Diabetes as a Social Disease: What is the Evidence?

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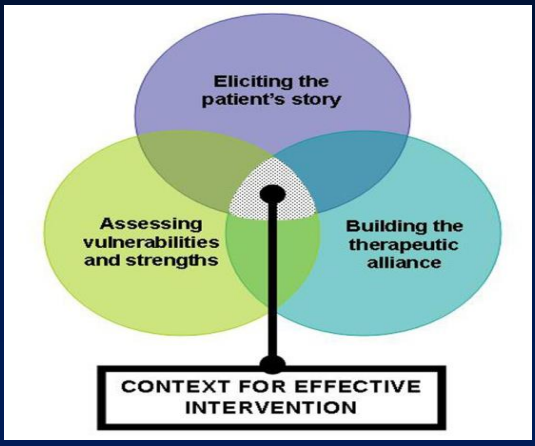
Objectives

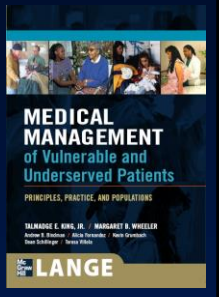
- Provide specific examples of how a range of adverse social conditions conspire to generate diabetes in individuals and communities
- Deconstruct the construct of vulnerable populations
- Reframe the diabetes epidemic in the US as a multi-level social phenomenon that disproportionately affects vulnerable populations – a reframing with direct relevance to Indian Country
- Discuss implications of this reframing for healthcare, social and public policy
- Share recent examples of health communications work whose goal is to effectively convey this reframing→ increase public health literacy

Finding the Sweet Spot for Effective Intervention with Vulnerable Patients



This approach uniformly allows a clinician to navigate the social distance and create the human connection that underlies therapeutic relationships

Common Social Vulnerabilities



- **V** Iolence /Trauma
- **U** ninsured
- **L** iteracy and Language
- **N** eglect
- **E** conomic hardship/food insecurity
- **R** ace/ethnic discordance, discrimination
- **A** ddiction
- **B** rain disorders, e.g. depression, dementia
- **I** mmigrant
- **L** egal status
- **I** solation/Informal caregiving burden
- **T** ransportation problems
- **I** llness Model
- **E** yes and Ears
- **S** helter

Schillinger 2007

Eliciting the Patient's Story: Reveals Hidden Treasures that Humanize

Finding Resilience

- Religion
- Expertise/Employment
- Social support & Network
- Intimates
- Laughter
- Institutions
- Energy & Enthusiam
- Navigate Life's Difficulties
- Cultural Assets
- Entertainment/Enjoyment

Exemplar Case:

- Ms J is a 57 yo English-speaking Latina, mother of 5, with 3 grandchildren, with high blood pressure, depression, arthritis and insulin-dependent diabetes that is poorly controlled. She presents for the first time after having been hospitalized for 3 days for hypoglycemia (low blood sugar). The hospital service was unable to identify a trigger for the hypoglycemia.

Common Social Vulnerabilities

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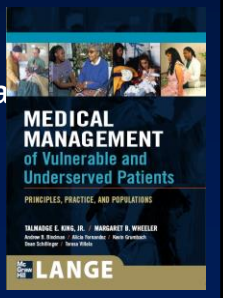
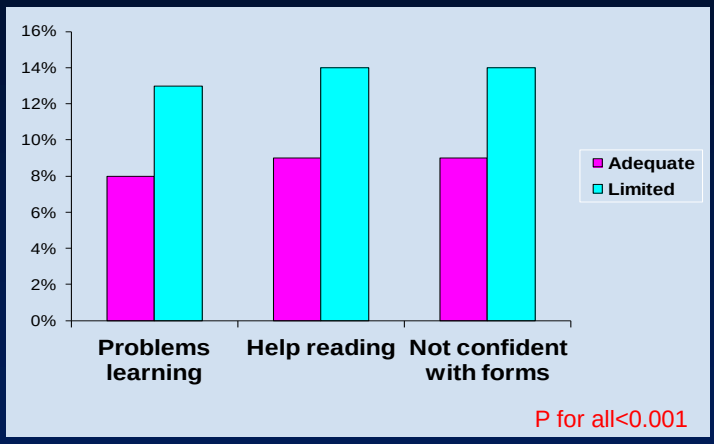


Schillinger 2007

Limited Health Literacy Patients Experience More Serious Hypoglycemia/year N>14,000



Sarkar, Adler, Schillinger, JGIM 2010

Common Social Vulnerabilities

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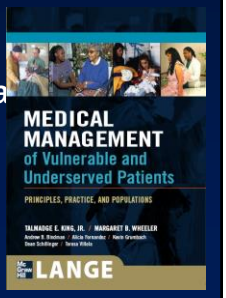
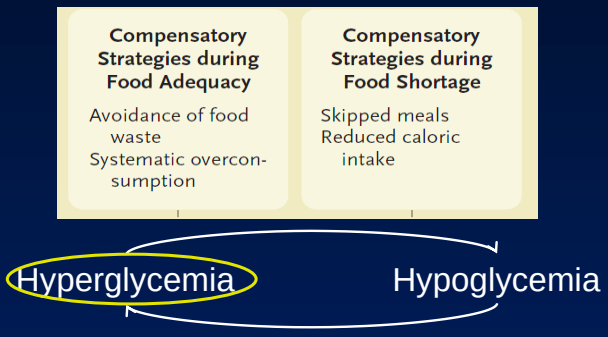


Schillinger 2007

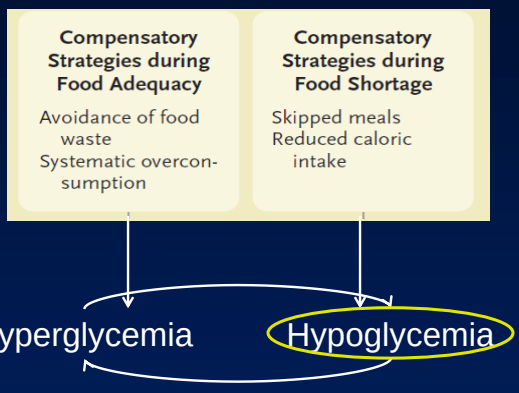
Cycles of Food Adequacy & Inadequacy Wreak Havoc



Seligman HK, Schillinger D. N Engl J Med 2010;363:6-9.

