

A Mixed Methods Community Based
Participatory Research Study to Expand
Intercultural Understanding of the Long-term
Detrimental Effects of Childhood Obesity

Teresa Sharp, Ph.D.
University of Colorado Denver

Liz Gilbert, Ed.D.
University of Northern Colorado
Colorado School of Public Health

Community-Based Participatory Research

- **Definition** – methodology that utilizes the expertise of the people most impacted by the health
- **Benefits**
 - Utilizes the expertise of the people most impacted by the health disparities
 - Produces intervention strategies that more specifically address the needs of this community
 - Empowers the community by providing them data and resources to which they might not otherwise have access.

History of the Study

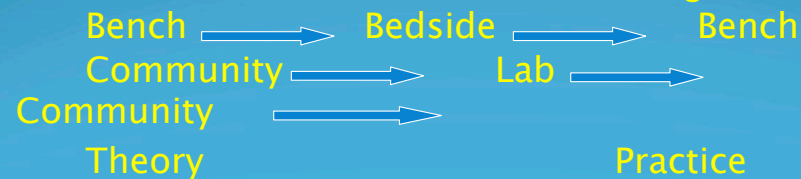
- UNM Gallup faculty position in Community Health Education since 1997
- Bringing students from Vanderbilt University to the Gallup area since 1999 for Academic/Cultural Exchange projects with UNM Gallup students
- Interest to expand work to a field school experience

History of the Study, cont.

- Involvement of University of Northern Colorado, Colorado School of Public Health and University of Colorado Denver
- Brought together the clinical work of UC Denver and community/social determinant work of UNC to develop a mixed-methods study in partnership with the community of Gallup

Translational Research:

- This work is being funded by a Community and Academic Partnership Pilot Grant from the Colorado Clinical Translational Research Institute (CCTSI) and funds from Peabody College of Vanderbilt University
- Funding that was received is shared by Academic and Community Partners to complete the proposed work
- CCTSI receives funding from NIH
- Intent of the CCTSI is to move knowledge from:



Bench = lab;

bedside = better care and information for those in the hospital or needing care

Quantitative Components

Clinical Vocabulary

- ASCVD – Atherosclerotic cardiovascular disease
- Sub-clinical CHD – risk indicators of coronary heart disease are present, but not yet manifest in an event
- Endothelial dysfunction – inability of the internal lining of the blood vessels to dilate/ constrict normally

Clinical Vocabulary, cont.

- FMD – flow-mediated vasodilation; indication of vascular reactivity; faster and greater = healthier
- CIMT – carotid intima media thickness; indication of vascular burden; thinner = healthier
- Lipids – Circulating “blood fats” such as cholesterol, triglycerides, free-fatty acids
- Type 2 diabetes – chronic disease related to the body’s inability to properly utilize insulin for fuel metabolism processes

Clinical Vocabulary, cont.

- Insulin resistance – reduced sensitivity to insulin for fuel and metabolism processes; associated with vascular inflammation, oxidative stress, and obesity
- Inflammation and oxidative stress – related to aberrant processes that negatively affect the vasculature
- (Children) Obesity $\geq 95\%$ BMI, Lean: $\leq 85\%$ BMI, at risk for overweight: 85–95% BMI

Background of the Study

- Elevated fasting lipids exist in obese adults
- Elevated circulating lipids are associated with reduced flow-mediated vascular dilation
- Endothelial dysfunction is associated with increased development of fibrous plaque
- Aberrant vascular reactivity is associated with CVD development
- Is this happening in young children???

Intent of the Quantitative Work

To compare baseline flow-mediated vasodilation, carotid intima media thickness, circulating levels of biomarkers of inflammation and oxidative stress and the blood lipid profile in obese and lean pre- and early-pubertal children after an overnight fast.

Anticipated findings

- A) Under overnight fasted conditions, CIMT will be greater, and FMD will be lower in obese than in lean children.
- B) Circulating markers of inflammation (CRP, IL-6, TNF- α ,) and oxidative stress (ox-LDL) will be higher in obese than lean children, and the blood lipid profile will be more atherogenic (higher TG and LDL-cholesterol, lower HDL cholesterol, higher Apolipoprotein B) in the obese vs lean
- C) The conditions listed above will be worse in Native American and Hispanic than in Caucasian children.

