USA-Caribbean Alliance for Health Disparities Research (USCAHHDR) Program

Steering Committee Meeting
February 18, 2015
National Institute on Minority Health and Health Disparities – Sullivan Alliance Cooperative Agreement - No.1U24MD006959-01

Louis W. Sullivan, M.D.,
Principal Investigator
Opening Remarks:
Louis W. Sullivan, M.D., Principal Investigator

- Welcome
- Introduction: New Team Members
- Agenda Review
Agenda

8:30 – 8:45 Welcome – Member Introductions – Agenda Review
Louis W. Sullivan, M.D., Principal Investigator

8:45 – 10:30 Year Four Progress Reports
8:45 - 9:15 Program Progress Report
Marlene MacLeish, Ed. D., Program Director
9:15 - 10:30 Evidence Core Report
Rainford Wilks, MBBS, DM, FRCP
Natasha Sobers-Grannum, MBBS, M.P.H.
Aurelian Bidulescu, M.D., Ph.D.

10:30 – 10:45 BREAK

10:45 – 1:15 Analysis Core Reports
Analyses from Caribbean Datasets and US-Caribbean Data Comparison
Trevor S. Ferguson, MBBS, DM
Novie Younger-Coleman, Ph.D.
Aurelian Bidulescu, M.D., Ph.D.

10:45-1:15 Overarching Papers
Ian Hambleton, Ph. D.
Nigel Unwin, M.Sc., D.M., FRCP, FFPH

1:15 – 1:45 WORKING LUNCH

1:45 – 2:15 E-Platform(s) Utilization: Data Sharing Challenges
Rainford Wilks, MBBS, DM, FRCP, Aurelian Bidulescu, M.D., Ph.D.

2:15 – 2:45 Year Five Implementation Plan: The Way Forward
Marlene MacLeish

2:45 – 3:45 Discussion - NIMHD Feedback
Program Overview: Marlene MacLeish

- **Research Plan Overview**
  - Framed by Institute of Medicine’s 2009 Report, U.S. commitment to global health: recommendations for the public and private sector
  - Research goal is to:
    - Conduct research on the role of social determinants - ancestry, language, indigenous health practices, lifestyles and socioeconomic status - in determining health status and health outcomes among English-speaking Caribbean populations and US populations
  - Aims to achieve goal:
    - Identify knowledge gaps: Evidence Core
    - Generate new knowledge: Analysis Core
    - Transfer knowledge – build research capacity – outreach: E-Platform
  - USCAHDR Organizing Principles:
    - Partnership building
    - Phased development over five-years
### Phase III: YR 4

**Deliverables**

- Manuscripts
  - Evidence Core: Four manuscripts – year-4 (two for completion -Year 5)
  - Analysis Core: Five manuscripts – year-4 (five for completion -Year 5)
- Educational Outreach Activities – USA Four abstracts
- E-Platform Utilization & Development
- “Way Forward : Discussion”

#### 1. Evidence Core - Knowledge Gaps

- Reorganized Cave Hill team
  - Drs. Unwin, Sobers-Grannum, Madhvanti Murphy
  - Dr. Hambleton (Team Leader)
- Systematic Reviews: Six health domains
  - Cancer, diabetes, chronic lung disease, depression, CVD, hypertension

#### 2. Analysis Core - Knowledge Generation

- Overarching Analyses
  - US-Caribbean Data Comparison
  - Ten Manuscripts (6 Caribbean Datasets - 4 US-Caribbean)
    - US: REGARDS, NHANES, JHS Protocol
    - Caribbean: Spanish Town Data, Caribbean risk factor survey

#### 3. Knowledge Dissemination - E-Platform

- Outreach/Conference:
  - Martin Luther King, Jr 3rd Annual Global Health Equity Summit
  - NIMHD Health Disparities Conference
  - African Immigrant Health Conference
  - Center for Strategic & Inter. Studies Conference

#### 4. Administrative Core

- Sullivan Alliance - Six member Team
- Steering Committee - New member - Dr. Tulloch-Reid

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### Phase III: YR 5

1. Complete/publication of Manuscripts
2. E-Platform Update
   - Upload data-manuscripts
   - Seek funds: * to upgrade E-Platform for data sharing
   * develop online course
   - Engage new UWI VC
   - Task Force – to merge USCAHDR articles
4. Intensify Outreach:
   - US Symposia on USCAHDR findings
   - Caribbean public forums
A Caribbean Health initiative of The Sullivan Alliance*

Louis W. Sullivan, MD
President Emeritus, Morehouse School of Medicine
U.S. Secretary of Health and Human Services, 1989-1993
Chairman, The Sullivan Alliance

* Presentation at the Martin Luther King, Jr 3rd Annual Global Health Equity Summit
The Willard Hotel, Washington, DC
January, 20, 2015
Year 4 Overall Progress Review:
RESULTS
Evidence Program
Evidence Program - Background

- Large body of research has accumulated showing that health is consistently worse for individuals with fewer resources
- Significant racial disparities: Blacks as compared to Whites
- Studies in the USA, United Kingdom and other developed countries
- Limited available data on health disparities within Caribbean origin populations
- No reviews on Caribbean Health Disparities have been published
Evidence Program - Background

**Aim:** To conduct scoping and systematic reviews of the available evidence with a focus on the chronic non-communicable diseases

**Objectives**

1. To synthesize the published evidence on the effect of health disparities on chronic non-communicable diseases (NCD) among Caribbean origin populations
2. To identify which NCD health disparities are relevant to Caribbean populations, and to identify which indicators contribute to these disparities
3. To identify gaps in the literature on health disparities in NCDs
Evidence Program – Outcome and Disparity Measures

- **Six Health Domains**
  - CVD (heart disease, stroke)
  - Hypertension
  - Diabetes mellitus
  - Chronic lung disease (COPD & Asthma)
  - Cancer
  - Depression

- **Areas of Health Disparity**
  - Age
  - Sex (male / female)
  - Ethnicity / race
  - Geographical location *(urban vs. rural, country of residence)*
  - Socioeconomic status *(occupation, education, income, household amenities etc.)*
  - Disability status *(physical or mental permanent inability to carry out routine function)*
  - Sexual orientation
Evidence Program – Methods

- Protocol – full study protocol developed
  - Aims → Objectives → Methods → Timelines

- Search Strategy
  - Comprehensive search strategy developed in collaboration with a library scientist with the Cochrane Collaboration
  - Databases searched
    - Ovid MEDLINE (1946 to May 2012)
    - Cochrane Library (to May 2012)
    - TRIP database
    - Web of Knowledge: Science Citation Index, Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index - Science (CPCI-S), Conference Proceedings Citation Index - Social Science & Humanities (CPCI-SSH)
    - PsycINFO
Inclusion Criteria

Population
- Participants age 18 years and older. Include studies with population including both children and adults
- English speaking Caribbean country or study includes Afro-Caribbean population living elsewhere

Outcome
- **Chronic non-communicable disease**
  - Cardiovascular diseases: Stroke, Hypertension, Myocardial Infarction, Heart Failure, Peripheral vascular disease
  - Diabetes mellitus
  - Chronic lung diseases: COPD, Asthma, Emphysema
  - Cancer: Breast, Prostate, Gastrointestinal, Cervical cancer, Cancers of the respiratory system (e.g. lung, laryngeal etc.)
  - Depression or depressive symptoms
- **Risk Factors:** Overweight, Obesity, Smoking, Alcohol use/abuse, diet, Physical activity
- **Use of health services/ Health seeking behaviour**
Chronic Non-Communicable Disease Flow Chart

Records identified through database searching

Records after duplicates removed

Records screened

Records excluded

Identification

Screening

Eligibility

Included

Cancer
Diabetes
Hypertension
COPD
Depression
CVD

* Includes 71 additional articles retrieved for the COPD search; 113 records being screened.

Progress for Year 4

- **Year 3**
  - Completed review and produced manuscripts on DM and COPD; to be submitted for publication shortly
  - New analysis on CVD and Asthma
  - Updated review on Depression and hypertension
  - Analyses and manuscripts to be completed at end of year three
Disparities in Diabetes Mellitus among Caribbean populations: A Scoping Review

In press at International Journal for Equity in Health
Aim

- To summarize the published studies on disparities in diabetes mellitus in Afro-Caribbean populations
- To identify gaps in the available literature
- To characterize the factors, which might explain the disparities observed.
Diabetes Review

Summary of the Inclusion and Exclusion process

1009 Studies
Retrieved by search strategy

813 Studies
Excluded at title and abstract screening

196 studies
Identified for full text review

8 studies
Full text unavailable for review

146 studies
Excluded based on inclusion exclusion criteria

43 studies
Included in scoping review
Summary of Findings

- Higher prevalence of DM among Caribbean Blacks compared to West African Blacks and Caucasians
- Lower prevalence compared to South Asian origin groups
- Morbidity from diabetes-related complications was highest in persons with low socioeconomic status.
- Gap analysis showed limited research data reporting diabetes incidence by sex and socioeconomic status.
- No published literature on disability status or sexual orientation
- Prevalence and morbidity were the most frequently reported outcomes
- Little or no data on health seeking behavior or health literacy
Health disparities research gaps identified in diabetes literature

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Socioeconomic status (SES)</th>
<th>Sex</th>
<th>Geographical location</th>
<th>Ethnicity</th>
<th>Disability status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of DM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Prevalence of DM</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Morbidity*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality (DM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Health Care Utilization</td>
<td></td>
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<tr>
<td>Other</td>
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<tr>
<td>(e.g. Quality of Life)</td>
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</tbody>
</table>

*Morbidity of Diabetes Complications (e.g. Microvascular and Macrovascular complications)

<table>
<thead>
<tr>
<th>Number of articles</th>
<th>0</th>
<th>1-2</th>
<th>3-5</th>
<th>6+</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Conclusion

- Literature on diabetes health disparities in Caribbean origin populations is limited.
- Future research should address these knowledge gaps and develop approaches to reduce them.
- In some areas (e.g. SES), some associations have been demonstrated – lower SES associated with worsening morbidity; this may provide an opportunity for intervention.
Disparities in Cardiovascular Disease among Caribbean Populations: A scoping review

Under revision for BMC Public Health
Aim

- To examine health disparities using similar outcomes and health disparity domains among Afro-Caribbean populations and Caribbean immigrants

- In this review, CVD includes:
  - coronary heart disease: disease of the blood vessels supplying the heart muscle
  - cerebrovascular disease (Stroke and TIA)
  - peripheral arterial disease: disease of blood vessels supplying the arms and legs
Summary of the Inclusion and Exclusion process for cardiovascular disease

- **Identification**
  - 665 Studies
    - Retrieved by search strategy

- **Screening**
  - 616 Studies
    - Excluded
  - 49 Studies
    - Identified for full text review

- **Eligibility**
  - 9 Studies
    - Full text unavailable for review
  - 18 Studies
    - Excluded
      - 12 no outcome of interest/disparity measure
      - 5 Inappropriate population
      - 1 Duplicate study

