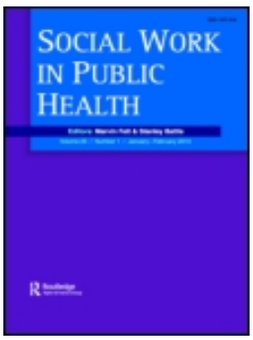

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Political Power and Health Inequalities in Vieques, Puerto Rico

Catherine K. Medina
School of Social Work, University of Connecticut, West Hartford, Connecticut, USA

Lawrence C. Pellegrini
School of Public Health and Health Sciences, University of Massachusetts, Amherst, Massachusetts, USA

Cristina Mogro-Wilson
School of Social Work, University of Connecticut, West Hartford, Connecticut, USA

The relationship between political power and the various pathways to health inequalities in Vieques, Puerto Rico, is explored. The U.S. Navy used the island for 62 years for bombing and other military exercises. The article focuses on the resulting changes to the island's socioeconomic positioning and the health inequalities over six decades. Secondary data analysis of census data using a revised World Health Organization model is used to examine the relationships of political power, labor markets, employment, material deprivation, social and family networks, and health inequalities. Findings are interpreted through a social justice lens and implications suggest the use of political advocacy for social change.

Keywords: Puerto Rico, health inequalities, political power, labor markets, material deprivation

INTRODUCTION

Vieques, known as *La Isla Nena* (Little Girl Island), is a municipality of Puerto Rico that measures approximately 21 miles long by 3 to 4 miles wide, with a total land area of 51 square miles. It is located 6 miles southeast of the main island of Puerto Rico. From 1941 to 2003, Vieques was used for bombing tests and other military practices by the United States (U.S.) Navy, and Marine Corps, for national and global security (Torres, 2005). During the Navy's 62-year occupation, 18,000 tons of bombs were dropped on the island (Gold, 2006). This political power by the U.S. military occupation of Vieques had a great impact on the socioeconomic and health status of its residents (Rabin, 2001; Santana, 2002). Over the past several years, studies have indicated higher levels of health disparities for the island of Vieques relative to Puerto Rico (D'Acunti, 2010; Nazario, Lindsey-Poland, & Santana, 2002).

In 1941, the U.S. Navy exercised its political power by expropriating two thirds of the island of Vieques—26,000 acres—and relocating Viequenses to the center of the island, where they occupied

Address correspondence to Cristina Mogro-Wilson, PhD, MSW, University of Connecticut, School of Social Work, 1798 Asylum Avenue, West Hartford, CT 06117-2698, USA. E-mail: cristina.wilson@uconn.edu

7,000 of the island's 33,000 acres (Murillo, 2001). Many of Vieques' residents were displaced from their land by the U.S. Navy and were forced to live in untitled settlements surrounded by a naval bombing range to the East and a munitions storage facility to the West. This occupation of the island and residents' properties was part of the military strategy to occupy the Caribbean region as a means to defend against the Germans during World War II. After the war, the island continued to be used for national security. The U.S. Navy rented Vieques' land, air, and ocean to North Atlantic Treaty Organization (NATO) countries and other governments for bombing practices for their military forces (*Comite Pro Rescate y Desarrollo de Vieques v. United States Navy*, 1999).

The focus of this article are the changes to the island of Vieques, Puerto Rico, and its socioeconomic positioning (i.e., changing its social structure and employment conditions), and the health inequalities that occurred over the six decades of U.S. use for national security. The authors analyze historical data during different periods of the military presence to explore the relationship of employment conditions and health inequalities using a modified World Health Organization (WHO) theoretical framework. The WHO model explores the relationship between macrostructural domains such as political power relations, labor markets, employment, material deprivation, social and family networks, and health inequalities. The authors conducted secondary data analysis using a revised WHO model to examine the relationship of the latter domains to health inequalities in Vieques. The findings are interpreted through a social justice lens, drawing attention to health inequalities promoted by the U.S. political policies that affected Vieques' economic and social well-being.

This work contributes to the social work literature because of the profession's emphasis on a just society that promotes freedoms by embracing values such as (a) the equal worth of all citizens, (b) equal right to meet basic needs, (c) spreading opportunity and life chances as widely as possible, and (d) reducing and eliminating unjustified inequalities (Finn & Jacobson, 2008). The WHO model focuses on eliminating health disparities by promoting equity in political and economic institutions (fair standards in the distribution of resources). The authors use a social justice lens to understand the expropriation forced on the Viequenses and the influence of this political power on the island's socioeconomic restructuring and its intersection with the various pathways to health inequalities. According to a social justice framework, basic freedoms must be equally distributed throughout society (Rawls, 1971). This framework draws from egalitarian principles that every member of society be guaranteed the same rights, opportunities, and access to goods and resources.

The authors note that the story of Vieques, Puerto Rico, is historically driven and contextually bound because of the political relationship with the United States. Viequenses are U.S. citizens who cannot vote for the president, and have no voting representation in Congress, yet they serve in the U.S. armed forces to defend America's political power globally. The article concludes with implications for social work and public health advocates to support *La Lucha* ("the struggle") against the historical inequalities in Vieques and to join the Viequenses in the restoration of the island's environment and other resources vital to develop an equitable, sustainable, and healthy society (Torres, 2005). La Lucha has now transcended to a development movement toward increasing equity and ensuring citizen participatory processes in decision making about Vieques' present and future health status.