Subjects and Methods

- Lean and Obese, boys and girls, 8–13 yrs
- Pre- and early-pubertal
- n=24
- Caucasian, Native American, Latino/Hispanic
- Lean = \leq 85 %ile of BMI for age and sex
- Obese = \geq 95 %ile of BMI for age and sex, 140–190% of ideal body weight (moderately obese)

Methods, cont.

- **Physical assessments:**
 - History and Physical Exam
 - Blood sampling for assessment of inflammatory and oxidative stress markers and lipids
 - OGTT—to determine level of insulin resistance
 - Body composition by skinfolds
 - Circumference measures for body fat distribution
 - Dietary intake by 24 hour recall
 - Physical activity by 24 hour recall
 - **Endothelial health and burden**
 - assessed by vascular ultrasound
 - FMD; measure of response to occlusion of brachial artery
 - CIMT; evaluation of presence of increased thickening of carotid artery

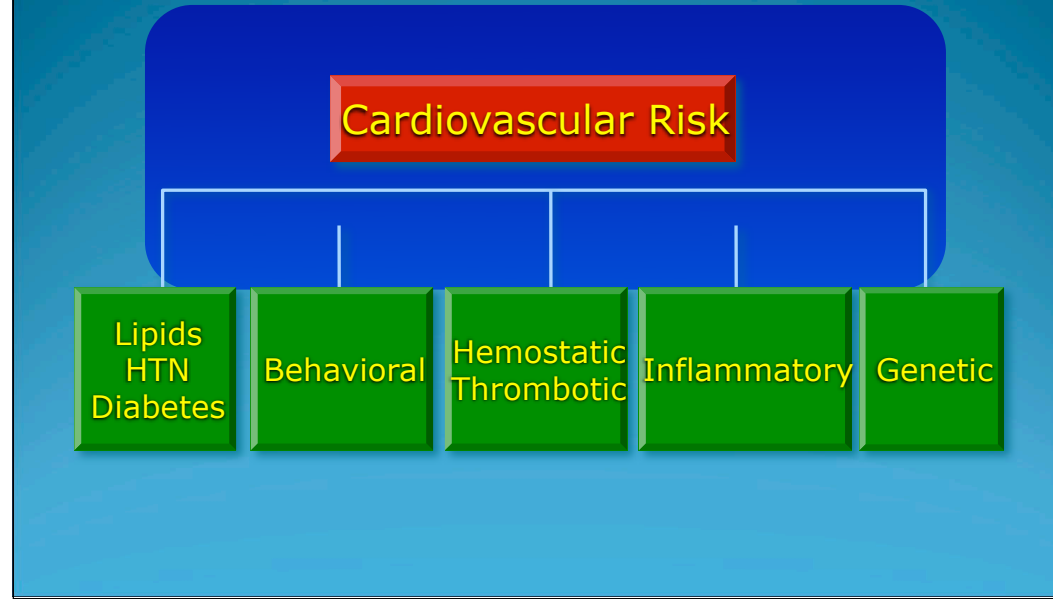
Primary Physical Outcome Measures:

- Carotid Intima Media Thickness (CIMT),
- Endothelial vasodilation assessed by FMD.
- Concentrations of CRP, TNF- α , IL-6, and ox-LDL after an overnight fast,
- Total TG, cholesterol, glucose, insulin, ApoB, insulin sensitivity by OGTT, free-fatty acids, adiponectin.

Secondary Physical Outcome Measures:

- We will determine if fasting blood measures are associated with endothelial dysfunction in lean and obese, pre- and early-pubertal children.
- Determine if habitual dietary intake and physical activity are associated with circulating lipids and endothelial function.

