VANDERBILT
Cultural Contexts of Health & Wellbeing
INITIATIVE

Improving Diabetes Care

Cultural Contexts, Global Comparisons, and Colonial Legacies

With funding from the Robert Wood Johnson Foundation and in collaboration with WHO/Europe's Behavioral and Cultural Insights Unit, the **Vanderbilt Cultural Contexts of Health and Wellbeing Initiative** uses cultural insights to help improve public health policy and healthcare delivery.

Primary authors:

Edward F Fischer, T.S. Harvey, Tatiana Paz Lemus, Breana Thompson-Guy.

Expert consultants

- Karabi Acharya – *Robert Wood Johnson Foundation*
- Jeffrey Bennet – *Vanderbilt University*
- Nancy Burke – *University of California, Merced and San Francisco*
- Jamie Bussel – *Robert Wood Johnson Foundation*
- Foluso Fakorede – *Cardiovascular Solutions of Central Mississippi*
- Nils Fietje – *World Health Organization*
- Eduardo Gomez – *Lehigh University*
- Kelly Hallman – *Indigenous Justice Circle*
- David Hodge – *Tuskegee University*
- Juliet Kiguli – *Makerere University School of Public Health, Uganda*
- Rashon Lane – *Sutter Health*
- Mathew Klingle – *Bowdoin College*
- Arlene Tuchman – *Vanderbilt University*

Illustrations by

- Jamiel Law, *USA*

Editor

- Tess Bird, *USA*

Suggested Citation:
Fischer, Edward F., T.S. Harvey, Tatiana Paz Lemus, and Breana Thompson-Guy. 2024. *Improving Diabetes Care: Cultural Contexts, Global Comparisons, and Colonial Legacies.* Nashville, TN: Vanderbilt Cultural Contexts of Health Initiative.

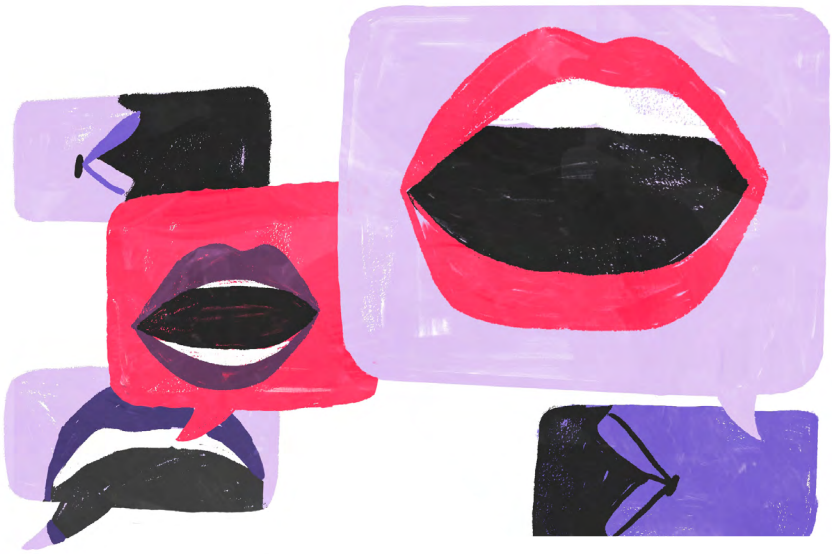
Funding for this report was provided by the Robert Wood Johnson Foundation. The views expressed here do not necessarily reflect the views of the Foundation.

Robert Wood Johnson Foundation

VANDERBILT Cultural Contexts of Health & Wellbeing INITIATIVE

Table of Contents

OVERVIEW



"It is my fault" is a refrain heard over and over from type 2 diabetes (T2D) patients. Janice, a woman in her early 70s, wondered "why did I do this to myself?" when a doctor told her that they would have to amputate her leg due to complications from undiagnosed diabetes. Living without health insurance, Janice had not visited a doctor in over 40 years. Mark, a middle-aged man, referring to his daily battle to maintain a lower blood sugar level, said: "It makes me feel like a bad person because, no matter what I do, I can't keep my A1C [blood sugar level] in line."

Diabetes was the eighth leading cause of death in the United States in 2021, a year in which it claimed more than 1.5m lives globally, the vast majority from T2D complications. According to the Centers for Disease Control and Prevention (CDC), more than 37 million adults in the U.S. have diabetes.[1] This translates to a significant portion of the population grappling with the disease.

Diabetes is diagnosed through elevated blood glucose levels, and prevention efforts largely focus on diet and exercise. **Research over the last decade has revealed the metabolic complexity of T2D**. It turns out that most of the factors that produce diabetes are found outside of the body. Evidence shows that age, stress, depression, family history, and chemical exposure all play a significant role. Diet, physical activity, and weight are just part of the story—and these are heavily influenced by the food landscape and built environment.

Yet, a pervasive cultural narrative presents those with diabetes as people who seem unwilling to control their lifestyle and the disease. This view affects policymaker and clinician attitudes and behaviors, often in ways that are hidden. As a result, people with diabetes may feel a sense of fear and shame that prevents them from talking about their diagnosis and even avoid seeking treatment. **To reduce stigma, we need to change our thinking about diabetes—and bring it more in line with the complex drivers that we now understand to produce it**.[2]

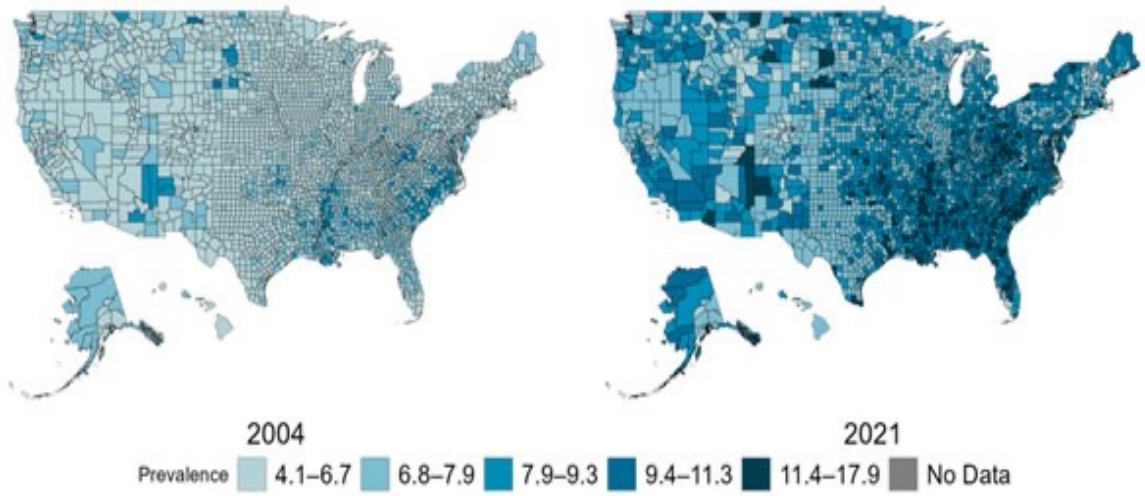
It is helpful to view diabetes as a *syndemic* disease, meaning a disease in which physiological processes interact with one another and with cultural, economic, and other environmental contexts to produce heightened risk in certain communities. Native American, Black, and Hispanic communities have much higher rates of T2D than White populations. Such correlations can be easily misinterpreted to mean that some populations are biologically more susceptible to developing insulin resistance. But, it is not genetic ancestry that makes one vulnerable to diabetes, but rather the social, economic, and environmental contexts in which particular racial/ethnic groups live. **The inequities in morbidity and mortality rates associated with diabetes are stark, but attributing them to race hides the ways in which historical legacies of colonization, structural inequalities, and current socio-economic contexts produce vulnerabilities and unequal health outcomes.**

EXECUTIVE SUMMARY

Type 2 diabetes (T2D) has been recognized as a public health crisis for decades, and yet rates continue to rise nationally and globally. Since the Centers for Disease Control and Prevention (CDC) declared diabetes a national epidemic in 1994, T2D rates in the U.S. have more than doubled and have increased even more dramatically globally.[3] Today, the CDC estimates that 40% of the U.S. population meets their definition of prediabetic.[4] Despite the heroic efforts of public health campaigns, something is not working. To improve T2D policy and care, we need to look beyond pharmaceutical and technological solutions to address the cultural contexts of health and wellbeing (CCH).

In 2022, the U.S. spent $413b on diabetes treatment[5], or roughly $1 out of every $4 in healthcare expenditures.[6] The human costs are enormous. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke, and lower limb amputation. It is estimated that over 250,000 people are in dialysis for diabetes-related kidney disease. Alonzo Plough has shown that dialysis centers are highly concentrated in minority communities.[7] Dr. Foluso Fakorede, a practicing physician in Mississippi, describes an "epidemic of amputations" among Black, Native American, Hispanic populations in the U.S.--more than 160,000 non-traumatic amputations linked to diabetes take place annually, and Black Americans are three times more likely than the general population to have an amputation.[8]

Given these dire numbers, it is important to remember that **diabetes is a serious but solvable public health problem**. Finding ways to treat diabetes and support people with diabetes is more important than ever. This report offers cultural insights and global examples for improving policy and health outcomes around the T2D epidemic. Building on a growing body of social science and historical literature, we bring a CCH approach to taken-for-granted categories and assumptions.



To learn more see the National Diabetes Statistics Report

Recent research reveals the **metabolic complexity** of T2D, a *syndemic* disease produced by the interaction of a range of biological, psychological, and social risk factors. Many equate T2D with obesity, but excess fatty tissue is not the only factor that leads to the insulin resistance characteristic of T2D. Stress, including the persistent low-level stress associated with poverty and discrimination that public health researcher Arline Geronimus terms "weathering,"[9] triggers insulin resistance by increasing levels of the hormone cortisol. Depression has also been shown to increase insulin resistance, perhaps by disrupting the hypothalamic-pituitary-adrenal axis in ways that elevate cortisol release. Endocrine-disrupting chemicals found in consumer goods are known to inhibit insulin processing, contributing to elevated blood sugar levels. Preliminary research also suggests that sleep, childhood trauma, and certain viruses may also be associated with risk for T2D. Finally, evidence shows that in at least some non-European populations, T2D has very different underlying causes unrelated to fat tissue. As this collective research shows, diabetes is caused by a variety of physiological factors interacting with particular socio-economic and environmental contexts in complicated ways.

Widely considered a "lifestyle disease," T2D carries the stigma of a self-inflicted illness brought about by lack of self-control. This can feed a psychologically and physically deleterious cycle of **shame and blame**, as many patients find it difficult or impossible to control weight and blood sugar through diet and exercise alone. Revealingly, this moral stigma does not apply to Type 1 diabetes (T1D, also known as juvenile, or early onset diabetes), whose patients are seen as innocent victims of genetic errors. The emphasis on diet and exercise plays into a pervasive narrative around **rational bodies,** the idea that there is an ideal body type and that we can, through self-discipline, mold our physical selves into that type.[10] In diabetes self-management, the burden of treatment is often placed on the patient, as they have to reconcile abstract protocols with complicated lives and sometimes disagreeable bodies.

As researcher Jeffrey Bennett explains, while controlling blood sugar has become equated with self-discipline and virtue, this ignores the "capriciousness of metabolic processes," and the complicated ways shame, self-governance, and race interact. Race/ethnicity is routinely listed as a primary risk factor for developing T2D, targeting Black, Hispanic, and Native American individuals. **But, it is not biological heritage that makes one vulnerable to diabetes, but rather the social, economic, and environmental contexts in which particular racial/ethnic groups live** that produces the vulnerabilities. Due to a wide spread and incorrect assumption that race is biological, racializing T2D risk turns attention away from contextual and structural factors by implying that there is a biological vulnerability.

To understand why so many people are suffering and dying from a disease for which there are effective treatments we have to look beyond pharmaceuticals and biomedical technologies to the social, cultural, commercial, and political contexts. Here, we employ a **cultural contexts** of health and wellbeing (CCH) approach to understand the lived experience of diabetes, but also to examine the cultural categories of biomedical health. This approach is concerned with care as well as treatment. Treatments react to presented conditions, and try to ameliorate them. We understand "care" to be a more expansive, proactive, and empathetic form of rendering aid and support. The medical community commonly refers to the site of treatment as the **"point of care,"** but the phrase has another, telling meaning: the purpose of care and who is deemed worthy of it. Engaging networks of care and responsibility that extend beyond the clinical setting can not only decrease disease prevalence but also help lessen individual burden and shame.

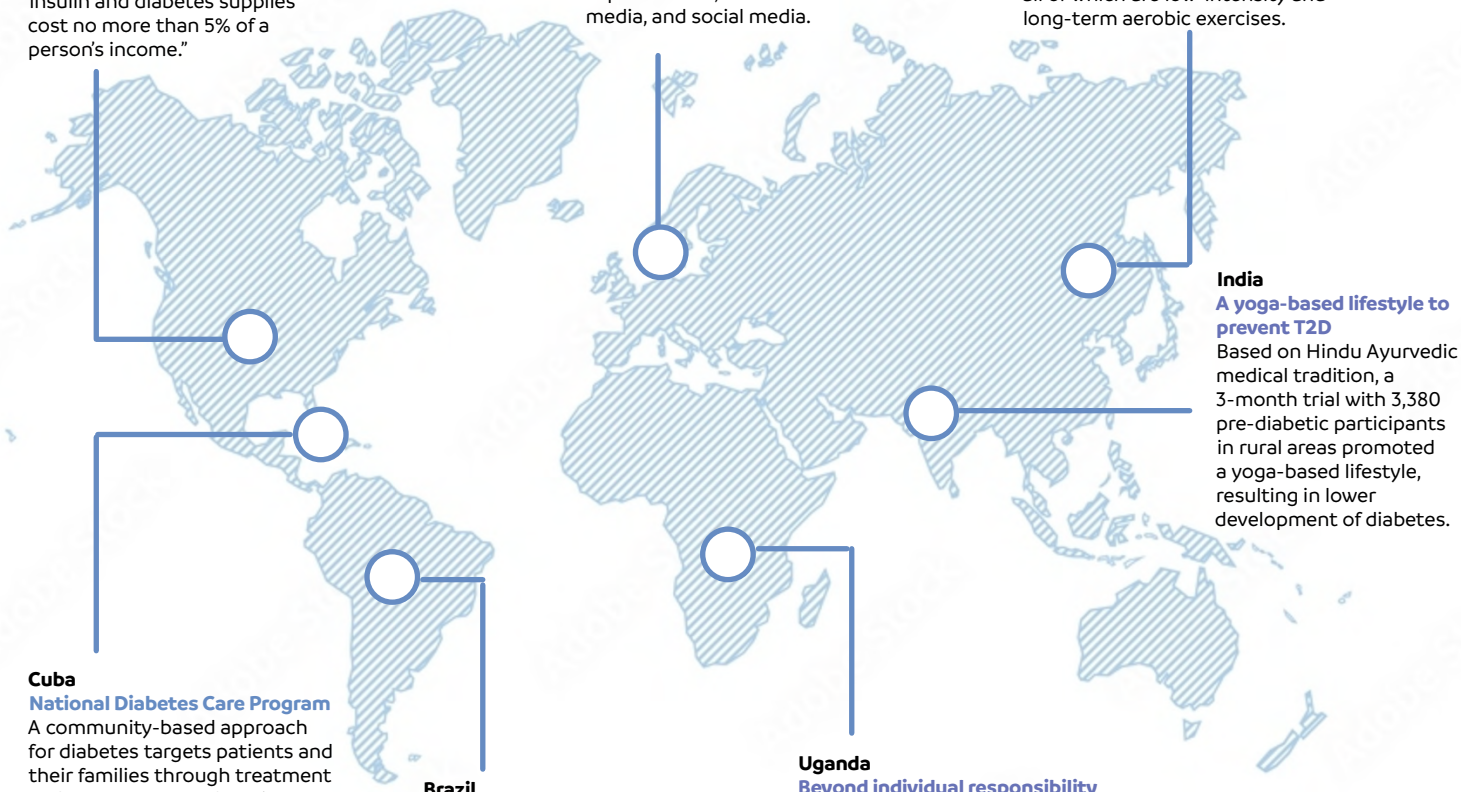
Contexts matter, and, in fact, matter most. While diabetes is detected through blood tests, it is a disease not just of individual bodies, but also of the social, cultural, political, commercial, and environmental contexts. **But contexts are also complicated,** impossible to fully capture or reduce to a few variables. They are made up of dynamic relationships, like an animated systems map, rather than static determinants; and, contexts are also patterned by long histories of institutionalized power relations that disproportionately affect Black, Brown, and Native Peoples. Diabetes is further fueled by commercial obesogenic and pharmaceutically enriched environments, the former fueling morbidities and the later treating them, both profitably. It is also fueled by conditions in economically marginalized environments. If the point of care is care, and not just treatment, we need to view diabetes as stemming from individual biologies and behaviors interacting with particular cultural contexts.

Global Examples

USA
Sustainable access to insulin and supplies
Based on the limited access to insulin through national health systems and its high out-of-pocket costs, T1 International's campaign "Fight for Five" advocates for a "world where insulin and diabetes supplies cost no more than 5% of a person's income."

Denmark
Tingbjerg Changing Diabetes
The Danish Cities Changing Diabetes program in Tingbjerg promoted healthy eating and physical activity for children integrating efforts across childcare centers, schools, supermarkets, local mass media, and social media.

