Diabetes Disparities in the African-American Community

Sherita Hill Golden, MD, MHS
Hugh P. McCormick Family Professor of Endocrinology and Metabolism
Executive Vice-Chair, Department of Medicine

Division of Endocrinology, Diabetes, and Metabolism
Welch Center for Prevention, Epidemiology, and Clinical Research
Johns Hopkins University School of Medicine

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Disclosures

• Financial Disclosure: None

• Unlabelled/Unapproved Uses Disclosure: None

Sherita Hill Golden, MD, MHS
Background

• IOM report: “Unequal Treatment (2002)”
  – Examine health system, provider, and patient factors
  – Ethnic minorities → less access to preventive care, treatment and surgery → delayed diagnosis, advanced disease
  – Persistence of race/ethnic disparities in health and healthcare
Health Disparities in Endocrine Disorders: Biological, Clinical, and Nonclinical Factors—An Endocrine Society Scientific Statement


Objective: The aim was to provide a scholarly review of the published literature on biological, clinical, and nonclinical contributors to race/ethnic and sex disparities in endocrine disorders and to identify current gaps in knowledge as a focus for future research needs.

Participants in Development of Scientific Statement: The Endocrine Society's Scientific Statement Task Force (SSTF) selected the leader of the statement development group (S.H.G.). She selected an eight-member writing group with expertise in endocrinology and health disparities, which was approved by the Society. All discussions regarding the scientific statement content occurred via teleconference or written correspondence. No funding was provided to any expert or peer reviewer, and all participants volunteered their time to prepare this Scientific Statement.

Evidence: The primary sources of data on global disease prevalence are from the World Health Organization. A comprehensive literature search of PubMed identified U.S. population-based studies. Search strategies combining Medical Subject Headings terms and keyword terms and phrases defined two concepts: 1) racial, ethnic, and sex differences including specific populations; and 2) the specific endocrine disorder or condition. The search identified systematic reviews, meta-analyses, large cohort and population-based studies, and original studies focusing on the prevalence and determinants of disparities in endocrine disorders.

Consensus Process: The writing group focused on population differences in the highly prevalent endocrine diseases of type 2 diabetes mellitus and related conditions (prediabetes and diabetic complications), gestational diabetes, metabolic syndrome with a focus on obesity and dyslipidemia, thyroid disorders, osteoporosis, and vitamin D deficiency. Authors reviewed and synthesized evidence in their areas of expertise. The final statement incorporated responses to several levels of review: 1) comments of the SSTF and the Advocacy and Public Outreach Core Committee; and 2) suggestions offered by the Council and members of The Endocrine Society.

Conclusions: Several themes emerged in the statement, including a need for basic science, population-based, translational and health services studies to explore underlying mechanisms contributing to endocrine health disparities. Compared to non-Hispanic whites, non-Hispanic blacks have worse outcomes and higher mortality from certain disorders despite having a lower (e.g. macrovascular complications of diabetes mellitus and osteoporotic fractures) or similar (e.g. thyroid cancer) incidence of these disorders. Obesity is an important contributor to diabetes risk in minority populations and to sex disparities in thyroid cancer, suggesting that population interventions targeting weight loss may favorably impact a number of endocrine disorders. There are important implications regarding the definition of obesity in different race/ethnic groups, including potential underestimation of disease risk in Asian-Americans and overestimation in non-Hispanic black women. Ethnic-specific cut-points for central obesity should be determined so that clinicians can adequately assess metabolic risk. There is little evidence that genetic differences contribute significantly to race/ethnic disparities in the endocrine disorders examined. Multilevel interventions have reduced disparities in diabetes care, and these successes can be modeled to design similar interventions for other endocrine diseases. (J Clin Endocrinol Metab 97: E1579–E1639, 2012)
Objectives

• Articulate disparities in the prevalence and incidence of diabetes and its complications

• Articulate contributors to diabetes disparities

• Identify effective interventions to reduce diabetes disparities
Race/Ethnic Disparities in Diabetes Mellitus
Diabetes Prevalence by Race/Ethnicity

- 7.1% Cuban, Central, South American
- 13.6% Mexican American
- 13.8% Puerto Rican American

Centers for Disease Control, National Diabetes Fact Sheet, 2011
Trends in Age-Adjusted Diagnosed Diabetes Prevalence and Incidence Among Adults (20-79 years), 1980-2012

Geiss LS et al, *JAMA*, 2014
Continuing Increase in Diabetes Incidence Among Older Adults, Women, Minorities, and the Less Educated

