

## CSREES OBESITY WHITE PAPER

### Overview

Overweight and obesity have reached epidemic proportions in the United States and all parts of the public and private sector must take action. The USDA has a unique, mandated responsibility for food and agricultural systems, including food assistance and nutrition education programs, and therefore, an important part to play in addressing the problem. USDA's Strategic Plan for FY 2002-2007 has specific targets related to overweight and obesity and healthy eating.

USDA's Cooperative State Research, Education, and Extension Service (CSREES), as the Federal partner with universities nationwide, is uniquely positioned to establish a new Partnership Obesity Prevention Initiative supporting and coordinating research, education, and extension programs across the country to stem the rising tide of obesity. This network would bring together cutting edge research to focus on a critical gap in addressing the problem of obesity. That gap is in understanding the factors that affect behavior and lead to obesity and in finding ways to intervene to change those factors to prevent obesity. Immediate action could be taken through the Cooperative Extension System (CES) which reaches across the country with county-based programs focusing on individuals and communities to promote behaviors that support physical fitness and healthy weights. The Partnership Obesity Prevention Initiative would use a holistic, food-focused approach to the obesity problem taking advantage of the existing infrastructure of the university system and the diversity of its research, education and extension missions. This is an approach that would be unique to USDA.

Three components would define the proposed Partnership Obesity Prevention Initiative:

- 1) Determining the salient factors affecting behavior and leading to obesity and developing the most effective intervention strategies through coordinated, integrated research, education and extension programs;
- 2) Providing extension/outreach on obesity prevention in rural and urban communities through a new Obesity Prevention Competitive Grants Program building on current Cooperative Extension System programs; and
- 3) Focusing on low income families and children who are disproportionately affected by obesity through enhancement of the Expanded Food and Nutrition Education Program (EFNEP).

## Defining the Problem

Overweight and obesity have reached epidemic proportions in the United States. In 2000-2001, an estimated 65.7% of U.S. adults, 20-74 years of age, were overweight or obese, and 30.6% were obese.<sup>1</sup> The Center for Disease Control and Prevention (CDC) estimates that 40% of adults (69 million) will be obese by 2010 if trends go unchanged.<sup>2</sup> In the past 20 years, the percentage of overweight children has doubled while the percentage of overweight adolescents has almost tripled.<sup>3</sup> In 2000-2001, 31.5% of children, 6-19 years of age, were at risk for overweight or overweight, and 16.5% were overweight. The total annual cost of obesity is estimated to be \$123 billion for 2001 - \$6 billion more than for the previous year.<sup>4</sup> Annual hospital costs for obesity-related disorders in children and adolescents is estimated to be \$127 million.<sup>5</sup> Notable disparities exist among racial, ethnic, and economically disadvantaged groups which are the primary groups served by USDA's food and nutrition assistance programs.

## National Goals

National objectives addressing the obesity epidemic were established by the Department of Health and Human Services (HHS), USDA, other Federal agencies, and professionals across the country. In 2000, they were published in *Healthy People 2010* [URL: <http://www.healthypeople.gov/>]. The objectives related to obesity are to:

- increase the proportion of adults who are at a healthy weight to 60% from a baseline of 42% in 1988-94;
- reduce the proportion of adults who are obese to 15% from a baseline of 23% in 1988-94; and
- reduce the proportion of children who are overweight or at risk of being overweight to 5% from a baseline of 11% in 1988-94.

Clearly data from 2000-2001, cited above, indicate that the population is moving in the wrong direction. In June of 2002, the President announced the HealthierUS Initiative [URL: <http://www.healthierus.gov>]. This initiative calls for Americans to eat a nutritious diet, to be physically active each day, to get preventive screening, and to avoid risky behaviors. Agriculture Secretary Ann M. Veneman recently released the USDA Strategic Plan for FY2002-2007 [URL: <http://www.usda.gov/ocfo/usdasp/usdasp.htm>]. One of the five strategic goals is to "Improve the Nation's Nutrition and Health." The specific goals for obesity and healthy eating are:

- achieve reductions in overweight and obesity that are consistent with *Healthy People 2010*. Specifically, USDA, in partnership with HHS, will take action to encourage a reduction in overweight and obesity such that the percentage of obese adults will be no greater than 20% and the percentage of overweight children and adolescents will be no greater than 8% by 2007.
- increase by at least 5 points, the Healthy Eating Index (HEI) scores (100 – point scale) scores for children and low income people from baselines of 63 and 61 in 1996; and increase the score for the broader U.S. population by at least 2 points from a baseline of 63.8 in 1996.

- increase to 60% of postpartum women in the Special Supplemental Nutrition Program for Women, Infants, and Children who breastfeed from a baseline of 44.5%.

## **Federal Partners**

Because of the multidimensional nature of obesity, many Federal and private groups need to be involved in the solution. The Department of the Interior (through the National Park Service), USDA's Forest Service and the Department of Education all have important roles to play in improving opportunities for physical activity. The Department of Health and Human Services (HHS), through its National Institutes of Health (NIH), Food and Drug Administration (FDA), and the Centers for Disease Control and Prevention (CDC), plays an important role in addressing all health problems including an increasing interest in obesity. HHS is most renowned for its work in the treatment of disease.

USDA coordinates with other Federal agencies through both formal and informal mechanisms. Both USDA and HHS have Human Nutrition Coordinating Committees with appropriate intra-agency representation and liaisons with other departments. These committees share information and provide opportunities for comment on strategic plans. The USDA committee oversees two working groups. One is the Dietary Guidance Working Group which along with its counterpart at HHS reviews all federally issued dietary guidance materials for the public for consistency with the "Dietary Guidelines for Americans" [[http://www.cnpp.usda.gov/dietary\\_guidelines.html](http://www.cnpp.usda.gov/dietary_guidelines.html)]. The other is the Diet Appraisal Research Working Group which is an information-sharing group for Federal researchers who collect and analyze dietary survey data. USDA also has signed a Memorandum of Understanding with the National Cancer Institute and Produce for Better Health Foundation to help promote the consumption of fruits and vegetables through the "5 A Day for Better Health Program" [<http://5aday.gov/>].