- **Included**
  - 22 Studies
    - Included in scoping review
Summary of Findings

- Most studies were on prevalence of CVD by ethnicity, age and sex

- CHD and PAD were less prevalent among Afro-Caribbean groups compared to Caucasian and South East Asian ethnic groups

- Strokes were more common among Afro-Caribbean groups

- Data on morbidity and mortality from CVD remains scant, particularly across the socio-economic gradient in Afro-Caribbean populations
## Health disparities research gaps identified in CVD literature

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Socioeconomic status (SES)</th>
<th>Sex</th>
<th>Geographical location</th>
<th>Ethnicity</th>
<th>Disability status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of CVD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence of CVD</td>
<td></td>
<td></td>
<td>1-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality CVD</td>
<td></td>
<td></td>
<td></td>
<td>3-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Care Utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6+</td>
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</tbody>
</table>

### Number of articles

<table>
<thead>
<tr>
<th>Number of articles</th>
<th>0</th>
<th>1-2</th>
<th>3-5</th>
<th>6+</th>
</tr>
</thead>
</table>
Conclusions

- There are differences in morbidity and mortality from CVD across ethnic groups.
- Knowledge gaps remain in understanding the social determinants of these disparities in CVD.
- More research exploring these gaps by varying disparity indicators needs to be undertaken.
Systematic reviews

- Specific diabetes review
- Cancers
  - Prostate
  - Breast
  - Colorectal
  - Lung
- Depression
- Asthma & COPD
Additional Diabetes Analysis
Equity, social determinants and public health programmes

Edited by Erik Elias and Anand Sivasankara Kurup
Framework: WHO Commission on the Social Determinants of Health

INTERVENE

Socioeconomic context & position (society)

Differential exposure (social & physical environment)

Differential vulnerability (population group)

Differential health outcomes (individual)

Differential consequences (individual)

ANALYSE

MEASURE
Specific objective

- To systematically review the literature (published 2007 to 2013) on distribution of diabetes, its risk factors and adverse outcomes by known social determinants of health for persons living in the Caribbean.
Social Determinants

Ethnicity (13, 19)
Education (13, 15)
Gender (50, 118)
Income (12, 14)
Occupation (3, 4)

Diabetes-related risk factor: obesity, smoking, physical activity, diet,

Prevalence/Incidence of type 1 or 2 diabetes mellitus

Complications of type 1 and 2 diabetes mellitus

Control of type 1 and 2 diabetes mellitus
Gender and diabetes prevalence

- 19 articles
- 12 unique studies
- 9 population-based - Jamaica (5), Barbados (1), Cuba (2), Grenada (1)
- All found a higher prevalence of diabetes in women than men
# Gender and diabetes prevalence

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Women Events</th>
<th>Women Total</th>
<th>Men Events</th>
<th>Men Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson 2011</td>
<td>71</td>
<td>507</td>
<td>27</td>
<td>340</td>
<td>8.6%</td>
<td>1.89 [1.18, 3.01]</td>
</tr>
<tr>
<td>Block 2012</td>
<td>206</td>
<td>1150</td>
<td>70</td>
<td>769</td>
<td>19.3%</td>
<td>2.18 [1.63, 2.91]</td>
</tr>
<tr>
<td>Cunningham-Myrie 2013</td>
<td>182</td>
<td>1957</td>
<td>57</td>
<td>891</td>
<td>17.4%</td>
<td>1.50 [1.10, 2.04]</td>
</tr>
<tr>
<td>Ferguson 2008</td>
<td>105</td>
<td>1311</td>
<td>42</td>
<td>661</td>
<td>12.9%</td>
<td>1.28 [0.89, 1.86]</td>
</tr>
<tr>
<td>Ferguson 2010a</td>
<td>52</td>
<td>473</td>
<td>19</td>
<td>275</td>
<td>6.5%</td>
<td>1.66 [0.96, 2.88]</td>
</tr>
<tr>
<td>Llibre 2011</td>
<td>524</td>
<td>1904</td>
<td>202</td>
<td>1040</td>
<td>35.3%</td>
<td>1.58 [1.31, 1.89]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>7302</strong></td>
<td><strong>3976</strong></td>
<td><strong>100.0%</strong></td>
<td></td>
<td></td>
<td><strong>1.65 [1.43, 1.91]</strong></td>
</tr>
</tbody>
</table>

Total events: 1140, 417

Heterogeneity: $\tau^2 = 0.01$, $\chi^2 = 6.27$, df = 5 ($P = 0.28$); $I^2 = 20$

Test for overall effect: $Z = 6.77$ ($P < 0.00001$)

![Graph showing odds ratio and 95% CI for women and men](image-url)
## Gender and obesity

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Women Events</th>
<th>Women Total</th>
<th>Men Events</th>
<th>Men Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbosa 2011 (Bdos)</td>
<td>433</td>
<td>920</td>
<td>174</td>
<td>588</td>
<td>11.4%</td>
<td>2.12 [1.70, 2.63]</td>
</tr>
<tr>
<td>Barbosa 2011 (Cuba)</td>
<td>367</td>
<td>1197</td>
<td>90</td>
<td>708</td>
<td>11.1%</td>
<td>3.04 [2.36, 3.91]</td>
</tr>
<tr>
<td>Block 2012</td>
<td>508</td>
<td>1210</td>
<td>137</td>
<td>807</td>
<td>11.4%</td>
<td>3.54 [2.85, 4.39]</td>
</tr>
<tr>
<td>Brathwaite 2011</td>
<td>460</td>
<td>1215</td>
<td>316</td>
<td>1254</td>
<td>11.8%</td>
<td>1.81 [1.52, 2.15]</td>
</tr>
<tr>
<td>Cunningham-Myrie 2013</td>
<td>734</td>
<td>1957</td>
<td>110</td>
<td>891</td>
<td>11.4%</td>
<td>4.26 [3.42, 5.31]</td>
</tr>
<tr>
<td>Diaz Sanchez 2009</td>
<td>1588</td>
<td>10313</td>
<td>727</td>
<td>9206</td>
<td>12.3%</td>
<td>2.12 [1.93, 2.33]</td>
</tr>
<tr>
<td>Ferguson 2008</td>
<td>393</td>
<td>1311</td>
<td>59</td>
<td>661</td>
<td>10.6%</td>
<td>4.37 [3.26, 5.85]</td>
</tr>
<tr>
<td>Ferguson 2010a</td>
<td>133</td>
<td>473</td>
<td>19</td>
<td>275</td>
<td>8.1%</td>
<td>5.27 [3.17, 8.75]</td>
</tr>
<tr>
<td>Nemesure 2007</td>
<td>821</td>
<td>2474</td>
<td>211</td>
<td>1840</td>
<td>11.9%</td>
<td>3.83 [3.25, 4.53]</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>21070</strong></td>
<td><strong>16230</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>3.10 [2.43, 3.94]</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total events 5437 1843

Heterogeneity: $\tau^2 = 0.12$, $\chi^2 = 108.49$, df = 8 ($p < 0.00001$); $I^2 = 93$

Test for overall effect: $Z = 9.19$ ($p < 0.000001$)
Gender

- 14/15 studies showed women were less likely to be physically active
- Men were four times more likely to be smokers
- Men were more likely to achieve control of their diabetes
Revisions submitted to PLOSone

Female gender is a social determinant of diabetes in the Caribbean: Systematic review and Meta-Analysis
Health inequities in diabetes, its risk factors, and adverse outcomes in populations living in the Caribbean: A systematic review
Current reviews
Framework: WHO Commission on the Social Determinants of Health
<table>
<thead>
<tr>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Prostate</td>
<td>- Breast</td>
</tr>
<tr>
<td>- Lung</td>
<td>- Colorectal</td>
</tr>
<tr>
<td>- Colorectal</td>
<td>- Lung</td>
</tr>
<tr>
<td>- Stomach</td>
<td>- Cervical</td>
</tr>
<tr>
<td>- Liver</td>
<td>- Liver</td>
</tr>
</tbody>
</table>
Search strategy

- **Databases:** Pubmed, SciELO, CINAHL, and WHO Virtual Library.
- **Publication period:** January 1st, 2004 - December 31st, 2014.
- **Search terms:**
  - Conceptualized through thorough researching of the disease in question
  - Social determinants guided by the PRISMA statement for reporting systematic reviews with a focus on health equity, which recommends using the PROGRESS-Plus checklist.
<table>
<thead>
<tr>
<th>Factor Categories</th>
<th>Factors Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease measurements</td>
<td>incidence, prevalence</td>
</tr>
<tr>
<td>Risk factors</td>
<td>Breast: alcohol; high BMI; diet high in sugar; physical inactivity; Prostate: diet high in calcium; Lung: smoking; outdoor or indoor air pollution; occupational hazards; Colorectal: physical inactivity; smoking; alcohol; high BMI; red meat;</td>
</tr>
<tr>
<td>Outcomes</td>
<td>staging, recurrence rates, survival, mortality (cancer-specific, all-cause)</td>
</tr>
<tr>
<td>Social distribution</td>
<td>age, race/ethnicity, gender, language, education, occupation, income/wealth, culture, religion, social capital, social support, residence, infrastructure, healthcare systems</td>
</tr>
</tbody>
</table>
Inclusion/exclusion criteria

- Participants/respondents resident in the Caribbean region
- Observational (human) studies only
- Cancer as being defined through any cancer screening tool
- Sample size \( \geq 50 \).
- Languages: English, Dutch, Spanish and French
- Age: all
Cancers

Records identified through database searching (n = 13,494)

Records after duplicates removed (n = 11,478)

Records excluded after title/abstract (n = 10,609)

Records requiring full text review (n = 964)

Records requiring full text review for disease status and outcome (n = 144)*

Studies included in synthesis for disease incidence/prevalence/complication/outcome (n = 61)

Colorectal (n = 17)

Breast (n = 14)

Prostate (n = 16)

Lung (n = 14)

*We have been unable to obtain the full text for 7 articles

# Results - Prostate Cancers

<table>
<thead>
<tr>
<th>Study Type</th>
<th>• Registry-based (7), Prospective cohort (3), Case control (5), Cross-sectional (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>• Ranged from 486 - 9824</td>
</tr>
<tr>
<td>Age</td>
<td>• All ages; 5 examined over 40 population only</td>
</tr>
<tr>
<td>Study Base</td>
<td>• Population-based (11), Health facility (5)</td>
</tr>
<tr>
<td>Country</td>
<td>• Cuba (3), Puerto Rico (3), Guadeloupe (1), Jamaica (5), Barbados (1), Trinidad &amp; Tobago (2), Bahamas (1)</td>
</tr>
</tbody>
</table>
Results - prostate

- Of the six papers (5 unique studies) that considered education:
  - Barbados and Tobago: found no relationship
  - Puerto Rico and Guadeloupe: higher education associated with increased prostate incidence risk
  - Jamaica: higher education as associated with a decreased risk
- Marital status was not significant in Tobago, cases were more likely than controls to be married in Barbados
- Race: no significant differences noted
- Highest SEP municipalities had a higher age-standardized incidence and 40% higher mortality Puerto Rico.
### Results - breast cancers

<table>
<thead>
<tr>
<th>Study type</th>
<th>Most studies were registry-based (11), case-control(2),</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>190 - 3710</td>
</tr>
<tr>
<td>Age</td>
<td>All ages, 21+</td>
</tr>
<tr>
<td>Study base</td>
<td>Population-based (8), Health facility (6)</td>
</tr>
<tr>
<td>Country</td>
<td>Cuba(3), Puerto Rico(4), Bermuda(1), Barbados(2), Trinidad &amp; Tobago (3), Suriname(1), Guyana(1).</td>
</tr>
</tbody>
</table>
Results-breast cancer

Barbados: No difference in educational levels
Puerto Rico: Cases had lower odds of having >9 years of education

T&T and Guyana: Women of African origin had a significantly worse survival than Caucasian women; women of mixed background and East Indian women experienced the worst survival.