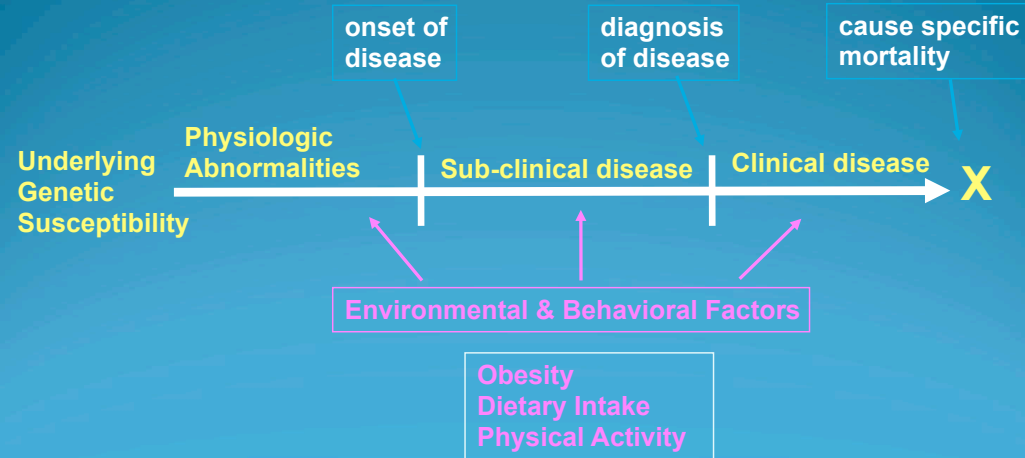
Beyond Cholesterol: Predicting Cardiovascular Risk In the 21st