## **Why USDA?**

USDA has a mandated, unique responsibility for food and agricultural systems including food assistance and nutrition education programs. Excess food energy intake coupled with inadequate energy expenditure though physical activity leads to obesity. While the equation seems simple, each part is influenced by myriad dynamic, overlapping and interacting factors. These might include genetic, physiological, psychological, cultural, social, economic (including disposable income and food prices), environmental, community-related, food production-related, intervention-related, education-related, and public policy factors. Years ago when food was scarce and energy needs for physical activity high, consumer demand was overshadowed by the limits of the food supply. Now, the food supply is abundant, and levels of physical activity are decreasing for most Americans. Consumer and public health concerns about obesity will have a major influence on agriculture, food and community systems of the future.

USDA's focus is on the prevention of obesity which results from ingesting more calories from food than are expended in physical activity. This complements HHS's disease

focus. USDA's programs address the total food system – that is, food production, processing, marketing, selection, preparation, food assistance programs, nutrition education programs, and food consumption. All of these components of the food system may contribute to the problem of obesity and all may be used to help prevent it. Another unique feature of USDA is the ability to integrate research with education and extension/outreach programs that focus on healthful eating and physical activity.

Several USDA agencies are working to prevent obesity. Figure 1 shows the functions of these agencies in relation to obesity prevention. The primary USDA agencies involved are the Agricultural Marketing Service (AMS), the Agricultural Research Service (ARS), the Food, Nutrition and Consumer Service's Center for Nutrition Policy and Promotion (CNPP), the Economic Research Service (ERS), the Food and Nutrition Service (FNS), and the Food Safety and Inspection Service (FSIS). AMS provides market news services and conducts promotional programs for several food commodities including fruit and vegetables. ARS is the principal internal research arm of the Department. In nutrition, ARS focuses primarily on biological research related to nutritional needs and food composition. ARS also has a large research/extension project focused on nutrition – the Mississippi Delta Nutrition Intervention and Research Initiative. A portion of this project focuses on obesity since obesity is a major health problem in the Mississippi Delta region. The National Agricultural Library, which is part of ARS, houses the Food and Nutrition Information Center, which provides current information to professionals and the public. CNPP leads the Department in establishing nutrition policy like the Dietary Guidelines for Americans and the Food Guide Pyramid. These responsibilities are shared with HHS. ERS conducts both intramural and extramural research focused on food and nutrition related to economic issues, especially poverty and food assistance programs. FNS is responsible for USDA's food assistance programs, including the Food Stamp Program, National School Lunch Program, and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Nutrition education is an important part of all these programs. FSIS is responsible for nutrition labeling of meat and poultry products as well as insuring food safety. CSREES (functions described below) and these USDA agencies coordinate their efforts by several means. Each agency is represented on committees that liaison with HHS - - the Nutrition Coordinating Committee, the Dietary Guidance Working Group and the Diet Appraisal Research Group as indicated earlier. There is also a USDA Interagency Obesity Prevention Working Group which meets on a regular basis to help coordinate individual agency activities. This group is led by a Special Assistant to the Secretary of Agriculture. In summary, each USDA agency plays a distinct, but coordinated part in working toward common goals.

### **CSREES and the University System**

CSREES is the Federal partner in the university system. Working in this role, CSREES is addressing obesity through the joint three-part mission of research, education and extension (see figure 1 and <http://www.csrees.usda.gov/obesityhealthyweight.html>). In research related to what we should eat, CSREES supports competitive basic and applied research through the National Research Initiative (NRI), and is responsible for formula-funded and special research grants primarily on nutritional needs and the functionality of

foods. In the areas of research related to why we eat and how we change, CSREES supports behavioral research on the factors that influence food related behavior and program development research to find effective ways of improving diet and fitness. In intervention, the formula-funded Cooperative Extension System (CES), which is unique to USDA, has the potential to reach into every county in every state and territory with science-based education and information programs that are meaningful and useful to the audiences they serve. In the area of formal education, CSREES plays a unique role in supporting programs in higher education, which produce the next generation of researchers and educators who will be called upon to address complex problems like obesity. CSREES and its partners in the university system, with their existing infrastructures and networks, are uniquely positioned to take advantage of the power of their mission in research, education and extension to bring a holistic, food-focused approach to addressing the multifaceted problem of obesity.

## **Current CSREES Work**

### Research

Research on the causes and prevention of obesity focuses on the entire food system, from production, processing, and marketing to food selection, preparation, and consumption. CSREES has funded a number of research projects related to obesity through the National Research Initiative (NRI) Competitive Grants Program, the Initiative for Future Agriculture and Food Systems (IFAFS), and Hatch and Evans-Allen Formula Funding. Multistate Research Fund (MRF) Projects are unique to CSREES and the land-grant university system. They are funded through Hatch formula funds that are awarded on a competitive basis through regional research offices. The Multistate Research process calls for consensus on a problem or issue to be addressed, and brings together the institutions, disciplines, and functions needed to address the problem within a set period of time. MRF projects provide a unique opportunity for several institutions to pool resources and undertake research, education, and extension activities focused on critical issues. CSREES is also responsible for special grants as designated by Congress. Approximately \$12.5 million were appropriated in 2003 for competitive, formula, and special grants for research projects related to obesity.