China
Traditional Chinese medicine (TCM)
TMC combines acupuncture treatment, emotional therapy, and traditional Chinese exercises such as Tai Chi, Baduajin, and Yijinjing, all of which are low-intensity and long-term aerobic exercises.



India
A yoga-based lifestyle to prevent T2D
Based on Hindu Ayurvedic medical tradition, a 3-month trial with 3,380 pre-diabetic participants in rural areas promoted a yoga-based lifestyle, resulting in lower development of diabetes.

Cuba
National Diabetes Care Program
A community-based approach for diabetes targets patients and their families through treatment and management education programs. This joint effort aims to improve the environment so patients can manage their diabetes successfully.

Brazil
Policies for T2D prevention and treatment
In 2007, Brazil passed legislation to guarantee the free distribution of diabetes medication. In 2010, the Ministry of Health developed innovative nutritional guidelines and boosted federal funding for obesity awareness and prevention programs

Uganda
Beyond individual responsibility
Local explanations for T2D are not linked to diet or lack of exercise but more often to witchcraft. The disease is understood as being caused by the wider social context, which has experienced an overall "sweetening" of the culture in recent years.

Recommendations

Recognize the Metabolic Complexity of Diabetes and Pluralize Solutions

- Recognize the multiple etiologies that may present as diabetes; understand that treatment protocols based largely on European-descent populations may not apply globally.
- Acknowledge the syndemic nature of diabetes, and temper the overriding focus on obesity to include other risk factors such as stress and chemical exposure.
- Learn from other medical systems, like Ayurveda or Traditional Chinese Medicine, and their holistic approaches to diabetes.

Minimize Stigma and Burden of Self-care, Emphasize Collective Responsibility

- Resist blame and shame, and integrate the practicalities of patients' lives and care networks into treatment regimes.
- Temper focus on "self-management" as a solution and look for approaches that support collective responsibility.
- Include patient perspectives in developing policy and treatment regimes.

Decouple Race and Diabetes to Recognize Contextual Factors

- Avoid assigning causation of diabetes risk to race: do not confuse biology with context.
- Promote proactive, wrap-around systems that engage communities in diabetes care
- Treat the context of diabetes, for example through food and beverage regulation, public design, and poverty and stress reduction

Cultural Contexts and Colonial Legacies of Diabetes

A cultural contexts of health perspective views physiological processes as embedded in larger systems, including but not limited to cultural contexts, market structures, political values, and natural environments. These systems interact with biological bodies to produce particular health outcomes. Our CCH framework is built on the following principles:

Brings in the marginalized voices and experiences to critically examine **colonial patterns of exclusion** built on historically racialized and gendered ideals

Works across tradionally bounded silos of knowledge to view biology, culture, markets, politics, and the environment as interrelated systems that produce certain health conditions

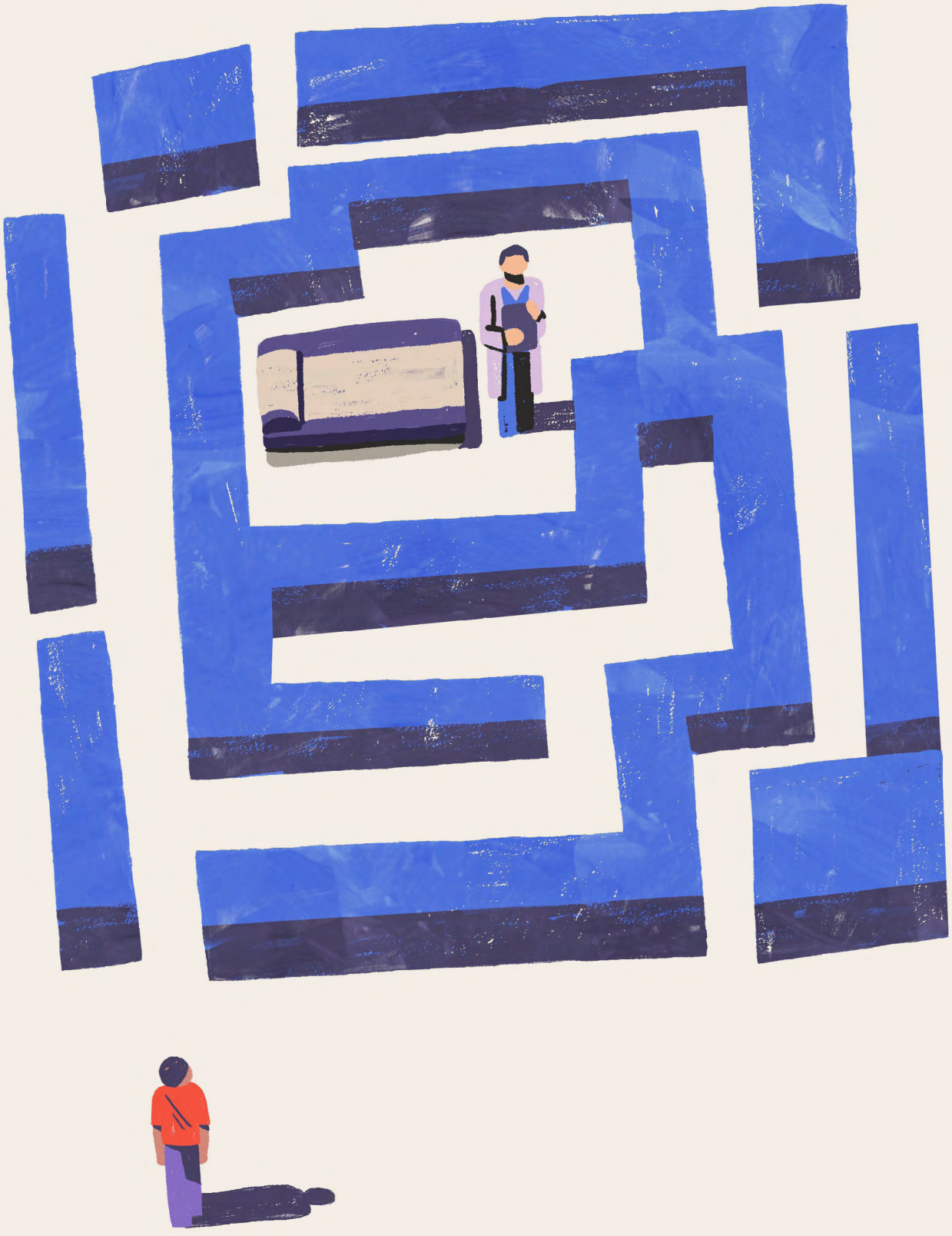
Recognizes Western categorizations of the world as culturally specific, looking to non-Western alternatives that see the world as more interconnected

The CCH approach allows us to look at diabetes in relation to the colonial replacement of food systems and lifeways, the trade of enslaved humans, and current trends of social, political, and economic marginalization. Beyond that, this approach lets us examine the cultural presuppositions baked into the Western scientific traditions that can get in the way of understanding syndemic complexities. The legacy of colonial cultural categories can masquerade as scientific truth, driving policy and clinical practice. For example, medical studies of diabetes have been overwhelmingly based on populations of European-descent, and the results have too often been universalized as applicable to all populations.

Western medical models often make cultural assumptions around individual autonomy, self-control, and personal responsibility, which arise from a Western value-structure rather than scientific evidence. Combined with colonial-legacy systems of racial and gender marginalization, such histories have insidiously led to a blame-the-victim mentality where individuals are expected to change their individual behaviors to avoid or cope with disease. In contrast, a CCH approach shifts the focus away from individual choice (and blame) and toward the underlying systems that produce certain outcomes.

Following these medical models, public health policies and medical treatments have too often been built on a particular Western worldview that overwhelms other, more holistic, approaches. A CCH approach allows us to put into relief our own cultural conceptions and biases, recognizing that building more just and equitable health futures requires addressing how unresolved colonial legacies of inequity impact health and wellbeing.

In this way, our CCH framework supports a decolonizing agenda by questioning systematic marginalization and helping us decolonize our own minds–recognizing our cultural assumptions for what they are rather than unconsciously considering them as the natural state of things.



1 Metabolic Complexity and Type 2 Diabetes as Syndemic

Type 2 diabetes has long been associated primarily with weight and large body size. Today, the body mass index (BMI) is used as the principle factor determining diabetes risk. The etiology of excess adipose tissue leading to insulin resistance is well documented, but recent research has uncovered a number of other contributing factors and even different etiologies. For example, stress, including the persistent low-level stress associated with poverty and discrimination, triggers insulin resistance by increasing levels of the hormone cortisol. Depression, trauma, chemical exposure, and certain viruses also seem to play a significant role. Rising rates of T2D among thinner South Asian individuals has led to the discovery of another etiology in which the pancreas produces too little insulin (rather than cells becoming insulin resistant).

What is emerging from this research is an understanding of T2D as a complex disease in which a range of biological and social risk factors combine to produce the insulin resistance and elevated blood sugar levels that define the disease. The challenge facing policy makers and clinicians is how to incorporate this metabolic diversity into diabetes interventions and treatments. This involves understanding the cultural underpinnings of policy and treatment approaches.

In this section we look at how the medical literature defines and classifies diabetes, focusing on type 2, and how recent findings complicate standard diagnosis and treatment models. It is well established that excess adipose tissue stimulates insulin resistance in cells, but Venkat Narayan, the Executive Director of the Emory Global Diabetes Research Center, and his colleagues argue that a simplistic view of obesity as the single cause of diabetes has precluded attempts to develop a cure based on deeper and more precise understandings of the disease. The focus on obesity feeds into a view that diabetes is a "lifestyle disease," implying that patient behavior is the overriding factor in treatment. Following this, we consider alternative conceptualizations and classifications of diabetes, and what we can learn from global examples about holistic approaches to treatment.

TYPES OF DIABETES

Diabetes Mellitus refers to a group of metabolic disorders stemming from problems with insulin regulation and diagnosed through elevated blood sugar (glucose) levels. Diabetes is diagnosed by a fasting blood glucose level higher than 125 mg/dL. The hormone insulin is produced by beta cells in the pancreas and regulates blood sugar levels by transporting glucose to cells (where it is used for energy). Thus, elevated blood glucose levels are caused by either insulin resistance (type 2) or an inability to produce sufficient insulin (type 1).

Diabetes is commonly classified into three types: type 1 diabetes (T1D, also known as early onset, or juvenile, diabetes); type 2 diabetes (T2D, also known as adult-onset, or non-insulin-dependent, diabetes); and gestational diabetes. Other etiologic classifications of diabetes are also recognized, including chemically-induced, hypercortisolism, infection-related, and Down Syndrome associated.[12]

It also turns out that some patients develop T1D later in life and in others T2D starts earlier than previously understood. Some researchers criticize the current classification system for minimizing the diversity of causes even within the three primary types, and proposals have been put forth to massively expand the number of recognized etiologies.[13]

Anthropologist Lauren Carruth and colleagues observe that "diabetes has multiple, locally variant, and unstable typologies."[14] Part of the staying power of the simple T1D and T2D typology comes from its utility, with clinicians looking for a singular diagnosis in order to establish a standardized treatment regime.

Type 1 diabetes is described as having a straightforward etiology: the pancreas is unable to produce sufficient insulin. This is caused by an autoimmune response in the body that destroys the ability of the pancreas' beta cells to produce insulin, and treatments involve insulin injections.[15]

This brief focuses on type 2 diabetes. Type 2 diabetes accounts for 95% of diabetes cases around the world. Type 2 diabetes, characterized by insulin resistance, is considered much more complex than T1D, with varied etiologies that progressively cause the body to develop insulin resistance.[16] In T2D, the pancreas produces insulin but the body's cells are resistant to it, limiting their ability to metabolize the glucose in the bloodstream, leading to higher blood sugar levels (hyperglycemia). T2D is described in the medical literature as a chronic and progressive disease for which there is no cure.

Many also describe T2D as a disease of modernity, a side effect of modern diets and lifestyles interacting with bodies that presumably evolved to store fat in times of plenty. While diabetes mellitus was formally named in 1889, and T2D in 1936, there are many earlier accounts of conditions that we now term diabetes going back more than two thousand years.

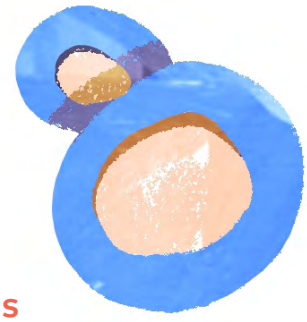
In T2D, the body produces insulin, but the cells are not able to make use of it to digest glucose effectively. Undigested glucose remains in bloodstream where it adheres to blood vessels, nerve endings, and internal organs, increasing the risk for various metabolic disorders and for amputations.[17] When cells become resistant to insulin, we find elevated blood sugar levels, increased insulin production, and insulin-producing beta cell strain. To compensate for elevated blood sugar, the pancreas will continue to produce ever larger amounts of insulin, eventually depleting its capacity, at which point T2D patients have to start insulin treatment.

The results of elevated blood sugar levels (diabetes) include weight gain (as insulin resistance stimulates fat storage), increased inflammation, and metabolic syndrome. Metabolic syndrome is defined by high blood sugar (hyperglycemia), high blood pressure (hypertension), high triglycerides, low HDL cholesterol, and high LDL cholesterol. These factors greatly increase the risk of stroke and cardiovascular disease. Diabetes is also associated with kidney disease, blindness, and peripheral artery disease (PAD) that results in an alarming number of amputations.

Venkat Narayan and colleagues observe that, "for type 2 diabetes, the definition and classification of the disease remains rudimentary. The disease is currently defined by the concentration of blood glucose using rather imprecise and static measures, and cutpoints based on prediction of the risk of complications, such as retinopathy, nephropathy, and macrovascular disease. Furthermore, the regulation of glucose in the circulatory system is not well understood given the plethora of complex physiological and pathophysiological processes working in tandem to maintain glucose in balance."[18]

Non-Western Understandings of Diabetes

Western descriptions of diabetes date back to Hippocrates (c. 460 to 370 BC), and several non-Western traditions describe the disease at around the same time, notably Hindu Ayurdevic medicine and traditional Chinese medicine (TCM). Because these medical traditions predate molecular biology, their approach to illness is systemic and holistic. Treatments are driven by a desire to restore physiological balance and alleviate symptoms. While healing is not focused on targeting a particular biological etiology, these traditions understand treatment as best achieved through a multimodal approach. Examining these non-Western approaches can provide us with alternatives to how the disease is conceived and treated.



Ayurvedic medicine addresses the balance (or imbalance) in a individual's physiological personality.[1] In this practice, health i viewed as a condition of homeostasis between physiological regulators (Doshas), metabolic activities (Agni), structural components (Dhathu), excretory functions (Mala-kriya), as well as psychological and behavioral conditions.[1] Thus, Ayurvedic practice approaches treatment through three principles for wellbeing: food (*Ahara*), drugs (*Aushadi)*, and lifestyle (*Vihara*). All these elements are important when considering Ayurveda's understanding of the treatment of diabetes.

Researchers are now finding that there are different etiologies of T2D that vary across populations. Most strikingly, there is clear evidence of rising rates of insulin-deficient T2D in non-overweight individuals in South Asia and southern Africa[19] and perhaps more generally in people of non-European ancestry in low- and middle-income countries (LMICs).[20] This seems to be caused by the pancreas' beta cells producing less insulin rather than adipose tissue stimulating insulin resistance.

Syndemic Diabetes

What is clear is that T2D develops from a combination of genetic, metabolic, social, and environmental factors. The exact mechanisms behind insulin resistance are complex and not fully understood, but inflammation, cortisol levels, hormonal changes, and obesity (linked to diet and physical activity) all play significant roles.

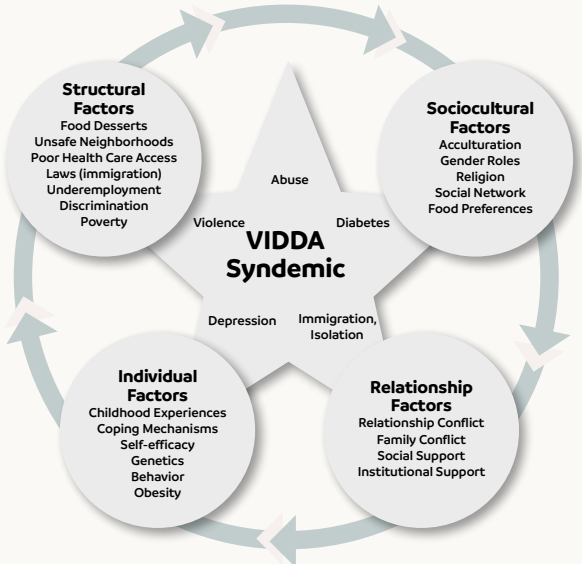
Given this diversity, it is helpful to consider type 2 diabetes as a **syndemic** disease, a concept first defined in the 1990s by medical anthropologist Merrill Singer in relation to human immunodeficiency virus (HIV).[21] A syndemic is characterized by a clustering of risk factors and health conditions (e.g., obesity, stress, high blood pressure, high cholesterol) that interact in complex ways. In the case of diabetes, chronic stress exacerbates insulin resistance, making it harder to manage blood sugar levels, which increases the risk of cardiovascular complications. In a syndemic, these factors interact synergistically through physiological, psychological, and social pathways and are driven by cultural, economic, and political factors. By understanding diabetes as a syndemic, we can move beyond individual risk factors and consider the broader social, economic, and environmental factors that contribute to the disease burden. This allows for a more comprehensive approach to prevention and management that addresses the root causes of the disease, not just symptoms.

