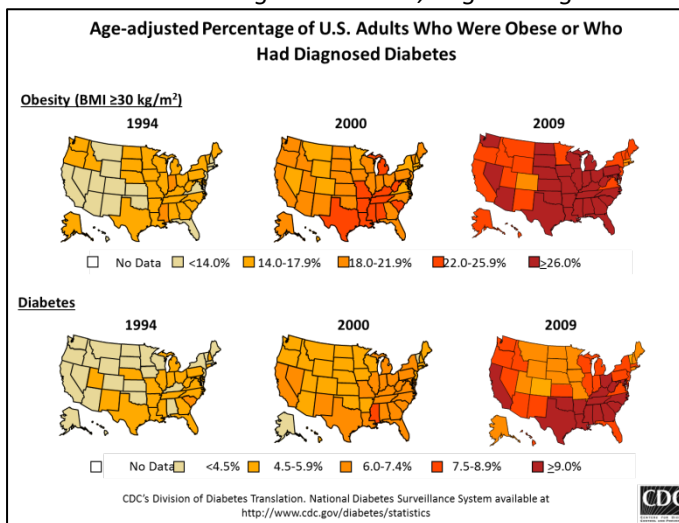


A Joint Working Group Report on Obesity/Diabetes and Nutrition: Analysis of Existing Strengths, Critical Gaps,
and Opportunities for Collaboration
May 2014

Analysis

Obesity and nutrition incorporates several of the integrating themes identified during the development of the University Strategic Plan under President Barchi: *Cultures, Diversity and Inequality-Local and Global; Improving Health and Wellness of Individuals and Populations; Creating a Sustainable World through Innovation, Engineering and Technology; and Educating Involved Citizens and Effective Leaders for a Dynamic World*. From bench to bedside to borough, Rutgers has considerable strengths and extensive reach in nutrition and obesity research; the weakest link but area of potential for greatest growth and development is translational research. Despite the existing expertise and socio-cultural diverse populations for clinical trials research, we lack funding recognition in this arena. Nevertheless, our public health research and community outreach in nutrition and obesity, particularly with respect to childhood obesity, is an outstanding strength that has come to the fore as a result of the merger of the former UMDNJ with Rutgers. Moreover, our population-based research is complemented by a substantial portfolio of basic research in metabolism, diabetes and cardiometabolic disorders.



Obesity is associated with numerous human health problems and is a key element of the metabolic syndrome, which is also characterized by a group of metabolic risk factors, including high plasma triglycerides, low HDL-cholesterol, hyperglycemia, insulin resistance and hypertension. Metabolic syndrome predisposes to diabetes, coronary artery disease and stroke, amongst others. The relationship between obesity and diabetes is well captured in the figure to the right, which shows 15 years of US data on a state-by-state basis. The term obesity epidemic can easily be understood from the rapid growth and geographic spread of this key public health problem. CDC data on all causes of death shows heart disease (#1), cerebrovascular disorders (#4) and diabetes itself (#7) amongst the top causes of death, all of which can be related to obesity. In addition, there are links between cancer (#2) and obesity¹, and a role for nutrient chemo-protection. The annual medical cost of obesity in the US has been estimated at \$147 billion in 2008 U.S. dollars. Importantly, the epidemic of adult obesity has been mirrored by an increasing trend towards obesity in adolescents, and young children².

In New Jersey, approximately 25% of adults are obese and even amongst adolescents the prevalence is ~11%, but in those aged 2-5, 17% are overweight or obese³. When examined by county, there is a clear relationship between socioeconomic disparities among residents and obesity rates, and these disparities are also reflected in hospitalization rates and outcomes. Since 1994 the rate of obesity among adults has more than doubled; at this rate the incidence could reach as high as 50% within in the next 2 decades. Heart disease and cancers accounted for more than 50% of the deaths in NJ in 2009, followed by stroke and diabetes³.

These data highlight the importance of obesity as a medical and public health problem. The case for strong clinical programs, basic and translational obesity and nutrition research, public policy, preventive medicine and health promotion and community education is easily manifest from these statistics. Rutgers has many of the elements necessary to position the institution as a leader in the area of nutrition and obesity, and there is a clear path forward to make this a signature area of the RBHS Strategic Plan.

