

The Jackson Heart Study: Recognizing a Burden, Seizing an Opportunity, Realizing a Vision, Making a Difference in Cardiovascular Health Disparities

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Presented at the Xavier University of Louisiana Conference
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Health Disparities Conference – April 19-21, 2009
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The future health of the nation will be determined to a large extent by how effectively we work with communities to reduce and eliminate health disparities between non-minority and minority populations experiencing disproportionate burdens of disease, disability, and premature death.

-Guiding Principle for Improving Minority Health, Centers for Disease Control and Prevention

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Recognizing the Burden

"... It has been discovered that the health of [African Americans] in [parts] of Mississippi is deteriorating while the health standards for the Nation are improving...."

---Wall Street Journal

"Cardiovascular deaths in Mississippi seem to be rising while they have fallen for the rest of the country."

---Circulation



Recognizing the Burden

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---Wall Street Journal

1969

"Cardiovascular deaths in Mississippi seem to be rising while they have fallen for the rest of the country."

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Recognizing the Burden

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1969

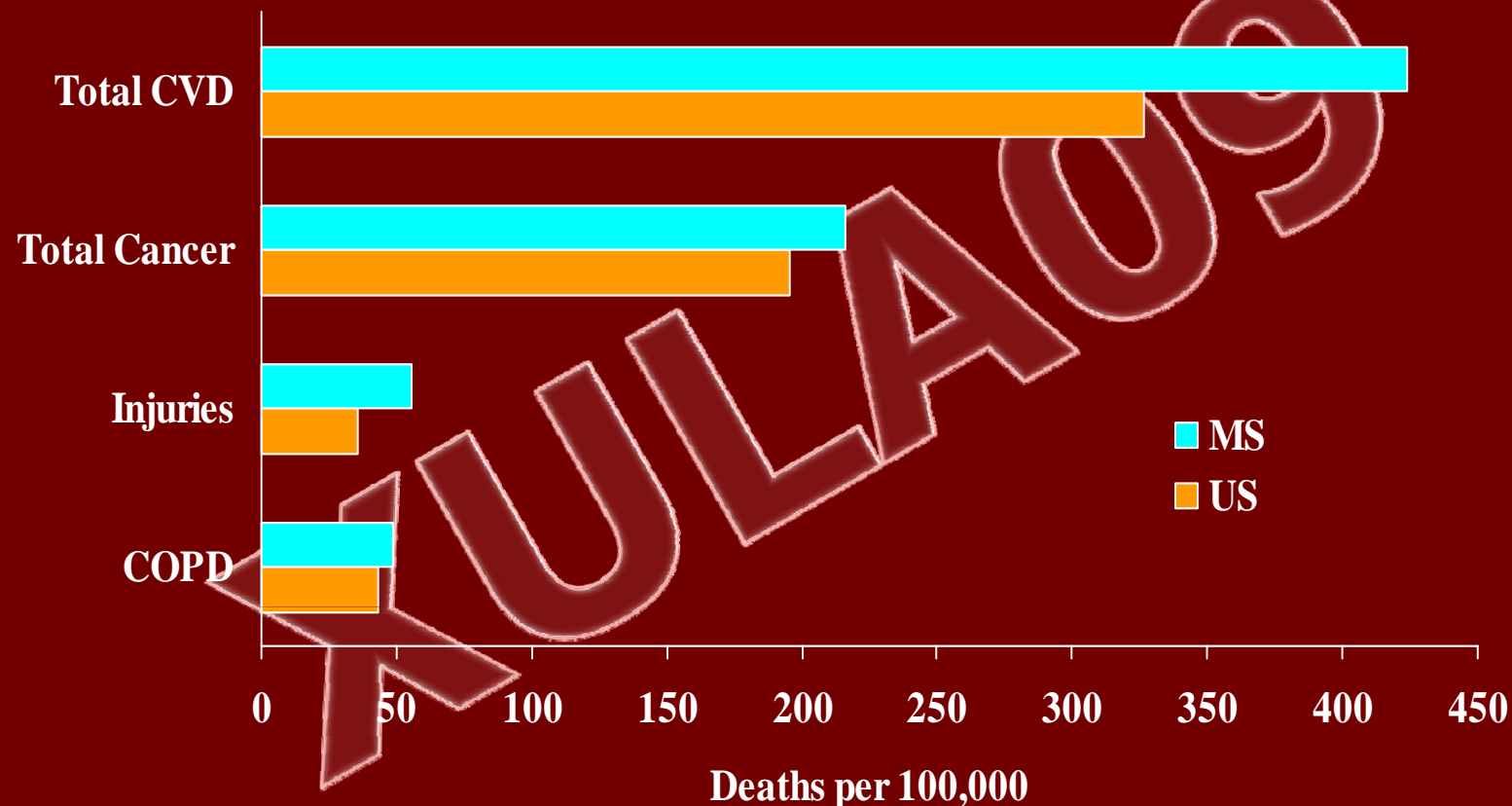
"Cardiovascular deaths in Mississippi seem to be rising while they have fallen for the rest of the country."

---Circulation

2000



Leading Causes Of Death: Mississippi and the US, 2001



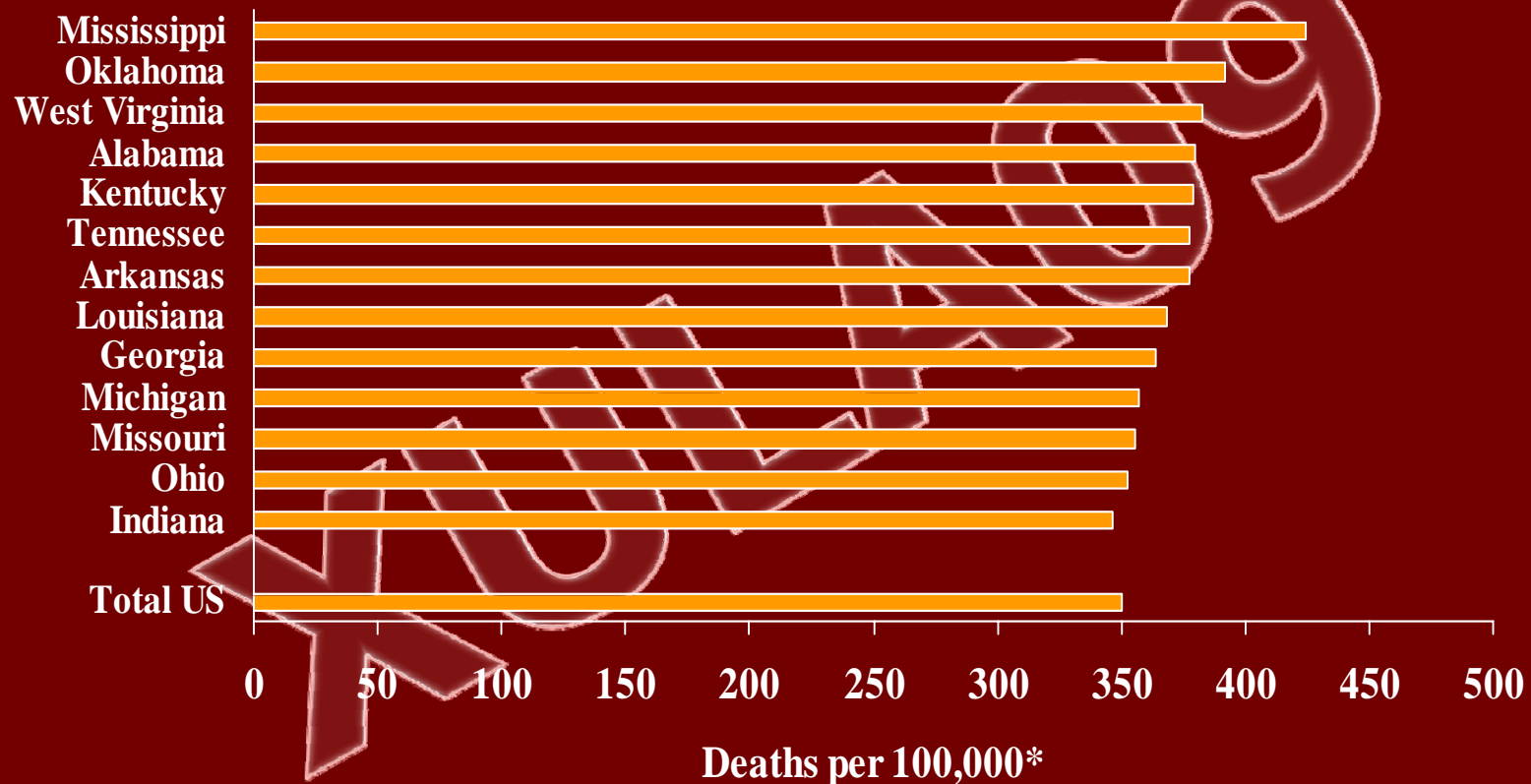
Source: CDC, National Center for Health Statistics.