No significant association in incident cases from T&T screening program

Barbados: No significant association found with occupation but relationship poorly classified
Puerto Rico: SEP associated with increased risk

Marriage was protective in PR and not significant in Bdos/T&T
## Results - lung cancers

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study type</strong></td>
<td>Registry-based studies (9); cross-sectional (3); prospective cohort (2)</td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td>55 - 4218</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>All ages</td>
</tr>
<tr>
<td><strong>Study base</strong></td>
<td>Population based (9); Health facility-based (5)</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td>Cuba (11), Puerto Rico (2) and Bahamas (1)</td>
</tr>
<tr>
<td><strong>Relationships studied</strong></td>
<td>gender (14); age (10); residence (4)</td>
</tr>
</tbody>
</table>
Results - lung cancer

- Higher prevalence, incidence and mortality associated with lung cancer in males

- Higher prevalence, incidence and mortality with increasing age (especially the 50-69 age group)
<table>
<thead>
<tr>
<th>Study type</th>
<th>Retrospective-cohort (13), cross-sectional (3), and 1 prospective-cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>55 - 1062</td>
</tr>
<tr>
<td>Age</td>
<td>All ages</td>
</tr>
<tr>
<td>Study base</td>
<td>population-based (10), followed by health-facility-based (7)</td>
</tr>
<tr>
<td>Country</td>
<td>Puerto Rico (7), Cuba (6), Jamaica (1), Barbados (1), Martinique (1) and Grenada (1)</td>
</tr>
</tbody>
</table>
Results – colorectal cancer

**GENDER**

- Incidence: 4 showing higher female incidence of colorectal and 5 showing higher male incidence
- Prevalence: 4 studies saying higher male prevalence and one says higher female prevalence
- Mortality: 3 studies showing higher female mortality and 3 higher male mortality

**EDUCATION/RESIDENCE**

- Puerto Rico: Higher prevalence in Less educated
- Puerto Rico: Prevalence varied by municipality
Depression
Rationale-Depression

- The World Health Organization estimates that 350 million people worldwide suffer from depression, ranking it as the leading cause of disability.

- Depression is the largest contributor to years lived with disability and is a significant contributor to disability-adjusted life years within the Caribbean.
Search strategy/methodology

- **Databases:** Pubmed, SciELO, CINAHL, PsycInfo, and WHO Virtual Library.

- **Publication period:** January 1st, 2004 - December 31st, 2014

- **Search terms:**
  - Conceptualized through thorough researching of the disease in question
  - Social determinants were guided by the PRISMA statement for reporting systematic reviews with a focus on health equity, which recommends using the PROGRESS-Plus checklist.
<table>
<thead>
<tr>
<th>Factor Categories</th>
<th>Factors Examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease measurements</td>
<td>incidence, prevalence</td>
</tr>
<tr>
<td>Outcomes</td>
<td>suicide ideation, suicide, para-suicide, all-cause mortality</td>
</tr>
<tr>
<td>Social distribution</td>
<td>age, race/ethnicity, gender, language, education, occupation, income/wealth, culture, religion, social capital, social support, residence, infrastructure, healthcare systems</td>
</tr>
</tbody>
</table>
Depression

Identification

Records identified through database searching
(n = 3768)

Records after duplicates removed
(n = 3011)

Records excluded after title/abstract
(n = 2937)

Records requiring full text review for
disease status and outcome
(n = 74)*

Studies included in synthesis for disease prevalence/complication/outcome
(n = 39)

Included

Depression prevalence
(n = 23)

Depression complication
(n = 16)

*We have been unable to obtain the full text for 2 articles

## Results - depression

### Study type
- Cross-sectional (28); retrospective-cohort (8); case-control (2); prospective-cohort (1)

### Sample size
- 63 - 31825

### Age
- Heavily focused on youth

### Study base
- Health-facility-based (16), population-based (13), and school-based (9), while 2 studies used police records source.

### Country
- Jamaica (13), Puerto Rico (10), Cuba (8), Trinidad (9), Barbados (1), Haiti (1), Guyana (1), Belize (1), Suriname (1), and Martinique (1)
Results - depression

- Females were found to have higher prevalence of depression than men.
- Men have higher suicide rates.
- Parasuicide and suicidal ideation seems to occur more in females.
- No clear age difference with respect to disease criteria and outcomes.
- Other key determinants of prevalence/outcomes were unemployment, low levels of education, lack of social support/cohesion, and presence of a chronic condition.
Chronic Lung Disease
COPD & Asthma
Asthma and COPD – WHO Key Facts

- More than 3 million people died of COPD in 2005, which is equal to 5% of all deaths globally that year.
- Almost 90% of COPD deaths occur in low- and middle-income countries.
- Asthma is one of the major non-communicable diseases.
- Some 235 million people currently suffer from asthma.
- Common disease among children.

Asthma & COPD

- Records identified through database searching (n = 7087)
- Records after duplicates removed (n = 6241)
- Records requiring full text review (n = 1036)
- Records excluded after title/abstract (n = 5205)
- Records requiring full text review for disease status and outcome (n = 73)*
- Studies included in synthesis for disease incidence/prevalence/complication/outcome (n = 42)

- Asthma (n = 37)
- COPD (n = 5)

*We have been unable to obtain the full text for 8 articles

Results - Asthma & COPD

**Study type**
- cross sectional (30); cohort prospective (6); cohort retrospective (4); case-control (2)

**Sample size**
- 76 - 6394

**Age**
- Focused on ages 0 - 16

**Study base**
- School-based (9); Health facility-based (22); population-based (12)

**Country**
- Puerto Rico (22), Cuba (11), Trinidad and Tobago (5), Barbados (1), Dominican Republic (1), Jamaica (1), Saint Vincent and the Grenadines (1).
Relationships

Gender (34)
Age (25)
Residence (15)
Income (10)
Race/ethnicity (4)
Results Asthma & COPD

- Some studies show that asthma is more prevalent in males; finding inconsistent
- Mortality appears higher in females
- There was also a trend observed that asthma is more prevalent in urban areas.
- Some studies also went on to show that African ancestry was associated with increased severity of asthma; others are inconclusive
- There were consistent findings of higher prevalence of COPD in males which was also seen with respect to age.
Overall Conclusion

- Limited study of social determinants beyond age and gender
- Appears to be significant heterogeneity across Caribbean countries
- Gender appears to be strong social determinant for mortality and morbidity - colorectal cancer, lung cancer, asthma and COPD
- Gender relationship with morbidity differs from that with mortality
## Timelines

<table>
<thead>
<tr>
<th></th>
<th>February to August 2015</th>
<th>September 2015</th>
<th>October to March 2016</th>
<th>April May 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic review with meta-analysis for prostate and breast cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic review for depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic review for asthma and COPD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic review for lung and colorectal cancers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1: Summary of the Inclusion and Exclusion process

1009 Studies
Retrieved by search strategy

813 Studies
Excluded at title and abstract screening

196 Studies
Identified for full text review

168 Studies
Excluded based on inclusion exclusion criteria

8 Studies
Full text unavailable for review

21 Studies
Included in scoping review
The majority of study conducted in the UK, with a cross sectional design

Figure 2: Distribution of included studies by study location and design

<table>
<thead>
<tr>
<th>Countries</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>14</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>6</td>
</tr>
<tr>
<td>Jamaica</td>
<td>4</td>
</tr>
<tr>
<td>USA</td>
<td>2</td>
</tr>
<tr>
<td>Barbados</td>
<td>2</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study Design</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross sectional</td>
<td>18</td>
</tr>
<tr>
<td>Cohort</td>
<td>2</td>
</tr>
</tbody>
</table>
Gap Map reflective of area such as SES, Disability and Sexual Orientation

Figure 3: Health disparities research gaps identified in hypertension literature

### Included studies—Hypertension (HTN)*

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Socioeconomic status (SES)</th>
<th>Sex</th>
<th>Geographical location</th>
<th>Ethnicity</th>
<th>Other (Disability &amp; Sexual orientation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of HTN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence of HTN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality (HTN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Care Utilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTN Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Gap analysis based on the number of included studies by theme and disparity indicator

<table>
<thead>
<tr>
<th>Number of articles</th>
<th>0</th>
<th>1-2</th>
<th>3-5</th>
<th>6+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of articles: 0 (red), 1-2 (green), 3-5 (dark green), 6+ (black)

---

SA
THE SULLIVAN ALLIANCE

UWI
Analysis Core
Outline

- Analyses from Caribbean datasets
  - Jamaica Health and Lifestyle Surveys
    - Educational Health Disparities in CVD Risk Factors (presented last year)
    - Socioeconomic Disparities in Tobacco Smoking
  - Jamaica CVD Mortality
    - Sex Disparity in CVD Mortality 1996-2009

- US-Caribbean Comparisons
  - Jackson Heart Study vs. Spanish Town Cohort
  - REGARDS Study vs. Spanish Town Cohort

- Overarchining papers (Profs Hambleton & Unwin)
Socioeconomic Disparities in Tobacco use among Jamaicans: Findings from the Jamaica Health and Lifestyle Survey 2007-2008
Non-communicable diseases (NCDs) accounted 38 million (68%) of global deaths in 2012

- Projected to increase to 52 million by 2030

- Approximately 75% of these deaths are in LMICs

- 42% of deaths take place before 70 years

- Major NCDs include cardiovascular disease, cancer, diabetes mellitus and chronic lung disease
NCDs are caused mostly by four behavioural risk factors

- Tobacco use
- Unhealthy diet
- Insufficient physical activity
- Harmful used of alcohol
Tobacco

- Approximately 1.1 billion smokers in 2012
  - Projected to increase to 1.8 billion by 2030
- A leading cause of preventable death globally
  - Causes six million deaths annually
  - 5 million from direct tobacco used
  - 600,000 from second hand smoke (170,000 children)
- 50% of current smokers will die from a tobacco related disease
- Results in increased economic burden – due to high medical costs of tobacco related illnesses & lost productivity
Global prevalence of cigarette smoking is ~22%