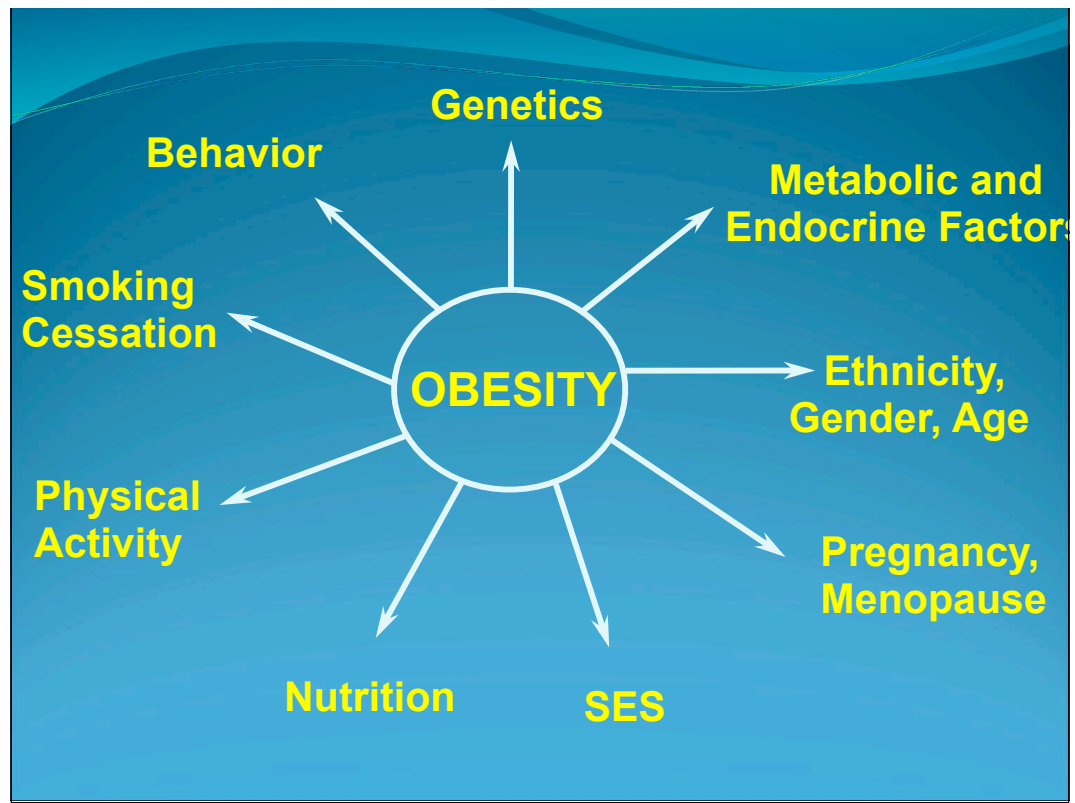


Beyond cholesterol: predicting cardiovascular risk in the 21st century

As we understand more about the biology of atherothrombosis, we need to move beyond standard cholesterol screening if we are to appreciate the promise of preventive early intervention therapies. While hyperlipidemia, hypertension, and diabetes, as well as the behavioral risk factors of smoking and diet, remain major critical modifiable risk factors for vascular disease, we have learned over the years that many hemostatic and thrombotic markers such as lipoprotein(a), D-dimer, and homocysteine, inflammatory markers such as C-reactive protein (CRP), fibrinogen, and interleukin-6, and genetic markers are all part of the evolving understanding of cardiovascular risk.

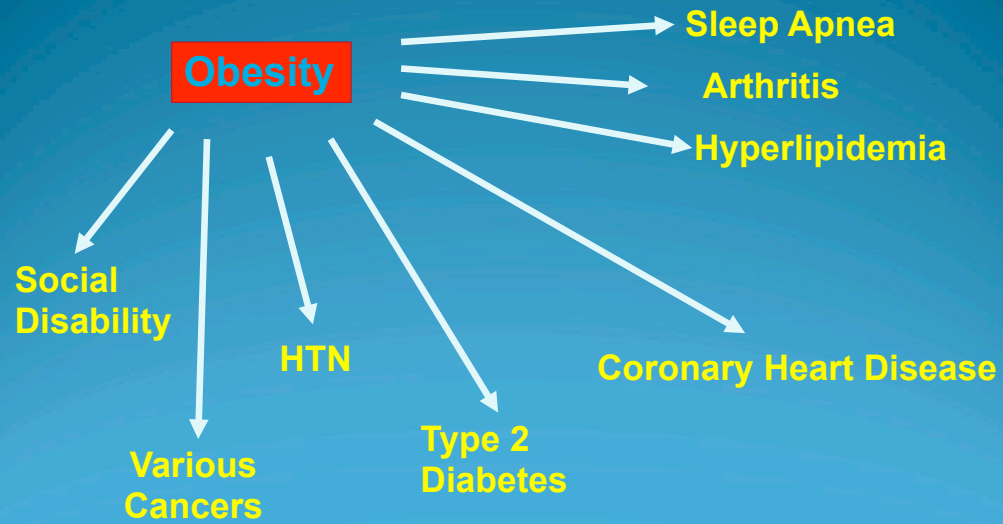
The Natural History of Disease





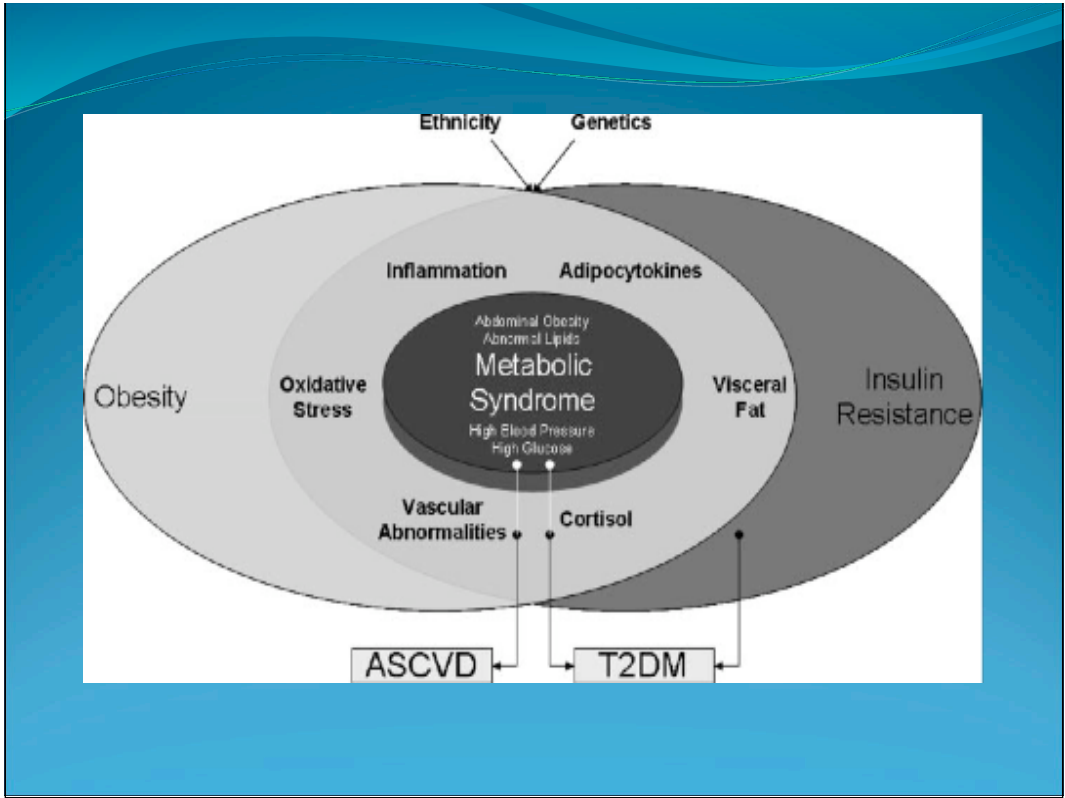
Obesity is multifactorial, and has been associated with all of these factors, not all of which are mutually exclusive.

