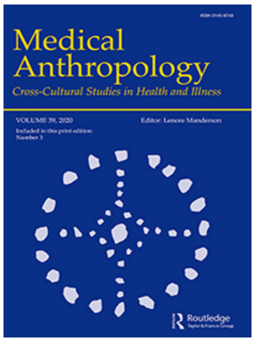

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Deadly Companions: COVID-19 and Diabetes in Mexico

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ABSTRACT

In this commentary, I assess the adverse syndemic interactions between COVID-19 and diabetes mellitus. This syndemic is of major concern for a country like Mexico which has seen a steady rise in the percentage of its population suffering these diseases. Mexico now has one of the highest rates of diabetes in the world and a rapidly growing COVID-19 caseload.

KEYWORDS

Mexico; Covid-19; diabetes; social determinants of health; syndemic

COVID-19 patients with diabetes have much higher rates of serious complications and death than people without diabetes. The adverse syndemic interaction between COVID-19 and diabetes in Mexico, which has one of the highest rates of diabetes in the world. Even in our highly interconnected world, in which infectious agents, commodities, and people cross borders incessantly, local biosocial factors shape disease and death profiles under pandemic and non-pandemic conditions. In this commentary, I examine COVID-19 and diabetes in Mexico, and pathways of syndemic interaction, and reflect on the impact of the rapidly spreading COVID-19/diabetes syndemic.

The spread of COVID-19

The first case of coronavirus in Mexico was confirmed on February 28, 2020 (Harrup 2020). Mexico's President Andrés Manuel López Obrador initially downplayed its seriousness, asserting "it isn't even equivalent to flu . . . " (AP 2020). Nonetheless, he vowed to mount a swift response, to avoid a repeat of the slow reaction to the H1N1 influenza (swine flu) epidemic in 2009. By late May 2020, however, the COVID-19 outbreak in Mexico had surged, and a growing number of hospitals were struggling to treat COVID-19 patients with shrinking numbers of health workers, a high proportion of whom were infected (CGTN 2020). Municipal cemeteries were forced to exhume bodies to make room for COVID-19 deaths (Alpeyrie 2020). As of July 11, 2020, Mexico City alone had confirmed almost 7,000 deaths; across the country there had been some 290,000 cases and 34,191 deaths (New York Times 2020), placing Mexico the country with the fourth highest number of COVID-19 deaths in the world. Moreover, the actual death count is likely severely underreported, because the official death count only includes people who test positive and die in hospitals and not those who die at home. Lost in these underreported deaths is a clear understanding of the role of preconditions like diabetes.

The diabetes crisis in Mexico

Syndemics are significant biosocial health events consisting of the deleterious interaction of two or more diseases facilitated by adverse social and/or environmental conditions (Everett and Wieland 2013; Singer et al. 2017). Syndemics research explores how multiple diseases cluster together in

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Social media teaser: Corona virus and diabetes, a deadly combination for Mexico populations; social, political, economic, and ecological factors drive those disease clusters and create vulnerabilities; and clustered health conditions interact via biological, psychological, and/or social pathways. Syndemic interventions target underlying patterns of multidirectional causality to achieve healthier outcomes (Carlson and Mendenhall 2019).

While seven percent of Mexicans had diabetes in 2006, by 2016 10–14% of the population suffered from the disease (Meza et al. 2015; WHO 2016). In Mexico, a middle-income country, diabetes is more widespread and has a much larger impact on mortality than in major high-income countries like the USA. Mexico has one of the highest national rates of death attributable to diabetes globally (almost 15% of all deaths). Diabetes now trails only heart disease as a cause of death (PAHO 2012), and 20% of preventable deaths (almost 87,000 people per annum) are caused by diabetes or related metabolic diseases (Bello-Chavolla et al. 2017; World Health Organization 2016). Annual average costs per diabetes patient in Mexico have been estimated to range from 700 to 3,200 in US dollars (Rodríguez Bolaños et al. 2010), with national estimates in 2013 of over 700,000,000 USD for outpatient treatment, 200,000,000 USD for inpatient care, and over 175,000,000 USD from indirect costs (Barquera et al. 2013). As Beaubien (2017) remarked: "The dramatic surge in diabetes threatens the very stability of Mexico's public health care system."