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Total CVD Death Rates by State and Total US, 2001



*Age-adjusted.

ICD/10 codes I00-I99

Source: CDC, National Center for Health Statistics

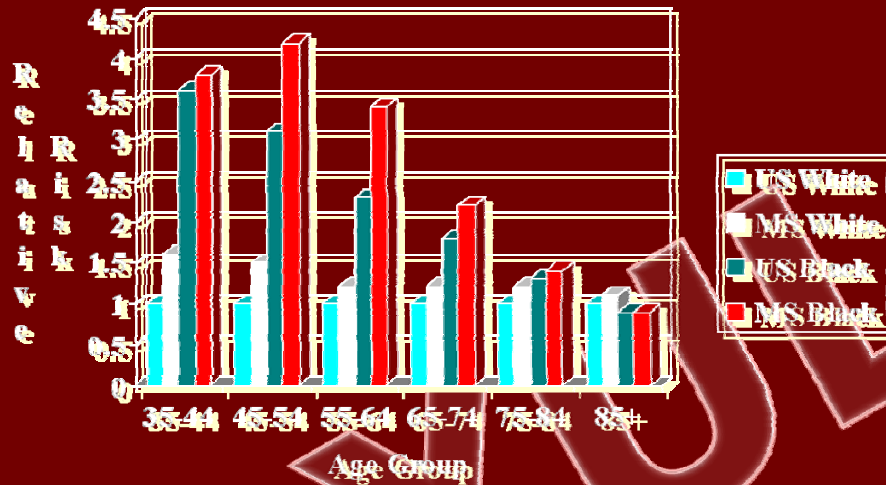
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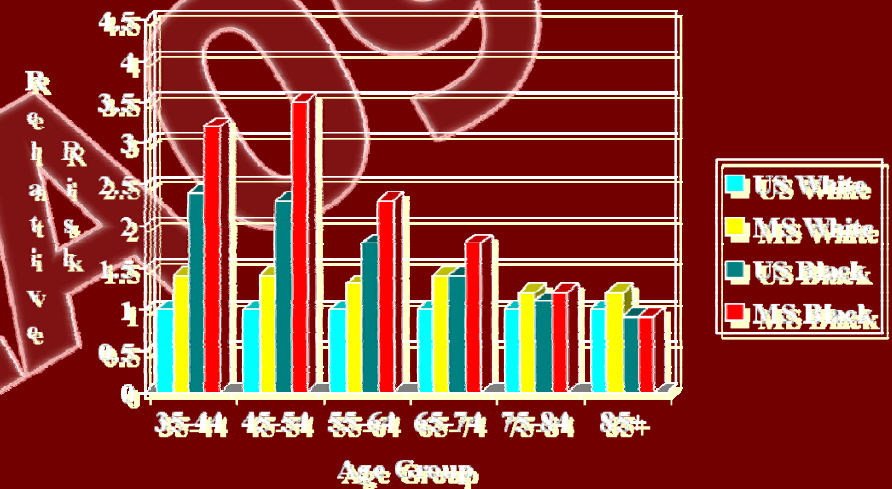