Global status report on NCDs 2014

Prevalence cigarette smoking in Jamaica is 15%

- Male: 22%
- Female: 7%

Ferguson et al. West Indian Med J 2011; 60 (4): 422
Age standardized prevalence of tobacco smoking

**Fig. 5.2** Age-standardized prevalence of current tobacco smoking in males aged 15 years and over, comparable estimates, 2012

**Fig. 5.3** Age-standardized prevalence of current tobacco smoking in females aged 15 years and over, comparable estimates, 2012

*Current smoking of any tobacco product such as cigarettes, cigars, pipes, etc. It includes both daily and non-daily or occasional smoking.*
## TABLE 2. Prevalence of current smoking* among persons aged ≥18 years, by selected characteristics — National Survey on Drug Use and Health, United States, 2006–2010†

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (yrs)</td>
<td>%</td>
<td>(95% CI)</td>
<td>%</td>
</tr>
<tr>
<td>18–25</td>
<td>36.8</td>
<td>(36.3–37.4)</td>
<td>35.0</td>
</tr>
<tr>
<td>26–34</td>
<td>33.7</td>
<td>(32.8–34.7)</td>
<td>33.6</td>
</tr>
<tr>
<td>35–49</td>
<td>28.1</td>
<td>(27.5–28.8)</td>
<td>26.1</td>
</tr>
<tr>
<td>50–64</td>
<td>22.9</td>
<td>(21.8–23.9)</td>
<td>22.4</td>
</tr>
<tr>
<td>≥65</td>
<td>9.4</td>
<td>(8.5–10.4)</td>
<td>9.2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29.2</td>
<td>(28.6–29.8)</td>
<td>27.5</td>
</tr>
<tr>
<td>Female</td>
<td>23.0</td>
<td>(22.5–23.5)</td>
<td>22.4</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>26.9</td>
<td>(26.4–27.3)</td>
<td>25.8</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>26.9</td>
<td>(25.6–28.1)</td>
<td>25.4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>22.9</td>
<td>(21.7–24.1)</td>
<td>22.9</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>42.2</td>
<td>(35.5–48.8)</td>
<td>34.4</td>
</tr>
<tr>
<td>Native Hawaiian/Other Pacific Islander</td>
<td>28.5</td>
<td>(20.9–36.1)</td>
<td>18.6</td>
</tr>
<tr>
<td>Asian</td>
<td>14.7</td>
<td>(13.0–16.4)</td>
<td>11.8</td>
</tr>
<tr>
<td>Multiracial</td>
<td>35.2</td>
<td>(31.4–39.0)</td>
<td>33.2</td>
</tr>
<tr>
<td>Educational attainment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>34.3</td>
<td>(33.0–35.6)</td>
<td>34.6</td>
</tr>
<tr>
<td>High school graduate or equivalent</td>
<td>31.1</td>
<td>(30.3–32.0)</td>
<td>30.4</td>
</tr>
<tr>
<td>Some college</td>
<td>27.1</td>
<td>(26.3–28.0)</td>
<td>25.6</td>
</tr>
<tr>
<td>College graduate</td>
<td>14.1</td>
<td>(13.4–14.8)</td>
<td>13.2</td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>27.8</td>
<td>(27.2–28.4)</td>
<td>25.4</td>
</tr>
<tr>
<td>Part-time</td>
<td>24.5</td>
<td>(23.5–25.4)</td>
<td>24.2</td>
</tr>
<tr>
<td>Unemployed</td>
<td>44.7</td>
<td>(42.3–47.2)</td>
<td>40.9</td>
</tr>
<tr>
<td>Other (Including not in workforce)</td>
<td>20.9</td>
<td>(20.2–21.7)</td>
<td>20.7</td>
</tr>
<tr>
<td>Poverty status*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;100% (below threshold)</td>
<td>36.5</td>
<td>(35.1–37.8)</td>
<td>37.9</td>
</tr>
<tr>
<td>100%–199% (at or near threshold)</td>
<td>32.8</td>
<td>(31.8–33.8)</td>
<td>31.5</td>
</tr>
<tr>
<td>≥200% (above threshold)</td>
<td>22.5</td>
<td>(21.9–23.0)</td>
<td>20.5</td>
</tr>
</tbody>
</table>

* Current smokers include all persons who smoked at least one cigarette during the 30 days before the survey.
§ Persons of Hispanic ethnicity might be of any race or combination of races.
**Health Disparities in Cigarette Smoking in LMIC**

Age-standardized prevalence estimates by education level

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Middle Income Counties</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal schooling</td>
<td>40.0</td>
<td>10.8</td>
</tr>
<tr>
<td>Less than primary school</td>
<td>36.7</td>
<td>10.6</td>
</tr>
<tr>
<td>Primary school completed</td>
<td>37.8</td>
<td>13.6</td>
</tr>
<tr>
<td>Secondary /high school completed</td>
<td>33.4</td>
<td>10.4</td>
</tr>
<tr>
<td>College completed or above</td>
<td>21.8</td>
<td>8.4</td>
</tr>
<tr>
<td><strong>Low Income Countries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal schooling</td>
<td>29.7</td>
<td>7.3</td>
</tr>
<tr>
<td>Less than primary school</td>
<td>29.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Primary school completed</td>
<td>25.8</td>
<td>2.3</td>
</tr>
<tr>
<td>Secondary /high school completed</td>
<td>19.8</td>
<td>2.1</td>
</tr>
<tr>
<td>College completed or above</td>
<td>14.7</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Hosseinpoor et al. BMC Public Health 2012, 12:912
Disparities in Tobacco Smoking in the Caribbean

- Limited available data

- One study* reported that lower educational status was significantly associated with smoking cigarettes and marijuana among men in Jamaica

- PubMed search did not identify any articles on socioeconomic disparities in cigarette smoking in Jamaica, Barbados or Trinidad and Tobago

Aims

- To estimate the prevalence of current tobacco smoking within socioeconomic status (SES) categories for Jamaican adults
- To estimate the extent of socioeconomic disparities in tobacco smoking using education and occupation as measures of socioeconomic status
Methods

- Data from Jamaica Health and Lifestyle Survey 2007-2008 (JHLS-II)
- Nationally representative sample of Jamaicans 15-74 years old
- Data on smoking obtained by interviewer administered questionnaire
Methods – Education Categories

- Data on highest level of education attained
- Classified in four categories
  - Primary or lower (up to grade 6)
  - Junior secondary (up to grade 9)
  - Full secondary (up to 11)
  - Post-secondary (vocational training, college, university)
Methods – Occupation Categories

- Reported usual occupation was coded using the Jamaica Standard Occupational Classification 1991 (JSOC)

- Grouped into four categories for analysis
  - Professionals & Managers
  - Office & Service Workers
  - Trade Workers & Farmers
  - Elementary Occupations

- Two additional categories created
  - Other: unemployed, students, retired or housewives
  - Unknown: reported occupation did not fit into any of the categories or did not respond to the question on occupation.
Methods

Sex specific estimates of disparity

- **Age-adjusted prevalence ratios** for current smoking across educational and occupational categories

- **Summary Measures of Relative Disparity:** Range Ratio, Index of Disparity

- **Summary Measures of Absolute Disparity:** Range Difference, Between Group Variance
Range Difference & Range Ratio

- **Range difference**: the difference between the maximum group rate and the minimum group rate

- **Range ratio**: the maximum group rate divided by the minimum group rate
Index of Disparity

- A summary measure of the difference between disease rates across several groups and a reference rate
- Expresses the mean deviation from the reference rate as a proportion (%) of the reference rate
- A value of zero indicates the absence of disparity
- It is useful in when comparing disparity across different diseases and different times

\[ \text{IDisp} = \left( \frac{\sum |r_j - r_{\text{ref}}|}{r_{\text{ref}}} \right) \times 100 \]

\( r_j \) indicates prevalence of the disease in the each group; \( r_{\text{ref}} \) is the prevalence in the reference group and \( J \) is the number of groups
Between Group Variance

- Calculated as the sum of the squared difference between the group rate and the population rate
- Weighted by the groups population share, i.e. the proportion of the population represented by each group
- Calculated using the following formula:

\[
BGV = \sum p_j (y_j - \mu)^2
\]

Where \( p_j \) is each group (j) population size
\( y_j \) is rate of disease in each group
\( \mu \) is the prevalence of the disease in the population or sub-population
Statistical Methods

- Statistical Analyses performed using Stata 12.1
- Prevalence estimates are weighted to account for complex survey design
- Analyses limited to participants 25-74 years
- Summary measures of health disparity were computed using the Health Disparities Calculator (HD*Calc) Version 1.2.4 software developed by the USA National Cancer Institute (http://seer.cancer.gov/hdcalc/)
- Bootstrap methods were used by the software to obtain confidence intervals for each estimate of health disparity
  - Re-estimating disparity measure on 1000 ‘samples’ drawn from the data
  - Using the lower and upper values of the middle 95% of the distribution of to represent the 95% confidence intervals
RESULTS
Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th></th>
<th>Male (n=696)</th>
<th>Female (n=1603)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age yrs. mean (SE)</td>
<td>42.9 (10.9)</td>
<td>42.8 (9.2)</td>
</tr>
<tr>
<td>Age groups % (n)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>32.6 (171)</td>
<td>32.6 (410)</td>
</tr>
<tr>
<td>35-44</td>
<td>28.6 (165)</td>
<td>29.7 (412)</td>
</tr>
<tr>
<td>45-54</td>
<td>18.2 (141)</td>
<td>17.4 (373)</td>
</tr>
<tr>
<td>55-64</td>
<td>12.1 (118)</td>
<td>10.8 (221)</td>
</tr>
<tr>
<td>65-74</td>
<td>8.5 (101)</td>
<td>9.5 (187)</td>
</tr>
<tr>
<td>Smoking Status % (n)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>49.2 (319)</td>
<td>81.0 (1304)</td>
</tr>
<tr>
<td>Past</td>
<td>25.3 (188)</td>
<td>11.1 (181)</td>
</tr>
<tr>
<td>Current</td>
<td>25.5 (189)</td>
<td>7.9 (118)</td>
</tr>
</tbody>
</table>

*P<0.001 for Male: Female difference
### Socioeconomic Characteristics of Participants

<table>
<thead>
<tr>
<th></th>
<th>Male (n=696)</th>
<th>Female (n=1603)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education level % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-secondary</td>
<td>11.9 (64)</td>
<td>9.8 (142)</td>
</tr>
<tr>
<td>Secondary</td>
<td>45.6 (276)</td>
<td>53.5 (761)</td>
</tr>
<tr>
<td>All age/junior</td>
<td>27.4 (206)</td>
<td>22.7 (419)</td>
</tr>
<tr>
<td>Primary or lower</td>
<td>15.2 (150)</td>
<td>14.0 (281)</td>
</tr>
<tr>
<td><strong>Occupation category % (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionals &amp; Managers</td>
<td>18.5 (112)</td>
<td>9.8 (141)</td>
</tr>
<tr>
<td>Office &amp; service workers</td>
<td>21.7 (131)</td>
<td>41.2 (626)</td>
</tr>
<tr>
<td>Trade workers &amp; Farmers</td>
<td>43.6 (333)</td>
<td>8.8 (171)</td>
</tr>
<tr>
<td>Elementary occupations</td>
<td>7.2 (47)</td>
<td>15.2 (231)</td>
</tr>
<tr>
<td>Other</td>
<td>1.5 (17)</td>
<td>12.6 (242)</td>
</tr>
<tr>
<td>Unknown</td>
<td>7.6 (56)</td>
<td>12.4 (192)</td>
</tr>
</tbody>
</table>

