Health outcomes for Puerto Ricans presents an interesting paradoxical reality for public health officials and policy makers. Puerto Ricans continue to struggle with poor health-related outcomes, such as comorbidity or the co-occurrence of other health conditions and modifiable risk behaviors when compared to their Hispanics counterparts.

Between 2000 and 2010, Puerto Ricans exhibited higher morbidity rates of cancer, diabetes, alcohol consumption, asthma as well as higher infant mortality compared to other Hispanics and major groups (Rosofsky & Aponte, 2013). In spite of this shortcoming, Puerto Ricans in U.S., showed a greater life expectancy than the national average, with 81.6% and 78.8%, respectively (Center for Disease Control and Prevention. National Center for Health Statistics, 2015).

Their overall health scenario appears to be relatively better than the population as a whole, including Non-Hispanic Whites. However, a number of health-related conditions, reduced access to healthcare services and limited healthcare coverage are setting the stage for a worrisome decline for health indicators, with the likely outcome of high morbidity and mortality.

Emerging challenges like the higher lifetime prevalence and high mortality rates for Puerto Ricans that foretell of preventable outcomes in a near future. For instance, the lifetime prevalence for diabetes, heart disease and asthma are higher among Puerto Ricans when compared to Non-Hispanic White and Hispanics overall, other Hispanic groups as well as national prevalence levels (Daviglus, Pirzada & Talavera, 2014; Félix, Bailey & Zahran, 2015; National Health Interview Survey, 2013). In addition, heart disease, diabetes, chronic respiratory disease (CRDs) related complications (eg. asthma, influenza, pneumonia and septicemia) and perinatal conditions (eg. disorders related to short gestation and low birth weight) are the main leading causes of death among Puerto Ricans in the U.S as shown on Table 1.
This chapter presents a brief state of current health including new relevant topics such as comorbidity, mental health and healthcare utilization among Puerto Ricans living in the U.S. In addition, clinical practice strategies, health policies dilemmas as well as future study directions are discussed. Data presented in this chapter include a brief overview of the literature and public available data by the Center for Disease Control and the National Health Interview Survey.

The following sections address these chronic diseases and other health related outcomes that affect Puerto Ricans in U.S.

HEART DISEASE

Puerto Ricans remained at an increased risk for heart disease due to factors associated with the prevalence of heart diseases. Among Hispanics, Puerto Ricans self-reported prevalence for heart disease was higher than national estimates and major groups like Non-Hispanic Whites, Non-Hispanic Blacks, Hispanics and residents of Puerto Rico with only Native Hawaiian and other Pacific Islander having a higher prevalence as illustrated in Figure 1. Heart diseases for Hispanics are less frequent compared to Non-Hispanic Whites; however, they are more prone to risk related factors

Table 1: Five Leading Causes of Death per 1,000 counts for US, White- Non Hispanics and Hispanics, 2013

<table>
<thead>
<tr>
<th>Leading Cause of Death</th>
<th>U.S.</th>
<th>White Non-Hispanic</th>
<th>Hispanic</th>
<th>Mexicans</th>
<th>Puerto Ricans</th>
<th>Cubans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Disease</td>
<td>171.5</td>
<td>172.7</td>
<td>128.7</td>
<td>129.2</td>
<td>171.5</td>
<td>153.9</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>21.4</td>
<td>18.7</td>
<td>28.3</td>
<td>33.8</td>
<td>33.7</td>
<td>19.6</td>
</tr>
<tr>
<td>Influenza &amp; Pneumonia</td>
<td>15.4</td>
<td>15.3</td>
<td>13.6</td>
<td>14.5</td>
<td>19.7</td>
<td>9.5</td>
</tr>
<tr>
<td>Septicemia</td>
<td>10.5</td>
<td>10.0</td>
<td>8.7</td>
<td>9.6</td>
<td>11.5</td>
<td>8.0</td>
</tr>
<tr>
<td>Perinatal Conditions</td>
<td>4.3</td>
<td>3.4</td>
<td>3.5</td>
<td>3.7</td>
<td>4.6</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Source: Domínguez, Penman-Aguilar, Chang, Moonesinghe, Castellanos, Rodríguez-Lainz & Schieber, 2015.