Age-specific Cardiovascular Disease Mortality Rates

FEMALES



MALES

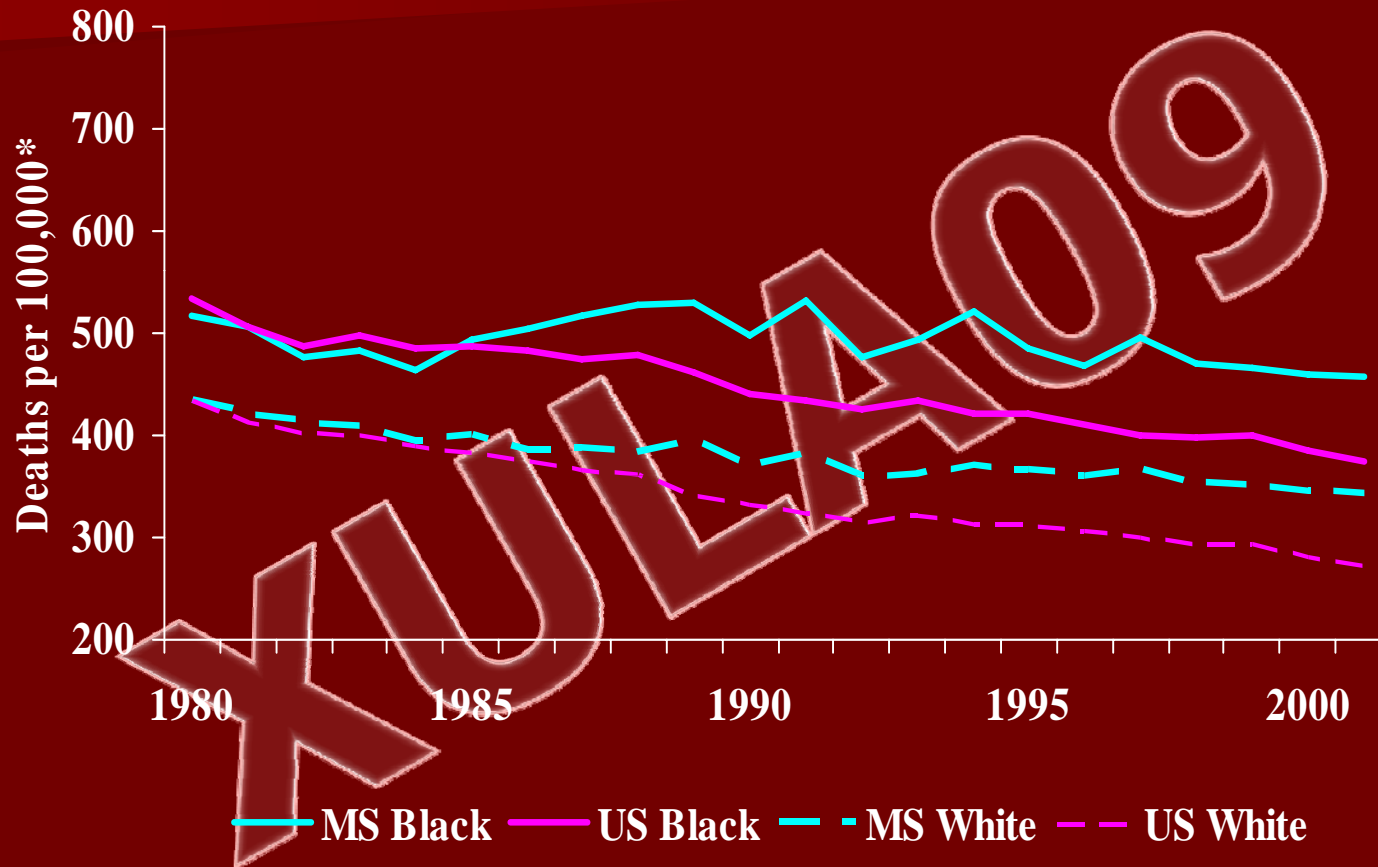


Defined as International Classification of Diseases (9th Edition) Numbers 390-459.

Source: Centers for Disease Control and Prevention (CDC) Wonder Internet Web site <http://wonder.cdc.gov>



CVD Death Rates For Women by Race: Mississippi and the US, 1980-2001

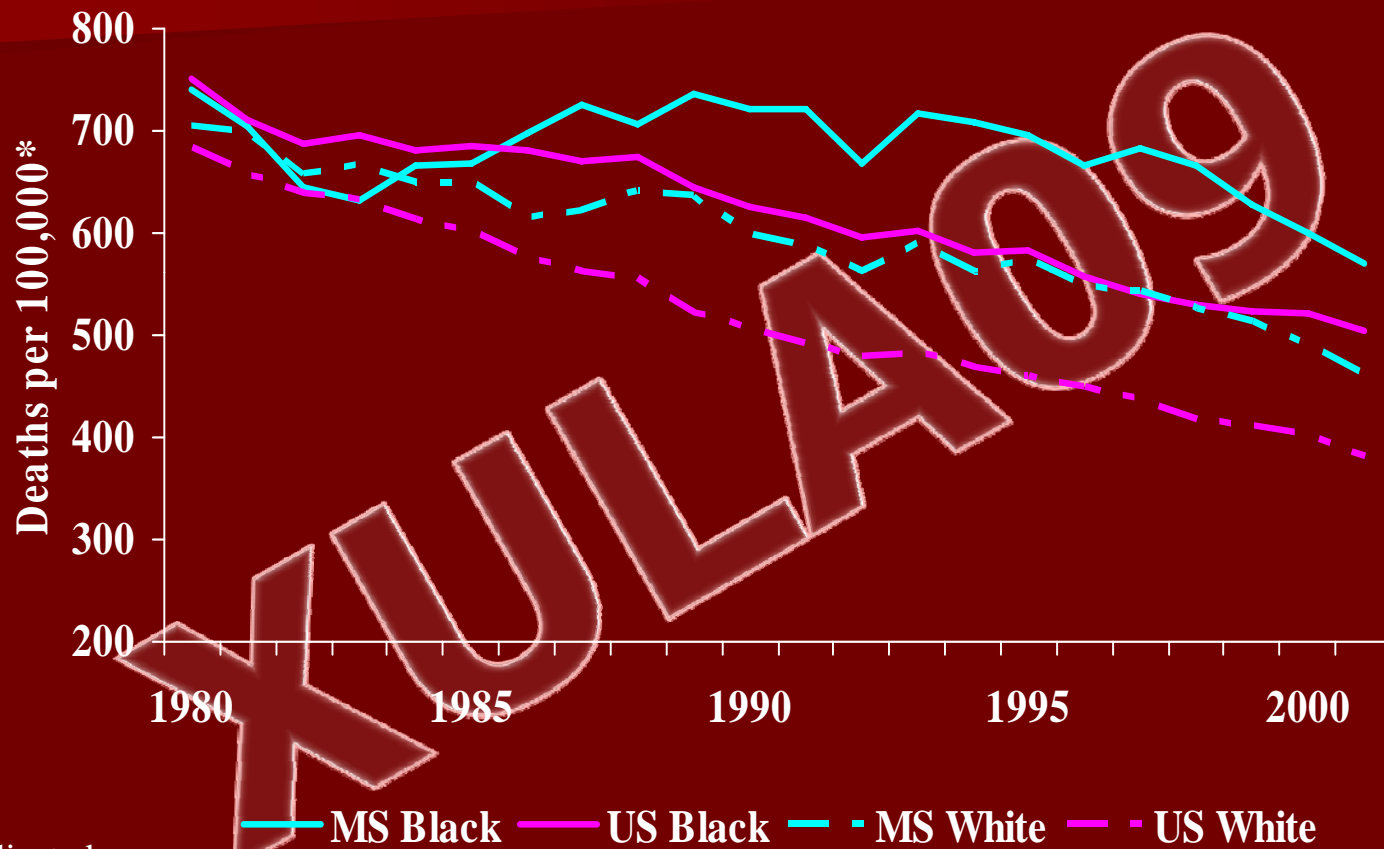


*Age-adjusted.
ICD/9 codes 390-459.
ICD/10 codes I00-I99

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Source: CDC, National Center for Health Statistics



CVD Death Rates For Men By Race: Mississippi and the US, 1980-2001



*Age-adjusted.

ICD/9 codes 390-459.

ICD/10 codes I00-I99.

Source: CDC, National Center for Health Statistics.

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The CVD Burden: Just the Facts

- CHD was reported to be less common in BM than WM until mid 1980's leading to the misconception of less CVD in BM
- Total CVD mortality has been higher in blacks than whites for many years
- The problem of excess CVD in blacks is worsening
- Mississippi: #1 all sex-race groups



Seizing the Opportunity

■ NHLBI response

- Capitalize on the existing Atherosclerosis Risk in Communities (ARIC) Study by expanding the all-African American cohort in the Jackson MS site
- Include two historically Black educational institutions in the planning and implementation
- Utilize the expertise of a majority academic medical institution with a long-standing history of clinical research
- Bring the study to the community, via the newly renovated Jackson Medical Mall in the heart of inner-city Jackson



Carpe Diem

- Special Emphasis Panel in early 1990's determined to establish a single-site study of CVD in African Americans in Jackson
- Partnerships were developed between the NHLBI, NCMHD, Jackson State University, Tougaloo College, and the University of Mississippi Medical Center
- Planning Phase: 1996-1997
- Feasibility Phase: 1998-1999
 - Participant Recruitment Study was conducted
 - NHLBI Field Site was located in Jackson
- Implementation Phase:
 - Exam 1: September 2000- March 2004
 - Interim Clinic Exam: August 2004- September 2005
 - Exam 2: October 2005- December 2008
 - Exam 3: February 2009- May 2013