P = 0.015 for sex difference by education
P <0.001 for sex difference by occupation
Sex-specific Prevalence of Smoking by Education Categories

- **Male**: Postsecondary: 8.9%, Full Secondary: 24.9%, Junior Secondary: 26.7%, Primary or Less: 38.2%
- **Female**: Postsecondary: 5.7%, Full Secondary: 7.8%, Junior Secondary: 10.1%, Primary or Less: 6.7%

P=0.001 for men; NS for women
Sex-specific Prevalence of Smoking by Occupation Categories

P <0.001 for men; P = 0.017 for women
### Age-adjusted, sex-specific prevalence ratios for current tobacco smoking by education categories

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>p</td>
<td>OR</td>
<td>95% CI</td>
<td>p</td>
</tr>
<tr>
<td>Post-Secondary</td>
<td>1.0</td>
<td>(ref)</td>
<td></td>
<td>1.0</td>
<td>(ref)</td>
<td></td>
</tr>
<tr>
<td>Full Secondary</td>
<td>2.6</td>
<td>1.2-5.5</td>
<td>0.017</td>
<td>1.4</td>
<td>0.6 -3.1</td>
<td>0.477</td>
</tr>
<tr>
<td>Junior Secondary</td>
<td>2.9</td>
<td>1.3-6.7</td>
<td>0.013</td>
<td>1.8</td>
<td>0.8 -4.0</td>
<td>0.163</td>
</tr>
<tr>
<td>Primary or Less</td>
<td>4.6</td>
<td>2.0 -10.7</td>
<td>&lt;0.001</td>
<td>1.4</td>
<td>0.6-3.3</td>
<td>0.498</td>
</tr>
</tbody>
</table>
Age-adjusted, sex-specific prevalence ratios for current tobacco smoking by occupation categories

<table>
<thead>
<tr>
<th></th>
<th>PR</th>
<th>95% CI</th>
<th>p</th>
<th>PR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professionals &amp; Managers</td>
<td>1</td>
<td>(ref)</td>
<td></td>
<td>1</td>
<td>(ref)</td>
<td></td>
</tr>
<tr>
<td>Office &amp; Service Workers</td>
<td>2.1</td>
<td>1.2-3.7</td>
<td>0.006</td>
<td>1.1</td>
<td>0.5-2.2</td>
<td>0.844</td>
</tr>
<tr>
<td>Trade Workers</td>
<td>2.1</td>
<td>1.2-3.6</td>
<td>0.004</td>
<td>0.4</td>
<td>0.1-1.2</td>
<td>0.114</td>
</tr>
<tr>
<td>Elementary occupations</td>
<td>4.2</td>
<td>2.3-7.7</td>
<td>&lt;0.001</td>
<td>1.7</td>
<td>0.7-4.0</td>
<td>0.202</td>
</tr>
<tr>
<td>Other</td>
<td>2.4</td>
<td>0.9-5.9</td>
<td>0.064</td>
<td>0.8</td>
<td>0.3-2.1</td>
<td>0.719</td>
</tr>
<tr>
<td>Unknown</td>
<td>2.1</td>
<td>1.4-4.0</td>
<td>0.168</td>
<td>1.5</td>
<td>0.7-3.3</td>
<td>0.224</td>
</tr>
</tbody>
</table>
### Summary Measures of Relative and Absolute Health Disparity for Education and Occupation by Sex

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Education</th>
<th></th>
<th></th>
<th>Occupation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td><strong>Relative Health Disparity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range Ratio&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4.3</td>
<td>4.8</td>
<td>4.0</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Index of disparity&lt;sup&gt;2&lt;/sup&gt;</td>
<td>232.3</td>
<td>307.1</td>
<td>195.3</td>
<td>143.8</td>
<td></td>
</tr>
<tr>
<td><strong>Absolute Health Disparity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range Difference&lt;sup&gt;3&lt;/sup&gt;</td>
<td>34.6</td>
<td>8.9</td>
<td>40.2</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>Between Group variance&lt;sup&gt;4&lt;/sup&gt;</td>
<td>1.1</td>
<td>0.1</td>
<td>1.7</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>

1-Range Ratio = Highest Prevalence ÷ Lowest Prevalence
2-Index of Disparity = (Mean Deviation from Best Rate ÷ Best Rate) x 100
3-Range Difference = Highest Prevalence – Lowest Prevalence
4-Between Group Variance = Sum of [squared deviations from population prevalence x population share]

Values are comparable across diseases, sub-populations and time. Larger values suggest greater disparity. Value of zero would indicate no disparity.
Summary of Findings

- Fairly large SES disparities with lower SES bearing much higher burden
- Prevalence ratios suggest greater disparity among men
- Summary measures suggest larger relative disparity compared to absolute disparity
- Lower disparity for BGV may be due to the small size of the higher education / occupation groups
Questions / Discussion
Sex Disparities in CVD Mortality among Jamaican Adults 1996-2009
"CVD remains the number 1 cause of death globally: more people die from CVDs than from any other cause" (WHO 2015)
Global distribution of CVD mortality rates in
(age standardized, per 100 000)
CVD Mortality

- ~17.5 million people died from CVD in 2012
  - 7.5 million due to coronary heart disease
  - 6.7 million due to stroke
- CVD deaths account for 37% of the 14 million NCD deaths occurring in low and middle income countries
- CVDs are projected to remain the single most frequent cause of death in 2030 (Mathers, 2006)
Low- and Middle-Income Countries

- NCDs accounted for 68% (38 million) of all global deaths in 2012.
  - 28 million of these deaths occurred in low-and middle-income countries
  - CVD deaths account for 37% of all NCD deaths which occur under the age of 70 years

(WHO - Global Status Report on NCDs, 2014)

- Sex-specific mortality estimates in LMICs are 65% and 85% higher than in high-income countries, for men and women respectively

(WHO global status report, 2010)
Comparison of leading causes of deaths, Global, 2000 and 2012

- Ischaemic heart disease
- Stroke
- COPD
- Lower respiratory infections
- Trachea, bronchus, lung cancers
- HIV/AIDS
- Diarrhoeal diseases
- Diabetes mellitus
- Road injury
- Hypertensive heart disease
- Prematurity
- Tuberculosis

Deaths (million)

2012
2000
The 10 Leading Causes of Death by Sex, Global, 2012

Male
- Ischaemic heart disease
- Stroke
- COPD
- Lower respiratory infections
- Trachea, bronchus, lung cancers
- Road injury
- HIV/AIDS
- Diarrhoeal diseases
- Diabetes mellitus
- Cirrhosis of the liver

Female
- Stroke
- Ischaemic heart disease
- Lower respiratory infections
- COPD
- Diabetes mellitus
- Diarrhoeal diseases
- HIV/AIDS
- Hypertensive heart disease
- Breast cancer
- Prematurity
Trends in CVD mortality

- General decline in CHD between 1979 and 2003
- Between 1950 and 2005 stroke mortality decreased considerably in many countries
- Greatest declines seen in Australia, Italy, and France (8-9%), and USA (≈ 3%).
- Annual decline (1985-1992) of 6-7% in CHD seen in:
  - USA
  - Israel among men
  - France among women
- Countries such as Poland and Romania have experienced increases.

Gerber et al. 2006, Masoud et al. 2011, PAHO Basic Indicators 2011
Caribbean and Jamaica

- 4 of 5 leading causes of death in Jamaica 2004 were CVDs
  - Similar pattern for Caribbean Epidemiology Centre (CAREC)\(^1\) member countries
- Jamaica has a high burden of CVD risk factors including obesity (25%), hypertension (25%) and diabetes mellitus (8%)

\(^1\)CAREC is now part of the Caribbean Public Health Agency (CARPHA)

Ferguson T. et al., 2010
Caribbean and Jamaica

- High burden of behavioral risk factors
  - 15% prevalence of smoking in Jamaica
  - Less than 2% of the population meets requirements for adequate fruit and vegetable consumption
  - 1 in every 3 Jamaicans classified as physically inactive

Ferguson T. et al., 2010
Objectives I

- To estimate the sex-specific mortality rates for ischaemic heart disease, stroke and hypertensive diseases in Jamaica for the period 1996-2009.

- To evaluate whether mortality rates for these conditions have increased or decreased over the study period.

- To determine whether there is evidence of sex disparity using the relative and absolute difference in mortality for men compared to women.
Objectives II

- To evaluate whether any observed disparity has increased or decreased over the study period
- To compare age standardized mortality rates among Jamaicans to rates in US Blacks and Whites
## Definition – CVD classification

<table>
<thead>
<tr>
<th>CVD Categories</th>
<th>ICD-9</th>
<th>ICD-10</th>
<th>ICD Blocks Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total CVD</td>
<td>390-459</td>
<td>100-199</td>
<td>All circulatory disease</td>
</tr>
<tr>
<td>CHD</td>
<td>410-414</td>
<td>120—125</td>
<td>Ischaemic heart diseases</td>
</tr>
<tr>
<td>Hypertensive diseases</td>
<td>401-405</td>
<td>110-114</td>
<td>Essential (primary) hypertension, Hypertensive heart disease, Hypertensive chronic kidney disease, Hypertensive heart disease, Secondary hypertension</td>
</tr>
<tr>
<td>Cerebrovascular events (stroke)</td>
<td>430-438</td>
<td>160-169</td>
<td>Nontraumatic subarachnoid hemorrhage, Nontraumatic intracerebral hemorrhage, Other and unspecified nontraumatic intracranial hemorrhage, Cerebral infarction, Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction, Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction, Other cerebrovascular diseases, Cerebrovascular disorders in diseases classified elsewhere, Sequelae of cerebrovascular disease</td>
</tr>
</tbody>
</table>
Methodology - Data Sources

- **Statistical Institute of Jamaica (STATIN)**
  - Demographic statistics
  - Mid-year population data used to calculate crude mortality rates
  - Census 2001 data for standardization

- **Registrar General Department (RGD)**
  - Provided vital statistics
  - Collective pooling of deaths within the country as by law all deaths must be registered
  - All deaths were coded using classifications of ICD 10
  - Summary tables by year, age, sex, and for each CVD category electronically generated by the RGD
Methodology- Data Quality

- STATIN Demographic Statistics
  - Census identifies the population usually resident in the area whether physically present or temporarily away at the time of the census (temporarily away- less than 6 months)

- RGD vital statistics (Audit Report Death Registration 2012)

Timeliness

- Median interval time from death to registration
  - 4 days for all causes
  - 113 days for natural causes when post-mortem is required (e.g. Sudden death)

Completeness

- For year 2008, 96.6% of death reported before March 1, 2009.