In universities across the country, groundbreaking biological research is underway on genetic and metabolic factors influencing obesity, including protein, fat and carbohydrate balance, dietary calcium and milk intake, the hormones leptin and ghrelin, and conjugated linoleic acid. Increasing attention in food science research is being given to new and genetically modified foods with special health benefits. Research leading to improvements in the quality of nutrient dense foods, decreases in costs, or increases in availability all can have a positive effect on nutrition and health. Cutting edge behavioral research is being done on the influence of breast-feeding, portion size, food insecurity, self-image, self-efficacy, risky behavior, and early childhood experiences in the home and day care setting. Community research is focusing on food availability and accessibility, food purchasing patterns, marketplace influences, and community involvement. These programs both improve diet and fitness and strengthen local agriculture and community life. Unique intervention research projects are being carried

out in rural towns in three Western states, African American communities in the South, and in Native American communities. The Current Research Information System (CRIS) is a unique system for tracking progress and funding for all CSREES-supported projects, including nutrition and a special file on obesity (<http://cris.csrees.usda.gov>). The attached table shows a list of currently active research grants as well as education and extension programs that address obesity.

### Higher Education

CSREES plays a unique role in supporting higher education in the agricultural sciences in land-grant universities and colleges (<http://www.csrees.usda.gov/about/offices/serd.html>). CSREES Higher Education Programs are intended to enhance the quality of education and to develop outstanding scientific and professional expertise. The National Needs Graduate Fellowships Program is especially noted for preparing scientists and other professionals to address the complex issues involved in the multidisciplinary aspects of agricultural and food systems. All parts of the land-grant university system, including the original 1862 land-grant universities, the 1890 or Historically Black colleges and universities and the 1994 or Tribal colleges, have programs designed to strengthen them. The Agriculture in The Classroom program targets youth in schools K-12 and is intended to provide information to interest young people in careers in agriculture. These programs prepare the next generation of scientists to address complex, multifaceted issues such as obesity. Funding for all higher education programs totaled about \$40 million in 2003. Funding for nutrition-related programs would be a very small part of the total.

### Extension

The Cooperative Extension System (CES) has the potential to reach into every county in every state and territory with science-based education and information programs that are meaningful and useful to the audiences they address. Some programs focus directly on helping people change their behavior in relation to diet and physical activity, such as the Nutrition, Diet and Health Program ([http://www.csrees.usda.gov/nea/food/in\\_focus/nutrition\\_if\\_broad.html](http://www.csrees.usda.gov/nea/food/in_focus/nutrition_if_broad.html)). Almost all of these nutrition education programs relate in some way to obesity since almost all address a healthy diet which includes the recognition of amounts of food and activity needed to achieve and maintain a healthy body weight. Another cooperative project, initiated in late 2001, is focusing directly on preventing childhood obesity - - Reversing Childhood Obesity Trends: Helping Children Achieve Healthy Weights [[http://www.csrees.usda.gov/nea/food/in\\_focus/nutrition\\_if\\_reversing.html](http://www.csrees.usda.gov/nea/food/in_focus/nutrition_if_reversing.html)]. This effort has stimulated CES staff to become more proactive and visible in implementing efforts to reduce childhood obesity. CES has a long history of work with families, community development, and environmental change. Partnering with other local educational and food assistance programs is a CES strength. These multidimensional efforts can have a long term positive effect on health. This expertise places CES in the unique position of being able to address both individual and environmental strategies for obesity prevention. Another advantage of the CES is its holistic, food-focused approach to improving diet and fitness. Funding for all CES nutrition programs was approximately \$18.7 million in 2003.

The Expanded Food and Nutrition Education Program (EFNEP) [<http://www.csrees.usda.gov/efnep>] also focuses on nutrition and fitness. It is directed to low-income youth and families who are disproportionately affected by obesity. EFNEP helps limited resource participants develop personally and acquire the knowledge, skills, attitudes, and changed behavior necessary for healthy diets for themselves and their families. EFNEP is delivered as a series of 10 or more lessons by paraprofessionals and volunteers, many of whom are indigenous to the target population. The hands-on, learn-by-doing approach allows adult participants to gain skill in food selection, purchasing, preparation, storage, and safety. They also learn how to better manage food budgets and related resources such as Food Stamps. EFNEP reaches youth by providing nutrition education at schools as an enrichment of the curriculum, in after school care programs, through 4-H EFNEP clubs, day camps, residential camps, community centers, neighborhood groups, and home gardening workshops. In addition to nutrition, food preparation, and food safety youth topics also include physical fitness, avoidance of substance abuse, and other health related topics. Funding for EFNEP was approximately \$58.2 million in 2003.

Many other CES programs focus indirectly on healthy eating and fitness, such as 4-H Youth Development, the Children, Youth and Families at Risk program, Military Partnerships for Youth and Families, Diabetes in African Americans, Healthy Families Healthy Communities, and cooking and gardening programs (<http://www.csrees.usda.gov/nea/family/family.html>).

#### Integrated Research, Education and Extension

While some funding agencies are just discovering the benefits of integrated programs, they are not new to USDA. The Multistate Research Fund, which is part of Hatch formula funding, has led the way in supporting projects that bring together the institutions, disciplines and functions needed to address important problems. In 2000 and in 2001, the Initiative for Future Agriculture and Food Systems (IFAFS) funded \$15.6 million in nutrition projects. Almost all of the seven nutrition projects funded relate to obesity. In 2003, the National Research Initiative (NRI) Integrated Program, conceptually similar to the IFAFS, was established. In the obesity area, 69 proposals were received. Fourteen were recommended for awards, totaling \$8.4 million. These projects are listed in the attached table.

#### Summary of Current Work and Gaps in Knowledge

CSREES efforts in research, education, and extension show great potential, but at their current levels, they are insufficient. The most critical gap in addressing the problem of obesity is in understanding the factors that affect behavior related to diet and physical activity and in finding ways to intervene to change those factors to prevent obesity. A new intense focus is needed to find the salient factors affecting behavior and leading to obesity including biologically-determined behavioral predispositions, such as taste and sensory specific satiety; experience with food including physiological and social conditioning; intra-personal factors, such as attitudes, self-identity and self-efficacy; inter-personal factors, such as social and cultural norms; and environmental factors including the physical, social, economic, educational, and policy environments. The

diversity of CSREES programs is a strength which could be brought to bear in addressing the obesity epidemic. A holistic, uniquely agricultural, food-focused approach, taking into account the interaction between the various components of the food system, provides the best hope for stemming the rising tide of obesity, reducing the risk of obesity-related diseases and socioeconomic consequences, and improving the health and fitness of Americans.