Academic Partner Roles

- Jackson State University
 - Coordinating Center
 - Community Outreach and Mobilization
 - Data Management
- University of Mississippi Medical Center
 - Examination Center
 - Recruit and retain cohort
 - Conduct examinations, annual follow up, and cohort surveillance
- Tougaloo College
 - Undergraduate Training Center
 - JHS Scholars
 - High School SLAM Program
 - Postgraduate Epidemiology Summer Program



Capturing the Vision

- Identify risk factors for development and progression of CVD in African-Americans, with emphasis on manifestations related to high blood pressure
- Increase minority participation in epidemiological research
 - Build research capabilities in minority institutions
 - Enhance participation of minority investigators
- Attract and prepare minority students for careers in public health and epidemiology
- Promote CVD awareness in Jackson community and provide education on heart disease prevention and health maintenance



Identifying Risk Factors: Data Collection - Interviews

■ Medical History

- Personal Health History
- Family History of CHD
- Reproductive History
- Respiratory Symptoms
- TIA/Stroke
- Sleep Quantity/Quality
- CHD Events/Procedures
- Medication Survey

■ Health Behaviors

- Vitamin Survey
- Home/Alternative Remedies
- Dietary Intake
- Smoking
- Alcohol
- Physical Activity

■ Sociocultural

- Socioeconomic Status
- Racism and Discrimination
- Depression
- Anger
- Hostility
- Stress
- Coping
- Social Support
- Religion and Religious Coping
- Optimism
- John Henryism
- Job Strain
- Geocoding for Contextual Context



Identifying Risk Factors: Data Collection - Examinations

■ ANTHROPOMETRY

- Height/weight
- Waist / neck
- Bioimpedance

■ BLOOD PRESSURE

- Sitting
- ABI
- 24-hr Ambulatory
- Self-monitored

■ ECHOCARDIOGRAPHY

■ ELECTROCARDIOGRAPHY

■ ULTRASOUND, B-MODE

- Carotid Arteries

■ CT CHEST/ABDOMEN

- Coronary Calcium
- Abdominal Fat

■ MRI HEART

■ PHYSICAL ACTIVITY

- Step Counts
- Actigraphy

■ PULMONARY FUNCTION

- FEV1
- FVC

■ URINE COLLECTION

- 24-hour
- Spot

■ VENIPUNCTURE

- Chemistries
- Hematology, Clotting/Fibrinolysis
- Iron/Iron Storage
- Inflammation/Endothelial Function
- Endocrine Hormones
- Vitamins/Amino Acids
- Lipids

■ GENETICS

- Cryopreservation of DNA
- GWAS (Family Sample)



Identifying Risk Factors: Data Analyses – Disseminating Findings

- Methods
 - Study Design
 - Psychometrics
- CVD Risk Factors
- Subclinical Disease
- Health Behaviors
- Sociocultural
- Genetics



Study Methods

- Ethnicity and Disease, 15(Suppl 6), 2005
 - Introduction –
 - Taylor, 15(6):S6-1-S6-3
 - Overall –
 - Taylor, Wilson, Jones et al., 15(6):S6-4-S6-17.
 - Recruitment –
 - Fuqua, Wyatt, Andrew et al., 15(6): S6-18-S6-29
 - Genetics –
 - Wilson, Rotimi, Ekunwe et al., 15(6):S6-30-S6-37
 - Sociocultural-
 - Payne, Wyatt, Mosley et al. 15(6):S6-38-S6-48
 - Diet –
 - Carithers, Dubbert, Crook et al., 15(6):S6-49-S6-55
 - Physical Activity –
 - Dubbert, Carithers, Ainsworth et al., 25(6):S6-56-S6-61
 - Events Ascertainment –
 - Keku, Rosamond, Taylor et al., 15(6): S6-62-S6-70
 - UTC –
 - Srinivasan, Brown, Fahmy et al., 15(6):S6-71-S6-75
- American Journal of Medical Sciences, 328, 2005
 - Lab, Reading Centers, and Coordinating Center –
 - Carpenter, Crow, Steffes et al., 328:131-144



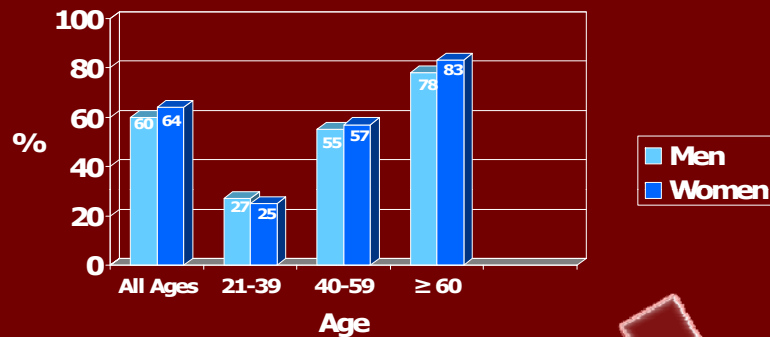
Psychometrics

- Diet
 - Delta NIRI short and long forms
 - Carithers, et al. JADA, 2009, In press, July
 - Antioxidant performance measures
 - Talegawkar, Johnson, Carithers et al., Pub Health Nut, 2007;
- Physical Activity
 - Smitherman, Dubbert, Grothe et al., J Phys Act Health, 2009; in press
- Coping Strategies Inventory
 - Addison, Jenkins, Sarpong et al., Int J Environ Res Public Health, 2007; 4:289-95
- Discrimination
 - Sims, Wyatt, Gutierrez, et al., Ethn Dis, 2009; 19:56-64
- Religion and Spirituality
 - Loustalot, Wyatt, Sims et al., J Rel & Health, 2009; in press