THEORETICAL MODEL

WHO (2010) acknowledged the pervasiveness of health inequalities around the world and established the Commission on Social Determinants of Health. WHO (2010) noted that social determinants of health are mostly responsible for health inequities—the unfair and avoidable

differences in health status seen within and between countries. Social determinants are defined as the conditions in which people are born, grow, live, work, and age, including the health system (WHO, 2010). Living circumstances are shaped by the distribution of money, power, and resources at global, national, and local levels and are influenced by policy choices of diverse societies. The goal of the commission was to advance health equity by addressing the social factors that lead to health inequalities (WHO, 2010). The Commission identified nine social determinants of health themes: early child development, globalization, health systems, measurement and evidence, urbanization, employment conditions, social exclusion, priority health conditions, women and gender equity. These key themes are integral to driving action to reduce health disparities among social groups within and between countries.

Knowledge around these health themes was developed by various knowledge networks established by the Commission. These networks consisted of field experts who collaborated and made recommendations that would help countries redress policies, conduct structural interventions, and establish leadership to create health equity in societies. Consequently, the Commission built a threefold global agenda to address health equity that involves (a) improving daily living conditions; (b) tackling the inequitable distribution of power, money, and resources; and (c) measuring and understanding health inequities while assessing the impact of implemented action (WHO, 2008). These equity principles guide the Commission's recommendations on promoting health equality in all nine social determinants of health themes.

The WHO Employment Conditions Knowledge Network (EMCONET; Benach, Muntaner, & Santana, 2007) introduced a socioeconomic conceptual model to describe and understand the link between employment conditions and health inequalities. Socioeconomics explores the relationship of economic conditions to social circumstances, often triggered by some precipitating event. The WHO model aims to capture the varying pathways to health inequalities, including the association between political power relations and several macrostructural domains. For the purpose of this article, the authors are examining (a) the pathway of the political power market (military occupation) on the labor market and industrial composition, (b) subsequent employment conditions, and (c) the influence of demographics, social and family supports, and material inequalities on health inequalities in Vieques. Political power market (first domain) represents corporate, military, or other institutional-based concentrations of power. This concentration of power through policies or programs shapes labor market regulations or industrial relations (second domain) that subsequently affect employment conditions (third domain) within that labor market. The impact of these three domains might lead to increased economic disadvantages for some groups within society as represented by material deprivation and economic inequalities (fourth domain). However, the strength of this impact is moderated by demographics and the presence of social and family networks (fifth and moderating domain). The concluding impact of all of these domains might lead to health inequalities (sixth domain). The next section, explores the relationship between the domains and health inequalities.

WHO Model Domains

Political power market and health inequalities. Political power market is a market structure where the distribution of goods and services (supply and demand) is controlled by external regulations by government or monopolies and represents an institutional-based concentration of power. Main political actors, however, not only redistribute resources affecting social stratification, but also have the power to affect the life experience of different social groups. To determine the level of equality present in a given society, it is necessary to examine how power relations redistribute economic resources (Benach, Muntaner, & Santana, 2007). According to Navarro and Muntaner (2004), social inequalities in health are fundamentally the result of a "political economy of health" meaning that a concentrated base of political power relations can decide

different outcomes for public health within a society (Navarro et al., 2006; Navarro & Shi, 2001). Because of this political economy of health, Benach, Muntaner, and Santana (2006) noted that macrostructural indicators as pathways to health inequalities are contingent upon specific social and historical contexts and processes.

Labor markets and health inequalities. Labor markets are defined by supply and demand, and a sustainable economy and environment. Economists consider a labor market free when wages are set by the forces of supply and demand, and not by nonmarket factors (such as minimum wage laws, or pressure from unions). In a competitive labor market, workers compete for jobs and employers for workers based on demand for goods and services. In an efficient labor market, individuals can find employment within a reasonable distance from home or can readily change jobs without changing their place of residence. Power in labor markets implies full employment, adequate wages, labor regulations, protection of the labor force despite the insecurities in the labor market, and a healthy environment. Evidence suggests that mortality is significantly higher among temporary workers as compared to permanent workers (WHO, 2008). The failure of the labor market to meet the economic needs of a population is the source of social problems such as poverty, unemployment, and health disparities.

Employment conditions and health inequalities. Employment and working conditions have powerful effects on the health status of a country. Fair employment and decent employment conditions provide financial security, and promote social status, personal development, and social relations. According to EMCONET recommendations (Benach, Muntaner, & Santana, 2007), economic insecurity related to employment conditions (nonfixed term contracts, no contract, part-time work, not earning a living wage, precarious employment, no economic opportunities or competitiveness) have adverse effects on the health and well-being of members of society. The macrostructural framework reflects the need for employment relations to be considered within the larger institutional context of the people's social and economic positioning in a global, competitive economy. WHO (2008) noted that through the assurance of fair employment and work conditions, government, employers, and workers can help eradicate poverty, alleviate social inequities, and enhance opportunities for health and well-being. A healthy work force enhances productivity and societal well-being by increasing its citizenry's chances for successful social and economic development and social mobilization in the market place (developing small businesses, protecting its resources and ecosystems, and building an infrastructure for job sustainability).