¹ <http://www.cancer.gov/cancertopics/factsheet/Risk/obesity>

² Ogden et al. 2014 JAMA, 311: 806-814

³ http://www.state.nj.us/health/fhs/chronic/documents/chronic_disease_prevention_plan.pdf

Current funding for Obesity, Nutrition, Diabetes and related diseases at Rutgers

Table 1 provides evidence of more than \$33 million dollars in annual research funding for obesity, nutrition, diabetes and related diseases at Rutgers. NIH funding data was available in the most complete detail, including abstracts and health relevance information. The NIH funding data is most accurately assembled as fiscal year direct and indirect costs, and in fact it is more difficult to get the full multiyear award amounts. By contrast, many other agencies make multiyear awards and from the data provided to us it was often difficult to separate direct and indirect costs, and annual award amounts had to be calculated from the award duration. Based on the annual funding amounts, a total 5-year funding level for the obesity, nutrition and diabetes area of about \$150 Million can be calculated. By inspection of grant abstracts and self-reported information from the PIs, we were able to determine the numbers and dollar amounts of awards in each of the specified research areas alone and in combination (Table 1). Thus, of the 82 grants in our area, 40 addressed obesity and 48 addressed nutrition, but as anticipated, there was substantial overlap between these topics yielding 61 discrete grants on obesity and/or nutrition with a total of \$23 Million per year. There was also strong funding for diabetes at \$14 Million, and smaller amounts of funding for cancer or cardiometabolic diseases in combination with obesity or nutrition.

Sources of funding are not shown in Table 1, but the predominant source was NIH Research Grants that yielded about \$20 Million per year. The major NIH Institutes represented are NIDDK, NICHD, NCI, NIGMS and NIA. Much of the NIH-funded research occurs in the medical schools of RBHS and CINJ, together with SAS, IFNH and SEBS. After NIH, the next highest source of funding was USDA (predominantly funding work through IFNH and SEBS), followed by programs of the US and NJ health departments. Table 2 lists the major centers, institutes and schools involved in obesity and nutrition research. For the most part, the annual grant award data do not include philanthropy that is received in single or planned giving increments. Thus, the important gifts of \$10 Million each to the Child Health Institute and the Institute for Food, Nutrition & Health are not reflected in this funding table. The extramural funding data also do not include unfunded and internally funded bench, translational and community based research as well as epidemiological and survey research conducted in RBHS schools such as SHRP, SPH, and others, and Rutgers New Brunswick schools including SW, SEBS, and Blaustein. These studies are supported by academic and training programs at Rutgers outlined in Table 4.

Table 1. Summary of Funding in Obesity, Nutrition or Diabetes at Rutgers

Research Area	No. of Awards	Annual Funding
Obesity	40	\$11,634,000
Nutrition	48	\$19,411,000
Obesity &/or Nutrition	61	\$23,049,000
Diabetes	36	\$14,366,000
Cancers with Obesity &/or Nutrition	20	\$5,980,000
Cardiometabolic Diseases with Obesity &/or Nutrition	13	\$4,017,000
TOTAL OF ALL GRANTS	82	\$33,191,000

Grant funding was derived from NIH Reporter using the indicated search terms and taking only the most recent award year (FY13 or FY14) to avoid duplicates of the same grant. Supplements to existing grants were also eliminated from the award count. Grants from other agencies and foundations were obtained by querying the PIs using information from workgroup members and a list provide by Neil Grant. There is extensive overlap between research areas, so the award count funding totals are not the sum of the individual areas. Also presented are grants that meet multiple criteria (eg. obesity and/or nutrition, cancer with obesity or nutrition).

Table 2. Rutgers Centers, Institutes and Departments with Obesity, Nutrition and Diabetes Research

Centers & Institutes	Schools & Departments
• Child Health Institute of New Jersey	• NJMS Basic Science Departments
• Cancer Institute of New Jersey	• RWJMS Basic Science Departments
• Institute for Nutrition Interventions (INI) in SHRP	• SHRP Department of Nutritional Sciences & Institute for Nutrition Interventions
• Institute for Food Nutrition and Health (IFNH)	• RWJMS Department of Family Medicine
• NJ Public Health Research Institute	• NJMS Departments of Medicine, Orthopedics and Ophthalmology
• NJMS Cardiovascular Research Institute	• School of Public Health
• Institute for Health, Health care Policy and Aging Research	• SAS Division of Life Sciences
• Rutgers University Cell and DNA Repository (RUCDR)	• School of Environmental and Biological Sciences

• School of Pharmacy Cancer Prevention Research Center	• RSDM Departments of Periodontics and Diagnostic Sciences
• Environmental and Occupational Health Sciences Institute	• School of Social Work

Publications on Obesity, Nutrition, Diabetes and related diseases by Rutgers Faculty