Geiss LS et al, JAMA, 2014
Race/Ethnic Disparities in Diabetic Complications
Microvascular Complications

• Retinopathy
  – Severe retinopathy and visual impairment more common in ethnic minorities

• Nephropathy
  – End-stage renal disease (ESRD) disproportionately affects minority populations (esp. NHBs and Native Americans)
  – NHBs have lower mortality on dialysis compared to NHWs
Macrovascular Complications

- **Cardiovascular Disease**
  - Lower risk of CVD in NHBs compared to NHWs
  - NHBs have higher CVD mortality rate

- **Peripheral arterial disease/amputations**
  - Higher risk in NHBs and Native Americans than NHWs
What Contributes to Diabetes Disparities: A Conceptual Framework

Biologic/Genetic Pathways
- Allostatic load
- Genetics
- Genetic ancestry
- Epigenetics

Biologic/Responses
- Stress
- Hypertension
- Obesity
- ↑ Cholesterol
- Hyperglycemia

BIOLOGIC-ENVIRONMENT INTERACTIONS

Proximate Factors

DISPARATE HEALTH OUTCOMES
- Diabetes Mellitus
- Diabetes Complications
Biological Factors: Race/Ethnic Differences in Overweight and Obesity

• Grade 2 (BMI ≥ 35 kg/m²) and 3 (BMI ≥ 40 kg/m²) highest in NHBs and Mexican Americans

• NHB and Mexican American women—greater rise in obesity prevalence over last 12 yrs than NHB or Mexican American men or NHW men or women

Flegal et al., JAMA, 2012
Biological Factors

• Obesity and body fat distribution

• Glucose metabolism and insulin resistance
  – Compared to NHWs, NHBs are more insulin resistant

• Ethnic minorities with diabetes have worse glycemic control than NHWs

• Genetics
  – Overall, genetic architecture of type 2 diabetes similar across race/ethnicity
Race/Ethnic Differences in CVD Risk Factors

• Blood pressure $\rightarrow$ nephropathy, peripheral arterial disease
  – Higher hypertension prevalence in NHBs than NHWs

• Lipids $\rightarrow$ CVD
  – Minorities generally have more favorable lipid profile (except lower HDL in NHBs)
DISPARATE HEALTH OUTCOMES
Diabetes Mellitus and Diabetes Complications
Non-Biological Factors

- **Socioeconomic Status**—lower income, education, and occupational status associated with increased diabetes risk
Inappropriate Income Sources for Patients with Limited Financial Resources
We Buy Your Diabetic Test Strips, You Get Your Money Fast!

CashInYourStrips.com
Click Here!

713-292-6321

**We Are Now Paying up to $25 Per Box!!**
Welcome to Test Strip Exchange

The Test Strip Exchange program was established so that people could donate or sell their excess test strips & supplies in an effort to help diabetics who have a lower income, lost a job or perhaps do not have insurance yet need to manage their diabetes. Recycling your unused, unexpired diabetic products can help you with extra cash, while helping others with the products they need. At Test Strip Exchange we do just that!

Millions of boxes of diabetic test strips are manufactured each year. Unfortunately, not all the boxes of test strips are actually used. There are many reasons, many of which are good reasons, why boxes go unused (see our FAQ section for details).
Non-Biological Factors

• **Socioeconomic Status**—lower income, education, and occupational status associated with increased diabetes risk

• **Health Behaviors**
  – Physical activity—Less in minorities compared to NHWs

• **Self-monitoring of blood glucose**
  – Rates lower in NHBs than NHWs
Interface of Clinical/Biological and Environmental Factors: Epigenetics and Early Life Events
Intrauterine Environment

• Fetal undernutrition and stress, maternal stress, maternal obesity → modification of offspring developmental biology

• Low birth weight → insulin resistance, diabetes, abdominal adiposity, CVD risk, elevated cortisol reactivity (esp. NHBs)
  – Nutritional deprivation
  – Placental vascular compromise

• Epigenetic changes in cellular gene expression: fetal adaptation to adverse intrauterine environment

Epigenetics and Diabetes Complications

- Low birth weight—may be associated with increased nephropathy risk through epigenetics
  - Associated with alterations in anatomical structure and function of kidneys and pancreas in animal models
  - Associated with increased odds of end-stage renal disease in humans
Biologic/Genetic Pathways
- Allostatic load
- Genetics
- Genetic ancestry
- Epigenetics

Biologic/Responses
- Stress
- Hypertension
- Obesity
- ↑ Cholesterol
- Hyperglycemia

Individual Risk Behaviors
- Smoking
- Diet
- Disease self-management
- Medication adherence