Emily Mendenhall's *Rethinking Diabetes: Entanglements with Trauma, Poverty, and HIV*

Anthropologist Emily Mendenhall reports on her years of research into diabetes in the very different contexts of Chicago, India, South Africa, and Kenya. The common thread that she finds is that context greatly impacts both the genesis of diabetes and the effectiveness of treatment. She describes syndemic relationships between diabetes and various social, political, and economic factors, challenging traditional perspectives by highlighting how diabetes is not just a medical condition. She explores the relationship of diabetes to trauma, stress, poverty, and HIV. She concludes that T2D should be understood primarily as a disease of economic poverty and social inequality: "understanding how structural violence and poverty fundamentally transform diabetes risk . . . reveals not only geographic vulnerabilities but also how intertwined food, finances, stress, family, and ecological livelihoods have become."[22]

Mendhall's VIDDA (violence, immigration, depression, diabetes, abuse) Syndemic Model:

Image courtesy of Emily Mendenhall and Cornell University Press



Beyond Obesity: Potential Contributors to Obesity

It is well-established that obesity increases one's risk for type 2 diabetes. Fatty acids released from adipose tissue interfere with cell receptors' ability to bind to insulin, and hormonal and inflammatory responses from excess adipose tissue disrupt insulin signaling, leading to higher blood sugar levels. This etiology is well-documented and backed up by population-level studies, where the risk for type 2 diabetes is statistically correlated with a high body mass index (BMI), especially among European-descent populations. BMI data captures this link at the population level: in adults, there is a strong linear relationship between BMIs above 23 and risk for Type 2 diabetes. As a result, most prevention and treatment efforts have focused on diet and exercise.

The overriding focus on obesity as the cause of T2D is a problem because (1) while weight and fatty tissue mass are the single most important risk factor, these are not the only factors to consider, and growing evidence suggests that diabetes emerges syndemically in conjunction with other variables; and (2) obesity is itself a well-established syndemic syndrome, produced by a complex system of other factors in addition to calories consumed and expended. One study found that about 40% of diabetes cases in the US are attributable to obesity.[23] Nayaran and colleagues conclude that, "although the rise in incidence of type 2 diabetes has coincided with a rise in rates of obesity—a condition that is without question a major risk factor for diabetes—several issues concerning the cause of diabetes, and its links with obesity, should be investigated further."[24]

Beyond excess adipose tissue, insulin resistance and T2D can be triggered by high levels of cortisol (a steroid hormone produced in the adrenal glands), which is associated with stress.[25] There may well be an intergenerational link between stress and diabetes,[26] and diabetes may be linked to trauma in childhood.[27] Arleen Tuchman, a historian of science and medicine, found that in the case of immigrants (such as early Jewish American cases), escaping hardship and hunger and the stresses of immigrating may increase insulin resistance.[28] She concludes that such stress likely contributes to the emergence of diabetes, perhaps by stimulating inflammation. Anthropologist Jo Scheder, who studied migrant farmworkers with diabetes in the 1980s, was one of the first to argue that life stressors are a better indicator of the development of diabetes than obesity or glucose intolerance.[29]

It is well-established that stress leads to a rise in cortisol levels. Cortisol acts on fat cells throughout the body to make them more insulin resistant, contributing to diabetes; elevated cortisol is also associated with hunger and overeating, again, potentially contributing to diabetes. Stress in babies (e.g., born underweight due to malnutrition) makes them more likely to develop chronic diseases such as T2D later in life, suggesting an epigenetic trigger. Anthropologist Emily Mendenhall—whose cross-cultural research on diabetes similarly uncovered links between stress, depression, life circumstances, and diabetes—further notes that childhood trauma (e.g., violence, sexual abuse) can lead to chronic stress and inflammation in the body, which are both linked to diabetes.[30]

Links found between diabetes and depression also suggest that depression has a role to play in diabetes. Approximately one-third of diabetes patients suffer from depression. While for some depression may be a result of their disease, there is also evidence that both depression and diabetes "share biological origins, particularly overactivation of innate immunity leading to cytokine-mediated inflammatory response" and "dysregulation of the hypothalamic-pituitary-adrenal axis."[31] These biological processes could result in elevated cortisol release, elucidating a further link between depression, diabetes, and stress. Physician-researchers Joshua J. Joseph and Sherita H. Goldin have posited that there is a relationship between chronic psychological stress—which increases the allostatic load, or the wear and tear on the body—and both depression and diabetes.[32]

Endocrine-disrupting chemicals (EDCs) have also emerged as potential contributors to diabetes, inhibiting insulin processing. A 2023 French review found strong evidence that some EDCs, such as BPAs, Phthalates, PCBs, and DDT, are either obesogenic or diabetogenic.[33] In his book on the history of the diabetes crisis, historian Matthew Klingle[34] reports that, "EDCs may not be the sole reason for the spike in type 2 diabetes, but they could be a contributing factor, which, when added to the usual factors like obesity, could act as a tipping point in causing the disease where people are living and transportation access. For good health, place matters." Rashon Lane, a Senior Health Equity Researcher in the Center for Health Systems Research, is also exploring the links between quality of sleep, cardiovascular disease, and diabetes, and her research suggests that economic and environmental detriments to sleep may become triggers for diabetes.[35]

> **It is challenging to bring sleep up to higher priority for individuals who have diabetes. Because when you're trying to just lower someone's blood glucose, sleep isn't often the priority for clinicians. But if we get back to social determinants of health, probably [people] don't have enough time to sleep when they work multiple jobs. They have families. They may be caregivers. All of these factors that we don't bring into the picture are probably not documented and may never be asked of the patient. And so we never truly capture that.**
>
> —RASHON LANE
> Sutter Health Center for Health Systems Research

In sum, the causes of T2D are more complicated than just individual choices around diet and exercise. As we have detailed, other factors play an important role, including stress, depression, and chemical exposure. As Mathew Klingle notes, all of these factors accumulate into an "allostatic load," which, combined "with poor diet and inadequate health care, dangerous environmental conditions, from racial strife to financial insecurity to racial discrimination, can literally get under the skin, spur unnecessary insulin production, and produce diabetes."[36]

Prevention and Treatments

The medical approach to T2D has relied primarily on "disease management to avert complications" rather than on finding a cure."[37] Managing active T2D has traditionally involved (1) medications (including metformin and, in severe cases, insulin); (2) monitoring glucose levels (with pin prick tests or continuous glucose monitoring systems) and taking medications accordingly; and (3) maintaining a healthy diet and regular physical activity to avoid further complications. Current trends may be moving towards a highly individualized approach, particularly as patients age and develop further comorbidities, making diabetes management more complicated.

Clinical preventions for T2D, particularly for those who are diagnosed as "pre-diabetic" emphasize the importance of diet and exercise in lowering weight and improving metabolic measures. While many lifestyle changes are proven to be effective on the individual level, they put the onus of responsibility on the patient and minimizes environmental, social, and economic contexts that may impact outcomes.

The focus on diet and exercise as prevention and treatment for pre-diabetes and diabetic maintenance relies on the energy-balance explanatory model for obesity (calories-in minus calories-out equals weight loss or gain). This model has been widely criticized for not recognizing the many contributors to obesity and it is now scientifically accepted that obesity is a complex phenomena. Relying on the energy-balance model alone puts a heavy burden on individuals and takes it off of health-care providers and socio-economic systems. Further, while diet and exercise affect weight and insulin resistance for many people, a significant portion of those in large bodies (>30 BMI) cannot sustain weight loss. Semaglutide treatments show promising results for those individuals, although costs are high, treatment has to be continuous to maintain results, and long-term effects are still unknown. As promising as these therapies seem, historical examples lead us to be skeptical of silver bullet solutions.

There are a variety of pharmaceutical interventions for T2D. These include first-line medications, such as metformin, which works by reducing the production of glucose in the liver and increasing the sensitivity of body tissues to insulin. Other drug classes work differently, including stimulating the pancreas to release more insulin, improving insulin sensitivity in muscle and fat cells, slowing the digestion and absorption of carbohydrates in the small intestine, and blocking the reabsorption of glucose by the kidneys.

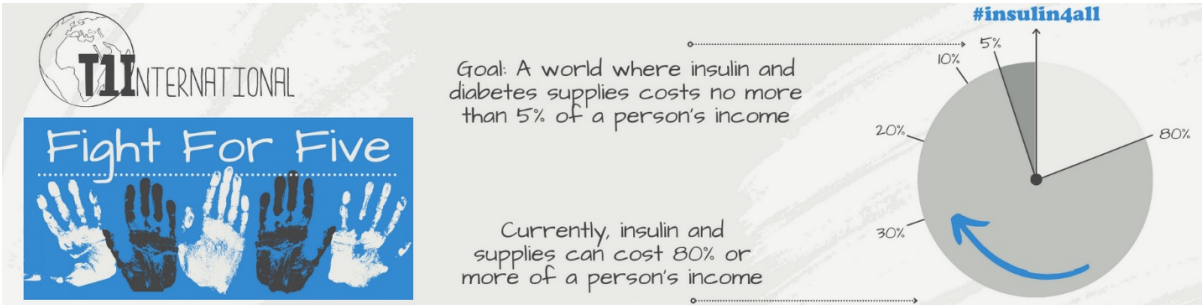
Eduardo Gómez observes that treatment in the U.S. pushes patients toward starting medications early, while in the U.K., the Netherlands, and other northern European countries, the goal seems to be getting patients off of medications as soon as possible, and to emphasize fitness and wellness.

For T2D patients, even those on metformin and other drugs, the pancreas eventually exhausts its ability to produce insulin, and insulin therapy becomes necessary. T1 International, a nonprofit organization, states that 50% of people living with diabetes, independent of the type, are unable to access insulin because of availability or costs.[38] Out of pocket expenses for those living with diabetes in the U.S. averages about $1000 a month, an extreme financial burden for most.[39]

> We know that Mama is going to share her insulin with her sister, who doesn't have health care. We know this. Okay, we're not stupid. We know that that she gets one vial of insulin, and her baby sister doesn't have any insurance. So she gives her part of her supply every day, and uses less insulin than she should. That's the reality, and let's not stop putting this stuff under the rug. That's what's happening. That's why we need a national, an international campaign that will push availability of insulin to those who need it. People are suffering, people are dying.

—DAVID AUGUSTIN HODGE
National Center of Bioethics in Research and Health Care, Tuskegee University

T1 International advocates for all those living with diabetes and needing more sustainable access to insulin; their goal is a "world where insulin and diabetes supplies cost no more than 5% of a person's income." The goal of "Fight for Five" is sustained by data on the limitations to accessing insulin through national health systems and the high out-of-pocket costs, reaching from 40% to 80% of a person's average monthly income in countries like Brazil and Fiji. Families United for Affordable Insulin (FUFAI) pays tribute to the sacrifices individuals and their families make to afford insulin, from giving up on education to rationing the medication, and to the lives lost because of a lack of access to insulin.[40]



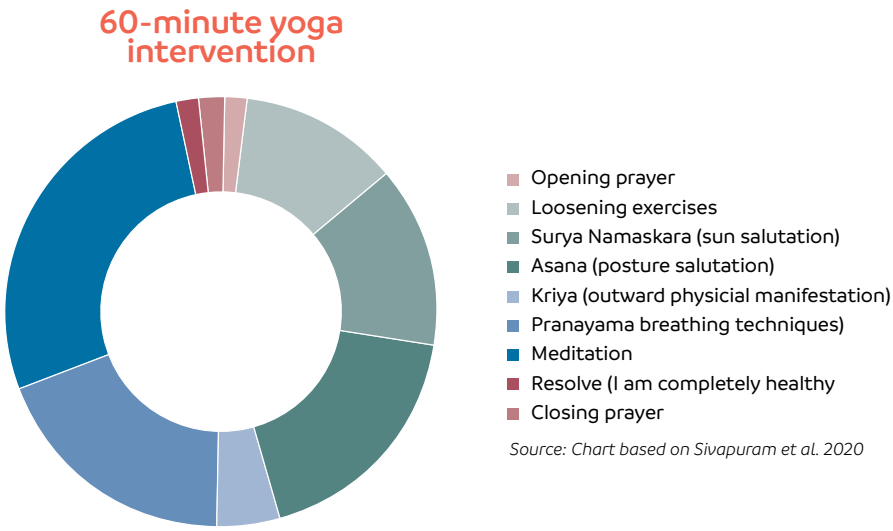
What these interventions miss are the ways in which the contexts of people's lived experience produces certain types of bodies and limits possibilities for change. "Our entire society is perfectly designed to create Type 2 diabetes," says Dr. Dean Schillinger, Professor of Medicine at the University of California, San Francisco.[41] Schillinger and others authored a report to Congress on diabetes that called for reframing the epidemic as a social, economic, and environmental problem.[42]

Alternative Approaches

Medical descriptions of diabetes in India go back at least a couple of thousand years. The early text *Susruta Samhita* goes into great detail into the symptoms and treatment of both "thin diabetes" and "fat diabetes," what we now refer to as type 1 and type 2. The *Susruta Samhita* points to nutrition and levels of physical activity as probable causes of diabetes, but they also emphasize psychosocial factors as well. Recommended treatments included diet, ayurvedic medicines, and psychosocial therapy. Building on this tradition as well as an extensive meta-analysis of diabetes interventions, endocrinologist Sanjay Kalra and colleagues developed clinical practice guidelines for the psychosocial management of diabetes.[43] They present a list of specific recommendations to help medical professionals identify the psychosocial interventions needed to support patients and their families. Their recommendations are notable for focusing not just on the patient but their families and communities as well. While many of the recommendations are specific to the Indian context, the model clearly has global relevance.

India and the Hindu Ayurvedic medical tradition provide evidence for more holistic approaches to diabetes through many scientific studies assessing interventions. For example, one large-scale randomized controlled trial recruited 3,380 pre-diabetic participants across rural and urban areas for a yoga-based lifestyle protocol aiming to prevent the development of diabetes[44]. The control group received standard behavioral-based advice for diabetes prevention. The intervention group received a 9-day training with a Yoga-Based Lifestyle Protocol (YLP) followed by daily practices and weekly supervision for 3 months. The initial and following trainings took place in public or community spaces, which extended social connections between patients. The YLP was developed with senior yoga experts from different yoga traditions across India. It included a sequence of movements like breathing

practices, meditation, intense physical movement, and relaxation techniques. This involves physical activity, but it is more than a sequence of movements designed to burn calories. The yoga movement is combined with meditation, mantras, and affirmations in a way that decreases stress and anxiety, which contribute to high blood sugar levels. Techniques such as meditation, yoga, deep breathing exercises, and cognitive-behavioral affirmations can help manage stress and improve overall well-being.

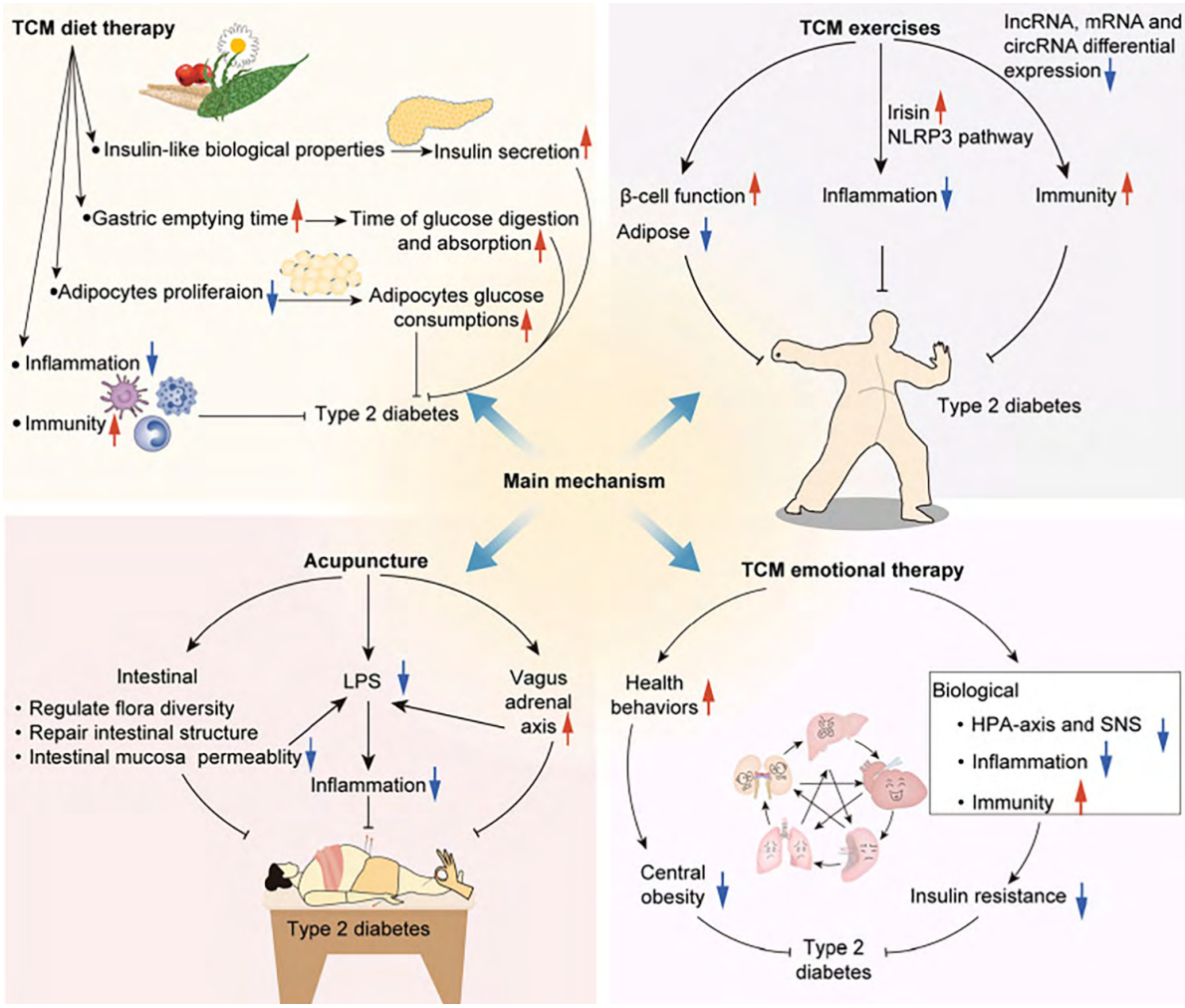


Source: Chart based on Sivapuram et al. 2020

The results show a significantly lower development of diabetes among the Yoga Lifestyle Protocol group (11%) in comparison to the control group (21%). At the end of the intervention, the intervention group also showed better conversion rates from pre-diabetic to moral glycemic levels; the rates also showed better chances of impact among younger participants (<40 years). Results among regional subsets of this pan-Indian intervention address the importance of expert guidance as well as community facilities for providing training and substantial follow-up.[45] While some participants dropped out due to time constraints and work demands, the different analyses suggest that the Yoga Lifestyle Protocol was sustainable for most participants, particularly as it did not require further costs associated with exercising once they received the training. While this intervention does focus on changes to individual lifestyle, it also incorporates stress reduction, community building, and the environmental and social contexts.