Material deprivation, economic inequalities, and health inequalities. Material deprivation and economic inequalities are realities for many children, women, and families and often lead to poverty. There are strong and pervasive links between poverty and health (Berkman & Kawachi, 2000; Braveman & Gruskin, 2003). According to Braveman and Gruskin (2003), a societal commitment to health necessarily implies a commitment to reducing material deprivation and the multiple social disadvantages associated with it. The right to health is the capacity to have healthy environments, economic security, and the social determinants of health previously listed (WHO, 2008). This same report purports that too often, structural inequities are systematic—meaning that inequities are produced by social norms, policies, and practices that are not only tolerated, but also promoted by unfair and unjust distribution of power, wealth, and necessary social resources. In fact, evidence indicates that the socioeconomic development of wealthy countries is strongly supported by publicly financed infrastructures and universal public services (WHO, 2008). The emphasis on public finance, given the market failure to supply vital goods and services equitably, implies strong public sector leadership and adequate public expenditure to achieve material and economic success in a country. The quest for economic security requires a foundation of interdependent and

mutually reinforcing pillars of economic and social development and environmental protection by local and national government.

Social and family networks and health inequalities. Social support and family networks are protective factors that offer social, emotional, and economic support to mitigate distress and illness. Globally, studies indicate that networks such as marriage, family contacts, and group affiliations can be linked to mortality after controlling for baseline differences in health status (House, Landis, & Umberson, 1988; Kawachi, Colditz, Asherio, Rimm, & Giovannucci, 1996). Confidants for understanding and assistance—providing access to information, influence, and resources—are critical sources of social support (Antonovsky, 1979; Thoits, 1986). According to Cabrera and Padilla (2004), the presence or lack of strong family or network supports may influence the motivation to participate in the life of a community and overcome extreme poverty. Sale et al. (2005) underscored the importance of family relationships and connectedness for Latinos as a protective factor in physical and mental health. In relationship to health disparities, Stratton, Hynes, and Nepaul (2009) noted that social supports within Latino families are likely to play a role in positive health status in comparisons to other racial and ethnic groups. Family composition is strongly correlated to poverty, and the families at greatest risk of poverty in the United States are those headed by single females (Karger & Stoesz, 2006).

Health inequalities or health disparities. *Health inequalities* and/or *health disparities*[1] do not refer to all differences in health, but to a particular type of difference in health. Disparities point out how social groups such as the poor, racial/ethnic minorities, women, and other groups who have experienced persistent social disadvantage or discrimination also experience worse health or greater health risks than more advantaged social groups (Braveman, 2006). Social advantage is determined by one's relative position in a social hierarchy based on wealth, power, and privilege. Furthermore, Carter-Pokras and Baquet (2002) noted that a health disparity is viewed as a chain of events signified by a difference in (a) environment; (b) access to, utilization of, and quality of care; (c) health status; and (d) a particular health outcome that deserves scrutiny. Public health studies about Vieques have often focused on the role that naval contamination has played in the development of health disparities on La Isla Nena. However, research documents that poverty, income and wealth inequality, poor quality of life, and low socioeconomic conditions are the major risk factors for ill health and health inequalities. Conditions such as polluted environments, inadequate housing, absence of mass transportation, and lack of employment opportunities are implicated in producing inequitable health outcomes. These systematic, avoidable disadvantages are interconnected, cumulative, intergenerational, and associated with lower capacity for full participation in society. Great social costs arise from these inequities, including threats to economic development, democracy, and the social health of the nation (Ramirez, Baker & Metzler, 2008).

The most important influences on the health status of a population subgroup could potentially be shaped by policies (Braveman, 2006). According to WHO (2008), political, social, and economic policies shape forces that help or hinder peoples' ability to grow, develop, and fully participate in a society. WHO noted that the unequal distribution of health is not a natural phenomenon, but the result of a toxic combination of poor social policies and programs, unfair economic and social arrangements, and ineffectual politics. Structural inequalities in social institutions are responsible for a major part of poor health outcomes (Institute of Medicine, 2002; Whitehead, 1990, 1992).

Purpose of Study

This article utilizes the macrostructural framework of WHO's employment conditions model to understand the link between the military expropriating the land from Puerto Rico's Viequense

people and changes to the various domains that generate health inequalities. The study aims to examine health inequalities in Vieques over six decades (1940–2000) by examining the following domains within the model: political power markets, labor markets, material deprivation and economic inequalities, and social and family networks.

METHOD

Approach and Analysis: The Modified WHO Framework

Although the WHO model offered an overarching conceptualization to the situation in Vieques, its theoretical underpinnings needed to be modified to account for the uniqueness of the Viequense situation. The developers of the WHO model acknowledged "difficulties inherent in establishing an overall framework that works for the entire world," and encouraged modifications to the model for its usefulness and applicability (Benach et al., 2007). The modified WHO framework (Figure 1) represents six domains: political power, demographics, labor market and industrial composition, material inequalities, social and family networks, and health inequalities. The model focuses on the influence of political power on health inequalities, as they are affected by employment conditions.