Obesity and Related Diseases

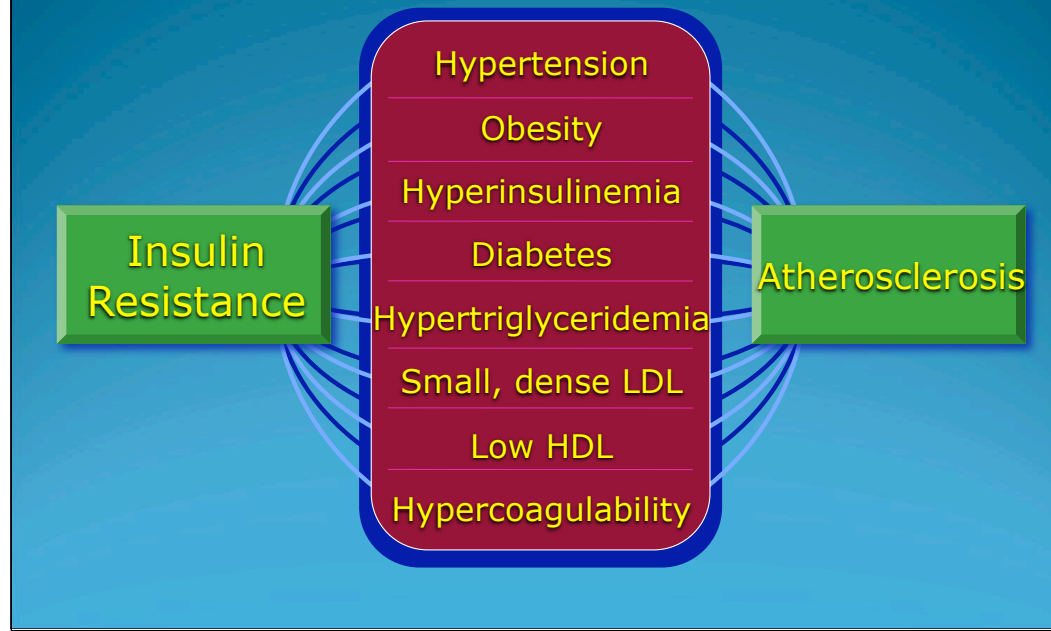


Economic Costs of Obesity:

- Americans spend about 9% of total medical costs on obesity-related illnesses
- Severely obese individuals spend more on health care than current smokers
- Direct cost of treating obesity related diseases: **\$61 Billion**
- Indirect cost (ie., missed work days, future earning losses) of treating obesity related diseases: **\$56 Billion** per year
- Rising disability claims: fastest growing cause of disability is Type 2 diabetes (Direct cost~\$116 Billion, Indirect cost ~\$58 Billion)