In traditional Chinese medicine (TCM), interventions adopt an integrative approach, with a focus on non-pharmacological interventions to prevent T2D that include changes in diet, acupuncture treatment, emotional therapy, and the inclusion of sustained physical activity through traditional Chinese exercises. Acupuncture is particularly important among prediabetic populations for reducing risk, and it can improve related complications like neuropathy and gastroparesis for those with progressed disease.[46] TCM prescribes physical activity to diabetic patients in one or more of four traditions of movement: Tajiquan (or Tai Chi), Baduajin, Yijinjing, and Wuqinxi. These practices are low-intensity and long-term aerobic exercises, similar to what Western research recommends. However, because these practices are rooted in a holistic understanding of the body, they also incorporate movements aiming towards healing and strengthening through breathing regulation, movement repetition, and mindfulness. A systematic review of 33 clinical randomized controlled trials that applied one of the four traditional Chinese exercises to treat T2D showed promising results in improving blood glucose, cholesterol, and insulin sensitivity levels.[47] These exercises also have the added benefit of being low-cost and adaptable to indoor situations, thus making them easier for individuals to sustain.

Main possible mechanism of non-drug TCM intervention



Source: Image courtesy of Liu, J., Yao, C., Wang, Y., Zhao, J., & Luo, H. (2023). Non-drug interventions of traditional Chinese medicine in preventing type 2 diabetes: A review. Chinese Medicine, 18(1), 151.

Recent evidence from the Western tradition supports the more holistic approach taken by Ayurveda and TCM, especially regarding psychosocial factors. In a similar fashion, evidence suggests that art therapy can have a positive outcome for people living with diabetes. While studies are few, interventions with music and visual arts have reported positive outcomes like decreasing blood glucose levels and alleviating signs of depression.[49] Though most of the studies addressing art therapy focus on T1D, there is potential relevance for all types of diabetes. One study in the UK found that frequent art engagement (going to the cinema, the theatre, a concert, or the opera) is associated with a lower risk of T2D, independent of an individual's socioeconomic factors.

Overly simplifying the causes of diabetes limits our understanding of what interventions are possible. Given this, we may look to global interventions that categorize and treat diabetes based on multiple physiological and cultural context variables.

As Arleen Tuchman writes,

“diabetes is a disease that tests the character of the patient.”[55]

2 Personal Blame, Collective Responsibility, and the Myth of Rational Bodies

Don't tell me I'm a 'bad diabetic.' You don't have diabetes. You don't know how hard it is. I try my best to manage what I didn't ask for.[51]

There is a feeling of stigma attached to getting type 2 diabetes because you feel it's your fault and you did it to yourself.

I actually had one person say 'well you've dug your grave with your own teeth.'[52]

Recent research has documented the metabolic and etiological complexity of diabetes. But diabetes policy and treatment have not kept up with the emerging scientific consensus that diabetes is caused by the interaction of biological and contextual factors. A CCH approach illustrates ways in which the burdens of care and prevention can be more widely distributed and the search for root causes can take into account the broader contexts that influence biology.

In this section, we examine the widely held cultural and medical assumption of "rational bodies" that respond mechanically to biomedical interventions. This assumption underwrites much of diabetes policy and clinical interventions. When bodies do not respond rationally or predictably, or the complicated contexts of lived experience conspire against adherence, patients are often blamed for their behavior ("non-compliance"), which can then produce shame and stress in the patient and in their family.

Anthropologist Rebecca Bedwell, who documents patient perceptions of T2D along the U.S.-Mexico border, found that "an emphasis on individual responsibility in diabetes management led to negative emotions both for the person with diabetes and their family members, as well as feelings of blame on the part of family members. Negative emotions cause conflict within families, and in the instance of depression or feelings of resignation, impede selfcare."[53]

Moralizations around excess weight[54] and a perceived lack of self-control have a long history in the Western tradition, and these moralizations have been extended into popular and medical approaches to diabetes. The widespread belief that overeating and low levels of physical activity are simply the result of choices that individuals make on their own has damaging effects on individuals' lives. This belief has resulted in an outsized burden placed on individual patients, who are often blamed when they cannot control their blood sugar levels. It also ignores the constraints of patients' actual lives. When patients avoid treatment for fear of moral reproach, the results can be devastating.

Rational Bodies and Self-Management

In the West, there is a long tradition of considering the body as an individual, biological entity that can be controlled and disciplined by the mind. This orientation stems from Enlightenment beliefs about rationality, or the idea that we should act through logic rather than sensory, emotional, or sociocultural experience—also known as "lived experience." This distinction has resulted in the presumption of what we may call the "rational body."[56]

By rational body we mean: (1) that bodies and their physiological processes are assumed to function in predictable ways based on scientifically established cause-and-effect mechanisms; and (2) that individuals are able to exert effective control over their bodies. A related concept that emerged from the same Enlightenment roots is gave birth to the enduring notion of a "perfectible body," that there is a singular ideal body type and that through self-discipline and willpower we can make our own bodies in that image. Furthermore, Western Enlightenment thinking about evolution and different, racialized body types resulted in a moralized hierarchy in which some bodies (White, European) were seen as superior.

Assuming a rational body leads to an emphasis on self-control and self-management in diabetes treatment. "Management" and "control" are bywords of T2D prevention and treatment, and HMOs and PPOs incentivize patient empowerment and self-management as a cost saving mechanism. Jeffrey Bennett, a professor of Communication Studies and author of *Managing Diabetes: The Cultural Politics of Disease*, identifies a foundational paradox in standard approaches to diabetes: 1) diabetes is easily managed (and should be almost effortless with the available technology) yet it is also lethal (which can lead to a sense of resignation and inefficacy; 2) individuals need to manage their disease, yet their ability to do so is constrained by systemic and structural issues.

Bennett focuses on the metaphor of "managing diabetes" and how this framework feeds into a long-standing Western narrative around personal responsibility and hard work. This model holds that diabetes is readily controlled with pharmaceuticals and personal restraint, but Bennett convincingly argues that it ignores the "capriciousness of metabolic processes" and the complicated ways shame, race, and self-control interact. He documents how media portrayals make an implicit association between race, consumption of junk food, and the moral failings of not taking care of one's own body. He concludes that the focus on individual responsibility distracts from the contextual and systemic factors that frame and delimit individual choices.

Similarly, anthropologist Steve Ferzacca writes that the clinical cultivation of an ideal, normative body tends to mirror "middle-class values that link self-discipline and productivity as behaviors essential to good health." Bodily signs such as weight, blood pressure, glucose readings, and lab results ground and help direct the narrative flow of the clinical encounter; these signs form an allegory and "are used as variables by clinicians to point out to the patient when he is 'in control' or 'out of control.'"[57] In these ways, Ferzacca argues, certain Western values, such as individual autonomy, rationality, self-discipline, and a work ethic around being productive "circulate in the course of medical practice."[58]

Marketing Diabetes Control

In 2023, it is estimated that more than $491 million was spent on advertising "diabesity" (diabetes and obesity) drugs. A content analysis[59] of T2D drug commercials for US audiences shows how the ads paint a picture of an uncontrolled disease, with individuals who are diagnosed as diabetic as wholly responsible for their health outcomes. "Control" is the dominant narrative of the direct-to-consumer (DTC) advertisements[60] for prescription diabetes medications.

By depicting the menace of uncertainty and the danger of diabetes, the ads aim to establish a tacit agreement among viewers that this individual 'lack of control' is *the* primary determinant of diabetes health outcomes.[61] With this foundation in place, the DTC ads offer users a restoration of 'control' over themselves, their desires, and their disease through a diabetes drug.

Ozempic ads, for example, suggests that the evidence of restored control can be found in "improved blood sugar control, lower cardiovascular risk, and weight loss." Similarly, Rybelsus, offers users the ability to "increase insulin, slow food (gastric emptying) after eating, and decrease blood sugar." Trulicity, on the other hand, places control of the disease clearly outside the reach and will of the diabetic, whose body (with the assistance of their drug) "can still make its own insulin," promising its users the ability to "activate their within." The presentation of the drug's most important risks (e.g., side effects) is craftily eclipsed by the threat of inaction or inadequate control.[62] This muddies the US Food and Drug Administration's (FDA) "fair balance" advertising rule that requires advertisers to fairly share the benefits and risks of a drug.

DTC diabetes drug ads use the 'restoration of control' as a powerful moralizing medical metaphor.[63] This is expressed not only in terms of its promise of positive impacts on the self, body (health) and treatment of disease, but also in its depictions of life with diabetes. Through video images of joyful and able-bodied diabetics participating fully in activities not typically associated with a diabetes diagnosis (including eating the foods they want and engaging in strenuous physical activities), these drugs promise a return to normality, an ability to "return to you." Freedom *from* the consequences and complications of diabetes is presented as a kind of market choice and not as an unavoidable circumstance. In this way, the DTC ads suggest that those with diabetes will further suffer if they do not choose to take pharmaceutical action.

Unruly Bodies

Jeffrey Bennett recounts a nurse saying that the hardest part of her job is "convincing patients that having atypical blood sugars did not make them bad people." Ironically, focusing on patients' ability to manage their own disease, Bennett points out, "can generate feelings of isolation and helplessness as much as empowerment and control."[64]

Despite the focus on self-management and control, in reality, people's lives are messy. In a 2018 study of diabetes and gender in India, medical anthropologist Lesley Jo Weaver finds that women's domestic obligations of care are often at odds with the self-care mandates of biomedically-managed diabetes. Weaver describes how women negotiate competing responsibilities to their own health and to those of their family's, as well as how their gendered role of caregiving bolsters mental health and fosters social belonging. Her ethnographic data demonstrates that many routes to living well with diabetes are not accounted for in standardized biomedical models of diabetes management. She encourages diabetes patient advocates to let go of the illusion of total control over the body and its blood sugar levels.[65]

Anthropologist Annemarie Mol and sociologist John Law argue that the body is not a coherent whole: there are tensions between organs (e.g., a tight control of blood sugar is not good for the eyes and neurons); tensions between control and capriciousness (metabolisms can be unpredictable); and tensions between different persons in same body (for example, an athlete and a diabetic). They also cite evidence showing that hypoglycemia can be caused by exerting (too much) control, not despite it. Ultimately, they argue, the assumption that there is a coherent body hides the very work of what it means to be human.[66]

In Mol and Law's view, clinicians and policymakers treat idealized rather than actual bodies. They argue that we should look at what patients actually do instead (e.g. their involvement in work, family obligations, recreational pursuits, etc.). In this way, we can identify different sorts of selves in one person, such as a diabetic self, a volleyball player self, and an overworked mom. They propose keeping practicalities in the foreground, such as the daily need to care for the kids before after school while also working eight hours.

Mol and Law further point out that numerical measurements of diabetes are almost always seen as more accurate, diminishing the value of self-awareness. They employ a concept called "intro-sensing" which helps patients' develop a higher level of self-awareness, and they look at how this interacts with diabetes monitoring technologies, such as glucose tests. When people are taught to sense, they are more likely to feel an episode come on and they provision their surroundings accordingly (putting snacks in bag to bring to work, for example). Mol and Law's idea of the "self-aware body" (patient-facing) opens the possibility of "self-aware treatment" (medicine facing) and "self-aware care" (community facing). It can also address a key issue identified by Mary Specker Stone: that patient empowerment strategies actually undermine patient agency by encouraging them to passively accept directives from biomedicine without learning how to integrate care for their disease into their unique, everyday lives.

Along these same lines, Jeffrey Bennett describes how people living with diabetes must learn to apply broad and often abstract principles to very specific situations in their personal lives.[67] This requires individuals to have a capacity for discernment that is not easily developed; rather, it "requires years of arbitration between medical necessity and lived reality."[68] He offers the examples of how some patients may try to game their clinical results by fasting or eating little before a doctors appt to produce lower blood sugar results–and to avoid the disapproval of the clinician. Bennett sees such health management as a performative dance on the part of the care provider and the patient, rather than a model that ultimately helps the patient.

Shame, Blame, and Understandings of Diabetes

In the prevalent medical model that assumes bodies can be perfected and controlled, shame and blame appear as common discourses in patient narratives and public health strategies. People who develop T2D or fail to control the disease become objects of scrutiny. It is important to understand that these rhetorics are not new and have a long history in the modern context.

In the early 20th century, T2D was widely considered a "disease of affluence." Haven Emerson, professor of preventive medicine at Columbia University, argued in a 1924 essay titled "Sweetness is Death" that diabetes was a disease of luxury, lamenting the loss of self-control it reflected and how weak society was becoming. In 1936, journalist Hannah Lees published an essay sounding the alarm of T2damong middle-class whites and amplified Emerson's advice to have more self-control and to live more abstemiously.[69]

Shame is often associated with an inability to control one's weight. While diet and physical activity clearly affect body size (and risk for T2D) for most individuals, evidence has shown that there is not a direct correlation between the energy-balance model (calories-in vs. calories-out) and weight gain or loss. For a significant portion of large-bodied individuals, diet and exercise alone cannot sustain a reduction of excess adipose tissue. While the reasons for this are still in debate amongst obesity experts, it is clear that weight is far more complicated than we initially thought. As discussed in section one, while particular types of excess adipose tissue do increase the risk for T2D, they are not the only factors and often work in conjunction with other variables.

Colonial legacies that link body size to moralities of discipline and self-control underwrite public health efforts that target diet and individual decision making. Recognizing how biomedical understandings of overweight and obesity are built on historically racialized and gendered notions of body ideals can help counter fat-bias and reveal structures that place BIPOC populations at higher health risk.

A 2010 *Lancet* report on diabetes concludes that the disease is "rooted in reversible social and lifestyle factors."[70] A common characterization is that "the onset and spread of type 2 diabetes are the result of social and cultural processes related to change in the quality and quantity of energy consumed (diet) and energy expended (physical activity)."[71] In this view, "culture is a mostly independent variable to which biology may be resistant, accommodating, or, at the very least, responsive" and that cultural and social "change is the culprit."[72] Unfortunately the report omits the many ways in which conceptualizations of the disease can result in further harm to the people who live it.

Targeting weight as an approach to T2D can create the same stigma as anti-obesity campaigns, which researchers have shown can have a negative health impact for many individuals. One of the leading researchers on weight stigma, Rebecca Puhl, has shown that stigma around weight can even lead individuals to gain more weight, likely due to the social marginalization and stress of stigmatization. People living with diabetes experience higher rates of weight stigma than the overall population.[73]

It is estimated that over 85% of those with T2D are overweight or obese; however, less than 40% of people labeled as overweight and obese have T2D.

The conflation between weight stigma and diabetes stigma has been reported across the globe. In a survey of 1,212 adults with T2D living in the US, more than 50% had experienced weight stigma, including within a healthcare context[74]. The respondents also reported diabetes stigma, experienced as blame, judgement, and differential treatment. Unfortunately, many also reported internalized forms of stigma. Another study, following 510 Japanese participants with diabetes showed that 32.9% experienced diabetes-related shame, and 17.5% concealed their disease from colleagues or friends.[75] The experience of shame was also connected to poor outcomes in mental health, with respondants reporting experiences closely related to depression and anxiety. The study also found that particular individuals were at higher risk of experiencing shame, including women, young adults, those without a college degree, those with low self-efficacy, and those with a strong sense of financial or external pressure. A study in Australia found a strong association between diabetes stigma and negative insulin appraisals among people with insulin-treated T2D[76]. Participants reported perceived or experienced stigmatization around insulin use, such as shame about injecting in public places or being labeled as sick, which resulted in less efficacy and poor management of insulin levels. Despite this evidence, little attention has been placed on diabetes stigmatization within policy or clinical practice.