Secondary Data Analysis

For the various domains that are pathways to health disparities, the authors collected secondary source data. The *United States Census Bureau's Decennial Census* from 1940 to 2000 is collected and published every 10 years and includes data for the municipality (*municipio*) of Vieques, Puerto Rico. Decennial census data are used for congressional redistricting and give information regarding households, income, education, homeownership, and more for the United States, Puerto Rico, and other territories. We gathered data for each decade from two distinct volumes: general population characteristics, and social and economic characteristics. The first volume, general population characteristics, includes data on age, sex, marital status, household dynamics, and family characteristics. The second volume, social and economic characteristics, includes data on labor force size, labor force participation rates, industry, occupation, work status, income, poverty, unemployment, and educational attainment. Labor force participation data (males) and industrial data were gathered for all decades excluding the year 2000. The U.S. Census Bureau did not publish this data for that decade.

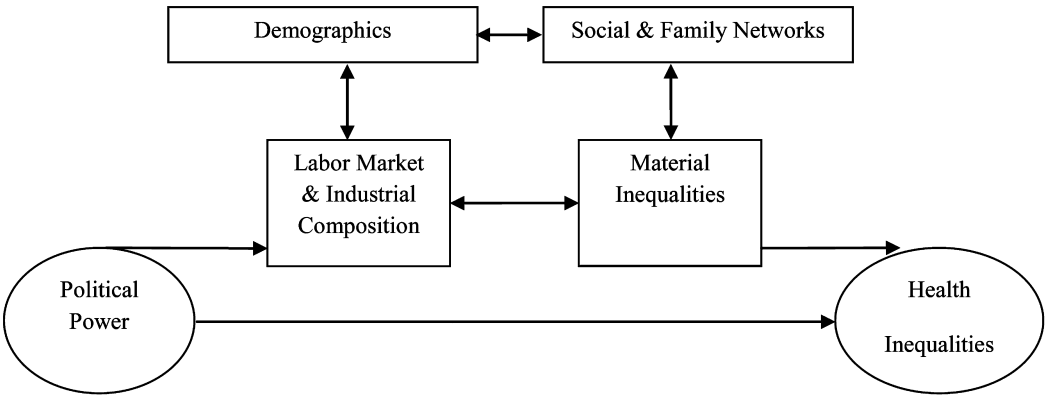

FIGURE 1 Modified WHO framework. Political power: Pathways to health inequalities.

Measures

The political power domain is defined as the expropriation of land by the U.S. government. The United States, under the judgment of the Federal Court, was granted the right of immediate possession and gave Vieques residents 10 days to vacate the property (Ayala & Carro, 2005; Murillo, 2001).

The health inequalities domain is defined by the differences in health between the main island of Puerto Rico and Vieques, based on scientific studies and public health documents.

The following domains are all from data gathered from the decennial census. The demographics domain is defined by total population counts, gender- and age-specific population concentration ratios, and total average age for the municipality of Vieques. The labor market and industrial composition domain is defined by labor force size, gender-specific labor force participation rates, and industrial sector. The material deprivation and economic inequalities domain is defined by changes in gender-specific labor force participation rates, unemployment, and the percentage of families below the poverty line. The social and family networks domain is defined by: concentration of females to males age 20 to 39, average household size, percentage of females who are married with spouse present, percentage of female-headed households, percentage of female-headed households with children younger than age 18, and the percentage of the population older than age 65.

FINDINGS

Changing Socioeconomic Positioning on the Island

In the following section, the various domains are examined in relationship to pathways of health inequalities.

U.S. political power. Change in the power structure came to Vieques in 1941, when the U.S. Navy expropriated 25,353 acres of land for military use and forced the Viequenses to move to 7,000 acres at the center of the island (Ayala & Carro-Figueroa, 2006). The island was under siege by the U.S. political power of the military services (including Marines, Army, and Air Force), controlling the land, ocean, and air space for their training. The United States neglected the island's interests for 60 years (Washington Post Editorial, 1999), because the expropriation reduced the likelihood to earn a living, farm, fish, and to access the natural ecology upon which the residents relied for daily sustenance. The Viequenses did not have a choice, or legal or financial resources about the loss of their land or being relocated to untitled settlement plots. The lack of land titles prevented Viequenses the opportunity to secure loans to build adequate housing and deprived them of financial security, transfer of wealth to their children, or the capability to invest or compete in a fair market with access to goods and resources (McCaffrey, 2008).

Demographics and employment conditions. The land expropriation had an impact on Vieques' demographics on two levels. First, the land expropriation reduced the size of the island's housing stock, forcing many residents to leave the island as their homes were taken away from them by the U.S. Navy. This seizure of property forced a primary exodus from the island, as reflected in the decennial census population drop from 10,362 individuals in 1940 to 9,228 individuals in 1950 (U.S. Census Bureau, 1942, 1953). Second, the land expropriation served as an immediate shock to the island's agricultural economy, forcing many residents to leave the island as their agricultural land and its corresponding jobs were lost. This seizure of property and resulting unemployment forced a secondary exodus from the island, as reflected in the decennial census population drop from 9,228 individuals in 1950 to 7,210 individuals in 1960 (Table 1). Between