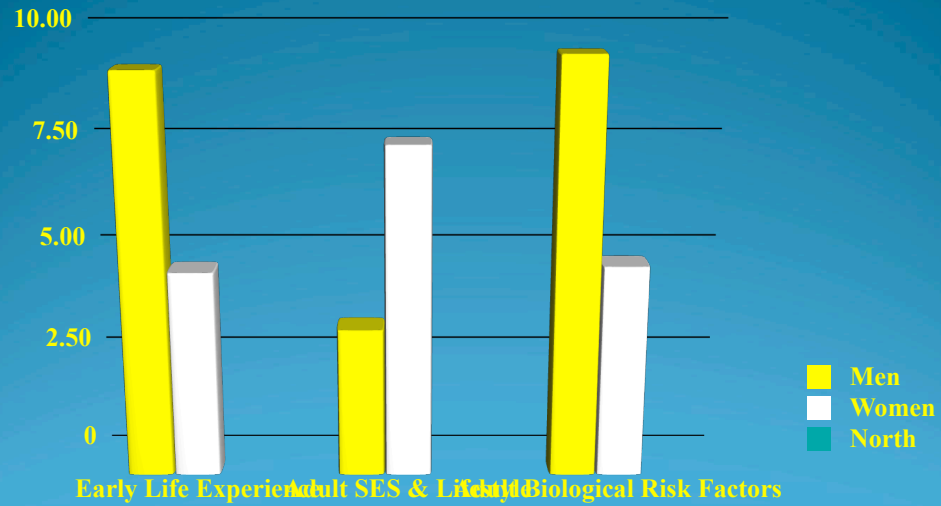
Interrelation Between Atherosclerosis and Insulin Resistance



Interrelation Between Atherosclerosis and Insulin Resistance

Insulin resistance is associated with a panoply of abnormalities, including hypertension, hyperinsulinemia, hypertriglyceridemia with small, dense low-density lipoprotein (LDL) and low high-density lipoprotein (HDL), and hypercoagulability. Of course, insulin resistance is a major risk factor for the development of diabetes. Obesity plays a role both in exacerbating insulin resistance and as an independent risk factor for atherosclerosis. Therefore, any patient with insulin resistance has numerous reasons to be at very high risk for atherosclerosis.

Predictors of Sub-clinical CHD (assessed by CIMT)



Lamont *et al.* BMJ, 2000

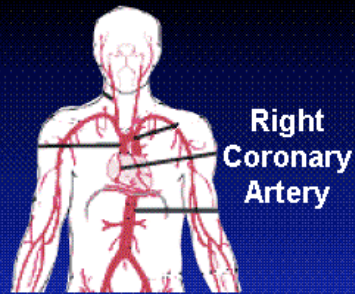
Impacts of Pediatric Obesity

- In epidemic proportions in many countries
- In the US, the obesity rate is more than four times higher among children ages 6 to 11 than it was a generation ago.
- Associated with health outcomes; mental/emotional, orthopedic, psychosocial, physical disability and chronic diseases
- Associated with the development of CVD risk factors; type 2 diabetes, HTN, dyslipidemia and metabolic syndrome
- Associated with increased risk of CVD in adulthood
- Early onset obesity and CV risk factors track into adulthood and further increase the risk of adult CVD

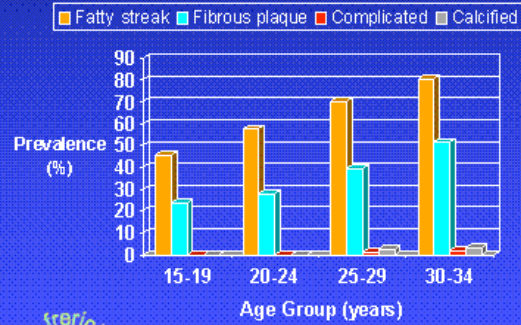
Jolliffe CJ. Vasc Health Risk Mgt 2006; 2: 171-87.