McCaw-Binns and Holder, 2012
Methodology - Data Quality

- Registrar General Department (RGD) vital statistics
  
  From a 10% sample of all deaths, including foetal deaths

  - **Coding:** 26% of 1955 certificates were not correctly coded but after editing by RGD 85% were correctly coded

  - **Precision:** Only 32 (3.4%) certificates were coded to less specific codes than the data provided while 118 (6%) had transcription error, either demographic or misreading of the medical term.

McCaw-Binns and Holder, 2012
Methodology- Data Quality

- Registrar General Department (RGD) vital statistics
- From a 10% sample of all deaths, including foetal deaths

  - Validity:
    - Ill-defined or vague, non-specific conditions (garbage codes) present on 1 in every 12 death certificates.
    - Proportions with “garbage codes” less than 27%, the international average.
    - Proportions highest in deaths amongst children under 5yrs (27% in children 1-11 months, 43% in children 1-4 years)

McCaw-Binns and Holder, 2012
Methodology

- Age-, sex-, and year-specific crude mortality rates were calculated for:
  - Hypertensive diseases
  - Ischaemic Heart Disease
  - Stroke

- Denominators determined by national mid-year population for individual years

- Age standardized mortality rates were calculated using the Jamaica 2001 census population as standard

- Analyses limited to death among persons 25 years and older and population 25 years and older
Methodology - Disparity

- Measure of absolute disparity
  - CVD mortality rate difference
    \[ RD = \text{Adj. Rate}_{(m)} - \text{Adj. Rate}_{(f)} \]

- Measure of relative disparity
  - CVD mortality rate ratio
    \[ RR = \frac{\text{Adj. Rate}_{(m)}}{\text{Adj. Rate}_{(f)}} \]

- Annual percent change in males and females
RESULTS

Hypertension (Males)

Hypertension (Females)

IHD (Males)

Year | Mortality Rate/100,000
--- | ---
1996 | 79.2
1997 | 72.6
1998 | 82.7
1999 | 86.3
2000 | 71.9
2001 | 73
2002 | 66.4
2003 | 70
2004 | 63.7
2005 | 74.7
2006 | 60.6
2007 | 80.4
2008 | 67.1
2009 | 75.2

IHD (Females)

Year | Mortality Rate/100,000
--- | ---
1996 | 67.8
1997 | 68.9
1998 | 76
1999 | 78.6
2000 | 65.5
2001 | 65.5
2002 | 56.4
2003 | 72.1
2004 | 66.4
2005 | 74.3
2006 | 49.2
2007 | 71
2008 | 57.8
2009 | 65.5

**Stroke (Males)**

Year | Rate/100,000
---|---
1996 | 176
1997 | 193.3
1998 | 181.3
1999 | 173.1
2000 | 175.5
2001 | 185.4
2002 | 169.5
2003 | 172.7
2004 | 169.4
2005 | 169.6
2006 | 120.2
2007 | 164.4
2008 | 160.5
2009 | 155.2

**Stroke (Females)**

Year | Rate/100,000
---|---
1996 | 143.5
1997 | 128.4
1998 | 135.7
1999 | 129.7
2000 | 129.4
2001 | 137.8
2002 | 120.2
2003 | 126.2
2004 | 121.8
2005 | 114.8
2006 | 85
2007 | 113.8
2008 | 108.1
2009 | 113.8
Rate difference and rate ratio for Hypertension mortality among Jamaica adults 1996-2009

Hypertension (Rate Difference(M-F))

Hypertension (Rate ratio(M/F))
Rate difference and rate ratio for IHD mortality among Jamaica adults 1996-2009

IHD (Rate Difference(M-F))

IHD (Rate ratio(M/F))
Rate difference and rate ratio for Stroke mortality among Jamaica adults 1996-2009

Stroke (Rate Difference(M-F))

Stroke (Rate ratio(M/F))
Summary of Findings

- Mortality rates for stroke and hypertensive diseases in Jamaica for the period 1996 -2009 higher in males.

- Mortality rates for stroke and IHD fluctuate but generally decrease over the study period.

- The relative and absolute disparity lowest for IHD suggesting males and females have similar burden of IHD over the period under study.
Future Work

- Use of difference and ratio measures to compare age standardized mortality rates among Jamaicans to rates in US Blacks and Whites
Questions / Discussion
Comparisons between Black Individuals in the Caribbean versus Black Individuals in the U.S.

Jackson Heart Study vs. Spanish Town Cohort Study
REGARDS vs. Spanish Town Cohort Study
NHANES vs. Spanish Town Cohort Study
Teleconferencing UWI-Jamaica with Indiana University

- Skype Access
- Data SharePoint
- Sharing Datasets
- Logistic Aspects
Jackson Heart Study

- The JHS is a large, community-based, observational study whose participants were recruited from urban and rural areas of the three counties that make up the Jackson Metropolitan Statistical Area (MSA).

- The final cohort of 5,301 participants includes 6.59% of all African American Jackson MSA residents aged 35-84.

- Major components of each exam include medical history, physical examination, blood/urine analytes and interview questions on areas such as: physical activity; stress, coping and spirituality; racism and discrimination; socioeconomic position; and access to health care.
Jackson Heart Study

- At 12-month intervals after the baseline clinic visit (Exam 1), participants are contacted by telephone to: update information; confirm vital statistics; document interim medical events, hospitalizations, and functional status; and obtain additional socio-cultural information
- Questions about medical events, symptoms of cardiovascular disease and functional status are repeated annually
- At six month intervals, participants are contacted by phone to ask about stroke symptoms, hospitalizations and general health status
- Ongoing cohort surveillance includes abstraction of medical records and death certificates for relevant International Classification of Diseases (ICD) codes and adjudication of nonfatal events and deaths
Manuscript Study Proposal within the Jackson Heart Study

- There is a higher age-adjusted prevalence of HTN / stroke / CHD / DM among black individuals enrolled in the JHS as compared with those enrolled in the Caribbean surveys.

- There are differences in population attributable risk (fractions) for HTN, stroke, CHD and DM between African Americans in Jackson, MS and black participants in the Caribbean; higher in the Caribbean region.

- Several indexes will be used: the index of disparity, the slope index of inequality, the relative index of inequality, etc.

- There are differences in age-adjusted prevalence by SES categories (education) between JHS and Caribbean populations.

- Other research hypotheses
Methods

- Estimated crude and age-standardized estimates of prevalence of hypertension and diabetes mellitus within education categories
  - Education grouped as: less than high school, high school and more than high school
  - Age distribution in Jackson Heart Study used as standard population

- Age-adjusted prevalence ratios (more than high school as reference) computed using Poisson regression models

- Summary measures of health disparity computed using HD*Calc software

- Analyses limited to participants 25-74 years old
RESULTS
**Large Differences in Age-Distribution and Hypertension Prevalence and Education Achievement**

Table 1A: Characteristics of Study Participants in Spanish Town Cohort Study and Jackson Heart Study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort N=2382</th>
<th>Jackson Heart Study N=4866</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>46.5 (13.7)</td>
<td>57.8 (11.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>165.5 (8.7)</td>
<td>169.1 (9.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>72.6 (16.0)</td>
<td>91.2 (21.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>26.6 (6.0)</td>
<td>31.9 (7.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>120.7 (21.1)</td>
<td>126.6 (18.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg)</td>
<td>69.5 (13.9)</td>
<td>79.2 (10.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fasting Glucose (mmol/l)</td>
<td>5.53 (2.28)</td>
<td>5.52 (1.83)</td>
<td>0.996</td>
</tr>
<tr>
<td>Hypertension</td>
<td>26.0 (595)</td>
<td>62.2 (3025)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12.5 (297)</td>
<td>18.2 (886)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Education Category</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Less than High School</td>
<td>61.7 (1470)</td>
<td>16.4 (796)</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>24.1 (574)</td>
<td>20.3 (986)</td>
<td></td>
</tr>
<tr>
<td>More than High School</td>
<td>14.2 (338)</td>
<td>63.3 (3084)</td>
<td></td>
</tr>
</tbody>
</table>
JHS – Older Participants; STCS – Younger Participants

Figure 1A: Age Distribution in the Spanish Town Cohort by Sex

Figure 1B: Age Distribution in the Jackson Heart Study by Sex

p=0.003

p=0.05
Higher Education in the JHS Sample

Figure 2: Distribution of Education Level by Age Category (A) Spanish Town (B) Jackson Heart Study

Panel A: Spanish Town Cohort

Panel B: Jackson Heart Study

HS = High School; p < 0.001 for variation in education by age group
## Unadjusted Prevalence of Hypertension and Diabetes Mellitus by Educational Categories for Spanish Town Cohort and Jackson Heart Study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort</th>
<th>Jackson Heart Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male % (n)</td>
<td>Female % (n)</td>
</tr>
<tr>
<td><strong>Hypertension</strong>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or More</td>
<td>26.4 (33)</td>
<td>18.3 (39)</td>
</tr>
<tr>
<td>High School</td>
<td>10.6 (25)</td>
<td>11.8 (40)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>26.2 (153)</td>
<td>34.4 (305)</td>
</tr>
<tr>
<td><strong>Diabetes</strong>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or More</td>
<td>10.4 (13)</td>
<td>11.3 (24)</td>
</tr>
<tr>
<td>Some High School</td>
<td>6.8 (16)</td>
<td>6.5 (22)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>11.8 (69)</td>
<td>17.3 (153)</td>
</tr>
</tbody>
</table>

*Statistically significant differences (p < 0.001) in the prevalence of hypertension across education categories for both males and females in both studies

**Statistically significant differences (p < 0.001) in the prevalence of diabetes across education categories for both males and females in Jackson Heart Study, but for females only in Spanish Town Cohort. For males in Spanish Town p = 0.105.
### Age-Adjusted Prevalence of Hypertension and Diabetes mellitus by Educational Categories

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort</th>
<th>Jackson Heart Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Hypertension</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>More than High School</td>
<td>40.7</td>
<td>42.4</td>
</tr>
<tr>
<td>High School</td>
<td>29.0</td>
<td>40.3</td>
</tr>
<tr>
<td>Less than High School</td>
<td>27.9</td>
<td>39.0</td>
</tr>
</tbody>
</table>

**Diabetes***

| More than High School          | 18.1    | 23.9    | 14.9    | 17.6    |
| High School                    | 31.9    | 9.2     | 17.6    | 17.5    |
| Less than High School          | 12.1    | 19.6    | 18.6    | 27.2    |

*Statistically significant differences in ages adjusted diabetes prevalence estimates: Males in STC p=0.029; Females in STC p=0.029, Females in JHS p=0.002; Males in JHS p=0.248. None of the subgroups showed a statically significant difference in prevalence for hypertension across sex-groups.
Higher PRs (especially for DM) for those with less Education in JHS