The onset and development of diabetes has been closely linked to overweight and obesity. Mexico has one of the world's highest rates of both of these health conditions, with significant increases in adolescent women and adults from 2006 to 2016 (Barquera et al. 2016; Shamah-Levy et al. 2019). These conditions increased each year of the survey. Overweight and obesity also impacted an estimated one million children in Mexico during this period. Along with diabetes, obesity is implicated in many cases of critical COVID-19 (Caussy et al. 2020).

The diabetes epidemic in Mexico is tied to the modern "nutritional transition" – significantly increased consumption of cheap, calorie-filled diets, high in oils, animal fat, sugar, and processed foods, combined with less active daily life patterns. In this transition, the consumption of cereals and legumes decreased from 1961 to 2013 by 12.9% and 3.1%, respectively. This dramatic change in diet was driven by several interlinked factors, including urbanization, neoliberal governance, foreign direct capital investment, and food marketing (Gálvez 2018).

Urbanization has increased since the 1960s, and today, 75% of Mexicans live in urban areas. A quarter of the population lives in the three largest cities: Mexico City, Guadalajara, and Monterrey (Kamiya 2018). Several forces appear to drive continuing urban migration including climate change (Hunter et al. 2013), with droughts caused by anthropogenic climate change, and associated water and food insecurity, pushing rural dwellers to the city. Farming in Mexico is highly reliant on rainfall and very susceptible to changing climate patterns (Conde et al. 2006).

A second factor driving urban migration is neoliberal governance and economic restructuring. Neoliberal policies transformed the Mexican state from providing public welfare and ensuring a social safety net to promoting market-based access to needed resources including food and health care. This facilitated foreign investment in Mexico and the outflow of profits to multinational corporations. The social impact of the austerity process was devastating, causing falling wages, increased precariousness of employment, and rising inequality. Health conditions also deteriorated and disorders like diabetes associated with chronic stress and changing dietary patterns become dominant (Laurell 2015).

Changes in diet in Mexico were shaped also by the global food system. In the mid-1970s, Mexico produced most of its own staple foodstuffs. However, since NAFTA, that is no longer the case (Gálvez 2018). Instead "rising agricultural prices [in the global market], combined with growing import dependence, have driven Mexico´s food import bill over 20 USD billion USD per year and increased its agricultural deficit" (Turrent Fernández et al. 2012: 2). Mexico, now the seventh largest food importer worldwide, imports 45% of its food, much from the USA. The multiply determined diabetogenic restructuring of consumption in Mexico has rendered the population highly vulnerable in the time of COVID-19.

The diabetes/COVID-19 syndemic

As several studies have already shown, diabetes is associated with poor COVID-19 prognosis in patients. In a study of almost 45,000 COVID-19 cases in China, Wu and McGoogan (2020) reported an overall case-fatality rate (CFR) of 2.3%, but this was elevated among patients with preexisting conditions including 10.5% for patients with cardiovascular disease and 7.3% for diabetes. Among patients with COVID-19 reported by Guan et al. (2020), those with severe infection had a higher prevalence of diabetes. A study of COVID-19 patients found that patients having diabetes had a twofold increase in the incidence of needing intensive care, and a threefold increase in mortality, compared with those without diabetes (Ruan et al. 2020; Yang et al. 2020). In Mexico, diabetes also has a significant association with complications from and lethality attributable to COVID-19 (Bello-Chavolla 2020).