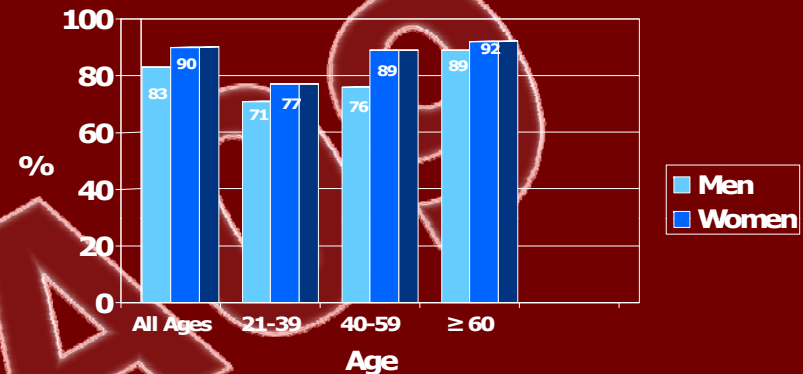


CVD Risk Factors: Hypertension

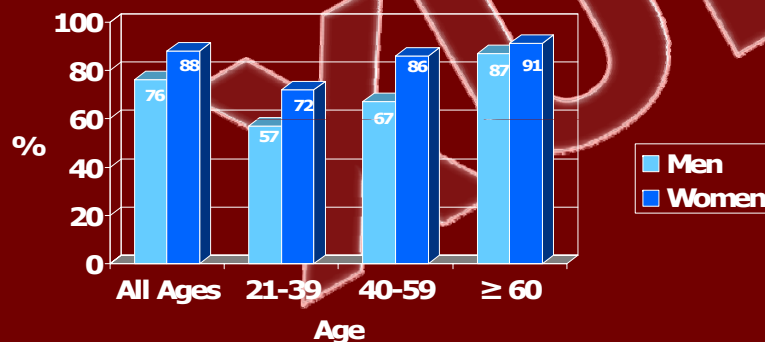
Overall HTN Prevalence = 62.6%



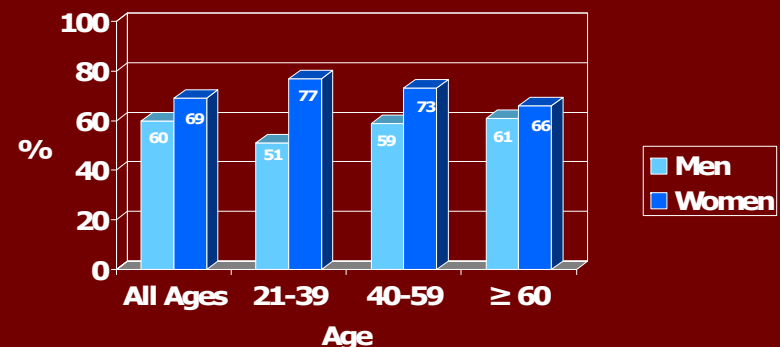
Overall HTN Awareness = 87%



Overall HTN Treatment = 83.4%



Overall HTN Control = 66%



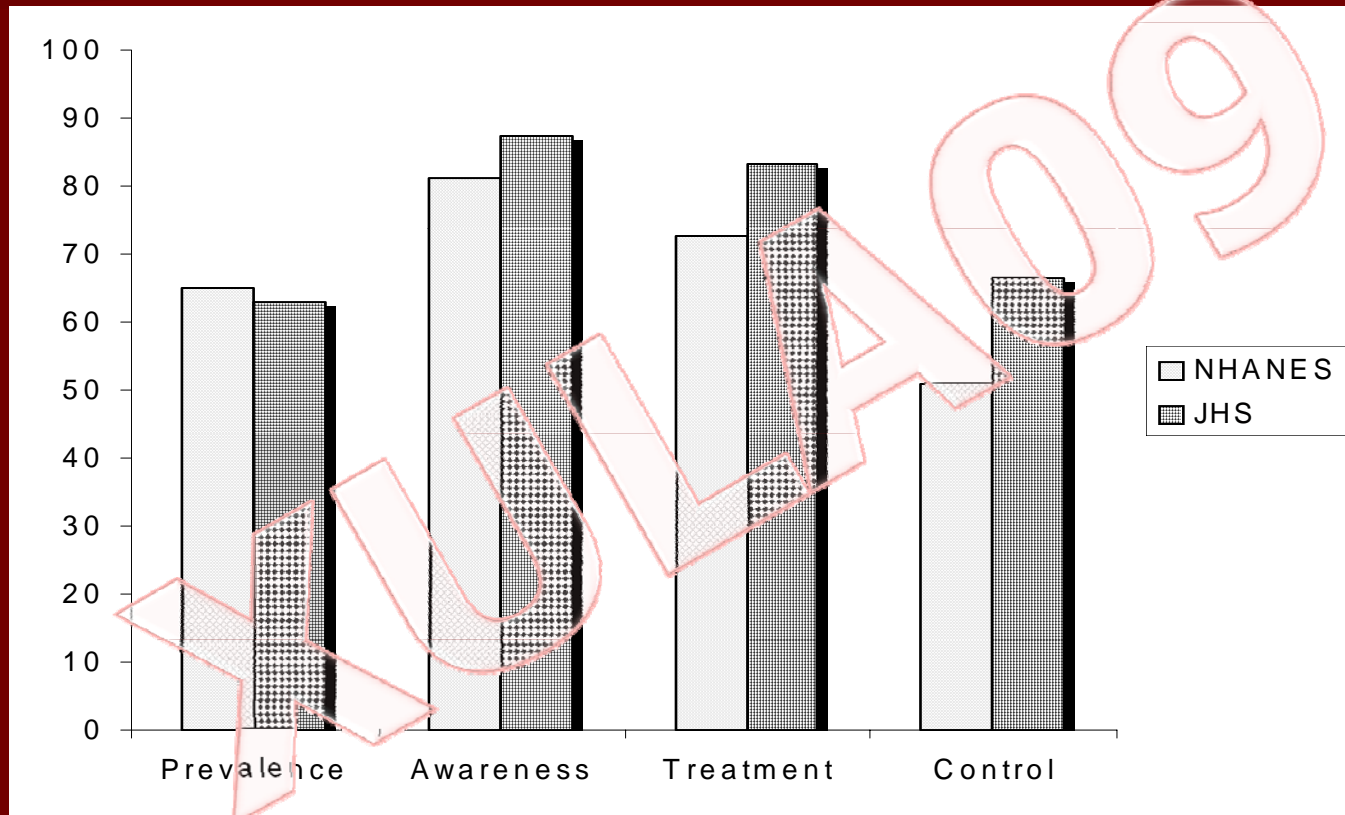
Wyatt, Akyzbekova, Wofford, et al. Hypertension 2008; 51: 650-656

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CVD Risk Factors: Hypertension, JHS & NHANES