### **Future Needs**

The most compelling current and future need is for a new Partnership Obesity Prevention Initiative capitalizing on the special relationship between CSREES and the university system. This network would extend from the Federal office to universities and communities and bring together cutting edge research on the correlates of obesity, and on the development and testing of intervention strategies. Immediate action could be taken through the Cooperative Extension System which reaches into counties across the country. The Initiative would use a holistic, food-focused approach to the problem of obesity taking advantage of the diversity and existing infrastructure of the university system and its three part mission in research, education, and extension.

The most important immediate steps to take in establishing a Partnership Obesity Prevention Initiative are:

- 1) Determining the most salient factors that affect behavior and lead to obesity and developing the most effective interventions for addressing those factors through increased funding for the Integrated NRI program on obesity;
- 2) Providing educational outreach on obesity prevention in rural and urban communities by funding a new CES Obesity Prevention Competitive Grants Program that builds on current CES programs; and
- 3) Focusing on low income families and children by increasing funding for EFNEP for programs specifically focused on obesity. Specific implementation strategies follow:

**Research programs and integrated research, education, and extension programs to increase knowledge of the many factors that lead to obesity and to increase knowledge of effective strategies for preventing and reversing obesity.**

The purpose of the NRI section on “Human Nutrition and Obesity” [section 31.5 <http://www.csrees.usda.gov/fo/humannutritionobesitynri.html>] is to provide funding to scientists for integrated research, education, and extension projects directly addressing obesity. Grants through this program were awarded for the first time in 2003. The number of high quality proposals far exceeded the number of grants that could be awarded. Therefore, increased funding for this program would rapidly reap rewards. In addition, large scale (up to \$5 million), multi-year projects that are intended to promote collaboration, open communication and exchange of information, reduce duplication of effort, and coordinate activities among individuals, institutions, states, and regions should be considered. In the future, the program directors, in agreement with the National



Agricultural Research, Extension, Education and Economics Advisory Board, would like to see such an award to expand research to understand factors underlying food related behavior. Requests for Applications should highlight the need for research on the factors that affect food- and fitness-related behavior. Projects might focus on (a) the influence of social and psychological factors, including the development of self-esteem, self-efficacy and resiliency, family and community influences and attitudes toward food, physical activity and health; (b) the role of lifestyle, including physical activity, cultural and ethnic factors and the influence of past dietary patterns; (c) the role of educational factors, cognitive ability and informational resources; and (d) the influence of economic factors and public policy issues, including the community environment, food availability, accessibility, cost, food insecurity, time constraints, and public and private assistance programs. Preference should be given to research projects that are most likely to provide results that are directly applicable to the development of interventions. Further work may be needed to develop adequately sensitive evaluation tools. New funding should complement current funding for integrated research, education, and extension projects on obesity. A multidisciplinary approach, which is readily achievable in the university environment, is essential to give attention to all the significant factors that relate to obesity and develop an understanding of how to use these factors to effectively intervene to stem the growing obesity epidemic.

The purpose of the NRI section on “Improving Human Nutrition for Optimal Health” [Section 31.0 <http://www.csrees.usda.gov/fo/humannutritionoptimalhealthnri.html>] is to provide funding for research that contributes to our understanding of appropriate dietary practices and the factors that affect nutrient needs. The focus is on basic metabolism not obesity. However, many of these fundamental and mission-linked studies will contribute to our understanding of the biological mechanisms involved in obesity. For example, studies of macronutrients and energy metabolism and studies of the influence of dietary components on gene expression can provide clues to causes of obesity.

The purpose of the NRI section on “Improving Food Quality” [section 71.1 <http://www.csrees.usda.gov/fo/foodqualitynri.html>] is to provide funding for basic and mission-linked research and integrated research, education and extension programs in food science and technology. The primary objective has been to expand knowledge that aids in the development of highly nutritious, affordable foods with superior sensory attributes. However, the scope of this program should be expanded to include the science and technology that could have an impact on obesity prevention. For example, intermediary food chain factors might include the amounts and ratios of fats, carbohydrates, proteins, fiber, calcium, and bioactive components such as conjugated linoleic acid in foods. Factors might also include the glycemic index and nutrient density of foods, portion sizes, composition, convenience, and clarity of food labeling. The discipline of food science and technology should investigate these factors and other factors in food production that could have a role in obesity prevention. In addition, larger awards should be considered. In the future, program directors would like to see awards to expand research on plant- and animal-based functional foods that could effectively prevent obesity.

The purpose of the Small Business Innovation Research (SBIR) program is to competitively award grants to support small business research and development in the agricultural sciences that could lead to significant public benefit (<http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1128>). The SBIR is funded by a small set-aside from other research programs. The Partnership Obesity Prevention Initiative could be supported by emphasizing in Requests for Application the desirability of projects that include a focus on obesity.

### **Extension outreach programs to prevent and reverse obesity, especially among high risk populations.**

The objective of the proposed CES Obesity Prevention Competitive Grants Program would be to competitively award funds to the CES for educational outreach programs to prevent obesity in the communities they serve. The competitive process would insure high quality programs focused on obesity. Priority would be given to innovative programs that are multistate, that coordinate with the research community, the local community, and Federal food assistance programs such as the WIC and Food Stamp Nutrition Education programs, and that have evaluation components that can demonstrate effectiveness. Multiple types of projects should be funded to determine which are most effective with different types of audiences.