TABLE 1
Political Power: Changing Socioeconomic Positioning on the Island

	Year						
Demographics	*1940*	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
Total population	10,362[a]	9,228	7,210[b]	7,767	7,662	8,602	9,106
Males, aged 20–29	903[a]	573	393[b]	671	524	673	560
Females, aged 20–29	838[a]	635	417[b]	505	524	643	545
Males, aged 30–39	559[a]	448	306[b]	351	353	526	509
Females, aged 30–39	522	484	352[b]	384	473	479	540[a]
Average age of total population	17[b]	16.8	18.6	21.6	25.5	28.6	34.5[a]
Industrial Composition; Percent of Population Working in	*1940*	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
Agriculture	64%[a]	51%	41%	7%	2%	2%[b]	N/A
Construction and mining	1%[b]	3%	9%	10%[a]	9%	9%	N/A
Manufacturing	12%	4%[b]	7%	30%[a]	20%	12%	N/A
Professional and related services	3%[b]	8%	9%	17%	20%[a]	15%	N/A
Public administration	1%[b]	9%	5%	9%	24%[a]	19%	N/A
Wholesale and retail trade	6%[b]	10%	13%	13%	12%	22%[a]	N/A
Labor Market	*1940*	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
Total labor force	N/A	2,170	1,820	2,184	1,798[b]	2,767[a]	2,386
Male labor force participation rate	N/A	68%[a]	67%	60%	46%[b]	57%	N/A
Female labor force participation rate	N/A	15%[b]	15%	29%	25%	34%[a]	27%
Females w/children < six labor force participation rate	N/A	N/A	N/A	N/A	39%[a]	34%	29%[b]
Material Inequalities	*1940*	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
Unemployment rate	N/A	2%[b]	2%	9%	24%	26%	28%[a]
% of families below poverty line	N/A	N/A	N/A	69%	76%[a]	70%	61%[b]
Social and Family Networks	*1940*	*1950*	*1960*	*1970*	*1980*	*1990*	*2000*
% of population who are female, aged 20–39	48%	52%	52%[a]	47%[b]	53%	48%	50%
Average household size	N/A	5.1[a]	4.26	3.93	3.28	3.17	2.74[b]
% of females who are married w/husband present	87%[a]	N/A	61%[b]	86%	N/A	N/A	N/A
% of total households who are headed by females	14%[b]	N/A	N/A	20%	21%	26%	30%[a]
% of female-headed households w/children < 18	N/A	N/A	N/A	10%[b]	10%	14%	14%[a]
% of population, age 65+	N/A	4%[b]	8%	9%	11%	12%	14%[a]

[a]Denotes high value for 1940 to 2000 time period.
[b]Denotes low value for 1940 to 2000 time period.

1940 and 1960, 3,152 Viequenese emigrated, reflecting a 30% population decrease in two decades. The most noticeable impact can be seen in the numbers of males age 20 to 39 living on the island. In 1940, 1,462 males age 20 to 39 resided in Vieques (approximately 14.1% of the island's total population), compared to 699 males age 20 to 39 in 1960 (9.7%) (U.S. Census Bureau, 1942, 1963). By 1960, sizeable numbers of males had left the island for opportunity elsewhere, and they did in greater numbers than their female counterparts. In 1940, the female-to-male concentration ratio for individuals age 20 to 39 was 48.2%, compared to 52.4% in 1960 (Table 1). For more than 25 years, there was a decline in the Vieques population, and the average age of the total population

changed from 17 years in 1940 to 35 years in 2000 (U.S. Census Bureau, 1942, 2002). Population shifts and migration patterns affect the labor market and industrial composition because of the changes in the demographic profiles of Viequenses who remained to work.

Labor market and industrial composition. Prior to the naval arrival in 1941, the Vieques economy was dominated by agriculture, which employed approximately 64% of working Viequenses. Nearly 73% of employed males and 4% of employed females found employment on one of Vieques' farms, which comprised largely sugar cane and some farming crops. During this period, approximately 86% of all household families were young, large, and overwhelmingly headed by males (U.S. Census Bureau, 1942). From 1940 until 1960, as the agricultural sector began to disappear, these were relatively flat years with very little industry. The size of the labor force shrank along with that of the overall population.

After 1960, renewed labor force growth and industrial reconfiguration of the island began to take place. Those industrial sectors include agriculture, manufacturing, public administration, professional and related services, and wholesale and retail trade (U.S. Census Bureau, 1942, 1953, 1963, 1973, 1984, 1993). Throughout this industrial reconfiguration, the population of males age 20 to 39 showed great volatility based upon the availability of paid work. The population of females age 20 to 39 grew consistently each subsequent decade after 1960, when the total population of the island was at its lowest. Like their male counterparts, working-age females were equally drawn to the Vieques manufacturing sector. They also gravitated toward the public administration, professional and related services, and wholesale and retail trade sectors. The latter three industry sectors have managed stable growth, all peaking in employment during the 1980 to 1990 reporting periods, as opposed to the demise of agriculture (which peaked in 1940) and manufacturing (which peaked in 1970) (U.S. Census Bureau, 1942, 1953, 1963, 1973, 1984, 1993).

For all working-age males who did remain on the island, their labor force participation waned along with the sectors that once employed them. Table 1 displays the evolving role gender has played in the labor market in Vieques. In 1960, approximately 67% of working-age males participated in the labor market as compared to 15% of working-age females. Subsequent decades reveal decreasing rates of labor market participation by males and increasing rates of labor market participation by females. For males, the low point for labor market participation occurred in 1980, when roughly 46% of working-age males participated. For females, the high point for labor market participation occurred in the subsequent decade, 1990, when roughly 34% of working-age females participated. Women doubled their work force participation between 1960 and 1990 (U.S. Census Bureau, 1963, 1973, 1984, 1993).