Wyatt, Akyzbekova, Wofford, et al. Hypertension 2008; 51: 650-656

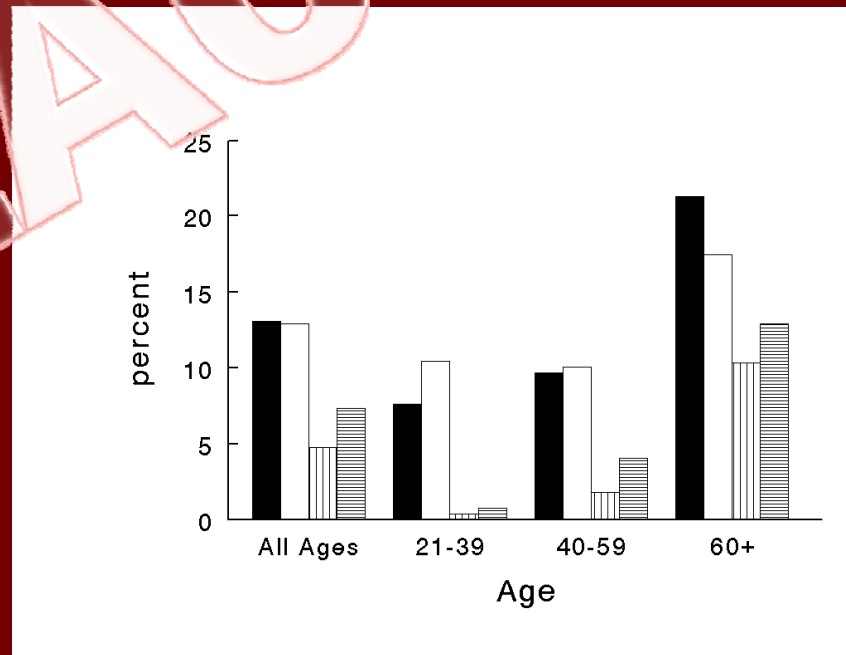
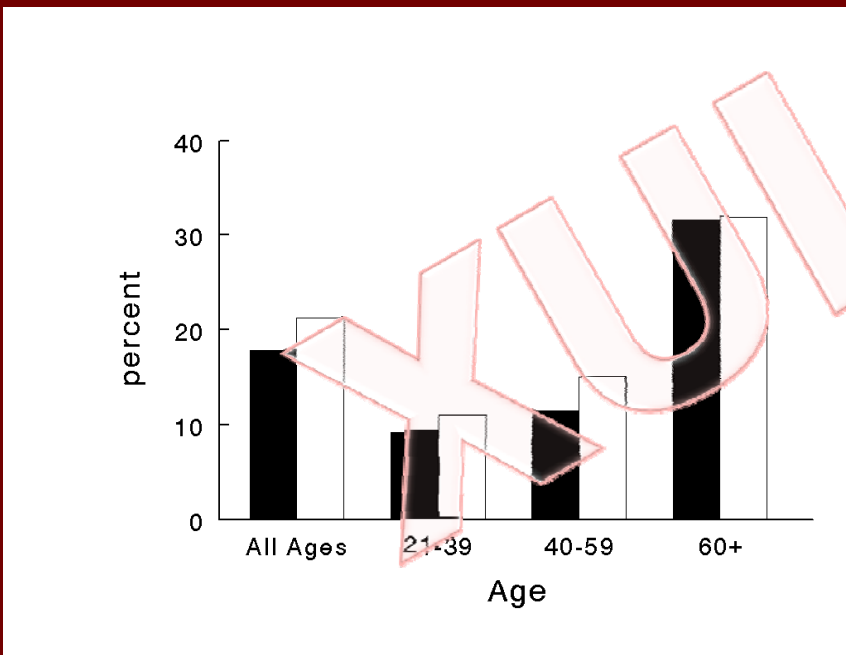
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CVD Risk Factors: Chronic Kidney Disease

CKD Prevalence by Sex and Age Group.
Solid bars: Men; Open bars: Women.

Prevalence of albuminuria and low eGFR by sex and age group: Solid bars: albuminuria in men; Open bars: albuminuria in women; Horizontal stripes: low eGFR in men; Vertical stripes: low eGFR in women.



Awareness and Treatment of CKD, Type 2 Diabetes, Hypertension, and Hypercholesterolemia

	CKD		Diabetes		Hypertension		Hypercholesterolemia	
	Awareness %	Treatment# %	Awareness %	Treatment %	Awareness %	Treatment %	Awareness %	Treatment %
All	15.8	52.0	84.4	85.4	82.7	83.2	60.3	43.4
Female	15.2	53.2	85.2	86.4	86.0	87.4	63.8	44.2
Male	16.8	49.8	82.8	83.2	76.5	75.1	54.3	42.1
21-39	13.0	33.3	84.9	81.8	69.6	65.2	36.0	16.3
40-59	14.1	49.1	80.6	82.1	79.8	78.3	59.1	36.1
60+	17.0	55.9	87.1	88.0	86.5	89.2	64.3	52.7

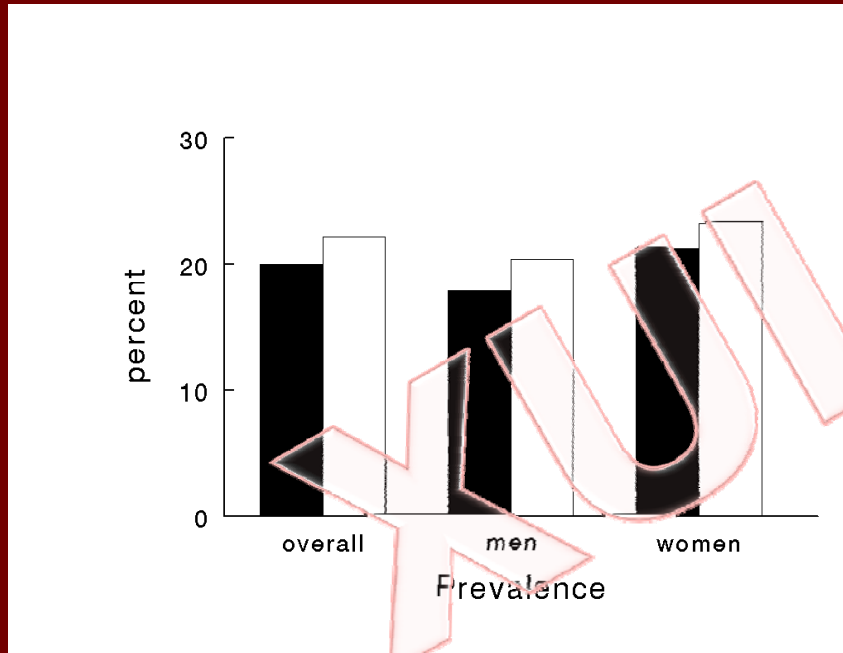
Receiving ACE Inhibitors or/and Angiotensin Receptor Antagonists alone or in combination with other agents was considered as hypertension treatment possibly targeting CKD.

Note: Awareness was defined as a self-report of being informed of the condition by a doctor or a healthcare professional. Those with CKD who reported being on dialysis were also considered as aware of their condition.



CVD Risk Factors: Chronic Kidney Disease

Age- and sex-adjusted comparison of the JHS and NHANES of:
CKD prevalence



Solid bars: JHS; Open bars: NHANES.

Flessner, Wyatt, Akyzbekova et al., AmJ Kidney Dis 2009;53:238-247

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CVD Risk Factors: Cholesterolemia