Figure 1. Prevalence for Heart Disease by Ethnicity, 2012-2014 (65+ Age-Adjusted Percentage)

Note: “Heart Disease” is conceptualized as the percentage of persons who answer “yes” to one or more of the following question: “Have you ever been told by a doctor or other health professional that you had… coronary heart disease, angina (angina pectoris), heart attack (myocardial infarction), or any other heart condition?” Source: Center for Disease Control and Prevention. National Center for Health Statistics, 2015.
such as obesity and poor controlled high blood pressure which may lead to future heart disease (Center for Disease Control and Prevention, 2015a). A study conducted among Hispanics from larger cities in U.S. found that Puerto Rican women have a higher prevalence of hypertension, hypercholesterolemia and obesity while Puerto Rican men report higher prevalence of smoking as a modifiable risk behavior for heart disease when compared to other Hispanic groups (Daviglus, Pirzada & Talavera, 2014).

DIABETES

Individuals with diabetes are at risk of comorbidity with hypoglycemia (low blood sugar), hypertension, dyslipidemia (higher levels of cholesterol, triglycerides or both), cardiovascular disease, stroke, blindness or eye problems, kidney failure and amputations, which increase the likelihood of dying from these conditions (American Diabetes Association, 2014). Hispanics older than 65 years of age, who have better access to healthcare insurance, are more engaged in treatment and have a better glycemic (blood sugar) control, reducing the risk of developing serious diabetes complications like cardiovascular autonomic neuropathy (nerve damage to the fibers in heart and blood vessels) than Hispanics under 65 years of age (Schneiderman, Llabre, Barnett, Carnethon, Gallo, Giachello, Heiss, Kaplan, LaVange, Teng, Villa-Caballero & Avilés-Santa, 2014). Among Hispanics, Puerto Rican women reported higher prevalence or diabetes compared to other Hispanic groups (Daviglus, Pirzada & Talavera, 2014). Diabetes rates reported for Puerto Ricans who live in the U.S. remained higher than national estimates and relative to major groups like Non- Hispanic Whites, Non-Hispanic Blacks, Hispanics, Mexicans and Asians. United States based Puerto Ricans showed a major prevalence of 36.8% diabetes mellitus when compared to residents of Puerto Rico who reported 15.7% (Center for Disease Control and Prevention, 2015b). Figure 2 shows the diabetes prevalence reported by adults of 65 years or more in U.S.

CHRONIC RESPIRATORY DISEASE

Chronic respiratory diseases (CRDs) lead to severe lifetime disease of the airways and other lung structures and are considered as one of the leading causes of death in countries like U.S. Chronic obstructive pulmonary disease (COPD), respiratory allergies, pulmonary hypertension and asthma are CRDs linked to climate change and ur-

Figure 2. Prevalence for Diabetes by Ethnicity, 2012-2014 (65+ Age-Adjusted Percentage)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexican</td>
<td>35.6</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>36.8</td>
</tr>
<tr>
<td>Hispanic</td>
<td>32.2</td>
</tr>
<tr>
<td>Asian</td>
<td>22.6</td>
</tr>
<tr>
<td>American Indian/ Alaska Native</td>
<td>38.4</td>
</tr>
<tr>
<td>Black Non-Hispanic</td>
<td>31.3</td>
</tr>
<tr>
<td>White Non-Hispanic</td>
<td>19.1</td>
</tr>
<tr>
<td>US</td>
<td>20.5</td>
</tr>
</tbody>
</table>

Note: “Diabetes” is conceptualized as the percentage of persons who answer “yes” to the following question: “Have you ever been told by a doctor or other health professional that you have diabetes or sugar diabetes?” Participants who reported borderline diabetes were not included.
ban areas due to allergens, hay fever (allergic rhinitis) and poor air quality (Pinkerton & Rom, 2015). Puerto Ricans adults reported almost twice the lifetime prevalence of asthma when compared to national estimates, Non-Hispanic Whites, all Hispanics and Non-Hispanic Blacks as shown in Figure 3. This rate was also higher than the prevalence found in Puerto Rico, where it was reported to be 17.1% for adults (Center for Disease Control and Prevention, 2015b). Besides asthma, Puerto Ricans with pneumonia (lung infection) and influenza (flu), as COPD-related conditions, and septicemia (bloodstream infection, particularly in lungs) have the highest rates of mortality when compared to US, Non-Hispanic Whites and other Hispanics (Table 1). In the U.S., Hispanics are approximately 60% more likely to require treatment at a hospital for asthma compared to Non-Hispanic Whites (Office of Minority Health, 2016). Furthermore, Hispanic children are also more likely to die from asthma than Non-Hispanic Whites. Puerto Rican children’s asthma prevalence is higher, reporting 20.7% current asthma prevalence, compared with all Hispanic (7.4%) and Non-Hispanic children (7.5%) (National Health Interview Survey, 2013).