RWJF

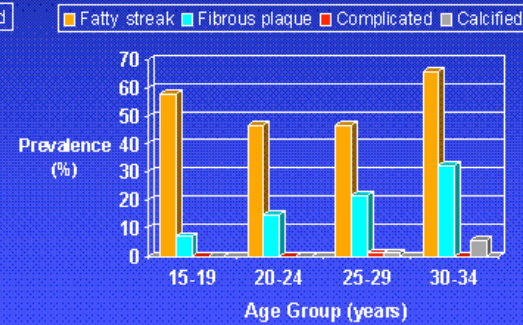
Atherosclerosis in Adolescents and Young Adults (3)



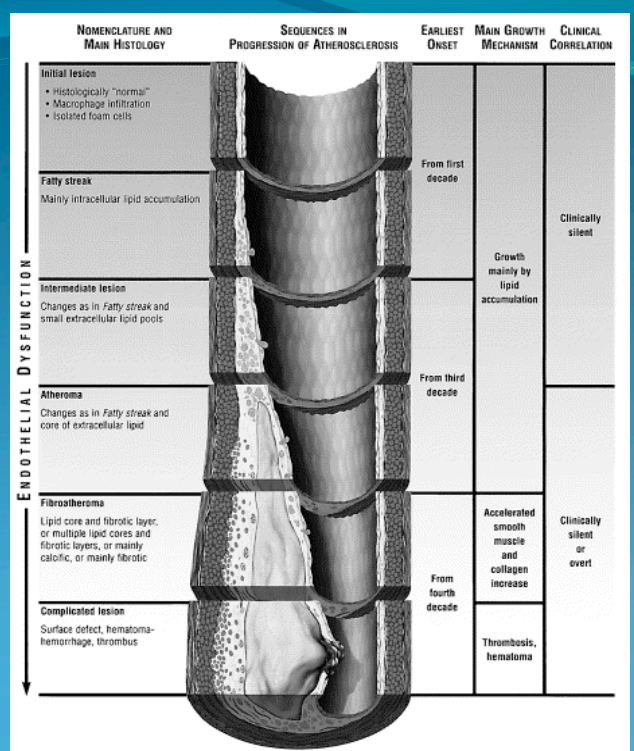
White Males



White Females



Source: Strong JP et al. JAMA 281(8), February 24, 1999



Pepine CJ. Am J Cardiol 1998

Qualitative Components

Intent of the Qualitative Work

To determine the impact of social determinants on the development of pediatric obesity and subsequent chronic disease risk development in a rural environment.

Anticipated findings

- A) Greater lack of access to social resources related to healthy food and physical activity facilities will be positively associated with increased prevalence of pediatric obesity
- B) Greater lack of access will be associated with detrimental health behaviors (ie., reduced physical activity, unhealthy dietary intake, etc)
- C) Children with the greatest lack of access will have more detrimental physical health outcomes compared to children with greater access to social resources

Greater the lack of access the greater the prevalence of pediatric obesity (positive association)

Methods

- Identify key stakeholders in the Gallup community and within each academic institution (UCD, UNC, CSPH & VU)
- Solicit community partner input for identification of effective recruitment strategies (Community Advisory Board)
- Train graduate students and staff to assist in data collection
- Complete community mapping (i.e., Geographical Information System (GIS) and inventory of community resources, i.e. food sources, activity access, health care resources, housing and transportation)
- Complete surveys/focus groups

Community Mapping & Inventory

- City of Gallup has been divided into grids consisting of a small number of city blocks (number of blocks dependent on the density of the area).
- Four teams of two students will complete food and activity inventories of multiple grids each day
- Each grocery store in the city will have a complete inventory conducted
- All of the data from the community mapping will be entered into GIS mapping program

Focus Groups

- Community Advisory Council members are assisting in the recruitment of focus group participants from their respective agencies (WIC, Boys & Girls Clubs, RMCH, the Community Pantry, etc...)
- Focus groups will have 8–10 participants each
- Focus groups will be made up of agency clients and employees
- Focus groups will discuss issues of resource availability and access.

Future Directions

- Funding for long term work/relationship with community
- Work with Advisory Council for direction in program planning and future data collection
- Plan community forum to bring information back to the Gallup community
- Planning and implementing of new programs
- Support for existing programs
- Examination of potential policy change initiatives