The experience of shame in clinical settings can also reduce treatment seeking and increase risk-associated behaviors. A study by Puhl and colleagues of health-related behaviors among 1,227 adults with T2D showed that experiences of weight stigma in health care, differential treatment, and self-stigma for diabetes resulted in increased episodes of binge eating, lower levels of physical activity, and poor perceptions of health. As a mechanism for coping with negative feelings, binge eating and social isolation also increased health risks. Puhl and colleagues recommend that initiatives addressing the well-being of people with T2D need to address "the potentially harmful roles of weight stigma and diabetes stigma."[77]

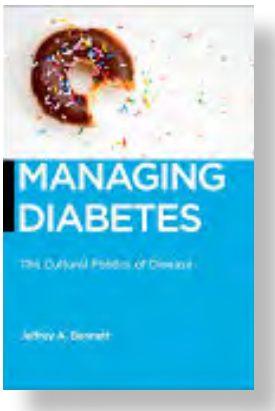
The authors of a reviews on the role of stigmatization and chronic stress in inflammation and overall metabolic health urge us to understand the perils of not challenging disease prevention programs that remain focused on the energy balance and BMI model[78]. Shifting the work of prevention towards a holistic perspective of metabolic health could include the benefits of stress relief, resting and restorative environments, and challenging shame and blame as part of diabetes prevention interventions.

From Individual to Collective Responsibility

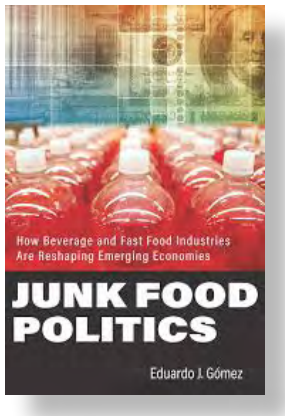
If we want to decouple individual fault from collective responsibility in T2D prevention and treatment, examining how other cultures address the illness is useful. Working in Uganda, public health researcher Juliet Kiguli observes that local explanations for T2D are not linked to diet or lack of exercise but more often to witchcraft. Those living with diabetes in this context *are* not individually blamed for "acquiring" the disease or having brought it onto themselves but rather they are embodying it as a result of social interactions. As such, the disease is understood as having been caused by the wider social context, a place Kiguli says has experienced an overall "sweetening" of the culture in recent years.

Alternatively, indigenous systems thinking can help us understand the importance of moving from individual to collective responsibility. For instance, in their health and healing practices, many Native American tribes acknowledge the role of internal and external forces beyond their control, both at the individual and collective level.[79] The legacy of relocation and land dispossession, loss of cultural practices and food sovereignty, and grief over experiences in boarding schools have been reported. Additionally, this perspective allows for the recognition of the consequences of the current economic system on human and planetary health.

The absence of individual blame afforded by blaming external forces does not necessarily protect those living with the disease from experiencing shame as they search for treatment. When exploring the stigma and diabetes in Ghana, social psychologist Ama de-Graft Aikins explains that even with the cultural explanation of witchcraft, people will still experience prejudice, stigmatization, and even discrimination that "have deeper pre-stigma roots in poverty and the socio-psychological and cultural impact of long-term illness."[80] This is particularly important for people experiencing uncontrolled diabetes and who belong to communities that have faced the dire consequences of health, social, and financial insecurities. Thus, acknowledging the multiple layers of stigmatization (arising from individual and structural conditions) is important for prevention and care interventions.



Jeffrey A. Bennett's *Managing Diabetes: The Cultural Politics of Disease*



Eduardo J. Gómez's *Junk Food Politics: How Beverage and Fast Food Industries Are Reshaping Emerging Economies*

> A common explanation given by Native Americans is that a harmful spirit power that inhabits you because of the imbalance in the world. Because the natural world is not the way it should be, we can't interact with it like we used to. So, helpful animal spirits usually remind us of how things are off kilter. Becoming inhabited by harmful spirits makes you unhealthy.
>
> —KELLY HALLMAN
> Indigenous Justice Circle

From Individual Blame to Collective Responsibility

The emphasis on individual responsibility in diabetes prevention and care, particularly focused on body size, dietary choices, or glucose and medication control, also underpins public health interventions and policies. However, as we have illustrated, structural conditions need to be. Rather than depend on individual diet choice and exercise changes, evidence suggests that we shift efforts toward changing the population-level distribution of body mass and T2D. We can do this through policy and environmental change in neighborhoods (nutritious food, safe recreation), schools (snacks, school lunch, physical education), workplaces (stress reduction, physical activity), restaurants (caloric labeling, limits on trans fats), farms (agricultural subsidies), and transportation (sidewalks, bicycle lanes, mass transit).

A small way to start is by incorporating an individual's household into care plans. Cuba provides an interesting model for such a task. Known for its focus on preventive care and public accessibility, the Cuban healthcare system has developed a uniquely collective approach to managing diabetes. According to anthropologist Nancy Burke, Cuban doctors estimate that about 10% of the population is diabetic, and many more are prediabetic. The Cuban approach to T2D is grounded in the country's healthcare infrastructure, which includes free healthcare for all citizens with an emphasis on primary care. Family doctors play a pivotal role in the early detection, treatment, and management of diabetes, and the health care system provides comprehensive care for individuals with diabetes. Cuban researchers have also developed innovative treatments, including a medication designed to treat diabetic foot ulcers and reduce the risk of amputation in those with diabetes.

Cuba further developed a National Diabetes Care Program in the early 1980s that sought to improve the quality of life for diabetic patients through education, medication, and ongoing support. The program is still alive today. A foundational element of the program is that not only the patient, but also their family members and community, share responsibility for treatment and management. Once a primary care physician identifies a patient as diabetic or borderline diabetic, the patient and another family member are jointly enrolled in an education program. In these programs, there is a strong emphasis on educating patients about self-management of diabetes, including monitoring blood sugar levels, adhering to medication regimens, and understanding the importance of diet and exercise. Patients and family members participate in interactive diabetes circles to discuss practical strategies of disease management, and patients receive special rations for their prescribed diets. Finally, patients receive ongoing care from local polyclinics and neighborhood-based family doctors and nurses who follow up with patients, including home visits.

By integrating prevention, comprehensive care, patient education, and innovative treatments within its universal healthcare system, Cuba works to manage diabetes effectively among its population. While the Cuban system has a mandatory element that would make it untenable in the U.S. context, it attempts to reduce the blame and shame on individual patients by incorporating family members. While Burke notes that patients still largely blame themselves, she argues that collectivization of the response and care–the sense that people are in it together–does make it feel like less of a personal failing.

When it comes to enacting policy and public health protocols, it's important to frame education initiatives as a collective endeavor. Especially for diabetes prevention, clinical and public health strategies at the community level can be designed to address a material and built environment that supports the required lifestyle changes, access to trained health specialists and health care affordability[81], and stigma.

Placing the pre-diabetic or diabetic person solely as a recipient of information can also result in their exclusion from research and policymaking. A review of diabetes research in the U.S. found that few studies incorporated patients and communities.[82] Evidence suggests that the involvement of families and communities is key for sustaining enrolment and achieving results. Community involvement, however, could also help increase the representation of BIPOC people in clinical trials and tailor research questions to fit their needs. Of course, collaborative research models require more funding and there are few incentives for researchers to share control over studies. A policy-driven paradigm shift is needed to incentivize researchers and funding bodies.

There is some evidence that such a paradigm shift would work. Public health researcher Jessica Martini and colleagues compared diabetes and HIV/AIDS policies in Mali.[83] They found that despite the early involvement of diabetes associations in seeking and creating treatment programs in Mali, once the disease was incorporated into public health strategies and policies, the patient associations were seldomly consulted or included in the design. HIV/AIDS programs, however, often had international funding that required the incorporation of patient organizations. The researchers further found that with the diabetes policies "most testimonies depict a relatively *"undisciplined chronic patient,"* who does not adhere to his diet nor understand the chronicity of the disease. This perception negatively influences other actors' recognition of diabetics' experiential knowledge, and correspondingly affects their legitimacy to participate in decision-making." The HIV/AIDS policies, however, were more likely to empower the patient.

Decoupling Race and Diabetes: Recognizing the Important of Context

> I see diabetes from the view of the Mississippi Delta and its history. White people used to gather on a square and watch the lynchings of black people. And they saw a life up there and saw that life taken immediately. Some felt gratification. To some it was a shock, but it was just what was done. I think about that today when I see all the amputations among Black people in Mississippi. The fact that they can take away a black or brown person's limb, knowing that in five years that person will likely be dead, it brings the same horror as those lynchings.

—FALUSO FAKOREDE
Cardiovascular Solutions of Central Mississippi

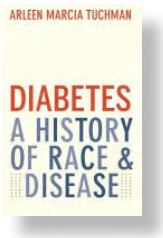
Race is routinely listed as one of the primary risk factors of type 2 diabetes. The CDC's guidelines state that "you are at risk for type 2 diabetes if you:

- Have prediabetes.
- Are overweight.
- Are 45 years or older.
- Have a parent, brother, or sister with type 2 diabetes.
- Are physically active less than 3 times a week.
- Have ever had gestational diabetes or given birth to a baby who weighed over 9 pounds.
- **Are an African American, Hispanic or Latino, American Indian, or Alaska Native person.** Some Pacific Islanders and Asian American people are also at higher risk."[84]

While it is true that diabetes rates are significantly higher in Black, Hispanic/Latino, and Native American populations, there is no evidence that this is due to an inherent biological vulnerability. In fact, modern geneticists no longer recognize race as a biological feature, but rather a social and cultural category. This is because there is far more genetic variation found within populations than between the so-called "races." The term "genetic ancestry" is now used instead.[85]

Unfortunately, the assumption that race represents a biological destiny is still widespread, and moralizations around diabetes are quick to follow. For instance, Jeffrey Bennett shows how the media use race, consumption (of junk food), and the moral failings of not maintaining the body interchangeably.[86] Yet, racialized inequalities in diabetes and other diseases are very real. Historian Roberta Bivins observes that health inequities "disproportionately affect biomedically marginalized communities: those comprised of people who differ from the imagined, normative (white, socially atomized, and economically enabled) target of biomedical research and clinical practice." Researchers have also noted that zip codes are one of the best indicators of risk for diabetes (and many other diseases); given the many segregated neighborhoods and communities in the U.S., these also often relate to racial and ethnic populations.

However, these racialized inequalities have little to do with biology or genetics. Evidence rather points to different culprits: the social, economic, environmental, and historical factors that make race a real social category.



Arleen Tuchman's *Diabetes: A History of Race and Disease*

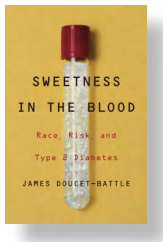
Historian Arleen Tuchman's *Diabetes* explores the relationship between race and risk of diabetes, highlighting how stereotypes and prejudice have influenced medical research. While many associate diabetes with African Americans and Native Americans today, Tuchman shows that in the early twentieth century, diabetes was known as "the Jewish disease," associated with a stereotype of a newfound affluence of immigrant populations who indulged their appetite for food and drink to excess. Over time, that racial association shifted, first to middle-class whites and then to Native Americans, and finally on to African American and Hispanic populations. This remarkable book details how cultural associations and racial stereotypes have driven much scientific research, and opens the door for new ways of thinking about the interaction of biology and cultural.

Race as a Misunderstood Risk Category

Historicizing race and diabetes can help us understand why race became such a misunderstood risk category. Racial associations with diabetes have changed over time, often following social prejudice rather than reality. Arleen Tuchman[87] reports that in the late nineteenth/early twentieth century, diabetes was seen as a Jewish disease, with much debate over whether it was linked to race/genetics. Haven Emerson, writing in 1924, similarly characterized diabetes as a Jewish disease, brought about by affluence and indulgence–although by his own account most of the Jewish patients were working class, not idle rich.[88] By the early/mid twentieth century, diabetes was identified as a white, middle-class ailment. By the mid-twentieth century, high rates of diabetes was discovered among Black and Native American populations.[89] During this time, Tuchman writes that "the disease was transformed from one associated with middle-class whites to one believed to afflict mostly racial minorities. *And in the process, descriptions of those who suffered the disease became far more judgmental.*"

Interestingly, diabetes did not become synonymous with obesity until the 1990s: obesity had long been considered a risk factor, but race was seen as more important until the declaration of an obesity epidemic.

Sociologist James Doucet-Battle reminds that T2D among African American populations is a consequence of the social, political, and economic environments interacting with bodies. Thus, Black Americans have a socially/politically/economically constructed racial risk, but there is no "racial metabolism" that acts biologically different than other races in terms of T2D risk. Rather African Americans live in **"socially constructed spaces of risk."** Despite this, race has become a central conceptual and methodological approach to diabetes and other illnesses.[90]



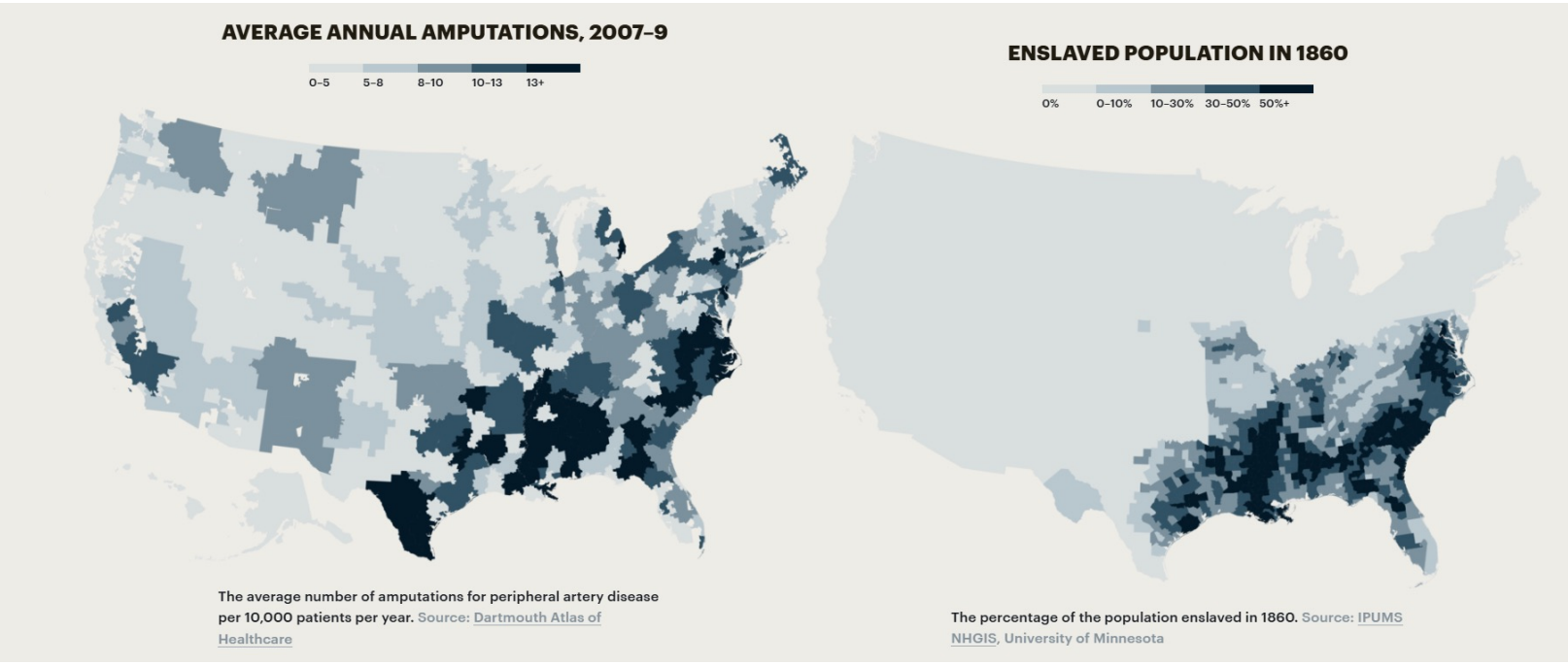
James Doucet-Battle's *Sweetness in the Blood: Race, Risk and Type 2 Diabetes*. Anthropologist James Doucet-Battle addresses the well-known observation that African Americans are far more likely than Euro-Americans to develop T2D (and all of the accompanying complications). But then, through a wide-ranging and meticulously documented study, he effectively undermines the notion that race should drive scientific inquiry into the causes of T2D. He looks at the historical relationship of African diaspora peoples with 'sugar,' from slavery on plantations to the targeted marketing of high-fructose corn syrup foods and beverages to African Americans. He shows how social, cultural, political, and economic contexts interacting with individual biological processes produces the higher incidence of T2D among African Americans and other racial and ethnic groups. He takes on the algorithms that drive diabetes risk assessment and the pharmaceutical capitalism that drives racially segmented research and marketing. Finally, he situates all of this in lived experience–his own and that of African American congregations and communities–in a way that humanizes the tragedy that racialization of the disease has produced.

Doucet-Battle writes that, "as one flock of canaries in the particular speculative Type 2 diabetes goldmine, African Americans embodied research imaginaries of difference that subsumed and marked national, ethnic, and racial notions of diabetes risk susceptibility."[91] Of African American, Latino, Native American, and Jewish bodies, he describes them as the wrong bodies for health risk, but the right bodies for health research and interventions. This is what anthropologist Michael Montoya terms "bioethical conscription" of risk, or attributing risk to race in a way that obfuscates structural factors.[92]

Structural Risks: Diabetic Amputations in Black Communities

There tends to be a different understanding of risk between the social sciences and medical sciences. Medical anthropologist Emily Mendenhall explains that social scientists tend to speak of risk structurally, but public health officials and researchers tend to frame risk in terms of individual biomarkers and behaviors.[93] Yet, structural conditions can produce risk environments that make the lifestyle change recommendations of diabetes treatment and prevention very difficult to accomplish. While structural risk underpins all diabetes risk, the damage caused by ignoring our environments is truly brought to the fore when it comes to diabetes-related amputations.