Several intertwined pathways of interaction have been suggested to explain the relationship between diabetes and COVID-19. One possibility is that SARS-CoV-2 triggers higher stress levels, causing greater release of hyperglycemic hormones (e.g., glucocorticoids) leading to increased blood glucose levels (Wang et al. 2020). Approximately 10% of patients with diabetes and COVID-19 suffered at least one episode of hypoglycemia (Zhou and Tan 2020). The link between diabetes and atherosclerotic cardiovascular disease is well established (Haffner et al. 1998), and hypoglycemia is known to both mobilize pro-inflammatory cells and increase platelet reactivity, contributing to heart-related mortality in patients with diabetes (Iqbal et al. 2019). This suggests that people with diabetes and COVID-19 "are more susceptible to an inflammatory cytokine storm eventually leading to ARDS [Acute respiratory distress syndrome], shock, and rapid deterioration of COVID-19" (Pal and Bhadada 2020). Moreover, diabetes is associated with reduced expression of angiotensin-converting enzyme 2 (ACE2). This enzyme is a critical component of the biochemical pathway that regulates blood pressure and wound healing; in the lungs, it plays potent anti-inflammatory and anti-oxidant roles (Zou et al. 2014). The lowered ACE2 expression in diabetes might help explain the increased incidence of severe lung injury and ARDS with COVID-19 (Tikellis and Thomas 2012). In addition, COVID-19 binds with and enters cells for RNA replication through ACE2 receptors on the surfaces of target cells. Once entry occurs, the host cell responds by sending out an enzyme that shears all the remaining ACE2 receptors off its surface, thereby eliminating molecules needed to maintain functioning lungs, heart, and other organs (Multeni 2020).

The body's anti-inflammatory process may compose the underlying mechanism that puts people with diabetes at risk for infection by affecting the body's response to pathogens. Research on the relationship between diabetes and infections (Abu-Ashour et al. 2017) shows that diabetes is associated with an increased incidence of infection, most commonly of the skin, respiratory system, and blood. Poorly controlled diabetes has been linked to impaired functioning of important immune system components (Knapp 2013). Further, high blood glucose levels may prevent a normal respiratory burst, the process by which immune cells kill invasive pathogens by releasing toxic oxidative chemicals (Jafar et al. 2016).

The co-presence of diabetes and COVID-19 has been called "an unholy situation wherein one disease entity tends to complement the other" (Pal and Bhadada 2020), a relationship known as a bidirectional syndemic. In the blood of people with diabetes and COVID-19, important immune T cells like CD4+ and CD8+ that coordinate the immune response are decreased in concentration. SARS-CoV-2 may infect circulating immune cells and cause increased cell death and greater COVID-19 severity (Muniyappa and Gubbi 2020). Moreover, Means (2020) suggests it is "possible that pancreatic damage from the virus and resultant impairment in beta-cell insulin secretion could worsen preexisting diabetes or even predispose to new cases of diabetes in non-diabetic subjects."

Conclusion

In Mexico, diabetes is a significant preexisting condition shaping the impact of COVID-19. This interaction reflects what Carolina Martínez and Gustavo Leal (2003) more broadly describe as

Mexico's "double burden" of disease, involving high rates of both infectious diseases and chronic diseases. The structural factors enabling this dangerous interaction are rooted in the country's history of global governance and economic restructuring ushered in by Mexico's dominant social class and international lenders, the intrusion of foreign capital, and the environmental effects of anthropogenic climate change. For this reason, Moran-Thomas (2019) calls diabetes a "para-communicable" condition transmitted as bodies, political economies, and ecologies intimately shape each other over time. Effectively addressing the diabetes and COVID-19 syndemic necessitates overcoming these deep structural problems. This requires making public welfare a priority over private profit. Mexican economist Gerardo Esquivel Hernandez (2015: 37) of El Colegio de México argues the need for the creation of a social state which entails a "shift to a rights-based approach to social policy: the right to food, education, health, etc." Achieving this goal will require the implementation of a progressive tax system including increased taxation of the wealthy, significantly enhanced government spending on education, health, and access to basic services, increasing the minimum wage, strengthening the negotiating power of unions, and improving government transparency and accountability mechanisms. These are not easily accomplished objectives, in no small part because of the resistance of the rich. However, as demonstrated by the Black Lives Matter movement, real change begins from below.

Notes on contributor

Merrill Singer is Emeritus Professor of Anthropology and Senior Research Scientist at the Center for Health, Intervention and Prevention, University of Connecticut. Dr. Singer's work has focused on social justice, the social determinants of health, syndemics, and critical medical anthropology, with research on HIV/AIDS, STIs, hepatitis, Ebola, tick-borne diseases, and arbovirus diseases. He is the author of 34 books and over 200 peer-reviewed articles. have been enduring themes of his research and applied work.

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