

prevention and treatment strategies for people

around the world and in the United States. Fi-

nally, training and reinvigorating a multidisci-

plinary scientific workforce will be essential to

the broad spectrum of research outlined in the

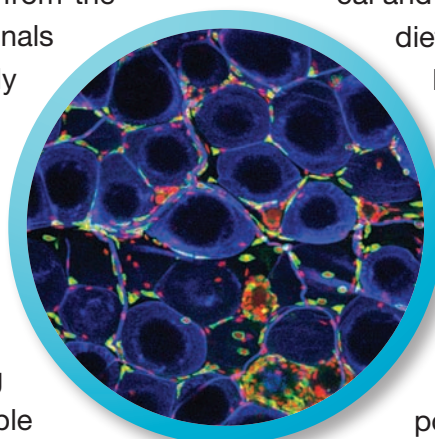
Strategic Plan.



The following pages describe the major themes of the *Strategic Plan* in more detail. For each theme, the highlighted examples of research topics are intended to be illustrative, rather than limiting.

Discover fundamental biologic processes that regulate body weight and influence behavior

The extraordinary difficulties of preventing obesity, losing excess weight, and keeping the pounds off derive, in part, from the elaborate array of molecular signals that travel throughout the body to influence fat accumulation, eating behavior, and physical activity. The genes that encode these molecular signals vary from person to person: these genetic differences, which scientists are beginning to discover, make some people more, and others less, prone to obesity. Additionally, diet, activity, and aspects of our environment may modify innate biologic pathways in ways that increase, or protect against, excess body fat. By advancing knowledge of how body weight and metabolism are normally regulated, and what goes awry in obesity, fundamental research discoveries open new avenues for preventing and treating obesity and health problems related to excess weight. This research will identify factors that could be targeted by new drug development or other strategies, and it also will enhance the design of lifestyle interventions that more effectively address the biologic influences on people's behaviors.



Understand the factors that contribute to obesity and its consequences

In addition to inherent biological factors, other potential contributors to excess weight gain include aspects of the environments in which

we live; individual behaviors; and family, social, and cultural interactions. For example, the types and costs of foods available in communities, sedentary work and play, media and marketing messages that surround us, and local and national policies can all influence dietary choices and physical activity levels. Eating habits and physical activity also may change over time, and vary at different life stages in children and adults. Research to better understand the many factors that contribute to obesity, and how these differ among individuals and populations will provide insight into what could be changed to make environments and policies more conducive to healthy lifestyles, and to motivate and facilitate long-term behavior modification.

The consequences of obesity are numerous and varied. Obesity heightens the risk for type 2 diabetes, heart disease, many cancers, and a range of other serious and debilitating health conditions; impairs quality of life in other ways; and increases healthcare costs. Obesity may be both a cause and a consequence of other conditions, such as stress, sleep problems, depression, and binge eating disorder. Through research, increased knowledge of the consequences of obesity, how excess body fat can lead to disease, and how some people appear to stay healthy despite their obesity will facilitate development of more successful strategies to improve the health of all people who are obese.

Design and test new interventions for achieving and maintaining a healthy weight

Loss of even modest amounts of excess weight can have dramatic health benefits. Preventing obesity is associated with reduced risk for many serious diseases. However, the high rates of obesity in adults and children attest to the difficulty of achieving and maintaining a healthy weight. Thus, it will be important to design and evaluate a variety of obesity prevention and treatment approaches—both personalized and population-based. Examples include strategies to guide parents in providing healthy food and physical activity for their children; methods to help adults manage their own weight through healthier eating, increased exercise, and decreased sedentary activity; lifestyle interventions for achieving a healthy weight during pregnancy, to benefit mothers and their children; and approaches for maintaining healthy behaviors. These types of interventions can take place in a variety of settings—wherever people spend time, there are opportunities to promote a healthy lifestyle. Researchers can explore interventions in homes, schools, workplaces, healthcare settings, and other community sites. Researchers can also evaluate broader environmental and policy changes relevant to food and physical activity, to see which show promise. For people who are extremely obese or who already have an obesity-related illness, lifestyle approaches, although vital, may not be enough. Thus, continued studies of medications and surgical procedures will be valuable to help inform treatment decisions. It also will be important



for researchers to determine whether weight control interventions reduce obesity-related diseases and improve quality of life.

Evaluate promising strategies for obesity prevention and treatment in real-world settings and diverse populations

As we find successful approaches to prevent or reduce obesity, we can implement them more broadly, in healthcare practice and community settings, to benefit more people. Research will guide the development of cost-effective strategies to bring findings from clinical trials into real-world settings. In communities, research to evaluate new and existing policies and grassroots initiatives will spotlight those that show success and could be expanded.