On average there are 200,000 amputations a year in the United States and 65 percent of those amputations are from diabetic complications.[94] Black people are three times more likely to have their limbs removed than the national average of amputations,[95] And Black women are more likely to have an amputation than Black men.[96] Foluso Fakorede, an interventional cardiologist working in Mississippi, highlights the overlap between the state's average annual amputations in the contemporary U.S. and the location of the enslaved population in the 1860s. In this, he sees an urgent call for action that addresses the challenges of diabetes preventive care in the context of health, social, and financial insecurities.



The average number of amputations for peripheral artery disease per 10,000 patients per year. Source: Dartmouth Atlas of Healthcare

The percentage of the population enslaved in 1860. Source: IPUMS NHGIS, University of Minnesota

Source: Images are courtesy of ProPublica, based on data from Dartmouth Atlas of Healthcare and IPUMS NHGIS, University of Minnesota.

To learn more see this ProPublica Report

Diabetic amputations often result from diabetes-induced peripheral arterial disease (PAD), which is characterized by reduced blood flow to the limbs caused by fatty deposits in the arteries. PAD is most common in patients with low incomes and levels of education.[98] Treating diabetes patients with PAD costs over $84 billion dollars a year.[99] Yet, many physicians are not knowledgeable about PAD or how to test for it. Further, up to a fourth of diabetes patients will develop a foot ulcer at some point in their lives, and even if that ulcer heals, they are 30% more likely to develop another ulcer within a first year by 30-40%.[100] If left untreated, both of these conditions can lead to amputation.

Amputations contribute to a heightened risk of heart attacks and up to an alarming 80 percent mortality rate within five years for individuals undergoing amputation.[101] Further, there are serious mental health effects following an amputation, including worry about how they will be perceived by others, isolation, depression, and friction with loved ones. Some people may develop PTSD from the procedure.

Structural conditions have a large role in creating environments of risk that may contribute to the high rate of amputations among Black individuals. For instance, in many Black communities, the stresses of poverty make it difficult to have doctor visits and maintain blood sugar levels–according to the CDC nearly 14% of the black community ages 19 to 64 did not have health insurance.[102] Black patients are less likely to have screenings and procedures done to prevent amputations.[103] The shame and blame that goes with not being able to control blood sugar levels contributes to this reluctance to seek care, yet often, it is circumstances that are out of the patients' control rather than their bodies. Food access, employment conditions, health care coverage, built environment, educational opportunities, and other contextual factors delimit individuals' choices in ways that may make it difficult or impossible to comply with medical guidance fully. And, for good reasons, many African Americans are mistrustful of the healthcare system.

Fakorede believes these amputations are largely preventable. While most health policies and individual guidance stress preventative measures focusing on patients changing their lifestyles, he believes that a more effective preventative measure is educating and equipping physicians to screen for PAD. He would like to see medical care involve education and therapy along side lifestyle change; for instance, it is key that patients understand that their A1C measure of blood glucose should be less than 7% to prevent an increase of plaque in their blood vessels, which can lead to PAD.

Dr. Foluso Fakorede (center), meets with a patientin Bolivar County, Mississippi.

Foluso Fakorede's Fight Against Diabetic Amputations

Foluso Fakorede is a Nigerian-born interventional cardiologist recognized for his work in peripheral artery disease (PAD) and his public advocacy for health equity. When he moved to the Mississippi Delta in 2015, Fakorede was shocked by the number of amputees he encountered and by the high rates of PAD associated with diabetes among Black individuals. In response, he started a cardiovascular practice in Cleveland, Mississippi.

Fakorede collaborates with local churches and community organizations. He believes that reducing the number of amputations must involve patient education. Unless patients are able to advocate for themselves, the system is likely to push them toward amputations rather than encourage preventative steps. He further believes it crucial for doctors and advocates to build a relationship with church leaders, who are more connected to the everyday lives of community members. He works with church leaders to educate patients on health disparities that affect the Black community, specifically the symptoms and treatments for diabetic PAD.

Dr. Fakorede is also a vocal advocate for policy changes. He has worked alongside congressional lawmakers to increase knowledge about PAD among both doctors and patients and institute measures to prevent amputations. Dr. Fakorede received the 2023 Louis B. Russell Jr. Memorial Award from the American Heart Association, presented for outstanding service to under-resourced communities.

This resonates with patterns found by a survey of international amputation rates for PAD, based on lower-limb amputation data from 2010-2014 across 12 countries participating in VASCUNET, a collaboration of vascular registries from Europe and Australasia.[104] The risk of amputations and diabetes varied across countries, with Hungary having the highest rates of lower-limb amputation and New Zealand the lowest. Lower-limb amputation was found to be higher in countries with the lowest GDP per capita and health care expenditures, indicating that in addition to comorbidities, **"predictive factors for amputation are low socio-economic status and economic factors."** The report also explored health system economic models as a source of amputation risk. Major amputations were also more frequent in countries with a use fee for. The VASCUNET report also suggested that the number of cardiovascular surgeons per 100,000 habitats could be considered a determinant of amputation risk.

It is also significant that specialists mirror the racial diversity of a particular locale. Data shows that Black, Indigenous, and other people of color feel less bias and mistrust when attended by a physician of color. A review of Black primary care providers (PCP) in 1,618 U.S. counties found that a larger representation of Black PCPs was associated with higher overall life expectancy for Black individuals and lower disparities in morbidity and mortality when compared with White populations.[105]

Structural Risks: Food Environments

Sociologist Anthony Hatch describes how metabolic syndrome– similar to diabetes – becomes racialized in research and medicine. He offers a political call to decenter the personal responsibility placed on Black individuals by drawing attention to structural conditions.[106] He notes that sugar consumption amongst Black communities is much higher than national average. Not only were Black populations enslaved on sugar plantations throughout the South, food and beverage companies have long targeted advertising campaigns towards these communities. Hatch argues that, like the 18th century anti-saccharine movement which protested slavery, sugar should be boycotted on political grounds. He uses the term "metabolic emancipation" to call for reducing the role of individual choice—and the stress and burden that comes with it—in an environment in which food and beverage companies largely set the terms of engagement.

Hatch brings up an important point: how one eats is influenced by cultural norms and commercial interests. In the U.S., a majority of the population's caloric intake comes from processed foods—forming what has come to be known as the Standard American Diet. The widespread availability of ultra-processed foods and sodas (and the obesogenic environment in which they thrive) emerged from colonial histories of commerce. Understanding how such patterns developed and became naturalized helps explain and address the systemic and structural conditions that produce current nutritional disparities associated with diabetes risk. Nutritional anthropologist and human ecologist Stanley Ulijaszek points out that the food and beverage industry has been effective at "promoting narrow epidemiological understandings of obesity [that] shift blame from foods to diet," which is to say from structural and systemic factors to one of individual choices.[107] The same can be said for diabetes.

Blaming individuals for bad choices takes attention away from considering who presents those choices, how they are curated, and the sorts of behavioral nudges companies use to influence our choices. Choice is often simplistically equated with freedom, especially in the U.S., yet, as Eduardo Gómez argues, more choice does not necessarily mean more freedom. The proliferation of food choices, many of which are engineered to be almost irresistible, often works against individual health.[108]

Similar to Black populations, much of the medical literature around diabetes among Indigenous peoples has linked the high rates of T2D to presumed genetic predispositions that are triggered by the modern food environment. The link of diabetes to modernization and modern diets can be traced back to an influential 1962 article by James Neel. In it, he argued that genotypes adapted to "feast-or-famine days of hunting and gathering cultures" were maladapted to the abundance and lifestyle of modern life. He argued that while this worked well for hunter-gatherer populations, it was ill adapted to the abundance

of modern food systems. Thus, when Indigenous peoples were exposed (often through forced colonial imposition) to Western diets, the result was high rates of diabetes. While Neel later distanced himself from that work, "the thrifty gene" model continues to influence both lay and scientific discourses about the disease and provided the enduring foundation for the racialization of the disease.[109]

Medical anthropologists Mariana Leal Ferreira and Gretchen Chesley Lang see the thrifty gene hypothesis as "a deliberate attempt to ignore the macro-social context in which diabetes originates and the political and economic aspects of its geographical distribution across so many groups of Indigenous Peoples around the world."[110]

While several genetic variations have been shown to be associated with increased risk for T2D, no one mutation has been found to be determinant. Within the current medical literature, it is thought that a combination of genetic variations interacting with behavior and environmental contexts produces a particular risk for developing T2D.[111] At the same time, "there is little evidence that differences in frequencies of known type 2 diabetes susceptibility genetic alleles account for racial/ethnic differences."[112]

Structural Risks: Colonialism, Food and Trauma in Indigenous Communities

Colonial patterns of exploitation and exclusion also have a role to play in Indigenous communities. Many Native American communities in the United States face food insecurity and poor nutritional outcomes as a direct result of colonialism. Reservations often have limited access to grocery stores, and hunting restrictions limit traditional sources of protein.[113] As Indigenous communities were forced off their ancestral land and into reservations and boarding schools, traditional food practices were systematically stripped away. Many communities living on reservations struggle with poverty, generations of trauma, and assorted health risk factors, such as diabetes. Colonized diets have become "traditional," as with fry bread, and for most processed foods are the cheapest and more reliable option.

Anthropologist Heather Howard studied how Canadian residential school life affected Indigenous children's relationship with food and management of diabetes as adults.[114] Food played a role in "the regimentation, discipline, punishment, morality, deprivation, and even sexual abuse" in these schools. An effective strategy for diabetes intervention in this context was acknowledging the historical trauma and resilience of child survivors, and building new relationships with Indigenous foods through culturally relevant practices like storytelling and eating together.

> With diabetes, the first thing we think about, with native peoples, is fry bread. It is emblematic of us being dispossessed from our land, having our resources taken away so that we were not able to access the plants and the animals and to have the space to move to roam as we did in the past. In those first internment camps, where we were held in during the Indian wars, the only thing that was provided was sugar, coffee, flour, and some poor-quality bacon. Across the board, corn meal or flour, one or the other, but it was usually flour because that was the white man's staple. And now this is something that has become something that people have embraced. We are still struggling with food access. And even if there was access, there's very little money to buy food that is not just off-the-shelf junk food or starches. Paths to food sovereignty are being explored now in Native American communities.

—KELLY HALLMAN
Indigenous Justice Circle

This example illustrates how taking a structural approach to T2D can help aid prevention and treatment, especially in communities that face complex histories of colonialism, slavery, dispossession, trauma, and poverty. Howard is not alone is showing the validity of this approach. Many health researchers have called for diabetes to be addressed as a structural issue, taking into account the social determinants of health. Anthropologist Janet Page-Reeves and colleagues argue that "conceptualization of the dynamics of diabetes health disparities remains shallow… demonstrating the need to conceptualize social determinants more broadly, more effectively, and more dynamically than often considered."[115] Similarly, anthropologist Melanie Rock[116] argues that studying risk factors in isolation limits our understanding of a disease because it is the interaction of factors that produces certain outcomes.

Health researchers John McKinlay and Lisa Marceau[117] see social structure, environment, lifestyle, and physiological factors working together. They map out upstream (health policy) interventions alongside midstream (prevention) and downstream (treatment): "an upstream or whole-population approach to disease prevention and health promotion shifts attention away from relative risk (how many times more likely is this exposed person to succumb than someone not exposed?) to absolute risk (what is this exposed person's increase in absolute level of risk?), and even further to some measure of population attributable risk (how much exposure of the disease in this population can be attributed to this level of exposure?)."[118]

The Akimel O'odham/Pima

The Akimel O'odham peoples (known in the literature as the Pima) feature prominently in T2D research concerning racial and genetic correlations. The causes and effects of the disease among the Pima have been studied intensely and continuously since 1965.[119] They present a unique case for looking at the role of biological heritage versus context because the population is split between reservations in Arizona and communities across the border in Mexico. These two groups share a close genetic ancestry, and their lands and population were almost equally split in the separation by the U.S./Mexico border after the Gadsden Purchase in 1853, yet only the U.S. Pima are widely regarded as having one of the highest rates of diabetes in the world.

In a 2006 study, health scientist Leslie O. Schulz and colleagues[120] found that, after adjusting for age and sex, 38% of the U.S. Pima had T2D, while the disease affected only 6.9% of the Mexican Pima. Obesity rates were also much lower among the Mexican Pima, and levels of physical activity were higher. The authors conclude that "the much lower prevalence of type 2 diabetes and obesity in the Pima Indians in Mexico than in the U.S. indicates that even in populations genetically prone to these conditions, their development is determined mostly by environmental circumstances, thereby suggesting that type 2 diabetes is largely preventable." Another study among the U.S. Pima found that diabetes rates have risen over time, correlated with rise of obesity.[121] In the medical literature, the rise of diabetes and obesity among the U.S. Pima is euphemistically associated with the "Westernization" of their diet. It is worth emphasizing that the U.S. Pima's modern diet was forged through forced relocations, confinement to reservations, destruction of native subsistence ecosystems, and the 'aid' given in the form of white flour, sugar, and lard. Thus, we must look to history as much as genetics in identifying the key factors that have led to the extremely high obesity and diabetes rates among the U.S. Pima.

Unfortunately, a majority researchers still conclude that the Pima likely have a genetic predisposition to diabetes that interacts with the changing environment to produce body size and metabolic outcomes.[122] A diabetes gene has yet to be identified, so that may or may not be accurate, but it is clear, given the comparisons with the Mexican Pima, that the context of U.S. Pima reservations plays a paramount role in their high rates of diabetes.

Studies have also compared U.S. Pima populations and South Asians, both of whom have a high prevalence of T2D. Research by Venkat Narayan and colleagues[123] shows that South Asians have higher diabetes incidence than the Pima at comparable body mass index (BMI) levels. For those with a BMI <25 kg/m2, South Asian men have five times the risk for T2D than Pima men, although rates were much closer for those with BMI ≥30 kg/m2. Other work has found that the Pima show much higher levels of insulin resistance than Asian Indians, while Asian Indians had three times less insulin secretion. The researchers conclude that "metabolic differences between Pima and Asian Indians suggest heterogeneous pathways of type 2 diabetes in the early natural history of disease, with emphasis of insulin resistance in Pima Indians and emphasis of poor insulin secretion in Asian Indians."[124]

Matthew Klingle writes that the association of the Pima with diabetes in both the scientific literature and the popular imagination gave rise to "the icon of the diabetic Indian." He continues that, "further variations of the same stereotype emerged as well: the diabetic Black, the diabetic Mexican, and so on. By the late twentieth century, the face of diabetes in America had morphed from an affluent Jew into a person of color, probably poor, from an inner-city neighborhood or an isolated rural hamlet."[125] Ferreira and Lang similarly argue that the root of T2D starts with social and historical racism, and they refute the notion that diabetes is specifically a function of a genetic "Indian heritage."[126]

Equating race and ethnicity with diabetes can have the effect of making the disease seem inevitable and unavoidable, giving way to the myth that biology is destiny. The view that 'being Indian means to be diabetic, disempowers individuals and their communities because it blames them for being who they are, rendering them inactive: 'nothing can be done about it.'"[127] In this way, diabetes comes to be seen as a chronic endemic disease, one that is assumed to always be present in particular populations and regions and one that will 'naturally' and intractably remain indefinitely. Medical anthropologist Carolyn Smith-Morris reports that the Pima diabetes crisis, along with the extensive public attention it garnered over the years, has fostered a sense of collective resignation towards the disease–one of the biggest challenges to prevention.[128]

Treating Contexts

How can we learn to treat contexts alongside individuals? Kelly Hallman, founder of the Indigenous Justice Circle, argues that we can learn from the Native American view that diabetes is something all around us, a context as much as a condition. She encourages us to see all aspects of life, health, and wellbeing as interconnected and created through the relationships between people, places, politics, practices, and policies. Diabetes interventions then, to be effective, need to focus on the varied ways in which the complicated lived experience of specific communities leads to poor health, sickness, and disease.