MENTAL HEALTH

Research on diabetes, heart disease and asthma have found strong links with serious psychological distress (Center for Behavioral Health Statistics and Quality, 2014; Shih & Simon, 2008; Weissman, Pratt, Miller & Parker, 2015). Serious psychological distress might lead to diagnosable disorders such as depression and anxiety that can impair daily functioning and prolonged care (Kessler, Greif Green, Grubber, Sampson, Bromet, Cuitan, Furukawa, Gureje, Hinkov, Hu, Lara, Lee, Mneimneh, Myer, Oakley-Brownie, Posada-Villa, Sagar, Viana, Zaslavsky, 2010). Puerto Ricans showed the highest serious psychological distress prevalence in U.S. compared to national estimates and other major groups (Figure 4). Little is known about Puerto Ricans as a subpopulation and the relationship between serious psychological distress and chronic disease. Nevertheless, a recent study found that Puerto Ricans with cardiovascular disease (CVD) reported a higher prevalence of depression when compared to other Hispanics between 2008 and 2011 (Wassertheil-Smoller, Arredondo, Cai, Castaneda, Choca, Gallo, Jung, LaVange, Lee-Rey, Mosley Jr, Penedo, Santistaban & Zee, 2014). The authors also argued that despite Puerto Rican exhibiting greater mental healthcare utilization, they continue to struggle with the highest prevalence of lifetime psychiatric disorders in U.S.

Figure 3. Asthma Lifetime Prevalence by Ethnicity, 2012-2014 (18+ Age Adjusted Percentage)

Note: “Asthma lifetime prevalence” is conceptualized as the percentage of persons who answer “yes” to the following question: “Have you ever been told by a doctor or other health professional that you had asthma?” Source: Center for Disease Control and Prevention. National Center for Health Statistics, 2015.
INFANT MORTALITY LINKED PERINATAL CONDITIONS

Infant mortality due perinatal conditions in the U.S. continues to increase among Non-Hispanics Blacks, American Indians or Alaska Natives followed by Puerto Ricans. These groups have several factors that increased the risk of infant mortality, such as receiving late prenatal care, smoking during the last 3 months of gestation and the mother’s age (Mathews, MacDorman, & Thoma, 2015). According to this report, Puerto Ricans have the highest infant mortality rates per 1,000 live births for disorders related to short gestation and low birth weight (LBW), only second to Non-Hispanic Blacks in contrast to national estimates and other major groups (Table 2). Several studies on low birth weight for

Table 2: Five Leading Causes of Infant Death per 1,000 counts by race and Hispanic origin and US, 2013

<table>
<thead>
<tr>
<th>Leading Causes of Death</th>
<th>U.S.</th>
<th>NHW</th>
<th>NHB</th>
<th>AIAN</th>
<th>NHA</th>
<th>HISP</th>
<th>MEX</th>
<th>PUR</th>
<th>CSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital Malformations</td>
<td>121.5</td>
<td>114.7</td>
<td>141.6</td>
<td>154.4</td>
<td>88.8</td>
<td>129.4</td>
<td>138.3</td>
<td>96.6</td>
<td>120.3</td>
</tr>
<tr>
<td>Short Gestation &amp; Low Birth Weight</td>
<td>107.1</td>
<td>74.4</td>
<td>260.7</td>
<td>95.7</td>
<td>72.6</td>
<td>88.1</td>
<td>81.8</td>
<td>131.8</td>
<td>80.7</td>
</tr>
<tr>
<td>Maternal Complications</td>
<td>40.6</td>
<td>29.8</td>
<td>86.5</td>
<td>--</td>
<td>36.5</td>
<td>33.1</td>
<td>32.6</td>
<td>48.3</td>
<td>30.5</td>
</tr>
<tr>
<td>Sudden Infant Death Syndrome</td>
<td>39.7</td>
<td>40.1</td>
<td>73.3</td>
<td>78.3</td>
<td>14.3</td>
<td>21.6</td>
<td>22.6</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Accidents (Unintentional Injuries)</td>
<td>29.2</td>
<td>27.4</td>
<td>63.5</td>
<td>47.8</td>
<td>--</td>
<td>16.8</td>
<td>16.1</td>
<td>35.1</td>
<td>--</td>
</tr>
</tbody>
</table>