The Expanded Food and Nutrition Education Program (EFNEP) is intended to improve the food related behavior of low income populations. The success of EFNEP is documented by an ongoing national evaluation system (<http://www.csrees.usda.gov/nea/food/efnep/resources.html>). Multiple cost benefit analyses in several states highlight the value of EFNEP. They show that for every \$1 invested in EFNEP, benefits as high as \$10.64 from reduced health care costs can be expected. Although EFNEP is a proven mechanism for reaching low income youth and families with nutrition education that leads to sustained behavior change, it currently operates in only 800 of 3,150 counties in the U.S., serving approximately 100 thousand adults and 400 thousand youth per year -- less than 2 percent of the eligible population. Additional funding would allow for expansion of this successful program to more people in more counties. Additional funding also would allow states to incorporate and/or expand new EFNEP program components, e.g. focusing on obesity and physical activity.

The purpose of the Community Foods Projects Competitive Grants Program (CFPCGP) is to support one-time grants to private, nonprofit entities for projects that meet the food needs of low-income people, increase the self-reliance of communities and promote comprehensive responses to local food, farm and nutrition issues (<http://www.csrees.usda.gov/fo/fundview.cfm?fonum=1080> ). The low-income population targeted in these grants suffers disproportionately from obesity. The Partnership Obesity Prevention Initiative could be supported by increasing funding for the program and directing the increase to support programs that include an emphasis on obesity prevention. Most of these programs would take an environmental, as opposed to

an individual, approach to obesity prevention. One example would be programs that increase the availability and accessibility of fruits and vegetables in communities.

**Higher education programs to increase the number of professionals prepared to address the multidimensional issues involved in obesity.**

The purpose of the Higher Education Competitive Grants Programs is to support primarily three programs: National Needs Graduate Fellowships; Multicultural Scholars; and Challenge Grants (<http://www.csrees.usda.gov/qlinks/education/education.html>). These grants are intended to strengthen the agricultural sciences in colleges and universities. A small portion of the funds support food science and human nutrition. The Partnership Obesity Prevention Initiative could be supported by increasing funding for the program and directing the increase to support programs that focus on obesity. A new Multidisciplinary Graduate Education and Training Scholarships (MGETS) program should be considered as a way to increase the number of professionals prepared to address the complex issues involved in the agricultural sciences. Proposals would be sought that identify opportunities for new graduate programs involving two or more departments and disciplines. It is desired that grants be about \$2 million, with most of the funding targeted toward student support. Such a program could be funded through the NRI or Higher Education competitive grants. The Partnership Obesity Prevention Initiative could be supported by emphasizing in RFAs the desirability of programs that focus on complex problems and issues like obesity.

**Impact Evaluation**

The overall impact desired of all our obesity-related work is, of course, to achieve the goals established in the USDA Strategic Plan FY2002-2007 and in *Healthy People 2010*: to increase the proportion of adults who are at a healthy weight; to reduce the proportion of adults who are obese; and to reduce the proportion of children who are at risk for overweight or are overweight. These goals should be achieved through healthy eating and physical activity as called for in the President's *HealthierUS* initiative. With 1% of the adult population moving into the obese category per year, the immediate goal is to stem the rising tide of the obesity epidemic. CSREES' focus is on obesity prevention through improving healthy eating behaviors and increasing physical fitness. Body mass index and percentage body fat are obvious individual measures of overweight and obesity, but because overweight and obesity increase the risk of high blood pressure, heart disease, stroke, diabetes, certain types of cancer, arthritis, and breathing problems, measures related to these conditions can also be used to mark progress in relation to obesity. For example, obesity prevention that results in decreasing the incidence of Type 2 diabetes would be a welcome measure of success. An improvement in knowledge, attitudes and behavior related to healthy eating would also mark positive progress. Physical fitness and psychological well being are inversely related to obesity. Therefore, measures of physical strength, stamina, and coordination; frequency, duration and intensity of physical activity; and measures of psychological status such as those assessing depression, self-image, and self-efficacy can also mark progress in relation to obesity. At the family level, measures might include: number of meals eaten at home, purchase of fruits and

vegetables, improvements in the nutrient density of meals eaten away from home, and sources of food, e.g., fast food vs. grocery store. At the community level, measures might include: availability and proportion of nutrient dense foods in grocery stores, restaurants, and farmers markets, and availability of facilities and programs for physical activity, e.g., parks, playgrounds and senior centers. Changes in community involvement in nutrition and health issues and changes in public policies that impact opportunities for healthy eating and improved fitness would also indicate positive progress. Data from national surveys, the EFNEP Evaluation and Reporting System, CSREES supported evaluation studies and feedback from CSREES supported Extension programs can be used to identify the most successful strategies for addressing the obesity epidemic.

Quality control for competitively awarded grants comes first through the rigorous competitive award process and through post-award management strategies including participation in mail groups, progress and annual reports, and site visits. But the primary performance measure will be a Portfolio Review Score. Portfolios may contain various research, education, and outreach programs with similar goals. Portfolios will be assessed by experts annually and every five years to determine progress toward solving targeted national problems. Using recommendations from reviewers, National Program Leaders will work to improve portfolio performance. The relative weight given to different criteria may change over time as issues emerge and priorities fluctuate. The performance criteria will be used to inform the primary performance measure which will be a portfolio review score.

## References

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5. Wang, G. and Dietz, W. "Economic Burden of Obesity in Youths Aged 6 to 17 Years: 1979—1999". *Pediatrics*, Vol. 109 (5)(2002) pp e81. Cost during 1997-1999 (in 2001 constant US. Dollars).