Material deprivation and economic inequalities. Although females assumed a larger role in the labor force, the labor force itself was shrinking relative to the total population of working-age males and females in Vieques.

A pronounced increase in unemployment on the island of Vieques began after 1960, when the unemployment rate went from approximately 2% to 9% (U.S. Census Bureau, 1963) parallel to farming as an industry declining. A sharp 15% increase in unemployment occurred between the 1970 and 1980 reporting periods (increasing from 9%–24%) and has been steadily increasing ever since (U.S. Census Bureau, 1952, 1963, 1973, 1984). In 1990, the unemployment rate was approximately 28% (U.S. Census Bureau, 1993).

The combination of limited labor market opportunities coupled with high unemployment resulted in steadily increasing percentages of families living below the poverty line. This rate peaked in 1980 at roughly 76% and has been receding slowly throughout the subsequent decades (U.S. Census Bureau, 1984). During the period of high poverty reported in the 1980 decennial census, females became even more active in the labor market to support their families, as reflected in the 39% labor force participation rate of females with children younger than age 6. U.S. Census

(2002) data indicate that: 61% of families are living below the poverty line; median household income in 1999 dollars was $9,331 (compared to $41,994 for the United States as a whole); and 35.8% of the population age 16 years and older was in the labor force (compared to 63.9% for the United States as a whole).

Social and family networks. The implication of material inequalities on health affected the composition of social and family networks of Viequenses living on the island. Since the 1980 reporting period, significant numbers of individuals have moved back to Vieques (U.S. Census Bureau, 1984, 1993, 2002). As a result, the female-to-male concentration ratio for individuals age 20 to 39 has become balanced at 50% (U.S. Census Bureau, 2002). In spite of the gender rebalancing, the percentage of total households headed by females still stands at an all-time high at 30%, and 14% have children younger than age 18 (U.S. Census Bureau, 2002). This report further states that though the percentage of families in poverty has decreased significantly from its 1980 high of 76%, it still stands at 61%, with a disproportionate number of those families comprising female-headed households with children (Table 1).

Health inequalities. There have been five released federal public health assessments (PHA) by the Agency for Toxic Substances and Disease Registry (ATSDR) from 2001 to 2013. The latest ATSDR report (2013) concludes with other PHA findings that contaminants in the evaluated pathways (review of existing soil, air, groundwater, and seafood data) were not at levels expected to cause health effects except for a single local well. In addition, ATSDR is no longer concluding that it is safe for everyone to eat fish because of mercury levels (ATSDR, 2013, p. xi). According to ATSDR estimating combined doses from multiple pathways on Vieques is hampered by a lack of knowledge of the levels of chemicals residents are exposed to through various pathways (e.g., eating seafood, ingesting soil, drinking water, and breathing air or the military chemical related activities). Yet ATSDR (2013) agrees that bombing activities are likely to have increased contaminant levels in parts of the Vieques environment. ATSDR notes that health outcome data indicates elevation in chronic disease prevalence, cancer incidence and mortality among Viequense population compared to Puerto Rico (ATSDR, 2013, p. xiv). Under research limitations, ATSDR note that methodological concerns in analyses about the effects of hazardous substances are complex and difficult to interpret (ATSDR, 2013, p. xiv; U.S. Department of Health and Human Services, 2013, p. 58).

U.S. Representative Rangel investigated contamination in Vieques and discovered that

> A number of studies conducted by well-qualified scientists from universities in the United States and in Puerto Rico reveal that there is a high probability that the compounds released by the Navy exercises and chemical testing created toxic levels in the environment and could be the cause of serious medical conditions affecting the people of Vieques. (Friedman, 2006, p. 8)

Although there is no evidence of a direct causal relationship between the Navy expropriation and health inequities on Vieques, there is a relationship with identified mercury and metal levels from the waters surrounding Vieques that pose public health concerns. In addition, scientists in Puerto Rico produced heart and hair studies that challenge ATSDR's (2013) findings of no conclusive evidence to military origins (Colón de Jorge, 2000; Mansilla-Rivera & Rodríguez Sierra, 2009; Ortiz-Rogue & Rivera, 2004; PRDOH, 2006).

In a 2007 report by the Puerto Rico Department of Public Health, Viequenses have elevated risks of health problems in comparison to the inhabitants of the main island Puerto Rico. For example, residents of Vieques have 25% higher infant mortality rates, 16% higher asthma rates, 27% higher cancer rates, 28% higher diabetes rates, 95% higher cirrhosis of the liver, and 381% higher hypertension rates than residents of the main island (Ginty, 2007; Rothman, 2010). In

addition, Viequenses are more likely to have skin problems, infertility, and low birth weight than residents of the main island (Koehler, 2010). This report indicates that the incidence of cancer is higher in Vieques than Puerto Rico's 77 other municipalities. There is empirical evidence that women have been seriously affected by cancers of the breast, cervix, and uterus, and that there has been a 300% increase in these cancers in the last 20 years (Rothman, 2010). With almost 60 years of constant pounding with live ammunition, including depleted uranium, napalm, and other toxic chemicals, the environment is highly polluted, affecting the area's rich ecosystem. Heavy metal contaminants (arsenic, lead, mercury, cadmium, aluminum) and unexploded ordnance numbering 18,700 live shells or bombs have all had an impact on the air, the land, and the water, and have affected the health of the Viequenses.