Research in other Indigenous communities similarly advocate for a holistic approach to care, integrating indigenous systems of knowledge with biomedical ones. Among the Akimel O'odham/Pima, concepts such as health, risk, and diagnosis are shaped and understood through ongoing dialogue, leading to layers of understanding and misunderstanding among both medical practitioners and Pima individuals.[129] Among the inhabitants of Reunion Island, a French colonial territory in the Pacific Islands, anthropologist Muriel Roddier found that the disconnect between local and the biomedical understandings is often ignored. She advocates interventions that fully engage local knowledge systems and understandings.[130]

Among the Indigenous community of Yelapa in rural western Mexico, where the rise of diabetes is linked to "nutritional trauma," the Comunidad Indigena de Chacala, a local Indigenous organization, has developed an innovative "pedagogy of the nourished" that seeks to improve nutrition and diabetes care by educating individuals on using traditional remedies and nourishment in a way that promotes biomedical objectives.[131] Through the Mino-Miijim program, packs containing healthy traditional foods are distributed monthly to elderly individuals with diabetes.
In recent years, food and sugary beverage taxes and labeling regimes have also been a major new tool in dealing with obesity and diabetes risk. Chile's 2016 Law of Food Labeling and Advertising was the first national regulation to mandate prominent front-of-package warning labels, restrict child-directed marketing, and ban sales in schools of all foods and beverages containing added sugars, sodium, and saturated fats. Studies in Chile have since shown a 23.7% decline in sugary beverages across socio-economic classes.[132] In contrast, Eduardo Gómez, Director of the Institute of Health Policy and Politics at Lehigh University, observes that China has the world's highest obesity rates and the least amount of food regulation. He argues that we need more regulation, and for it to target very young ages, to effect change.[133]

Gómez has studied the effectiveness of public health interventions around obesity and diabetes in Mexico, China, India, and Brazil. He finds that Brazil has had the most success by integrating nutrition, education, food regulation, and access to medications and health care. In 2007, Brazil passed legislation to guarantee the free distribution of diabetes medication—unlike in China, India, and Mexico. Then, in 2010 Brazil's Ministry of Health developed a plan that includes innovative nutritional guidelines and boosts federal funding for obesity awareness and prevention programs. The Brazilian approach integrates diabetes surveillance, prevention, medication, and primary health care, with primary health care teams working with state governments, schools, and families to increase access to medication and prevention services.

Fully addressing the contexts that produce diabetes will also have to involve reducing poverty, trauma, and stress. Ultimately, holistic approaches to diabetes are an important first step in making T2D a collective responsibility, and they can begin on the city level. Two programs that have have effectively taken a more holitic approach are the Cities Changing Diabetes initiatives in Denmark (and elsewhere) and Amsterdam's Healthy Weight Approach. The Danish Cities Changing Diabetes program facilitates vertical and horizontal integration of programs. Paul Bloch, lead researchers at the Steno Diabetes Center Copenhagen, explains that they believe that "impact is only achievable in long-term interventions, not through discrete projects." One of their most successful projects is Tingbjerg Changing Diabetes (www.tingbjergchangingdiabetes.dk), where their intervention focused on both vertical and horizontal integration. Horizontal integration includes all stakeholders–everyone who is interested in health and social intervention. Vertical integration includes all staff in municipalities, schools, and nurseries. This program was implemented over four years with the aim to promote healthy eating and physical acutivity among children aged 3–8 years. Interventions were implemented in childcare centers, schools, and supermarkets in three local communities as well as in local mass media and social media during a 19 month period. A nearby Municipality served as control group. The results were positive and significant.

> It's very easy to blame the victim rather than addressing larger structural issues. Of course, it's diet. Yes, it's exercise. But how easy is it to have a good diet if you don't have access to healthy foods? Obviously, we need to consider where people are living and transportation access.

— MATTHEW KLINGLE
Bowdoin College

Amsterdam has developed another good example of an integrated approach to children's nutrition and health. Based in a children's rights framework, the Amsterdam Healthy Weight Approach (AHWA) is described as a "20 year marathon" (2013-2033) with the goal to reduce overweight and obesity rates of children in Amsterdam to the national average, and to make Amsterdam one of the top five healthiest European cities by 2033. By 2018, the goal is for children 0-5 years old to have a healthy weight; by 2023, for 0–10-year-olds to have a healthy weight; and by 2033 for all young people in Amsterdam to have a healthy weight. The AHWA was created with a whole-system approach and encourages the cooperation of city-level program management, local and federal policymakers, health professionals, and community support groups. City and national governments are encouraged to condemn media platforms and publishers which provide misleading marketing information about the consumption of unhealthy foods. Furthermore, through adaptive cluster programs, AHWA strives to partner with the pre-existing national Equitable Start Program, Jump-in program, and Health City Program to implement nutritional education in school-based environments, prioritizing a child's rights lense to equitably reach all children. Furthermore, the program partners with local food entrepreneurs on issues ranging from healthy business operations to portion sizes. In keeping with the marathon metaphor, AHWA advocates for a reasonably paced run towards healthy living, rather than a sprint to lose weight. By encouraging people to walk more, provide individual support to family, and creating close circles of care, AHWA provides the tools for sustainable healthy lifestyle, where weight loss is a primary but not the only goal.

Conclusions and Recommendations

Diabetes is a serious but solvable public health problem. To address rising T2D rates nationally and globally, we need to look beyond technology and pharmaceuticals to address the larger contexts that produce vulnerabilities to the disease. Contexts matter, and they matter most. Diabetes is borne not principally of individual biology or behaviors, but a combination of these acting in conjunction with the cultural contexts of health. As a syndemic disease, T2D diabetes arises from a complex interplay of individual physiologies, cultural frameworks, social networks, the built environment, and political and economic environments.

Factors external to the individual, and beyond their direct control, significantly contribute to the rise of T2D by framing choices, shaping individuals' behaviors, and allowing or denying access to resources. Western cultural presumptions about rational or perfectible bodies reinforce individual responsibility and blame, and misleading racial correlations assign blame to biology rather than to cultural and economic contexts. Understanding and addressing these contexts are crucial for developing effective interventions and support systems to mitigate the rise and impact of T2D among diverse populations.

Treatment, as it is generally conceived in T2D care, is reactive, responding to an actual or potential health problem. In contrast, we may understand care as more holistic, preventative as well as responsive. Patients may be treated (through medical interventions) and not feel cared for; conversely, they may be cared for (by family and social networks) and not be medically treated. We advocate for a wrap-around approach to care. Slowing the progress of diabetes will require a whole-of-healthcare and a whole-of-society approach that understands the disease as based in contexts and its prevention as a collective responsibility rather than the patient's fault.

1 Recognize the Metabolic Complexity of Diabetes and Pluralize Solutions

- **Recognize** the multiple etiologies that may present as diabetes; treatment protocols based largely on European-descent populations may not apply globally.
- **Acknowledge** the syndemic nature of diabetes, and temper the overriding focus on obesity to include other risk factors such as stress and chemical exposure.
- **Learn** from other medical systems, like Ayurveda or Traditional Chinese Medicine, and their approaches to diabetes with a holistic model.

2 Minimize Stigma and Burden of Self-care, Emphasize Collective Responsibility

- **Resist** blame and shame, and recognize the practicalities of patients' lives and care networks into treatment regimes.
- **Temper** focus on "self-management" as a solution, and look for approaches that support collective responsibility.
- **Include** patient perspectives in developing policy and treatment regimes.

3 Decouple Race and Diabetes to Recognize Contextual Factors

- **Avoid** assigning causation of diabetes risk to race: do not confuse race with context.
- **Promote** proactive, wrap-around systems that engage communities in diabetes care.
- **Treat** the context of diabetes, for example through food and beverage regulation, public design, and poverty and stress reduction.

FOOTNOTES

1 CDC. 2024. National Diabetes Statistical Report. https://www.cdc.gov/diabetes/php/data-research/index.html
2 See the excellent report produced by the FrameWorks Institute (2020): *Changing the Narrative around Diabetes.* Washington, DC: FrameWorks Institute.
3 Michael Fang, Dan Wang, Josef Coresh, Elizabeth Selvin; Undiagnosed Diabetes in U.S. Adults: Prevalence and Trends. Diabetes Care 1 September 2022; 45 (9): 1994–2002. https://doi.org/10.2337/dc22-0242
4 CDC. 2024. National Diabetes Statistical Report. https://www.cdc.gov/diabetes/php/data-research/index.html
5 https://pubmed.ncbi.nlm.nih.gov/37909353/#:~:text=Results%3A%20The%20total%20estimated%20cost,indirect%20costs%20attributable%20to%20diabetes
6 https://www.cdc.gov/chronicdisease/programs-impact/pop/diabetes.htm
7 Plough, Alonzo L. (1986) *Borrowed Time: Artificial Organs and the Politics of Extending Lives.* Philadelphia: Temple University Press.
8 Fakorede, Foluso A. 2022. "Congress Must Act to Stop America's Amputation Epidemic." AJMC Contributor, May 16, 2022
9 Geronimus, Arline T. (2023) *Weathering: The Extraordinary Stress of Ordinary Life in an Unjust Society.* New York: Little, Brown.
10 Shilling, C. (2012) *The Body and Social Theory*. London: Sage. Dutton, Kenneth (1995) *The Perfectable Body: The Western ideal of Physical Development*. New York: Continuum.
11 Narayan, K. M. V., Jagannathan, R., & Ridderstråle, M. (2023). Managing type 2 diabetes needs a paradigm change. *The Lancet. Diabetes & Endocrinology*, 11(8), 534–536. https://doi.org/10.1016/S2213-8587(23)00166-3
12 The current classification system, primarily consisting of T1D, T2D, and Gestational Diabetes, imperfectly captures the multifaceted nature of the disease; see Rock, Melanie. (2003). "Sweet blood and social suffering: Rethinking cause-effect relationships in diabetes, distress, and duress." *Medical Anthropology: Cross-Cultural Studies in Health and Illness* 22(2): 31–74.
13 Carruth, L., Chard, S., Howard, H. A., Manderson, L., Mendenhall, E., Vasquez, E., & Yates-Doerr, E. (2019). Disaggregating diabetes. *Medicine Anthropology Theory*, 6(4), Article 4. https://doi.org/10.17157/mat.6.4.730
14 Carruth (2019)
15 Ferzacca, S. (2012). Diabetes and Culture. *Annual Review of Anthropology*, 41(Volume 41, 2012), 411–426. https://doi.org/10.1146/annurev-anthro-081309-145806
16 Ferzacca (2012)
17 Doucet-Battle, J. (2021). *Sweetness in the Blood: Race, Risk, and Type 2 Diabetes*. University of Minnesota Press. P., 27
18 Narayan, K. M. V., Jagannathan, R., & Ridderstråle, M. (2023).
19 Varghese JS, Narayan KMV. (2022). "Ethnic differences between Asians and non-Asians in clustering-based phenotype classification of adult-onset diabetes mellitus: a systematic narrative review." *Prim Care Diabetes* 16: 853–56.
20 Gujral UP, Weber MB, Staimez LR, Narayan KMV. (2018). "*Diabetes among non-overweight individuals: an emerging public health challenge.*" *Curr Diab Rep* 18: 60
21 Singer M. (1996) A dose of drugs, a touch of violence, a case of AIDS: conceptualizing the SAVA syndemic. *Free Inq. Creat. Sociol*. 24(2):99–110.
22 Mendenhall, E. (2019) Rethinking Diabetes. Ithica: Cornell University Press, pp. 23-24; see also Singer, M. (2003) "Syndemics and Public Health: Reconcentualizing Disease in Bio-Social Context" *Medical Anth Quarterly* 17(4): 423-41.
23 Cameron, N. A., Petito, L. C., McCabe, M., Allen, N. B., O'Brien, M. J., Carnethon, M. R., & Khan, S. S. (2021). Quantifying the Sex-Race/Ethnicity-Specific Burden of Obesity on Incident Diabetes Mellitus in the United States, 2001 to 2016: MESA and NHANES. *Journal of the American Heart Association*, 10(4), e018799. https://doi.org/10.1161/JAHA.120.018799
24 Narayan, K. M. V., Jagannathan, R., & Ridderstråle, M. (2023).
25 See, Carruth et al, (2019); Moran-Thomas, A. (2019). *Traveling with sugar: Chronicles of a global epid*emic. University of California Press.
26 Thayer, Z. M., & Kuzawa, C. W. (2011). Biological memories of past environments: epigenetic pathways to health disparities. *Epigenetics*, 6(7), 798–803. https://doi.org/10.4161/epi.6.7.16222
27 Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, 14(4), 245–258. https://doi.org/10.1016/s0749-3797(98)00017-8
28 Tuchman, A. (2020). *Diabees : a history of race and disease* Yale University Press, p. 3; see also Frang et al (2015). "Stressful life events are associated with insulin resistance among chinese immigrant women" *Preventative Medicine Reports*; Misra and Ganda 2007 "Migration and its impact on adiposity and type 2 diabetes" *Nutrition*; Ferreira, M. K. L & Lang, G. C. [Eds.] (2006). I*ndigenous peoples and diabetes: community empowerment and wellness*. Carolina Academic Press.
29 Scheder, J.C. (1988), A Sickly-Sweet Harvest: Farmworker Diabetes and Social Equality. Medical Anthropology Quarterly, 2: 251-277. https://doi.org/10.1525/maq.1988.2.3.02a00050
30 Mendenhall, E (2019). *Rethinking Diabetes : Entanglements with Trauma, Poverty, and HIV*. Cornell University Press,. https://doi.org/10.7591/9781501738319
31 Moulton, C. D., Pickup, J. C., & Ismail, K. (2015). The link between depression and diabetes: the search for shared mechanisms. *The Lancet. Diabetes & Endocrinology*, 3(6), 461–471. https://doi.org/10.1016/S2213-8587(15)00134-5
32 Joseph, J. J., & Golden, S. H. (2017). Cortisol dysregulation: the bidirectional link between stress, depression, and type 2 diabetes mellitus. *Annals of the New York Academy of Sciences*, 1391(1), 20–34. https://doi.org/10.1111/nyas.13217
33 Hinault C, Caroli-Bosc P, Bost F, Chevalier N. Critical Overview on Endocrine Disruptors in Diabetes Mellitus. Int J Mol Sci. 2023 Feb 25;24(5):4537. doi: 10.3390/ijms24054537. PMID: 36901966; PMCID: PMC10003192.
34 Klingle's book Sweet Blood: Diabetes and the Changing Nature of Modern Health is forthcoming from Yale.
35 Consultation December 2023
36 Klingle, M. (2015). Inescapable Paradoxes: Diabetes, Progress, and Ecologies of Inequality. *Environmental History,* 20(4), 736–750. http://www.jstor.org/stable/24690824. Page: 742

37 Kilgore, Christine. 2023. Diabetes Management Is Different in Older Adults, Especially Those in Long-Term Care. Caring for the Ages 24(8): 1-3.
38 T1International. (2024). https://www.t1international.com/
39 Parker ED, Lin J, Mahoney T, Ume N, Yang G, Gabbay RA, ElSayed NA, Bannuru RR. 2024. "Economic Costs of Diabetes in the U.S. in 2022." *Diabetes Care* 47(1):26-43. doi: 10.2337/dci23-0085.
40 Families United for Affordable Insulin—T1International. (2024). Retrieved April 23, 2024, from https://www.t1international.com/FUFAI/
41 Rabin, Roni Caryn. (2022). "Medical Care Alone Won't Halt the Spread of Diabetes, Scientists Say." New York Times 5 October 2022. https://www.nytimes.com/2022/10/05/health/diabetes-prevention-diet.html
42 https://health.gov/sites/default/files/2022-01/NCCC%20Report%20to%20Congress.pdf
43 Kalra S, Sridhar GR, Balhara YP, Sahay RK, Bantwal G, Baruah MP, John M, Unnikrishnan AG, Madhu K, Verma K, Sreedevi A, Shukla R, Prasanna Kumar KM. National recommendations: Psychosocial management of diabetes in India. *Indian J Endocrinol Met*ab. 2013 May;17(3):376-95. doi: 10.4103/2230-8210.111608.
44 Raghuram, N., Ram, V., Majumdar, V., Sk, R., Singh, A., Patil, S., Anand, A., Judu, I., Bhaskara, S., Basa, J. R., & Nagendra, H. R. (2021). Effectiveness of a Yoga-Based Lifestyle Protocol (YLP) in Preventing Diabetes in a High-Risk Indian Cohort: A Multicenter Cluster-Randomized Controlled Trial (NMB-Trial). *Frontiers in Endocrinology* (Lausanne), 12, 664657–664657. https://doi.org/10.3389/fendo.2021.664657
45 Sivapuram, M. S., Srivastava, V., Kaur, N., Anand, A., Nagarathna, R., Patil, S., Biman, S., Chander, I., Jyoti, S., & Nagendra, H. R. (2020). Ayurveda Body–Mind Constitutional Types and Role of Yoga Intervention Among Type 2 Diabetes Mellitus Population of Chandigarh and Panchkula Regions. *Annals of Neurosciences*, 27(3–4), 214–223. https://doi.org/10.1177/09727531211000040. See also Sharma, R., Shahi, V., Khanduri, S., Goyal, A., Chaudhary, S., Rana, R., Singhal, R., Srikanth, N., & Dhiman, K. (2019). Effect of Ayurveda intervention, lifestyle modification and Yoga in prediabetic and type 2 diabetes under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS)-AYUSH integration project. *Ayu*, 40(1), 8–15. https://doi.org/10.4103/ayu.AYU_105_19
46 Liu, J., Yao, C., Wang, Y., Zhao, J., & Luo, H. (2023). Non-drug interventions of traditional Chinese medicine in preventing type 2 diabetes: A review. *Chinese Medicine*, 18(1), 151. https://doi.org/10.1186/s13020-023-00854-1
47 Jia, Y., Huang, H., Yu, Y., Jia, H., & Zhang, Y. (2023). Four kinds of traditional Chinese exercise therapy in the treatment of type 2 diabetes: A systematic review and network meta-analysis. *Systematic Reviews*, 12(1), 231. https://doi.org/10.1186/s13643-023-02384-1
48 Yang, Q., Shao, Q., Xu, Q., Shi, H., & Li, L. (2021). Art Therapy Alleviates the Levels of Depression and Blood Glucose in Diabetic Patients: A Systematic Review and Meta-Analysis. *Frontiers in Psychology*, 12. https://doi.org/10.3389/fpsyg.2021.639626
49 Wang X, Jiang J, Hu Y, Qin LQ, Hao Y, Dong JY. Art Engagement and Risk of Type 2 Diabetes: Evidence From the English Longitudinal Study of Ageing. *Int J Public Health.* 2023 Feb 20;68:1605556. doi: 10.3389/ijph.2023.1605556.
50 Thottapillil, A., Kouser, S., Kukkupuni, S. K., & Vishnuprasad, C. N. (2021). An 'Ayurveda-Biology' platform for integrative diabetes management. *Journal of Ethnopharmacology*, 268, 113575–113575. https://doi.org/10.1016/j.jep.2020.113575
51 Social media posts cited in Hussain SA. Sharing Visual Narratives of Diabetes on Social Media and Its Effects on Mental Health. Healthcare (Basel). 2022 Sep 12;10(9):1748. doi: 10.3390/healthcare10091748.
52 These two narratives come from Browne, J. L., Ventura, A., Mosely, K., & Speight, J. (2013). 'I call it the blame and shame disease': a qualitative study about perceptions of social stigma surrounding type 2 diabetes. *BMJ open*, 3(11), e003384. https://doi.org/10.1136/bmjopen-2013-003384
53 Bedwell, R. (2017). *Diabetes Illness Narratives among Mexican Immigrants in the U.S.-Mexico Border Region* [MA in Anthropology, The University of Arizona.]. http://hdl.handle.net/10150/626725
54 Obesity is defined as abnormal or excess adipose tissue that results in increased health risks. This definition is consistent with research showing that different types of adipose tissue pose different levels of risk; that is to say that the type and location and not just the absolute mass of fat tissue matters. The problem arises in translating this definition into workable metrics for research and clinical diagnosis. The widely accepted standard to define categories of "overweight" and "obesity" is the Body Mass Index (BMI, kg/m2), a population measure that can be used to calculate over- and under-weight as percentile deviations from the mean. At the population level high BMIs are closely correlated with risk of Type 2 diabetes. The strong and linear correlation of BMIs above 23 and risk for Type 2 diabetes in European and U.S. adult populations largely justified the modern classification of obesity as a disease.
55 Tuchman (2020)
56 Shilling, C. (2012). The body and social theory. London: Sage https://doi.org/10.4135/9781473914810
57 Ferzacca S. (2000). "Actually, I don't feel that bad": managing diabetes and the clinical encounter." *Medical Anthropology Quarterly*, 14(1), 28–50. https://doi.org/10.1525/maq.2000.14.1.28
58 Ferzacca (2012)
59 Glinert, L. H. (2005). TV commercials for prescription drugs: A discourse analytic perspective. *Research in Social and Administrative Pharmacy*, 1(2), 158–184. https://doi.org/10.1016/j.sapharm.2005.03.003
60 Ball, J. G., & Applequist, J. (2019). The Use of Narratives to Deliver Information in Direct-To-Consumer Prescription Drug Commercials: A Content Analysis. *Journal of Health Communication*, 24(5), 512–524. https://doi.org/10.1080/10810730.2019.1631915
61 Archer, A. (2014), Shame and diabetes self-management. *Practical Diabetes,* 31: 102-106. https://doi.org/10.1002/pdi.1842
62 FDA. (2020). Drug Advertising: A Glossary of Terms. FDA. https://www.fda.gov/drugs/prescription-drug-advertising/drug-advertising-glossary-terms
63 Broom, D., & Whittaker, A. (2004). Controlling diabetes, controlling diabetics: Moral language in the management of diabetes type 2. *Social Science & Medicine*, 58(11), 2371–2382. https://doi.org/10.1016/j.socscimed.2003.09.002
64 Bennett (2019): 19