Note: U.S. = United States, NHW= Non-Hispanic White, NHB= Non-Hispanic Black, AIAN= American Indian or Alaska Native, NHA= Non-Hispanic Asian, HISP= All Hispanics, MEX= Mexican, PUR= Puerto Rican, and CSA= Central South American.

Disorders related to short gestation and low birth weight as defined by the ICD-10 include: extremely low birth weight (999 g. or less), other low birth weight (1000-2499 g.), extreme immaturity (< than 28 completed weeks of gestation), and other preterm infants (28 weeks or more but < than 37 weeks).

-- Data not shown due to imprecise and unreliable estimates.

Source: Domínguez, Penman-Aguilar, Chang, Moonesinghe, Castellanos, Rodríguez-Lainz & Schieber, 2015.

Figure 4. Prevalence for Serious Psychological Distress by Ethnicity, 2012-2014.
(Age 18 + Percentage)

Note: “Serious Psychological Distress” was measured by the K6 to screen potentially diagnosable mental disorders. Participants who score 12 or more have serious psychological distress. Source: Center for Disease Control and Prevention. National Center for Health Statistics, 2015.
Puerto Ricans women have been consistent with the following: 1) nativity does not play a substantial role when comparing U.S. born Puerto Rican women with Puerto Ricans born in Puerto Rico, and 2) residential isolation and poverty are contributors only among Puerto Rican island born women (Britton & Vélez 2015; Kaufman, MacLehose, Torrone & Savitz, 2011). These authors concluded that further research is needed to explore possible mitigating variables, such length of U.S. stay and language proficiency, to explain these outcomes. Another research gap is the exclusion of other developmental variables that might advance the study of LBW among Puerto Rican women like family discord, formal (eg. family) as well as non-formal (eg, neighborhood, school, church, work, social media, and others) support networks prior, during and after the childbirth.

HEALTHCARE UTILIZATION AND HEALTH INSURANCE

Access to healthcare and health insurance is different for Puerto Ricans when compared to other Hispanic groups due to their U.S. citizenship, which allows them to internally migrate and qualify for health programs provided by the federal and state governments (Vargas, Fang, Rizzo & Ortega, 2009). In 2013, Puerto Ricans who lived in the U.S. were more likely to be covered by either a public or private health insurance when compared to other Hispanics, Non-Hispanic Whites and Non-Hispanic Blacks (See Figure 5 & Figure 6). Puerto Ricans also revealed the highest rates for healthcare seeking behavior patterns compared to other Hispanics (Ai, LaTonya, Appel, Huang & Hefley, 2013). In addition, the rates for public health insurance coverage continues to be higher among Puerto Ricans compared to other Hispanics. Findings can also be supported by the increase of Puerto Ricans under the age of 65 who were uninsured between 2010 and 2013, from 13.7% to 15.6%, respectively (Centers for Disease Control and Prevention, 2014). The data also highlights a dramatic increase of uninsured Puerto Rican adults under the age of 65 not seen since the year 2000, when they account for 16.4% and higher than the 7.3% uninsurance rate among Puerto Ricans living in the island (Center for Disease Control and Prevention, 2015b).

CONCLUSION

This chapter has briefly presented some challenges faced by Puerto Ricans living in the U.S. The high prevalence for lifetime chronic disease and mental health as well as low birth weight found in Puerto Ricans place them at greatest risk of higher mortality rates that must be addressed. Several clinical practice strategies might tackle some of the poor health outcomes mentioned earlier like 1) improving the screening and treatment by meeting cultural sensitive standards that best fit the experience of Puerto Rican population living in U.S., 2) the use of evidence-based practices, 3) providing counseling, if needed, during treatment.