When an intervention seems promising, researchers can develop and test innovative adaptations for diverse populations and other settings where implementation may be more feasible or cost-effective. By surveying the landscape of obesity prevalence, neighborhood characteristics, and people's health and behaviors, researchers can identify populations that may have particular challenges to be addressed. Several avenues of study will yield information to help healthcare providers and their patients make decisions about weight management. This research includes comparing the outcomes of different lifestyle, pharmacologic, and surgical interventions, along with other forms of comparative effectiveness research. It is also important to ensure that weight control and related health information is communicated in

meaningful ways. By exploring different communication strategies, researchers will improve ways to give people the health information they need, in terms they understand and that resonate with their own lives.

Harness technology and tools to advance obesity research and improve healthcare delivery

Advances in technology and tools will bolster all of the research avenues described in the *Strategic Plan*, enhance delivery of health care, and improve people’s ability to monitor

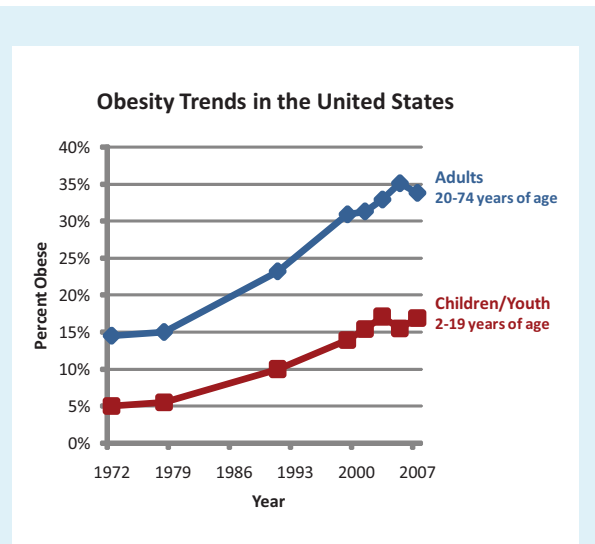


their own diet and activity. Strategies to prevent and treat obesity would benefit from technologies to make a variety of measures feasible in real-world settings, more accurate, and cost-effective.

These include measures of body fat, what and how much people are actually eating, how active or sedentary they are, and what types of foods and opportunities for physical activity are available in their neighborhoods. Advanced tools for collecting and analyzing very large amounts of data (high-throughput technologies) and other cutting-edge techniques will continue to accelerate research progress.

Facilitate integration of research results into community programs and medical practice

To maximize the impact of research, the *Strategic Plan* highlights education, outreach, and other efforts to help community leaders, healthcare professionals, policymakers, and the general public make use of research findings. These include, for example, national education campaigns and programs for diverse audiences, such as an NIH education program to reduce childhood obesity called *We Can!*[®] – Ways to Enhance Children’s Activity & Nutrition. Additionally, the NIH has developed evidence-based clinical guidelines and other resources to help healthcare providers assist their patients with weight management. The NIH also collaborates and coordinates with other agencies and organizations to enhance research, patient care efforts, education, and outreach. These efforts will help educate the public, inform policy, and improve health care.



The prevalence of obesity has increased dramatically over the past three decades. More than 33 percent of adults and more than 16 percent of children are currently obese. (Data from National Health and Nutrition Examination Survey)

Conclusion

The NIH is committed to moving research forward, in order to provide a sound evidence base for effective actions to prevent and treat obesity. Importantly, the *Strategic Plan for NIH Obesity Research* is intended to be dynamic: NIH research will continue building on emerging discoveries and knowledge, to catalyze the development of new approaches and to identify and expand those that work, so that people can look forward to healthier lives.

Image credits

Parent and child with bicycle: *Polka Dot Images/Punchstock*

People walking: *Getty Images*

Cells in body fat tissue: Obesity leads to chronic inflammation, which is associated with diabetes and other diseases. This image of fat tissue from an obese mouse shows fat cells (blue) surrounded by inflammation-promoting cells of the immune system, called macrophages (green). *Image provided by Dr. Carey Lumeng.*

Parent and child preparing salad: *Punchstock*

Person buying healthy food: *Getty Images*

Image of mice: This photograph, among the images featured on the cover of the full *Strategic Plan*, illustrates research on biological factors associated with obesity. *Image of mice provided by Dr. Robert A. Waterland and reprinted from Journal of Pediatrics, 149, Waterland RA, Epigenetic mechanisms and gastrointestinal development, S137-S142, Copyright 2006, with permission from Elsevier.*

Graph of obesity trends in the United States: This graph shows data from the National Health and Nutrition Examination Survey (NHANES) of the Centers for Disease Control and Prevention (CDC)/National Center for Health Statistics. Obesity is defined as body mass index (BMI) greater than or equal to gender- and age-specific 95th percentile from the 2000 CDC Growth Charts among youth (children/adolescents 2–19 years of age), and BMI greater than or equal to 30 among adults (20–74 years of age). NHANES survey years: 1971–74, 1976–80, 1988–94, 1999–2000, 2001–2, 2003–4, 2005–6, and 2007–8.

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A REPORT OF THE NIH OBESITY RESEARCH TASK FORCE



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