Table 1. Active Research, Education and Extension Projects with an Obesity Focus Funded Through CSREES

Type of Work <sup>1</sup>	Type of Project <sup>2</sup>	Principal Investigator <sup>3</sup>	Institutions	Title
D	NRI	Fleming, S.	University of California, Berkeley	Randomized, Controlled Community Intervention to Reduce the Risk of Type 2 Diabetes in Overweight African American Children
D, C	NRI	Boushey, C.	Purdue University	Student-centered Web-based Communities: Multidisciplinary Approach for Adolescent Obesity Prevention
D	NRI	Beckham, S.	Waianae Coast Comprehensive Health Center	Hawaii Community Resource Obesity Project
C, D	NRI	Tanumihardjo, S.	University of Wisconsin	Promotion of High Vegetable Consumption as a Weight-loss Strategy and General Well-being
D, E	NRI	Goodman, B.	Southwestern Indian Polytechnic Institute	Seven Generations of Health: a Transgenerational Approach to Human Nutrition and Obesity Intervention in Indian Country
C, D	NRI	Novotny, R.	University of Hawaii	Healthy Living in the Pacific Islands Healthy Pacific Child Program
C, D	NRI	Anliker, J.	University of Massachusetts	Tween POWER: Preventing Obesity Through Wise Expenditures of Resources
C, D	NRI	Drewnowski, A.	University of Washington	Poverty and Obesity: Energy Density and Cost of Diets
D, E	NRI	Archuleta, M.	New Mexico State University	El Regalo de Salud (The Gift of Health): A Radio Obesity Education Campaign Targeting Latino Parents
D	NRI	Cullen, K.	Baylor College of Medicine	A Ground Level Weight Management Approach: Creating Healthy Home Eating Environments
D	NRI	Freeman, W.	Northwest Indian College	Prevention of Obesity and Diabetes in American Indian Tribes Using Peer Coaches for Individuals, Families and Communities

Table 1. Active Research, Education and Extension Projects with an Obesity Focus Funded Through CSREES

C	NRI	Murimi, W.	Louisiana Tech University	The Effect of the School Environment and Food System on Food Choices, Physical Activity, and Weight Status of School-aged Children
C, D	NRI	Bronner, Y.	Morgan State University	A Multi-Site, Multi-State Applied Research Project Focused on Nutrition and Obesity
E	NRI	Youngbear Tibbits, H.	College of the Menominee Nation	Woodlands Wisdom Nutrition Project
C, D	IFAFS	Nitzke, S.	University of Wisconsin	A Stage-Based Intervention to Increase Fruit & Vegetable Intakes of Young Adults
D, E	IFAFS	Monroe-lord, L.	University of the District of Columbia	Determinants of Childhood Obesity
E	IFAFS	Gailfus, P.	Turtle Mountain Community College	Woodlands Wisdom Project
D, E	IFAFS	Mullis, R.	University of Georgia	Bringing it Home: Creating Healthy Generations in Low Income African American Families
C, D	IFAFS	Sigman-Grant, M.	University of Nevada	Factors Influencing Child Care Providers' Feeding Practices
D, E	Research and Education	Savaiano, D.	Purdue University	Improving Bone Health in Adolescence Through Targeted Behavior Intervention
C, D	IFAFS	Moore, S.	University of Wyoming	Win the Rockies: A Food & Nutrition-Related Behavior-Change Consortium Project in WY, MT & ID
D	NRI	Hampm, J.	Arizona State University	Impressions of Mass and Peer-Based Media on Adolescents' Nutrition Behavior
B, C	NRI	Crawford, P.	University of California Berkeley	Dietary Patterning and Obesity Through Adolescence
B, D	NRI	Anderson, J.	Colorado State University	Alternative Strategies of Nutrition for Low-Income Hispanics
A, B	NRI	Duffy, V.	School of Allied Health, CN	Taste Genetics and Dietary Risk of Cardiovascular Disease

Table 1. Active Research, Education and Extension Projects with an Obesity Focus Funded Through CSREES

B	NRI	Novotny, R.	University of Hawaii	Japanese and White Female Adolescent Maturation
B	NRI	Sharma, S.	Cancer Research Center of Hawaii	Food and Nutrient Intakes Within a Large Multiethnic Cohort: Evaluation and Recommendations for Improvement
B	NRI	Chambersm, E.	Kansas State University	Accuracy of Descriptor Categories for Portion Size Estimation in Dietary Recalls
A	NRI	Gettys, T.	Pennington Biomedical Research Center	Mechanisms of Leptin Resistance in Diet-Induced Obesity
C, D	NRI	Gittelsohn, J.	Johns Hopkins Bloomberg School of Public Health	Food Store-Base Program to Reduce Risk of Chronic Disease in The White Mountain and San Carlos Apache Reservations
B, D	NRI	Betts, N.	University of Nebraska	Using the Stages of Change Model to Increase Fruit and Vegetable Intake
D	NRI	Cunningham-Sabo, L.	University of New Mexico	Cooking with Kids Evaluation Plan
B	NRI	Kileen, M.	University of New Mexico	The Validity and Reliability of a Dietary Behaviors Survey and of the Food-Security Core Module in Two Native American Communities
A	NRI	Tso, P.	University of Cincinnati	Toxic Lipophilic Xenobiotics: Tissue Distribution and Dietary Interactions
B	NRI	Preston, A.	University of Puerto Rico	Nutrition of Puerto Rican School Children: Importance of the Federal Breakfast and Lunch Programs
C	NRI	Nicklas, T.	Baylor College of Medicine	Environmental Influences on Children's Food Consumption
C	NRI	Fisher, J.	Baylor College of Medicine	Large Portion Size Effects on Daily Intake in Young Children and Their Mothers
B, C	NRI	Fitch, C.	West Virginia University	Factors Affecting Intake, Growth, and Body Mass Index of Rural Preschool Children