Individual Demographics and Social Factors
- Age
- Socioeconomic status
- Education
- Race/ethnicity
- Acculturation
- Social support
- Language barriers

Healthcare Context
- Access to care
- Quality of care
- Provider characteristics
- Patient-provider relationships
- Health literacy

DISPARATE HEALTH OUTCOMES
Diabetes Mellitus and Diabetes Complications
Non-Biological Factors: Access to and Quality of Care

**Poor access to care**

- Factors associated with inadequate access to diabetes specialist care
  - Lower educational attainment
  - Lack of health insurance greater in minorities with diabetes
- Ethnic minorities have worse diabetes-related outcomes even in countries with universal health insurance coverage

**Poor quality of care**

- Uninsured with diabetes receive fewer recommended processes of care, have worse glycemic control, and more diabetic eye disease
- Less aggressive prescribing practices in minority individuals living in countries with universal health insurance coverage
BIOLOGIC-ENVIRONMENT INTERACTIONS

Proximate Factors

Biologic/Genetic Pathways
- Allostatic load, genetics, genetic ancestry, epigenetics

Biologic/Responses
- Stress, hypertension, obesity, ↑cholesterol, hyperglycemia

Individual Risk Behaviors
- Smoking, diet, disease self-management, medication adherence

Individual Demographics and Social Factors
- Age, socioeconomic status, education, race/ethnicity, acculturation, social support, language barriers

Intermediate Factors

Physical Context
- Neighborhood stability, cleanliness, sidewalks, open space, parks, food availability

Social Context
- Collective efficacy, social capital, social network, social cohesion, poverty, racial/ethnic integration, social/economic gradient

Healthcare Context
- Access to care, quality of care, provider characteristics, patient-provider relationships, health literacy

DISPARATE HEALTH OUTCOMES
Diabetes Mellitus and Diabetes Complications
Intermediate Factors

- **Physical context**—neighborhood environment

- **Social context**—neighborhood cohesion, neighborhood socioeconomic status, social network, social capital, racial/ethnic integration
You gotta start eating out of a different parking lot.
Food Deserts and Food Swamps
2012 Baltimore City Food Environment

Solutions
- Supermarket
- Farmers Market
- Public Market
- Virtual Supermarket

Neighborhood Boundaries
Non-Residential
Harbor, Lakes, & Streams
Major Parks

*Food Desert: An area where the distance to a supermarket is more than 1 mile, the median household income is at or below 100% of the Federal Poverty Level, over 40% of households have no vehicle available, and the average Healthy Food Availability Index score for supermarkets, convenience stores, and corner stores is low (measured using the Nutrition Environment Measurement Survey).

*Not included in study: Non-residential areas include Colleges and Universities; Hospitals; Industrial Areas; Stadiums; and Cemeteries.

Stephanie Rawlings-Blake
Mayor
Council of Neighborhoods

Johns Hopkins Bloomberg School of Public Health
Center for a Livable Future
Medium Drink at Wendy’s!!
The Power of Neighborhood Factors on Health

- Minority and disadvantaged populations live in inferior neighborhoods with respect to food stores, places to exercise, esthetic problems (vacant houses), and traffic or crime-related safety.

- Factors associated with obesity
  - Poor access to supermarkets
  - Less neighborhood walkability
  - Less access to recreational facilities

DISPARATE HEALTH OUTCOMES
Diabetes Mellitus and Diabetes Complications

BIOLOGIC-ENVIRONMENT INTERACTIONS

Proximate Factors
- Biologic/Genetic Pathways
  - Allostatic load, genetics, genetic ancestry, epigenetics
- Biologic/Responses
  - Stress, hypertension, obesity, ↑cholesterol, hyperglycemia
- Individual Risk Behaviors
  - Smoking, diet, disease self-management, medication adherence
- Individual Demographics and Social Factors
  - Age, socioeconomic status, education, race/ethnicity, acculturation, social support, language barriers

Intermediate Factors
- Physical Context
  - Neighborhood stability, cleanliness, sidewalks, open space, parks, food availability
- Social Context
  - Collective efficacy, social capital, social network, social cohesion, poverty, racial/ethnic integration, social/economic gradient
- Healthcare Context
  - Access to care, quality of care, provider characteristics, patient-provider relationships, health literacy

Distal Factors
- Social Conditions and Policies
  - Poverty, public policy, prejudice, culture, discrimination
Successful Interventions for Reducing Diabetes Health Disparities