65 Weaver, L. J. (2019). *Sugar and tension : diabetes and gender in modern India*. Rutgers University Press.
66 Mol, A., & Law, J. (2004). Embodied Action, Enacted Bodies: the Example of Hypoglycaemia. *Body & Society*, 10(2-3), 43-62. https://doi.org/10.1177/1357034X04042932
67 Bennett (2019)
68 Bennett, J. A. (2019). *Managing Diabetes The Cultural Politics of Disease*. New York University Press. https://doi.org/10.18574/9781479821273
69 Tuchman (2020)
70 Lancet (2010). Type 2 diabetes: time to change our approach. *The Lancet* 375:2193–95
71 Ferzacca (2012): 415
72 Ferzacca (2012): 426
73 Himmelstein, M. S., & Puhl, R. M. (2021). At multiple fronts: Diabetes stigma and weight stigma in adults with type 2 diabetes. *Diabetic Medicine,* 38(1), e14387. https://doi.org/10.1111/dme.14387
74 Himmelstein & Puhl (2021).
75 Inagaki, S., Matsuda, T., Muramae, N., Abe, K., & Kato, K. (2022). Diabetes-related shame among people with type 2 diabetes: An internet-based cross-sectional study. *BMJ Open Diabetes Research and Care*, 10(6), e003001. https://doi.org/10.1136/bmjdrc-2022-003001
76 Holmes-Truscott, E., Browne, J. L., Ventura, A. D., Pouwer, F., & Speight, J. (2018). Diabetes stigma is associated with negative treatment appraisals among adults with insulin-treated Type 2 diabetes: Results from the second Diabetes MILES – Australia (MILES-2) survey. *Diabetic Medicine,* 35(5), 658–662. https://doi.org/10.1111/dme.13598
77 Puhl, R. M., Himmelstein, M. S., & Speight, J. (2022). Weight Stigma and Diabetes Stigma: Implications for Weight-Related Health Behaviors in Adults With Type 2 Diabetes. *Clinical Diabetes*, 40(1), 51–61. https://doi.org/10.2337/cd20-0071
78 Adams, M. S., Enichen, E., & Demmig-Adams, B. (2023). Reframing Diabetes Prevention: From Body Shaming to Metabolic Reprogramming. *American Journal of Lifestyle Medicine*, 15598276231182656. https://doi.org/10.1177/15598276231182655
79 Satterfield, D., DeBruyn, L., Francis, C., & Allen, A. (2014). A Stream Is Always Giving Life: Communities Reclaim Native Science and Traditional Ways to Prevent Diabetes and Promote Health. *American Indian Culture and Research Journal*, 38(1). https://escholarship.org/uc/item/3z64g5nq
80 Aikins, A. D. G. (2006).
81 Bergman, M., Buysschaert, M., Schwarz, P. E., Albright, A., Narayan, K. V., & Yach, D. (2012). Diabetes prevention: Global health policy and perspectives from the ground. *Diabetes Management*, 2(4), 309–321. https://doi.org/10.2217/dmt.12.34
82 Harris, J., Haltbakk, J., Dunning, T., Austrheim, G., Kirkevold, M., Johnson, M., & Graue, M. (2019). How patient and community involvement in diabetes research influences health outcomes: A realist review. *Health Expectations : An International Journal of Public Participation in Health Care and Health Policy*, 22(5), 907–920. https://doi.org/10.1111/hex.12935
83 Martini, J., Tijou Traoré, A., & Mahieu, C. (2019). Chronic patient as intermittent partner for policy-makers: The case of patient participation in the fight against diabetes and HIV/AIDS in Mali. *BMC Public Health*, 19(1), 1179. https://doi.org/10.1186/s12889-019-7453-2
84 CDC. (2022, April 5). *Diabetes Risk Factors. Centers for Disease Control and Prevention*. https://www.cdc.gov/diabetes/basics/risk-factors.html
85 Beth Baker, Race and Biology, BioScience, Volume 71, Issue 2, February 2021, Pages 119–126, https://doi.org/10.1093/biosci/biaa157
86 Bennett (2019)
87 Tuchman (2020)
88 in Tuchman (2020)
89 Tuchman (2020)
90 Doucet-Battle (2021)
91 Doucet-Battle (2021): 69
92 Montoya, M. J. (2007). Bioethnic Conscription: Genes, Race, and Mexicana/o Ethnicity in Diabetes Research. *Cultural Anthropology*, 22(1), 94–128. https://doi.org/10.1525/can.2007.22.1.94
93 Mendenhall (2019).
94 U.S. Department of Health and Human Services. (2021, April 21). *Reducing disparities in diabetic amputations - blog - Niddk*. National Institute of Diabetes and Digestive and Kidney Diseases. https://www.niddk.nih.gov/health-information/professionals/diabetes-discoveries-practice/reducing-disparities-in-diabetic-amputations
95 Fakorede, F. (2022). *Congress Must Act to Stop America's Amputation Epidemic*. AJMC. https://www.ajmc.com/view/contributor-congress-must-act-to-stop-america-s-amputation-epidemic
96 Osinubi, A. (2021). *Sex & gender differences in lower extremity amputation*. American Medical Women's Association. https://www.amwa-doc.org/sghc/sghc-case-studies/sex-gender-differences-in-lower-extremity-amputation/#:~:text=For%20example%2C%20Black%20women%20are,to%20women%20of%20other%20races
97 Presser, L. (2020, May 19). The Black American Amputation Epidemic. *ProPublica*. https://features.propublica.org/diabetes-amputations/black-american-amputation-epidemic/
98 Thiruvoipati, T., Kielhorn, C. E., & Armstrong, E. J. (2015).
99 Barnes, J. A., Eid, M. A., Creager, M. A., & Goodney, P. P. (2020).
100 Lu Y, Xing P, Cai X, Luo D, Li R, Lloyd C, Sartorius N, Li M. 2020. Prevalence and Risk Factors for Diabetic Peripheral Neuropathy in Type 2 Diabetic Patients From 14 Countries: Estimates of the INTERPRET-DD Study. Front Public Health. 8:534372. doi: 10.3389/fpubh.2020.534372
101 Qaarie MY. Life Expectancy and Mortality After Lower Extremity Amputation: Overview and Analysis of Literature. Cureus. 2023 May 12;15(5):e38944. doi: 10.7759/cureus.38944. PMID: 37309338; PMCID: PMC10257952.
102 Branch, B., & Conway, D. (2022). Health insurance coverage by race and Hispanic origin: 2021. *American Community Survey Briefs*. https://www.census.gov/content/dam/Census/library/publications/2022/acs/acsbr-012.pdf

103 Releford, B. (2023). *Blacklimbs Matter*. https://www.blacklimbsmatter.com/#About
104 Behrendt, C.-A., Sigvant, B., Szeberin, Z., Beiles, B., Eldrup, N., Thomson, I. A., Venermo, M., Altreuther, M., Menyhei, G., Nordanstig, J., Clarke, M., Rieß, H. C., Björck, M., & Debus, E. S. (2018). International Variations in Amputation Practice: A VASCUNET Report. *European Journal of Vascular and Endovascular Surgery,* 56(3), 391–399. https://doi.org/10.1016/j.ejvs.2018.04.017
105 Snyder, J. E., Upton, R. D., Hassett, T. C., Lee, H., Nouri, Z., & Dill, M. (2023). Black Representation in the Primary Care Physician Workforce and Its Association With Population Life Expectancy and Mortality Rates in the US. *JAMA Network Open*, 6(4), e236687. https://doi.org/10.1001/jamanetworkopen.2023.6687
106 Hatch (2016)
107 Ulijaszek, S. J. (2017). *Models of Obesity: From Ecology to Complexity in Science and Policy*. Cambridge University Press.
108 Gómez, E. J. (2023). *Junk food politics : how beverage and fast food industries are reshaping emerging economies*. Johns Hopkins University Press.
109 Everett, M. and Wieland, J.N. (2012), Diabetes among Oaxaca;s Transnational Population: An Emerging Syndemic. *Annals of Anthropological Practice*, 36: 295-311. https://doi.org/10.1111/napa.12005
110 Ferreira, M. K. L., & Lang, G. C. (2006). Introduction: Deconstructing Diabetes. In *Indigenous peoples and diabetes: Community empowerment and wellness.* Carolina Academic Press.
111 Wu, Y., Li, H., Loos, R. J. F., Yu, Z., Ye, X., Chen, L., Pan, A., Hu, F. B., & Lin, X. (2008). Common Variants in CDKAL1, CDKN2A/B, IGF2BP2, SLC30A8, and HHEX/IDE Genes Are Associated With Type 2 Diabetes and Impaired Fasting Glucose in a Chinese Han Population. *Diabetes,* 57(10), 2834–2842. https://doi.org/10.2337/db08-0047; also, Schwarz, P. E. H., Towers, G. W., Fischer, S., Govindarajalu, S., Schulze, J., Bornstein, S. R., Hanefeld, M., & Vasseur, F. (2006). Hypoadiponectinemia Is Associated With Progression Toward Type 2 Diabetes and Genetic Variation in the ADIPOQ Gene Promoter. Diabetes Care, 29(7), 1645–1650. https://doi.org/10.2337/dc05-2123
112 Golden, S. H., Yajnik, C., Phatak, S., Hanson, R. L., & Knowler, W. C. (2019). Racial/ethnic differences in the burden of type 2 diabetes over the life course: a focus on the USA and India. *Diabetologia*, 62(10), 1751–1760. https://doi.org/10.1007/s00125-019-4968-0
113 Spoonhunter, T. & Collins, C.L. (2020). *Crow Country: Our Right to Food Sovereignty*. https://www.crowcountrydoc.com/
114 Howard, H.A. (2020), History, Truth, and Reconciliation in Settler Health Care. *American Anthropologist*, 122: 659-661. https://doi.org/10.1111/aman.13447
115 Page-Reeves, J., Mishra, S. I., Niforatos, J., Regino, L., & Bulten, R. (2013). An Integrated Approach to Diabetes Prevention: Anthropology, Public Health, and Community Engagement. *Qualitative report* (Online), 18, 1–22.
116 Rock (2003)
117 McKinlay, J., & Marceau, L. (2000). US public health and the 21st century: diabetes mellitus. Lancet, 356(9231), 757–761. https://doi.org/10.1016/S0140-6736(00)02641-6
118 McKinlay and Marceau (2000): 760
119 Klingle 2015
120 Schulz, L. O., Bennett, P. H., Ravussin, E., Kidd, J. R., Kidd, K. K., Esparza, J., & Valencia, M. E. (2006). Effects of Traditional and Western Environments on Prevalence of Type 2 Diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care*, 29(8), 1866–1871. https://doi.org/10.2337/dc06-0138
121 Pavkov, M. E., Bennett, P. H., Knowler, W. C., Krakoff, J., Sievers, M. L., & Nelson, R. G. (2006). Effect of youth-onset type 2 diabetes mellitus on incidence of end-stage renal disease and mortality in young and middle-aged Pima Indians. *JAMA*, 296(4), 421–426. https://doi.org/10.1001/jama.296.4.421
122 Klingle 2015; Golden et al 2019
123 Narayan, K. M. V., Kondal, D., Kobes, S., Staimez, L. R., Mohan, D., Gujral, U. P., Patel, S. A., Anjana, R. M., Shivashankar, R., Ali, M. K., Chang, H. H., Kadir, M., Prabhakaran, D., Daya, N., Selvin, E., Tandon, N., Hanson, R., & Mohan, V. (2021). Incidence of diabetes in South Asian young adults compared to Pima Indians. *BMJ open diabetes research & care*, 9(1). https://doi.org/10.1136/bmjdrc-2020-001988
124 Staimez, L. R., Deepa, M., Ali, M. K., Mohan, V., Hanson, R. L., & Narayan, K. V. (2019). Tale of two indians: heterogeneity in type 2 diabetes pathophysiology. *Diabetes/Metabolism Research and Reviews*, 35(8). https://doi.org/10.1002/dmrr.3192
125 Klingle 2015; see also Tuchman 2020
126 Ferreira, M. K. L & Lang, G. C (2006)
127 Ferreira, M. K. L & Lang, G. C (2006).
128 Smith-Morris, C. (2006). *Diabetes among the Pima: stories of survival*. University of Arizona Press.
129 Smith-Morris, C. (2006)
130 Roddier, M. (2006). "Diabetes in Reunion Island (Indian Ocean): From Sugar Plantations to Modern Society." In Ferreira, M. K. L., & Lang, G. C. (Eds.). (2006). *Indigenous peoples and diabetes: Community empowerment and wellness*. Carolina Academic Press.
131 Korn, L. E. and Rudolph C. R. (2006) "Burying the Umbilicus: Nutrition Trauma, Diabetes, and Traditional Medicine in Rural West Mexico." In Ferreira, M. K. L., & Lang, G. C. (Eds.). (2006). *Indigenous peoples and diabetes: Community empowerment and wellness*. Carolina Academic Press.
132 Taillie, L. S., Reyes, M., Colchero, M. A., Popkin, B., & Corvalán, C. (2020). An evaluation of Chile's Law of Food Labeling and Advertising on sugar-sweetened beverage purchases from 2015 to 2017: A before-and-after study. *PLoS medicine*, 17(2), e1003015. https://doi.org/10.1371/journal.pmed.1003015
133 Gómez, E. J. (2017). From Hungry to Hefty. *Finance and Development* 54(2). https://www.imf.org/external/pubs/ft/fandd/2017/06/gomez.htm; Gómez E. J. (2015). Understanding the United States and Brazil's response to obesity: institutional conversion, policy reform, and the lessons learned. *Globalization and health*, 11, 24. https://doi.org/10.1186/s12992-015-0107-y

VANDERBILT
Cultural Contexts of
Health & Wellbeing
INITIATIVE

Visit us at www.vanderbilt.edu/cultural-contexts-health
Contact us by email at vu-cch@vanderbilt.edu
Follow us on Twitter at @VanderbiltCCH