Overall

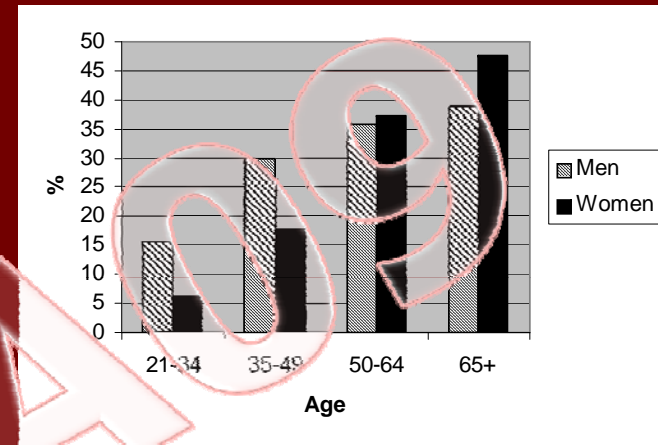
Prevalence = 32.9%

Awareness = 69.7%

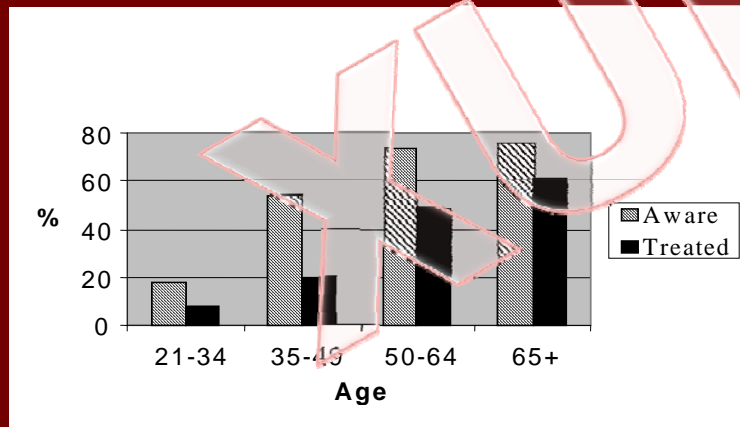
Treatment = 43.4%

Control = 88.2%

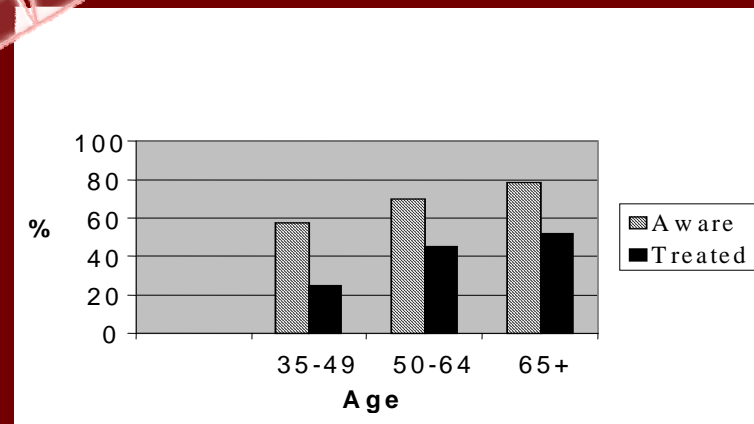
Prevalence, Men & Women by Age



% Aware and Treated, Men



% Aware and Treated, Women



Taylor, Akyzbekova, Garrison et al., Am J Med, 2009, in press (May).

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Subclinical Disease

- Inflammation
 - CRP and Kidney Disease (Fox, Benjamin et al., in review)
 - CRP and CMT (Nagarajarao et al., 2009 AHA Epi)
 - CRP and PAD (Agrawal et al., 2009 AHA Epi)
- LV Structure/Function
 - Relation of DM, Glucose Intolerance, Insulin Resistance (Fox, Cook et al., 2009 AHA Epi)
- Hyperuricemia
 - CKD (Flessner, Akylbekova, Wyatt et al., 2009, in review)



Health Behaviors

- **Dietary patterns** (Talegawkar, Johnson, Carithers, et al., J Am Dietet Assoc 2008;108:2013-2020)
 - 4 dietary patterns identified: Fast food (41%), Southern (27%), Prudent (17%), Juice (16%) among African Americans
 - Serum carotenoid and tocopherol concentrations vary by pattern
- **Physical Activity** (Dubbert, Ainsworth, Sung et al., 2009, AJE, in review)
 - Low Total, Home, Active Living, Work, Sport with women < men
 - 60% women and 78% men had NO participation in moderate or vigorous leisure time PA
 - Education and income important predictors of low PA
- **Behavior change** (Wyatt, Sims, Walker et al., 2006, ISHIB)
 - > 50% changed health behaviors as result of JHS participation
 - >75% sought health care follow-up of abnormal findings
 - Patterned response with women, 45-54 year olds, educated, and high or low income enacting behaviors



Sociocultural & Disease

- **Religion and Blood Pressure** (Loustalot, Wyatt, Ellison et al., *J Clin Hyper* 2006;Supplement A,8: 148)
 - High religious and spiritual participation
 - Religion associated with lower DBP in unadjusted and lower SBP in adjusted analyses
 - Lower cortisol levels among those with higher religious practice and lower blood pressure
- **Discrimination and Blood Pressure** (Sims, Wyatt, Diez-Roux et al., 2009, AHA Epi Council)
 - Everyday and Lifetime discrimination higher for men, younger, and more education
 - No association of Everyday discrimination with blood pressure
 - Lifetime discrimination and Lifetime Burden associated with HTN for women; no associations for men
- **Depression and CVD** (Akylbekova, Dubbert, Wyatt et al., 2009; AHA Epi Council)
 - High depressive sx's more prevalent among those with CVD (46%) vs none (26%), regardless of treatment of depression



Sociocultural and Health Behaviors

■ **Neighborhood Context and Physical Activity**

(Robinson, Wyatt, Dubbert et al., *J Clin Hyper* 2006;Supplement A,8: 243)

- 4.7% of variation in Active Living scores occurred b/tw neighborhoods; Controlling for individual parameters, neighborhood predictors explained 32% of variance in b/tw neighborhood scores
- 27% of variation in Sports scores occurred b/tw neighborhoods; Controlling for individual parameters, neighborhood predictors explained 74% of b/tw neighborhood variance

■ **Depression and Physical Activity** (Dubbert, Akylbekova, et al., 2009; AHA Epi Council)

- High depressive sx's in cohort (~17%), 2x as high in women (20% vs men (10%))
- Significantly associated with low physical activity



Genetics

- CRP (Fox, Benjamin, Sarpong et al., AJCardiol 2008;102:835-841)
 - Moderately heritable (0.45) with suggestive linkage to Chromosome 11
 - Associated with traditional risk factors (24% of variance), particularly BMI (14% of variance)
- Lipid profiles (Deo, Reich, Tandon et al., PLoS Genetics, 2009; e1000342)
 - Identified novel common variant of the lipoprotein lipase locus assoc w TG in African Americans
 - Systematically lower effect sizes in African Americans for the 12 risk variants discovered in European populations
- White Blood Cells (Nalls, Wilson, Patterson et al. Am J Hum Gen, 2008; 82:81-87) & Neutrophils (Reich, Nalls, Kao et al., PLoS Genetics, 2009; 5:e1000360)
 - Genetic locus of lower white cell count on chromosome 1q
 - Genetic locus of reduced neutrophil count is regulatory variant in the Duffy Antigen Receptor for the Chemokines gene