Table 5: Sex-Specific Age-Adjusted\(^1\) Prevalence Ratios for Hypertension and Diabetes Mellitus in STCS and Jackson Heart Study

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort</th>
<th>Jackson Heart Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>Hypertension</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or More</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Some High School</td>
<td>0.71</td>
<td>0.99</td>
</tr>
<tr>
<td>(0.42-1.20)</td>
<td>(0.63-1.55)</td>
<td>(0.88-1.20)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>0.62*</td>
<td>1.01</td>
</tr>
<tr>
<td>(0.42-0.91)</td>
<td>(0.73-1.42)</td>
<td>(0.86-1.18)</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School or More</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Some High School</td>
<td>1.12</td>
<td>0.87</td>
</tr>
<tr>
<td>(0.53-2.34)</td>
<td>(0.48-1.56)</td>
<td>(0.92-1.64)</td>
</tr>
<tr>
<td>Less than High School</td>
<td>0.71</td>
<td>0.84</td>
</tr>
<tr>
<td>(0.39-1.29)</td>
<td>(0.54-1.31)</td>
<td>(0.96-1.69)</td>
</tr>
</tbody>
</table>

\(^*P<0.05; \^{**p<0.001\)

\(^1\)Separate models created for hypertension and diabetes mellitus as outcome. Models included outcome variable, education categories, sex (with interaction term for sex and education) and age category (in 10 year bands)
Higher Disparity Indexes in the STCS; probably reflective of higher health care access and SES differences

Table 6: Summary Measures of Health Disparity

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort</th>
<th>Jackson Heart Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range Ratio</td>
<td>1.46</td>
<td>1.09</td>
</tr>
<tr>
<td>(1.15-3.02)</td>
<td>(1.04-1.98)</td>
<td></td>
</tr>
<tr>
<td>Index of Disparity (%)</td>
<td>28.8</td>
<td>6.16</td>
</tr>
<tr>
<td>(10.3-147.7)</td>
<td>(2.98-86.6)</td>
<td></td>
</tr>
<tr>
<td>Relative index of Inequality</td>
<td>0.43</td>
<td>0.11</td>
</tr>
<tr>
<td>(-0.25-0.99)</td>
<td>(-0.42-0.53)</td>
<td></td>
</tr>
<tr>
<td>Range Difference (%)</td>
<td>12.8</td>
<td>3.5</td>
</tr>
<tr>
<td>(4.5-30.5)</td>
<td>(1.5-6.0)</td>
<td></td>
</tr>
<tr>
<td>Between Group Variance (%)</td>
<td>0.18</td>
<td>0</td>
</tr>
<tr>
<td>(0.8-7.7)</td>
<td>(0-0.9)</td>
<td></td>
</tr>
<tr>
<td>Slope index of Inequality (%)</td>
<td>12.8</td>
<td>4.6</td>
</tr>
<tr>
<td>(-6.6-31.7)</td>
<td>(-15.1,-23.4)</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range Ratio</td>
<td>2.62</td>
<td>2.59</td>
</tr>
<tr>
<td>(1.46-4.71)</td>
<td>(1.26-12.30)</td>
<td></td>
</tr>
<tr>
<td>Index of Disparity</td>
<td>106.0</td>
<td>135.4</td>
</tr>
<tr>
<td>(31.1-225.2)</td>
<td>(20.5-1022.1)</td>
<td></td>
</tr>
<tr>
<td>Relative index of Inequality</td>
<td>1.39</td>
<td>-0.27</td>
</tr>
<tr>
<td>(0.39-2.08)</td>
<td>(-1.05, 0.40)</td>
<td></td>
</tr>
<tr>
<td>Range Difference (%)</td>
<td>19.8</td>
<td>14.7</td>
</tr>
<tr>
<td>(6.0-36.5)</td>
<td>(4.4-26.9)</td>
<td></td>
</tr>
<tr>
<td>Between Group Variance (%)</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>(0-2.4)</td>
<td>(0-0.7)</td>
<td></td>
</tr>
<tr>
<td>Slope index of Inequality (%)</td>
<td>24.8</td>
<td>-4.7</td>
</tr>
<tr>
<td>(5.5-43.5)</td>
<td>(-17.0, 7.6)</td>
<td></td>
</tr>
</tbody>
</table>
The REasons for Geographic and Racial Differences in Stroke (REGARDS)

- REGARDS project, sponsored by the NIH, is a national study focusing on the factors that increase a person's risk of having a stroke.

- REGARDS is an observational study of risk factors for stroke in adults 45 years or older -- 30,239 participants were recruited between January 2003 and October 2007.

- They completed a telephone interview followed by an in-home physical exam; measurements included traditional risk factors such as blood pressure and cholesterol levels, and an echocardiogram of the heart.

- At six month intervals, participants are contacted by phone to ask about stroke symptoms, hospitalizations and general health status.

- The study is ongoing and will follow participants for many years.
REGARDS Progress

- Manuscript proposal accepted
- Data sharing agreement signed
- Preliminary analyses started
Similar differences in HTN, DM and Education when comparing STCS with the 30-site REGARDS sample

Table 1A: Characteristics of Study Participants in Spanish Town Cohort Study and REGARDS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Spanish Town Cohort</th>
<th>REGARDS</th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>46.5 (13.7)</td>
<td>64.1 (9.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>26.6 (6.0)</td>
<td>30.8 (6.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>120.7 (21.1)</td>
<td>130.8 (17.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg)</td>
<td>69.5 (13.9)</td>
<td>78.5 (10.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>% (n)</td>
<td></td>
<td>% (n)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>26.0 (595)</td>
<td>71.3 (8910)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12.5 (297)</td>
<td>30.9 (3692)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Education Category</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Less than High School</td>
<td>61.7 (1470)</td>
<td>20.0 (2498)</td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>24.1 (574)</td>
<td>27.2 (3489)</td>
<td></td>
</tr>
<tr>
<td>More than High School</td>
<td>14.2 (338)</td>
<td>52.8 (6511)</td>
<td></td>
</tr>
</tbody>
</table>
US-Caribbean Health Disparities Research
Analysis program
Year 4 update
OBJECTIVE
Evaluate disparities in health among Caribbean populations with secondary analyses of available datasets.
Analysis Framework

- **Current Disparity**: Absolute AND Relative disparity measures
- **Time Trend**: Has disparity improved or worsened?
- **Bench-marking**: Provide context to disparity measures
- **Sensitivity analysis**: Examine assumptions
Ecological analyses

**Manuscript 1**
Trends in longevity in the Americas: disparities in life expectancy in women and men, 1965-2010

**Manuscript 2**
Cause-of-death disparities in the African diaspora: exploring differences among shared-heritage populations
Trends in longevity in the Americas

International LE targets met by most countries

...population growth has dropped to replacement levels and life expectancy is relatively high...

A positive picture. But not the whole picture...
Trends in longevity in the Americas

1970: Caribbean highest LE
2010: Caribbean lowest LE

1970: Caribbean lowest LE disparity
2010: Caribbean highest LE disparity

Prospective country-level monitoring of disparities should supplement traditional metrics
Disparities in the African-diaspora

- Diabetes: 77.7, 73.6, 76.7, 73.2
- Cerebrovascular: 71.4, 64.5, 71.5, 67.9
- Heart: 77.7, 73.6, 76.7, 73.2
- Cancer: 77.7, 73.6, 76.7, 73.2
- Respiratory: 77.7, 73.6, 76.7, 73.2
- Injury: 77.7, 73.6, 76.7, 73.2
Disparities in the African-diaspora

Caribbean diabetes mortality excess

Women vs. AA: x2
Men vs. AA: x2
Women vs. WA: x4
Men vs. WA: x4
**Analysis 3**

Can comparing trends in disparities identify poorly performing health systems in the Caribbean and United States?
An analysis of mortality trends between 2000 and 2010

<table>
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</table>

**Analysis 4**

State level disparities in chronic disease mortality in the United States:
An analysis of mortality trends between 2000 and 2010

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<td>Circulate &amp; Comment</td>
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<td>Draft 02</td>
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<tr>
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</tr>
</tbody>
</table>
Manuscript 3: Disparity (Caribbean vs. US)

All-cause mortality: women & men

2000

Δ

2009
All-cause mortality: women & men

2000

869 909

Martinique
Guadeloupe
St.Lucia
Puerto Rico
USA White-American
Antigua and Barbuda
Cuba
Aruba
French Guiana
Bahamas
Suriname
St.Vincent & Grenadines
Barbados
USA African-American
Grenada
Guyana
Trinidad and Tobago
Belize

Δ

-26
-23
-22
-21
-20
-19
-14
-13
-12
-12
-10
-10
-10
-9
-3
-2

2009

750 819

Martinique
Guadeloupe
USA White-American
Puerto Rico
French Guiana
St.Lucia
Bahamas
Cuba
Aruba
Suriname
USA African-American
Antigua and Barbuda
Barbados
Belize
Trinidad and Tobago
St.Vincent & Grenadines
Grenada
Guyana
Manuscript 3: Disparity (Caribbean vs. US)

All-cause mortality: men only

2000

Δ

2009

-27
-24
-22
-20
-19
-15
-14
-13
-12
-11
-10
-9
-7
-6
-2
0
2
2
17
78

All-cause mortality rate

-27
-24
-22
-20
-19
-15
-14
-13
-12
-11
-10
-9
-7
-6
-2
0
2
2
17
78

All-cause mortality rate
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<th>2009</th>
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<th>ID</th>
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</thead>
<tbody>
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<td><strong>all-cause</strong></td>
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<td></td>
<td>-11</td>
<td>+35</td>
</tr>
<tr>
<td><strong>cvd-diab</strong></td>
<td></td>
<td></td>
<td>-16</td>
<td>+72</td>
</tr>
<tr>
<td><strong>heart</strong></td>
<td></td>
<td></td>
<td>-22</td>
<td>+30</td>
</tr>
<tr>
<td><strong>stroke</strong></td>
<td></td>
<td></td>
<td>-12</td>
<td>+27</td>
</tr>
<tr>
<td><strong>diabetes</strong></td>
<td></td>
<td></td>
<td>+2</td>
<td>-32</td>
</tr>
</tbody>
</table>
Manuscript 4: Disparity (Caribbean vs. US)

All-cause mortality
women & men
Manuscript 4: Disparity (Caribbean vs. US)

Diabetes mortality
men only

<table>
<thead>
<tr>
<th></th>
<th>MR</th>
<th>ID</th>
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</thead>
<tbody>
<tr>
<td>US-WA</td>
<td>-21</td>
<td>-44</td>
</tr>
<tr>
<td>US-AA</td>
<td>-28</td>
<td>-41</td>
</tr>
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<td>Caribbean</td>
<td>+2</td>
<td>-32</td>
</tr>
</tbody>
</table>
Manuscript 4: Disparity (Caribbean vs. US)