DISCUSSION

For more than 60 years, Vieques endured an unequal burden of socioeconomic hardships and health inequalities in the name of U.S. national security and global security (Koehler, 2010). This controlled militarism and colonialism shifted the balance of power and social and economic relations within Puerto Rican society, making Vieques a subordinate entity (a colony within a colony; Acosta-Belen & Santiago, 2006). Although the major expropriation of land occurred between 1941 and 1943, the U.S. Navy attempted repeatedly to obtain the entire island. Politically, it was unable to justify the complete removal of the Viequense people because of the resistance from the Puerto Rican people (Billing & Pinderhughes, 2004). By 1947, the U.S. Navy was using three fourths of Vieques' land, air, and surrounding ocean. The government of Puerto Rico abandoned the island-municipality relationship to its own fate. Local politicians were reluctant to file grievances against the Navy because they viewed it as an unattainable battle against U.S. political power associated with colonialism (D'Acunti, 2010; McCaffrey, 2008). During the decade from 1950 to 1960, the Viequenses migration was influenced by Operation Bootstrap (1945–1960), a U.S. and Puerto Rico government development program. Fostering migration to U.S. inner cities was the adopted political strategy to deal with the unemployment problems in Puerto Rico and Vieques, providing low-wage labor for manufacturing and agricultural employers in the states and the Virgin Islands (Acosta-Belen & Santiago, 2006). Although Operation Bootstrap aimed to industrialize the main island of Puerto Rico to produce sugar, tobacco, and garments—and also to consume U.S. products—the strategy neglected the development needed in Vieques because of the military expropriation of land. The Viequenses experienced the unfairness of such a policy, and the population was forced to migrate in search of jobs. Similarly, the industrialization process of Operation Bootstrap in Puerto Rico had an incentive to have U.S. manufacturers locate their operations on the main island. Thus, a federal tax-exemption program, Section 936 of the Tax Reform Act of 1976 (H.R. 10612) was introduced to attract U.S. industrial capital into the main island. This forced many Viequenses, mostly males, to travel to the main island for employment. Since the 1970s, the only manufacturing business that actually moved their plant to Vieques was General Electric, employing a few hundred workers. Significant numbers of males age 20 to 39 returned to Vieques, as documented in the 1970 census, to work in the construction, mining, and manufacturing industries. When growth in these sectors turned negative by the subsequent decade, as documented in the 1980 census, the population of males age 20 to 39 receded significantly, as well. Although construction, mining, and manufacturing appeared to be a draw for working-age males, much like agriculture was, those industries were unable to produce long-term sustainable jobs for these males to develop roots on the island, forcing them to leave the island once again to find employment.

A major consequence of the manipulation of the labor force on the main island and in Vieques has been the increased dependency of the island government on the influx of federal funds to

provide essential social services to the poor and unemployed, and to provide an infrastructure to support public agencies including some access to health care and the pavement of roads (Acosta-Belen & Santiago, 2006). However, this economic dependency exists alongside the political subordination and limited political power for self-government and self-determination granted to island Puerto Ricans by the U.S. Congress.

The demographic profiles of individuals who chose to reside on the island during the socioeconomic years of military occupation were influenced by the types of jobs available in the Vieques economy. Many Viequenses men left the island to work in the agriculture and stock farms of St. Croix, Virgin Islands (Acosta-Belen & Santiago, 2006). Young men were forced to leave the island because of high unemployment and few economic opportunities. Women increasingly became the heads of their households, many of them taking care of home, child, elderly, and the community (McCaffrey, 2002).

With the military occupation, the island's opportunities for employment, economic, and industrial development were frozen. Although many countries around the world benefit from U.S. military bases placed in their communities, this was never the situation in Vieques (Billing & Pinderhughes, 2004). The U.S. Navy never became a primary employer on La Isla Nena; instead, the economic benefits were limited to the area surrounding Roosevelt Roads Naval Station on the main island, where the military stayed during training sessions focused on Vieques. Furthermore, Vieques experienced a lack of economic development and a lack of infrastructure to support a sustaining economy. The people had limited land and lived in a concentrated area surrounded by military training facilities. As a result, the labor market was forced into a reconfiguration that had to consider the new limitations on the land, how it could be put to best economic use, the presence of the military neighbors, and the demographic profiles of those who remained in Vieques to work in the failing sugar cane and crop economies. Although employment in the sugar cane industry was not gainful, Viequenses were able to provide for their families off the land (Ayala, 2003).