Figure 5. Medicaid Coverage by Ethnicity, 2013

Source: Center for Disease Control and Prevention, 2014
to reduce modifiable risk behaviors (e.g. smoking, alcohol and substance abuse), 4) providing mental health counseling or treatment if patient meets criteria for a clinical disorder, and 5) involve Puerto Rican families and communities in treatment to reduce possible stigma linked to health disease and mental health.

These strategies might also have a collateral benefit in decreasing some of the staggering national economic burden caused by these health outcomes ranging from $26 to $273 billion dollars, including direct (e.g. medical procedures and medical care) and indirect cost (job absence, disability and comorbidity) (American Diabetes Association, 2012; Behrman & Stith, 2007; Hankin, Bronstone, Wang & Buck, 2013; Heidenreich, Trogdon, Khavjou, Butler, Dracup, Ezekowitz, Finkelstein, Hong, Johnston, Khera, Lloyd-Jones, Nelson, Nichol, Orentein, Wilson & Woo, 2011; Greenberg, Fournier, Sisitsky, Pike & Kessler, 2015).

The economic toll resulting from these health outcomes among underserved populations like Puerto Ricans has been considered for recent health policies like the Affordable Care Act (ACA); however, much policy work is still needed. Ortega, Rodríguez and Vargas (2015), stated that despite the efforts made by ACA, healthcare needs (e.g. physical, mental, developmental, behavioral, sensory, cognitive or limiting condition) were not necessary met among underserved Puerto Ricans and other Hispanics. The authors also added that Hispanics healthcare might be improved if health policies dilemmas like the following are addressed: 1) the limited expansion of the ACA for the growing population; 2) expands the delivery of public and private healthcare systems; and 3) the need to increase Hispanic physicians as well as adding more responsibilities among Hispanic non-physicians (e.g. mental health practitioners and nurses) who work in health related settings. Furthermore, outreach efforts by healthcare professionals in community settings such as neighborhoods, non-profit organizations, faith-based organizations as well as schools may serve as additional preventive and engagement strategies for Hispanics and Puerto Ricans who live under the poverty threshold. These suggestions might diminish some of the healthcare gaps among this population and consequently improve their access, leading to a better quality of life.

Finally, this chapter seeks to encourage more research on outreach and prevention for chronic diseases, the development of health policies and healthcare standards among Puerto Ricans and other Hispanics living in U.S.
FOOTNOTES
1 Center for Puerto Rican Studies, Hunter College, City University of New York.
2 Heart disease for Puerto Rican residents included: 8.5% for angina; 5.3% for myocardial infarction and 2.2% for heart stoke (Center for Disease Control and Prevention, 2015b).
3 Hypertension, also known as high blood pressure, specifically 140/90 or greater.
4 Hypercholesterolemia is a group of familial disorders describe as elevated circulating cholesterol contained in lipoproteins in bloodstream.
5 Obesity is diagnosed among adults who meet a body mass index (BMI) of 30 or greater.
6 Diabetes mellitus, also known as diabetes, is the body inability to properly use energy or glucose due to either lack or non-production of insulin. Diabetes mellitus can be caused by genetic and insulin action defects, postpancreatonomy, drug or chemical related and gestational period, among others. Diabetes Mellitus includes Type I, usually diagnosed during childhood and Type II as the most common diagnosis among adults.
7 Integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences (American Psychology Association, 2006).

REFERENCES
The Center for Puerto Rican Studies (Centro) is the nation’s leading university-based institution devoted to the interdisciplinary study of the Puerto Rican experience in the United States. Centro is dedicated to understanding, preserving and sharing the Puerto Rican experience in the United States. Centro invites Centro Voices contributors to make use of the extensive archival, bibliographic and research material preserved in its Library and Archives.

The Centro Library and Archives is devoted to collecting, preserving and providing access to resources documenting the history and culture of Puerto Ricans. The Centro Library and Archives was established in 1973 as a component of the Center for Puerto Rican Studies. The collections include books, current and historic newspapers and periodicals, audio, film & video, manuscripts, photographs, art prints, and recorded music. The Library and Archives provides services and programs to the scholarly community as well as the general public. Constituents are diverse and come from the United States and abroad. The Library and Archives facilitates access to information on its holdings through the City University's online public catalog or CUNY+. It also provides research and information assistance via phone and email.