Diabetes mortality
men only

<table>
<thead>
<tr>
<th></th>
<th>MR</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>US-WA</td>
<td>-21</td>
<td>-44</td>
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<tr>
<td>US-AA</td>
<td>-28</td>
<td>-41</td>
</tr>
<tr>
<td>Caribbean</td>
<td>+2</td>
<td>-32</td>
</tr>
</tbody>
</table>
Manuscript 4: Disparity (Caribbean vs. US)

CVD/Diabetes mortality
women & men

<table>
<thead>
<tr>
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<th>MR</th>
<th>ID</th>
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</thead>
<tbody>
<tr>
<td>US-WA</td>
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<td>+60</td>
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<td>US-AA</td>
<td>-31</td>
<td>+72</td>
</tr>
<tr>
<td>Caribbean</td>
<td>-14</td>
<td>+35</td>
</tr>
</tbody>
</table>

- Guyana
- TnT
- Grenada
- St.Vincent
- Martinique
- Fr.Guiana
- Guadeloupe
Caribbean Data Repository

1. Data Sets Identified: 78
2. To CKAN
3. 262,000
4. 233,000
5. 73,000

CKAN, the world's leading open-source data portal platform

CKAN is a powerful data management system that makes data accessible – by providing tools to streamline publishing, sharing, finding and using data. CKAN is aimed at data publishers (national and regional governments, companies and organizations) wanting to make their data open and available.
Thank you!
The evidence and analysis programs: initial implications for future work

Nigel Unwin
Chronic Disease Research Centre
Tropical Medicine Research Institute
University of the West Indies
Findings from the Scoping and Systematic Reviews

- **Gender and diabetes/cvd risk in the Caribbean**
  - Smoking, alcohol >> in men
  - Obesity, PI, diabetes >> in women
  - Undetected hypertension >> in men
  - Poor diabetes control ? > in women

- **Male/female differences much less in the US**

- **Work to understand the basis of Caribbean gendered differences in risk**
  - Qualitative
  - Implications for prevention and control
Findings from the Scoping and Systematic Reviews

- **Health outcomes by social determinants other than gender**
  - Very limited data from the Caribbean
  - Need for new analyses – of existing data sets
  - New data collection

- **Routine mortality data in Caribbean not collated by measures of socio-economic position, such as education or occupation**
Fill an important gap in the systematic review work?

- Injuries (intentional and unintentional) as causes of mortality and morbidity
  - Differences by gender, age
  - Differences within countries by social determinants
  - Example from Belize – mortality differences by ethnic group
Probability (%) of death in Belize between the ages of 15 and 59 by ethnic group

- **All causes**
  - Mayan
  - Creole
  - Garifuna
  - Mestizo

- **Injuries**
  - Mayan
  - Creole
  - Garifuna
  - Mestizo
Some implications for future work from the mortality analyses
‘Avoidable mortality’ to assess health system performance

- Use of mortality from ‘sentinel disorders’ to assess health system performance
  - Rutstein et al (NEJM 1976)

- Sentinel disorders
  - Mortality (largely) avoidable by appropriate personal health care and/or public health interventions

- Compare mortality rates from sentinel disorders between populations
  - Relative differences imply relative functioning of the health care system/access to the system
Examined mortality trends by country, by cause, in over 60s, comparing them to the best performing countries – argue that differences represent ‘avoidable mortality’
Trends in rates of ‘avoidable mortality’ in men age 60+ in Trinidad and Tobago

‘Avoidable’ CVD/DM mortality:

- Risk factors
- Treatments

Excess deaths per 100,000 population

Communicable and nutritional diseases
Cancers, excluding lung
Lung cancer
Chronic respiratory diseases
Cardiovascular disease and diabetes
Other noncommunicable diseases
Injuries
Changes in total and CVD/DM Mortality

United States

Deaths per 100,000

-131 CVD/DM

-98 CVD/DM

Caribbean

-46 CVD/DM
Non-CVD/DM Mortality 2000/2009

Caribbean (red), African Americans (blue), White Americans (orange)
CVD/Diabetes Mortality in the US vs Caribbean
Percentage change in CVD/DM mortality, 2000 to 2009


Martinique  Aruba  Belize
USA African-American  USA All races  USA White-American
Bahamas  French Guiana  St.Lucia
Guadeloupe  Puerto Rico  Trinidad and Tobago
Caribbean  Suriname  Barbados
Cuba  Grenada  St.Vincent & Grenadines
Antigua and Barbuda  Guyana

CVD / diabetes mortality rate

CVD / diabetes mortality rate
Question: What underlies the differences in trends in CVD/DM mortality between Caribbean countries and between US states?

- How much of the differences are explained by differences in trends in risk factors?
  - E.g. smoking, blood pressure, cholesterol, obesity?

- How much of the differences are explained by differences in trends in coverage of effective health care?
  - E.g. effective treatment of blood pressure, glucose, hypercholesterolaemia, acute myocardial infarction, heart failure etc.
Example of an epidemiological model designed to answer such questions.....

**IMPACT MODEL AIMS TO:**

- Integrate treatment trends & risk factor trends

In order to:

- Explain falls or rises in CHD mortality

Source: WHO statistics 2004 Men aged 35 - 74, Standardised
IMPACT Model: Main Components

Risk Factors
- Cholesterol
- Blood Pressure
- Smoking
- Obesity/Diabetes/Inactivity
- Deprivation

Patient Groups
- Age & Sex
- Myocardial Infarction
- Angina
- Heart Failure
- 2 Prevention

Therapies
- Medical Therapy
- CABG Surgery/PTCA

Outcomes
- Survival
- Death
Explaining the fall in coronary heart disease deaths in England & Wales 1981-2000

Risk Factors worse +13%
- Obesity (increase) + 3.5%
- Diabetes (increase) + 5%
- Physical activity (less) + 4.5%

Risk Factors better -71%
- Smoking -41%
- Cholesterol -9%
- Population BP fall -9%
- Deprivation -3%
- Other factors -8%

Treatments -42%
- AMI treatments -8%
- Secondary prevention -11%
- Heart failure -12%
- Angina: CABG & PTCA -4%
- Angina: Aspirin etc -5%
- Hypertension therapies -3%

68,230 fewer deaths
Examples of similar modelling undertaken in:

- Finland
- Poland
- New Zealand
- Sweden
- Scotland

Explaining the Decrease in U.S. Deaths from Coronary Disease, 1980–2000


NEJM 2007;356:2388
Impact model for Barbados
Work in progress – Dr Sobers-Grannum

- Explain trends in CHD death rates between 1990 and 2010
  - Identify the relative contributions of:
    - Risk factors
    - Specific medical and surgical treatments

- Guide policy
  - Help identify most cost-effective approaches to reducing mortality
Possible future work:

- Case studies
  - Selected better and worse performing
    - Caribbean countries
    - US States
    - Consider AA and WA trends separately
  - What explains the differences in CVD/DM mortality trends?
  - What are the policy implications for reducing disparities in CVD/DM mortality?
Case studies – key aspects of methodology

- Develop/adapt a model that includes all CVD, not just CHD
- Minimum data requirements
  - Trends in risks factors and trends
  - Trends in coverage of effective treatments
- To guide policy and specific interventions
  - Estimate potential of:
    - Risk factor reduction
    - Improved coverage of specific treatments
  - Estimate costs of potential interventions
  - Compare cost-effectiveness
Mortality analyses – summary points

- Marked disparities in trends in total mortality
  - Between US and Caribbean
  - Within US
  - Within Caribbean

- Major contributor to these disparities is CVD/DM mortality

- Clear evidence that much CVD/DM mortality is ‘avoidable’
  - Risk factor reduction
  - Treatment of established disease
  - Treatment of acute events

- Need to understand basis of current disparities in CVD/DM mortality
  - Identify most effective points to intervene
The US-Caribbean Health Disparities Research (USCAHDR)

E-Platform:
Facilitating Collaborative Research, Training and Exposure
3rd Objective

“To establish a global health disparities E-Museum that adds content-value to UWI’s, Caribbean Knowledge and Learning Network (CKLN) broadband e-platforms and disseminates research materials for use by UWI and other educational institutions in the US and the Caribbean. USCAHDR staff will accomplish this aim through the activities of the Administrative, Research, and E-Museum Cores”
3<sup>rd</sup> Objective: operationalized

- **Provide**
  - A safe, efficient forum for sharing data and carrying comparative analyses
  - A method for delivering training in research skills
  - A site to showcase the work in order to inform stakeholders and encourage new collaborations
SharePoint 2013

- Assistance from UWI Chief Information Officer (UWI CIO)
- SharePoint 2013 chosen as the vehicle to achieve the targets
- Development of the scope document with deliverables against timelines
- Project objectives
  - Ability to share & collaborate on information and documents for internal and external users
  - Appropriate governance
  - Appropriate taxonomy
Capabilities of SharePoint 2013

- Document management
- Discussion boards
- Issue tracking
- Work-flows
- Blogging
- Wiki’s
- Site-wide searching
- Surveys
- Calendar, emails
- Others
Activities

- **Meta-data availability**
  - This is available and showcases some of our datasets
  - Published manuscripts will be uploaded soon

- **SharePoint 2013**
  - Link web-front-end to SharePoint

- **Development of and customization of websites – fit for purpose – teaching etc.**
Constraints & Threats

- **Limited human and other resources**
  - This system will require highly skilled IT personnel

- **Urgent timeline**
  - To be delivered within lifetime of the project

- **Inadequate governance mechanism**
  - Level of access and security
Suggested Structure

- **Strategy team**
  - Senior academic & administrative staff responsible for strategic insight and direction

- **Tactical team**
  - Operations
  - Support
  - Developers
Achievements to Date

- Data display

- Collaboration
  - Jackson Heart Study & Spanish Town cohort are being analyzed by Drs. Bidulescu, Younger-Coleman, and Ferguson using SharePoint
USCAHDR E-Platform for Knowledge Dissemination
www.uwi.edu/uscahdr
Requirements

- Dedicated manager – lecturer/assistant professor level

- Endorsement and support of new executive management

- Governance document and mechanism to enforce needs to be developed
  - Secure interface with the UWI ICT management system
Requirements

- **Manager**
  - Able to monitor, update, and respond to queries/requests that come in relating to data/documents on SharePoint and/or the web platform

- **IT Technician**

- **Developer – skills to be purchased**

- **Equipment**
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- Appropriate governance
- Appropriate taxonomy
## Draft Implementation Plan - Year Five

### 1. Evidence Core
- Complete Systematic-Scoping Reviews
- Complete – publish manuscripts

### 2. Analysis Core
- Complete US-Caribbean Data Comparison Analysis
- Prepare/publish manuscripts

### 3. E-Platform
- Complete UWI Web – training course (capacity building)
  - Supplemental Funds
    - UWI Web-based research course modules
    - Secure E-Platform: data access-sharing for comparative analyses

### 4. Transfer Knowledge
- Establish Taskforce to assess knowledge from USCAHDR manuscripts
- Further research to confirm findings
- Symposia: USA – Caribbean policy makers - PAHO, CARPHA
- The Way Forward: Sustain- expand Caribbean-based health disparities reduction research