Before the expropriation, the Viequenses depended on employment in the sugar cane industry and living on the plantations. The local laborers on the sugar plantations—called *agregados*—were given a plot of land to grow crops and had access to plantation lands where they could fish, hunt, and gather coconuts and wood. There was a community, a belonging to a social network built on relationships and connection to the land and ocean. The expropriations forced Viequenses (without choice) from the livelihood of agregados to a concentrated population in the center of a dual-use target range/amphibious exercise base for powerful countries to test military weaponry (Barreto, 2002; Gold, 2006). Expropriation broke communities and changed family structure and supports by altering communal ties, severing peasants' relationship to the land, and closing down the island's main source of employment (Soto, 2008). Expropriation changed the social and economic structures for the Viequenses, and affected the various pathways to health inequalities. Military expropriation in the 1940s caused a social and economic crisis that lasts to this day (*Comite Pro Rescate y Desarrollo de Vieques vs. United States Navy*, 1999). The data suggest that though women have emerged in large numbers in the labor market they are also challenged by the demands of raising their children, and caring for their elderly parents.

The fundamental rights of Vieques' children, women, and men to health and the protection of the environment has been violated by a legacy of long-term U.S. military occupation (Dominican Network, 2004). Some scientists, elected officials and public health advocates claim that ATSDR assessments are inconclusive because they do not evaluate the risk of physical injury from unexploded ordnance or consider cumulative effects of exposure to multiple contaminants through multiple pathways. Wargo (2010), a Yale University environmental expert, noted that ATSDR assessments contain flaws in scientific methods, analyses, and interpretation of evidence yet concluded that human health risks are insignificant. ATSDR's (2013) response is that current science does not adequately support a robust analysis of multiple chemical exposures and their interactions. Debate continues in the scientific community about how best to evaluate exposure to

a chemical mixture from a single pathway and from multiple, combined pathways. Yet there is research associating arsenic exposure to fish consumption in Vieques (Lebron, Gonzalez, Mansilla-Rivera, & Rodriquez-Sierra, 2007). Some research findings show that toxic substances have entered the food chain and are contaminating vegetation (ATSDR, 2009; Diaz & Massol-Deya, 2003; Massol-Deya, Perez, Berrios, & Diaz, 2005). Washington's Environmental Protection Agency has designated Vieques as a "Superfund" site; that is, one of the most contaminated sites containing unexploded ordnance in U.S. territory, and one deserving priority cleanup (Ginty, 2007). Indeed, research data suggest a relationship between the onset of live bombing in the 1970s and the escalation of cancer rates on the island (Nazario, Suarez, & Perez, 1998). According to testimony given by the Committee for the Rescue and Development of Vieques before the U.S. Senate Committee on Energy and Natural Resources in 1999, environmental and health experts throughout Puerto Rico and the United States (University of Georgia, and Yale University) relate the high cancer rates among people in Vieques to the environmental degradation caused by U.S. Navy and NATO bombing. High cancer rates, especially in women, warrant a systematic study of the health of Viequenses. The prevalence of health disparities and health risks is alarming when one considers the small population of Vieques.

La Lucha

A prevalent question for the authors has been: How did Viequense population of 10,000 U.S. citizens endure such violations of human rights? This political struggle of the U.S. Navy military takeover of La Isla Nena made Viequenses realize that their island was a colony within a colony, with little power and resources against the U.S. Navy (Roberto Ravin, Committee for the Rescue and the Development of Vieques, personal communications, June 9, 2009). Although Viequenses were not silent, their voices of protest and fear about the year-round bombing on their health and well-being were not heard outside of Puerto Rico (Murillo, 2001). There has been a long history of protest by the Viequenses, which this article does not address. In 2003, the Navy left Vieques after a period of civil disobedience that involved U.S. citizens and the international world (see McCaffrey, 2002; Rabin, 2001; Torres, 2005). The Navy's departure ended the struggle and gave rise to new social development challenges. La Lucha (the struggle) has taken on a new meaning for the Viequenses who are redressing the socioeconomic and health inequalities by viewing their circumstances as a call to action. Addressing the health needs of Viequenses is central to the development of the island, because the exposure to contamination has been a public health concern. According to the Master Plan for the Sustainable Development of Vieques (Villamil, 2011) there is an emphasis on finishing the cleaning process of polluted land and the restoration of the natural systems affected by the military activities. Viequenses are preparing an inventory of economic resources and developing a plan with recommendations on regulations and legislation related to land use, wind and solar renewable energy, urban design for tourism, housing, commerce, and education. The Plan proposes an infrastructure to create Vieques as a biological corridor because of its bioluminiscent bays, land and marine ecosystems, floral and fauna diversity, and archeological and cultural richness. There has been some movement by woman activists in the development of a business incubator through microfinancing (Nilda Medina, personal communications, June 1, 2013). Viequenese are using their self-determination for social-economic positioning and well-being.

CONCLUSION

There is growing evidence that social and economic inequalities faced by ethnic minority groups are likely to be a fundamental explanation of health inequalities (Abbott, 2007; La Veist, 2005;

Nazroo, 2003). Health inequality is an issue in all countries and is affected by economic and political arrangements. The authors discussed the relationship of expropriation on several pathways to health inequalities for the Viequenese. The findings analyze deep inequities in the distribution of political power and economic arrangements within Vieques as key factors in generating health inequalities. The dynamic relationship between political power and health inequalities is affected through factors that include labor markets, employment conditions, material deprivation and economic inequalities, and moderating variables of social and family networks. Future research is needed to examine the pathways to health inequalities based on the first period after the departure of the military.

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NOTE

1. Health disparities and health inequalities will be used interchangeably (see Braveman, 2006).

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