Increasing Minority Research Participation

■ Community Driven Model

Wyatt, Diekelmann, Henderson et al., Ethn Dis, 2003; 13:438-55

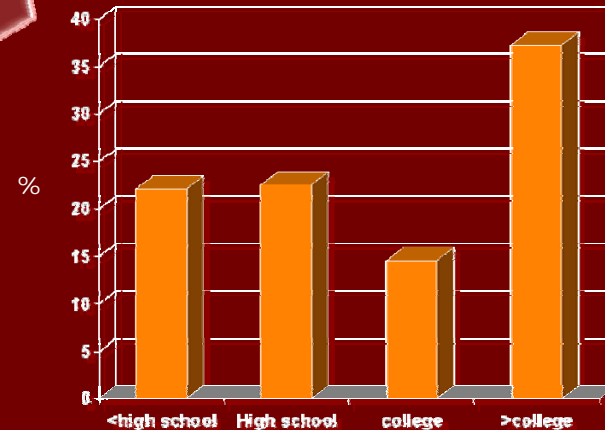
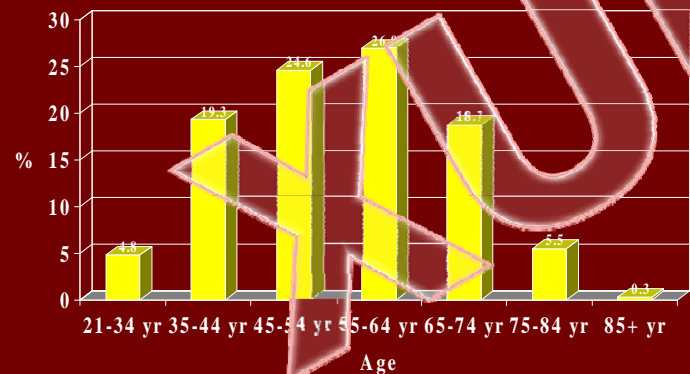
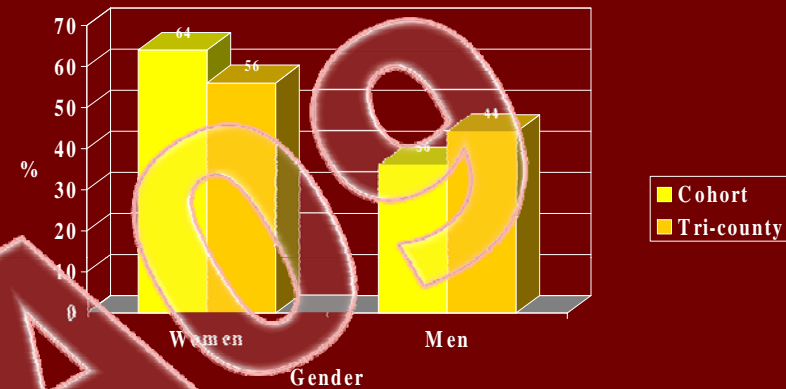
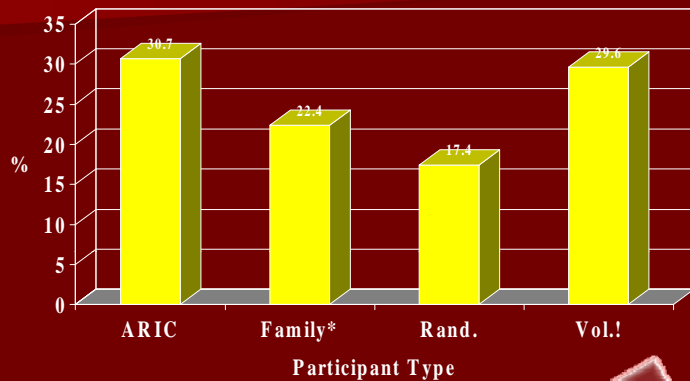
■ Committee Participation

- Council of Elders
 - Selection of recruiters, strategic planning
- Partnership Committee
 - Research ethics, scientific presentations
- Steering Committee
- Standing Committees



Jackson Heart Study Participants

n=5,301



Mean (SD) age of cohort = 54.8 (12.9) yr
Mean (SD) age of women = 55.2 (12.9) yr
Mean (SD) age of men = 53.9 (13.0) yr

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Community Celebrations

- Since the beginning of the study in Sept. 2000, over 20 community celebrations have been held for participants and the community, including:
 - The annual Family Reunion and Birthday Celebration each September to commemorate the initiation of the first exam in 2000
 - The annual Celebration of Life each February which recognizes our accomplishments with the general community, coinciding with Black History Month and National Heart Month
 - The annual Community Monitoring Board Meeting is open to the community and provides opportunities for input on the study's progress and planning



Attracting and Preparing Minority Investigators

- Bridges to the Future
 - JHS Scholars
 - SLAM High School Programs
 - Summer Postgraduate Epidemiology Courses



JHS Scholars

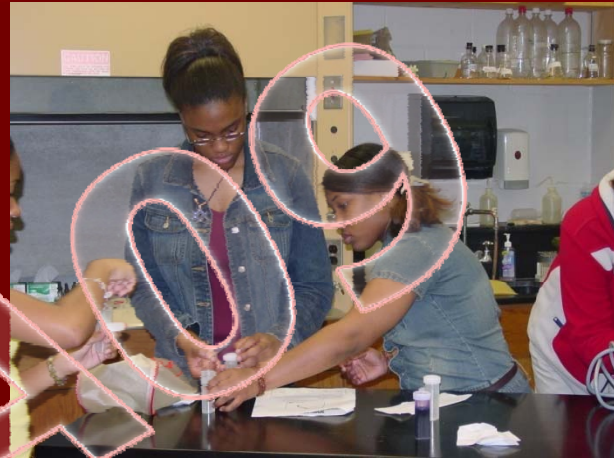


- 12 freshmen selected annually from all majors
- Curriculum
 - Courses:
 - *Introduction to Public Health*
 - *Biostatistics*
 - *Research Methods in Public Health and Epidemiology*
 - *Ethics, Medicine, and Technology*
 - Research Practica with JHS Investigators each semester
 - Summer Internships



SLAM

- Approximately 90 High School (10th, 11th, 12th grade) students are selected each summer for participation in this science enrichment program which also includes:
 - *Introduction to epidemiology and heart disease prevention*
 - *ACT preparation*
 - *Mentoring by JHS and Scholars'*
- Over 400 Jackson-area high school students have participated in these summer science enrichment programs



Promote CVD Awareness and Provide Community Education

- CHAN—Community Health Advisor Network
- TRIPP—Translation of Research into Practice and Prevention
 - ‘Whole Grain Campaign’
- Interim Clinic Plan---Know Your Numbers
- HEAT-- Hypertension Education and Treatment Partnership
- JSU Center of Excellence
 - Project Health (School-based intervention)



Community Health Advisors' Graduation and Pinning



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It's kind of like when you see somebody down in a ditch, they don't want you to say "Hey. You know you down in a ditch?" cause they already know that. What they want you to do is throw a chain down there, hook it up to the back of your truck and pull them out. And if we're not going to do that, if the only thing that we are going to do in the JHS is that "Hey, Black people. Don't you know you got the highest rate of heart disease, obesity, high blood pressure, whatever?" and that's it. Then we haven't done anything for them. So we need to be figuring how to get them out of the ditch.



Making A Difference

- The JHS is transforming a history of African Americans' heart disease into a legacy of heart health through research, and by translating and disseminating these research results
- The JHS is involving the community using a research approach that assures that the population who is being studied will provide some direction in the conduct of the research
- The JHS is preparing young African American and other minority students for careers in health sciences in order to establish a pool of qualified minority researchers who will be available for addressing minority health issues
- The JHS provides capacity building and a laboratory for minority investigators to continue to make a difference in overcoming health disparities for African Americans in Mississippi and across the nation



An Invitation for Collaboration

- Analysis of Existing Data
 - Manuscript Proposals
 - Dissertation Research
 - K Awards
 - Minority Supplements
- Ancillary Studies for Additional Data



Contact Us

<http://jhs.jsums.edu/jhsinfo/>



Dr. Herman Taylor, Principal Investigator, with the staff of the Jackson Heart Study

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