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C, D	MRF	NC-219	Land Grant Universities: OR, RI, MI, NY, KS, WI, IA, AL, SD, ME	Using Stage-Based Interventions to Increase Fruit and Vegetable Intake in Young Adults
C, D	MRF	W-1003	Land Grant Universities: AZ, CA-D., CO, IN, NM, OR, UT, WA, WY, MN, MI	Parent and Household Influences on Calcium Intake Among Preadolescents
C	MRF	NC-1001	Land Grant Universities: IA, MN, NYC, TX, MI, PA, WA, CA, NJ, OH	System Analyses of the Relationships of Agriculture and Food Systems to Community Health
A	Special	Bray, G.	Louisiana State University	Dietary Fat and Central Adiposity(The Metabolic Syndrome)
C	Special	Harvey-Berino, J.	University of Vermont	Special Research Grant for Child Obesity and Nutrition
C,D	Special	Rasmussen, K.	Cornell, Bassett Institute	Rural Obesity, New York
A	Hatch	White, B.	Auburn University	Lack of Central Leptin and Insulin Resistance: A Potential Connection Between Obesity and Type 2 Diabetes
A	Hatch	Sul, H.	University of California	Nutritional and Hormonal Regulation of Genes Involved in Lipogenesis
A	Hatch	Fleming, S.	University of California	Modulation of Cancer Risk in Colonic Epithelial Cells
D	Hatch	Sylva, K.	University of California	Visual Communication for Health Promotion in Rural and Low-Income Communities
C	Hatch	Kaiser, L.	University of California	The Relationship of Poverty, Food Security, and Food Assistance to Child Nutrition in Latinos
D	Hatch	Stern, J.	University of California	Obese Female Restrained Eaters: Two Treatment Options

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A	Hatch	Schneeman, B.	University of California	Foods for Maintaining Health
C	Hatch	Adams, E.	Colorado State University	Impact of Seasonal Patterns of Food Insecurity on the Diet and Growth Status of Children in Alamosa County in Colorado
A	Hatch	Nelson, T.	Colorado State University	Effect of Dietary Fat Type on Cardiovascular Risk Factors in Human Obesity
A	Hatch	Freake, H.	University of Connecticut	Molecular Mechanisms of Thyroid Hormone Regulation of Lipogenesis
A	Hatch	Rodriguez, N.	University of Connecticut	Effects of Exercise and Diet on Protein-Related Metabolic Responses in Healthy Lean and Obese Children
A	Hatch	Azain, M.	University of Georgia	Effect of Conjugated Linoleic Acid on Body Composition
A	Hatch	Harris, R.	University of Georgia	Environmental Factors Influencing the Efficiency of Energy Utilization
A	Hatch	Nakamura, M.	University of Illinois	Regulation of Phosphatase Expression and Its Impact On Body Fat Deposition
A	Hatch	Kim, Y.	Purdue University	Regulation of Adipocyte Differentiation and Lipid Metabolism
A	Hatch	Mattes, R.	Purdue University	Human Food Intake and Nutrient Balance
A	Hatch	Campbell, W.	Purdue University	Health-Related Impacts of Nutrition and Exercise Across the Life Span
A	Hatch	Keenan, M.	Louisiana State University	Bone Health and Obesity After Menopause
C	Hatch	O'Neil, C.	Louisiana State University	Impact Eating Patterns and Diet Quality by Young Adults on Obesity and Chronic Disease Factors
A, D	Hatch	Keenan, M.	Louisiana State University	Investigating Effects of Dilution of Dietary Energy and Willingness of People to Adopt Lower Energy Diets (Fruits and Vegetables)
A	Hatch	Hegsted, M.	Louisiana State University	Reducing Obesity and Bone Loss With Functional Foods
A	Hatch	Romsos, D.	Michigan State University	Comparative Aspects of Nutrition and Lipid Metabolism

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C	Hatch	Song, W.	Michigan State University	Nutritional Assessment In Population-Based Epidemiological Studies
C,D	Hatch	Hoerr, S.	Michigan State University	Relation of Family Meals and Lifestyle Factors to Obesity and Diet Quality of Children and Youth
A	Hatch	Claycombe, K.	Michigan State University	Obesity-Induced Systemic Inflammation: Effects of Anti-Inflammatory Nutrients
C, D	Hatch	Smith, C.	University of Minnesota	Examination of Nutritional Status and Dietary Behavior for Minority Populations
A	Hatch	Parks, E.	University of Minnesota	Quantification of Fatty Acid and Triglyceride Flux in Fasted and Fed Humans
A	Hatch	Earthman, C.	University of Minnesota	Body Composition and Nutritional Status Across the Clinical Spectrum: From Obesity to Wasting
C	Hatch	Benedict, J.	University of Nevada	Statewide Survey of Elementary School Employees on the School Environment
A	Hatch	Fagan, J.	Rutgers University	A Proteomic Approach to the Study of Brain Neuropeptides Regulating Food Intake
A	Hatch	Tepper, B.	Rutgers University	Genetic Taste Sensitivity to 6-N-Propylthiouracil (Prop), Fat Preference and Body Weight
A	Hatch	Shapses, S.	Rutgers University	Dietary Regulation of Extracellular Matrix of Bone
A	Hatch	Storch, J.	Rutgers University	Regulation of Dietary Lipid Traffic in Intestinal Epithelial Cells
A	Hatch	Fried, S.	Rutgers University	Regulation of Leptin Biosynthesis in Human Adipose Tissue
C	Hatch	Lee, S.	Rutgers University	Effects of Acculturation on Weight Status in Korean American Adults
A	Hatch	Hoffman, D.	Rutgers University	Small-For-Gestational Age and Non-Insulin Dependent Diabetes
C	Hatch	Worobey, J.	Rutgers University	Early Weaning and Dietary Variety as Predictive of Infant Weight Gain
C	Hatch	Eastman, W.	New Mexico State University	Childhood Obesity in New Mexico