<table>
<thead>
<tr>
<th>Level of intervention</th>
<th>Successful Components</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Patient</td>
<td>Interpersonal connections rather than computer-based</td>
<td>Improved glycemic control and diabetes-related knowledge</td>
</tr>
<tr>
<td></td>
<td>• Face-to-face</td>
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<td></td>
<td>• Social networks</td>
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<td></td>
<td>• Family/peer support groups</td>
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<td></td>
<td>• Community health worker</td>
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<td></td>
<td>Culturally tailored</td>
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<tr>
<td>Provider</td>
<td>In-person feedback rather than computerized decision-support</td>
<td>Change in provider behavior and improved diabetes outcomes</td>
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# Successful Interventions for Reducing Diabetes Health Disparities

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<tr>
<td>Microsystem/health care organization</td>
<td>Disease management</td>
<td>Improved diabetes outcomes</td>
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<tr>
<td></td>
<td>• Identification of diabetes population (registries)</td>
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<td></td>
<td>• Practice guidelines</td>
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<td></td>
<td>• Health IT to track and monitor patients</td>
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<tr>
<td></td>
<td>• Care management*</td>
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<tr>
<td></td>
<td>*Care management: Patient education addressing adherence barriers, ancillary services (labs), transportation</td>
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<tr>
<td>Community/health care system</td>
<td>• Culturally tailored patient education and empowerment</td>
<td>Improved minority health care</td>
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<td></td>
<td>• Community coalition building and advocacy</td>
<td>Reduced racial and ethnic disparities in care</td>
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<tr>
<td></td>
<td>• Community health workers</td>
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<td></td>
<td>• Provider audit and feedback</td>
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<td></td>
<td>• Quality improvement</td>
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<tr>
<td></td>
<td>• Case management*</td>
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Six cross-cutting themes of successful disparity interventions (RWJ Foundation)

- Target multiple patient barriers rather than single solution
- Culturally tailor interventions
- Use multidisciplinary teams
- Employ interactive, skills based patient training rather than passive learning approaches
- Use patient navigators
- Involve family and community

Take Home Pearls

• Compared to NHWs, NHBs have a higher prevalence of diabetes and microvascular diabetes complications

• NHBs with diabetes experience higher mortality from heart disease despite having a lower or similar incidence to NHWs

• Obesity and insulin resistance are important contributor to diabetes risk in NHBs

• Little evidence that genetic differences contribute significantly to race/ethnic disparities in diabetes

• Multi-level interventions are effective in reducing disparities in diabetes care and outcomes
Diabetes at Johns Hopkins Medicine

Sherita Hill Golden, MD, MHS
- Diabetes epidemiology and health services research
- Diabetes population health
- Director, Inpatient Diabetes Management Program
- Lead, Diabetes Clinical Community, Armstrong Institute for Patient Safety and Quality
- Co-Director, Dept. of Medicine Civic Engagement Initiative

Rexford Ahima, MD, PhD
- Bloomberg Distinguished Professor of Diabetes, Johns Hopkins University
- Director, Division of Endocrinology, Diabetes, and Metabolism
- Lead, JHM Diabetes Initiative
Diabetes at Johns Hopkins Medicine

Felicia Hill-Briggs, PhD

• President Elect, Healthcare and Education, American Diabetes Association
• Diabetes behavioral scientist
• Behavioral interventions for underserved
• Senior Director, Population Health Research and Development, JHHC
Effect of DECIDE (Decision-making Education for Choices In Diabetes Everyday) Program Delivery Modalities on Clinical and Behavioral Outcomes in Urban African Americans With Type 2 Diabetes: A Randomized Trial

Diabetes Care 2016;39:2149–2157 | DOI: 10.2337/dc16-0941

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<th>Self-Study</th>
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<th>Group</th>
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<tr>
<td>SBP &gt;130 mmHg</td>
<td>-9.69 (3.47)**</td>
<td>-4.04 (1.20)***</td>
<td>-8.25 (3.56)*</td>
</tr>
<tr>
<td>DBP &gt;80 mmHg</td>
<td>-2.86 (1.82)</td>
<td>-1.37 (0.62)*</td>
<td>-3.61 (1.94)</td>
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<tr>
<td>LDL &gt; 100 mg/dl</td>
<td>-12.38 (7.49)*</td>
<td>-6.02 (2.59)*</td>
<td>-22.17 (7.71) **</td>
</tr>
<tr>
<td>HDL &lt; 40 men or &lt; 50 women</td>
<td>1.60 (1.81)</td>
<td>1.76 (0.74)*</td>
<td>-1.12 (2.10)</td>
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*p < 0.05,  **p < 0.01,  ***p < 0.001
Thank You!

sahill@jhmi.edu