Our scholarly strengths in obesity and nutrition with related foci in cancers and diabetes are evident in almost 600 discrete publications with many in high impact factor journals. These publication data were assembled from literature searches on 40 specific faculty members identified as being active in research in the relevant areas, together with a similar search of the PIVOT database. Care was taken to eliminate duplication of publications involving two or more Rutgers faculty members. High impact factor journals represented in Table 3 include the *American Journal of Clinical Nutrition*, *American Journal of Physiology*, *Annals of Oncology*, *Annual Review of Nutrition*, *Appetite*, *British Journal of Cancer*, *BMC Cancer*, *Ca Cancer Journal for Clinicians*, *Cancer*, *Cancer Epidemiology Biomarkers and Prevention*, *Cancer Prevention Research*, *Cell Calcium*, *Cell Metabolism*, *Critical Care Medicine*, *Diabetes*, *Endocrinology*, *International Journal of Obesity*, *Human Molecular Genetics*, *Journal of Bone Mineral Research*, *Journal of the Academy of Nutrition and Dietetics*, *Journal of Clinical Endocrinology and Metabolism*, *Journal of Clinical Investigation*, *Journal of Nutrition*, *Journal of the National Cancer Institute*, *Journal of Lipid Research*, *JAMA*, *JAMA-Pediatrics*, *Kidney International*, *Lancet*, *Nature*, *Nature Genetics*, *Obesity*.

Table 3. Summary of Topic Area Related Publications by Rutgers Faculty for Last 5 Years

Topic Area	Total
Obesity	83
Nutrition	288
Diabetes with Obesity &/or Nutrition	34
Cancers with Obesity &/or Nutrition	152
TOTAL PUBLICATIONS	568

Duplicates due to the involvement of multiple Rutgers authors have been eliminated from the above table of publications. It should also be noted that we have likely undercounted substantially, because the search was based on specific authors with known interests in the obesity/nutrition field, and self-reported publications from workgroup members and their associates.

Education and Professional Training Programs Related to Obesity, Nutrition, Diabetes and related diseases

Rutgers has robust and diverse educational programs in nutrition and obesity-related health that train researchers and practitioners, as well as serving as a resource and vehicle for research studies. Undergraduate programs prepare students for entry into food, nutrition and dietetics careers. Post-baccalaureate, certificate and graduate degree programs provide training for credentialing exams and advanced practice as well as research within the state and around the world through innovative traditional and distance learning programs that integrate an interprofessional approach. The advanced education and training programs support a sustainable consortium via the entrance of new talent mentored by dedicated faculty within the consortium.

Table 4. Education and Training Programs related to Nutrition

School	Bachelor's Degrees	Training	Masters Degrees	Doctoral Degrees
NJMS RWJMS RSDM		• Residencies/Fellowships in Endocrinology, Cardiology, Preventive Medicine		• MD coursework in Nutrition & Preventive Medicine. • DMD coursework & competencies in nutrition
SHRP	• BS in Nutrition & Dietetics-Coordinated Program	• PostBac Dietetic Internship. • Advanced Practice Clinical Nutrition Residency • Accredited CPE provider for RDs and DTRs	• MS in Clinical Nutrition (thesis required) for RDs only.	• Doctorate of Clinical Nutrition for RDs only. • PhD in Health Sciences Nutrition Track for RDs.
SPH			• MPH in Nutrition	

			Collateral with SHRP	
SEBS	<ul style="list-style-type: none"> • BS in Nutritional Sciences (dietetics, nutrition, food service admin, food & business, community nutrition). • BS in Food Science (research, management, general food science) 	<ul style="list-style-type: none"> • Certificate in Child Nutrition 	<ul style="list-style-type: none"> • MS in Nutritional Sciences, Food Science or Endocrinology and Animal Biosciences • MBS in Food Science 	<ul style="list-style-type: none"> • PhD in Nutritional Sciences • PhD in Food Science or • Endocrinology & Animal Biosciences

The following are highlights from an extensive SWOT analysis carried out by the workgroups:

Strengths

- NIH funding of over \$20 Million for studies related to obesity, nutrition, diabetes and related diseases
- Basic science and translational research in obesity and nutrition as related to diabetes, cancer and associated comorbid conditions
- Cancer chemoprevention, diet, body size and composition and cancer risk (ovarian, breast, endometrial), cancer disparities in relation to nutritional risk and breast and ovarian cancer with
 - Over \$2 million in community based research in obesity and breast and ovarian cancer in African Americans
 - Impact of family structure on child food insecurity and obesity and family research
- Diabetes and metabolic disorders studies in bench and community-based research
- Tissue banking particularly in cancer and diabetes; metabolomics
- Expertise in health promotion, obesity and cardiometabolic disease prevention research at all levels of the social ecological framework (individuals, community, systems) with over \$6 million in community based research to assess environmental determinants of childhood obesity and prevent childhood and adult obesity through healthy lifestyles, diet, behavior change, and physical activity practices
- Core roles of obesity and nutrition in relation to several clinical disciplines including endocrinology, hepatology, cardiology, nephrology, oncology, dentistry, wellness and orthopedics upon which to build an integrated network of obesity and nutrition medical services
- Methodological expertise in translational research from bench to clinical trials, community-based participatory research, longitudinal studies
- One-stop shopping model for all levels of nutrition, dietetics and food science education as well as post-professional and credentialing through unique training programs that are recognized nationally and internationally for their quality
- Pool of economically and ethnically diverse populations across the lifespan
- Worksite wellness data demonstrating significant improvements in cardiometabolic and quality of life outcomes
- Mechanisms and opportunities for collaborative research and dissemination through schools, institutes, and departments within Rutgers, as well as external to state, national and international agencies

In order to become “best in the nation” existing critical gaps must be addressed. Our strengths in diverse populations across the state combined with the spectrum of bench, clinical, and public health researchers provide the infrastructure upon which to build a nationally recognized RONC with a strong research portfolio if we can effectively address these key issues:

- Infrastructure, processes for pre and post award administration and faculty drivers to progress collaborative and interprofessional nutrition and obesity research, clinical practice and training
- Breadth of interaction and collaboration in obesity and nutrition, cancer and cardiometabolic disease research from primary to tertiary prevention, intervention and survivorship
- Clinical trials research particularly in chemoprevention and personalized medicine for obesity, nutrition and cancers
- Relative lack of and need for clinician scientists in the face of rich opportunities
- Absence of an interprofessional clinical program in obesity that could unite physicians and other health professionals and generate referrals
- Unified approach to internal collaboration to build strength in an increasingly competitive external federal grant funds environment in place of the existing silo’ist approach
- Faculty time and monies for seed research

Potential opportunities for collaboration across Rutgers in obesity and nutrition exist in basic and translational research, education and training, and clinical practice. Through the creation of a *Rutgers Obesity and Nutrition Consortium (RONC)* we propose an integrated research platform, a center for clinical excellence, and education and training across the health professions in obesity and nutrition. This will focus on translational obesity and nutrition research in cancer, diabetes and cardiometabolic diseases. Our opportunities, recommendations and goals are complementary to several of those posed by the Clinical Research and Cancer groups, and thus offer opportunities to join forces in 'like' initiatives to build internal collaboration to enable strong competition externally. Beyond RBHS we are aware of proposals submitted to the Rutgers New Brunswick Strategic Planning process including one for *Rutgers One Nutrition Initiative*; our intent is for RONC to have a collegial and collaborative approach with any of the signature areas of RBHS or Rutgers New Brunswick's chosen initiatives that have similar missions and goals.

Opportunities for Collaboration

- Establish a Rutgers Obesity Nutrition Consortium (RONC) to include multidisciplinary research, an interprofessional clinical program generating patient traffic for medical and surgical specialties as well as health promotion and wellness approaches
- Use RONC to leverage strengths and resources of the health and non-health professions in research, practice and training
- Within RONC create linkages with existing centers and institutes including the Child Health Institute, Institute for Nutrition Interventions and the Institute for Food, Nutrition & Health and their grants infrastructure (Table 2)
- Potential to create research 'incubators' for translational and innovative research from bench-to bedside-to-borough, leading to policy changes in cancer chemoprevention, diabetes from primary to tertiary prevention, healthy lifestyles, family and adult weight management, obesity and nutrition community-based research and initiatives for food insecurity, and reducing health disparities
- Creation of a transformative, translational research program that can over time translate outcomes into robust interprofessional practice initiatives in an economic and ethnically diverse state
- Pursuit of interdisciplinary/interprofessional funding to address clinical dilemma/questions via community based research for underrepresented minorities across the state – CER, PCORI
- Expansion of existing nutrition and obesity training, education and research programs across the professionals from entry to specialist, advanced and continuing education
- Leveraging research that generates knowledge of the contributions of social, economic and physical environmental factors to childhood obesity to develop new models for prevention and intervention and affect policy on the local and state levels in obesity, nutrition and food
- Ability to compete for grants in areas unique to obesity and nutrition such as USDA and the food and nutrition industries