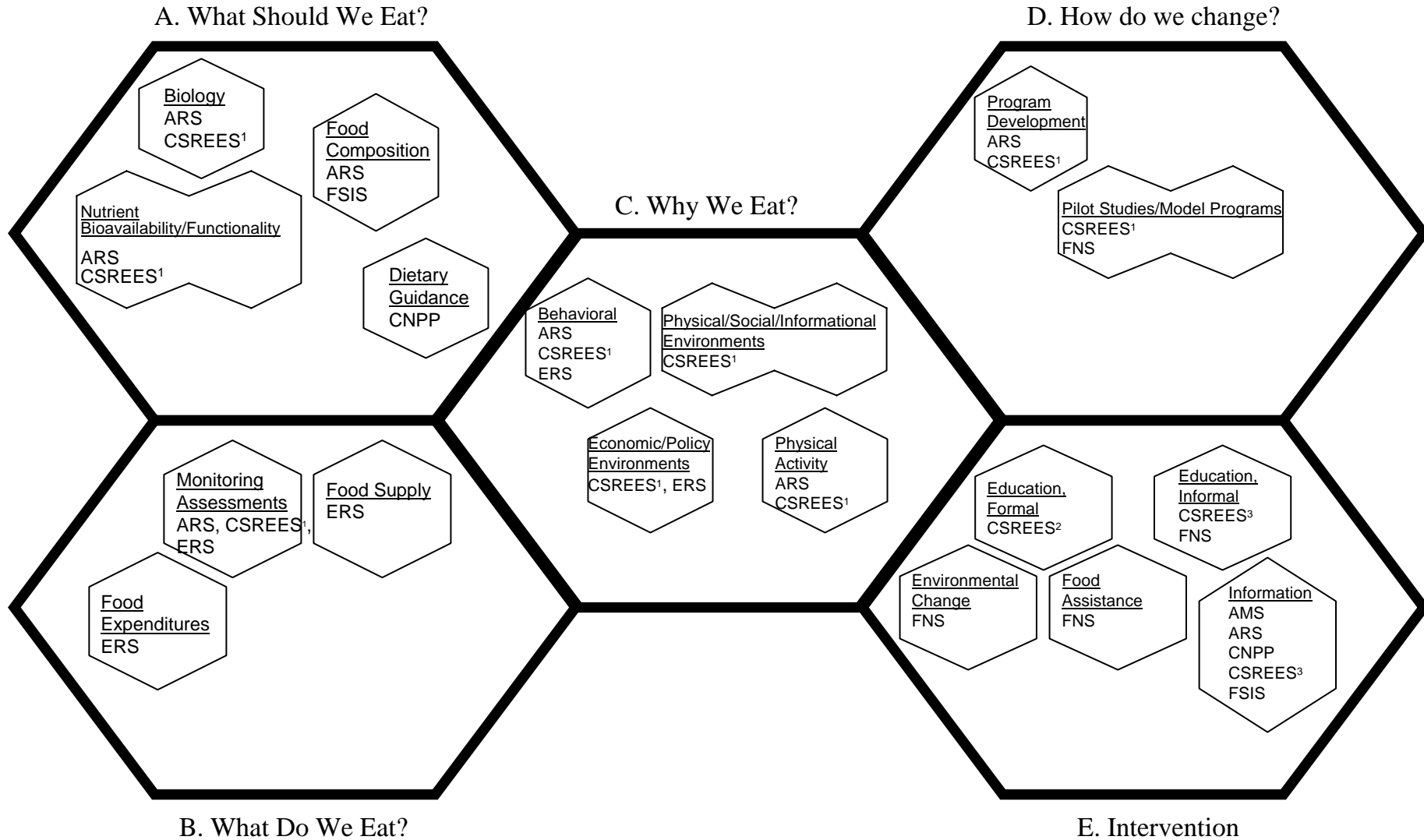
Table 1. Active Research, Education and Extension Projects with an Obesity Focus Funded Through CSREES

A	Hatch	Rasmussen, K.	Cornell University	Links Between Maternal Obesity Before Pregnancy and Infant Growth
A	Hatch	Mcintosh, M.	North Carolina State University	Influence of Dietary Lipids on the Growth of Human Preadipocytes
A	Hatch	Zemel, M.	University of Tennessee	Dietary Calcium Modulation of Obesity
A	Hatch	Moussa, N.	University of Tennessee	Mechanisms Mediating High Fat Diet and Angiotensin II Effects on Lipid and Adipocyte Metabolism
A	Hatch	Gilbertson, T.	Utah State University	Role of K <sup>+</sup> Channels in Nutrient Detection Mechanisms in Pre- and Post-Ingestive Chemosensory Cells
D	Hatch	Harvey-Berino, J.	University of Vermont	Internet Weight Loss: Stand-alone Intervention or Adjunct to Traditional Behavioral Treatment
C	Hatch	Fitch, C.	West Virginia University	Factors Affecting Intake, Growth, and Body Mass Index of Children and Adolescents in West Virginia
A	Hatch	Attie, A.	University of Wisconsin	Biochemistry and Genetics of Insulin Resistance and Diabetes
A	Hatch	Ntambi, J.	University of Wisconsin	Conjugated Linoleic Acid (CLA) in Fat Cell Differentiation and Metabolism
A	Hatch	Schoeller, D.	University of Wisconsin	Time Course of Adaptation to a High Fat Diet with Exercise
A	Hatch	Yandell, B.	University of Wisconsin	Molecular Biometry of Diabetes and Obesity: Modeling Biochemical Pathways Using Experimental Crosses
D	Development	USDA	National Program	Small Business Innovation Research
E	Education	USDA	National Program	National Needs Graduate Fellowship
E	Education	USDA	National Program	Multicultural Scholars Program
E	Education	USDA	National Program	Challenge Grants
E	Extension		National Program	Expanded Food and Nutrition Education Program
E	Extension		National Program	Cooperative Extension System Program in Diet, Nutrition and Health
E	Extension		National Program	Cooperative Extension System 4-H Program in Foods and Nutrition

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E	Extension		National Program	Community Foods Projects Competitive Grant Programs
<p><sup>1</sup>Type of work codes are explained in Figure 1.</p> <p><sup>2</sup>Type of project: NRI - National Research Initiative; IFAS - Initiative for Future Agriculture and Food Systems; MRF - Multistate Research Fund.</p> <p><sup>3</sup>More information on each project can be found by searching CRIS [<a href="http://cris.CSREES.usda.gov/">http://cris.CSREES.usda.gov/</a>] by principal investigator.</p>				

# Figure 1. USDA's Efforts in Obesity Prevention for a HealthierUS



<sup>1</sup>CSREES-Research, <sup>2</sup>CSREES-Education, <sup>3</sup>CSREES-Extension