The NEW ENGLAND JOURNAL of MEDICINE

Cycles of Food Adequacy & Inadequacy Wreak Havoc



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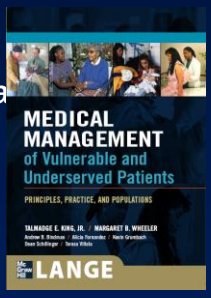


Schillinger 2007

Vulnerable Populations Defined

- Vulnerable Populations are subgroups of the larger population that, *because of social, economic, political, geographic, structural and historical forces* (aka oppression), are exposed to "greater risk of risks", and are thereby at a disadvantage with respect to their health and health care
- Focuses on (mal)distribution of exposures and resources

The Legacy of "Rugged Individualism"

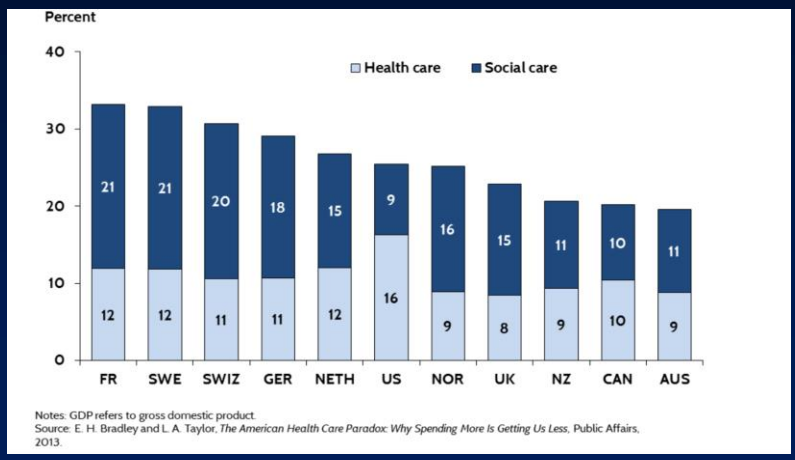
- For far too long, the national discourse on type 2 diabetes has revolved around the genetic and behavioral origins of the disease.
- Leading to "public health illiteracy"
- A recent study of US media content related to Type 2 Diabetes revealed that
  - » Only 12% mentioned social or environmental contributors
  - » The vast majority focus on poor individual choices, unhealthy behaviors, or bad genetics
  - » "Shame and Blame Game"

What is "Public Health Literacy" ?

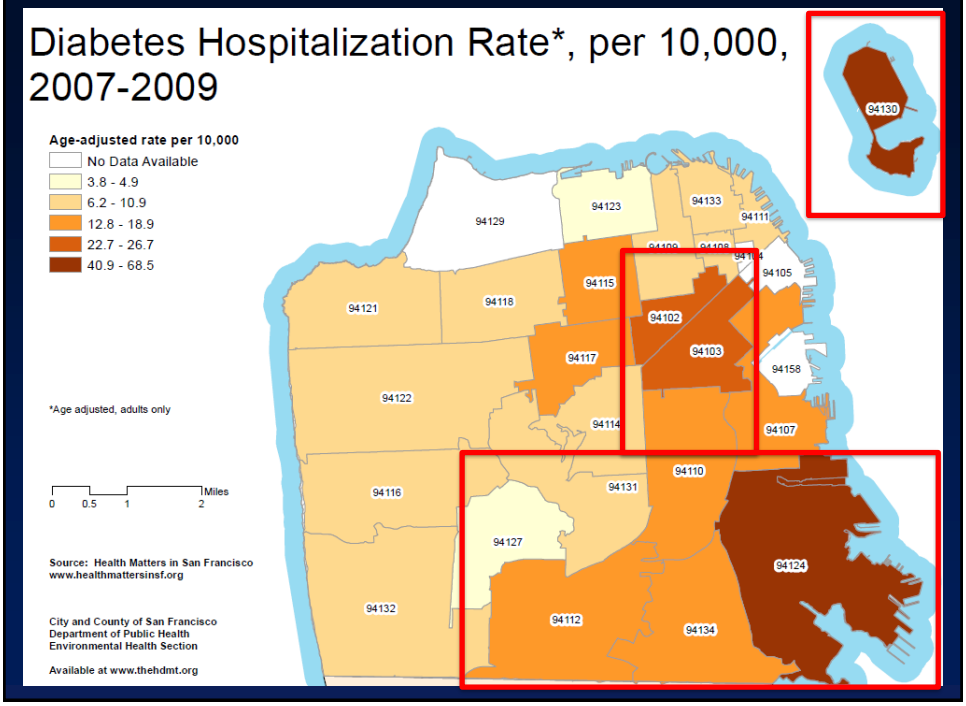
- *Degree to which individuals and groups can obtain, process, understand, evaluate, and act upon information needed to make public health decisions that benefit the community*
- **Target populations:** The public
- **Purpose:** Improve the health of the public
- **Aims:** Engage more stakeholders in public health efforts; address determinants of health
- **Multidimensional:** conceptual foundations (socioecological model); critical skills; civic orientation

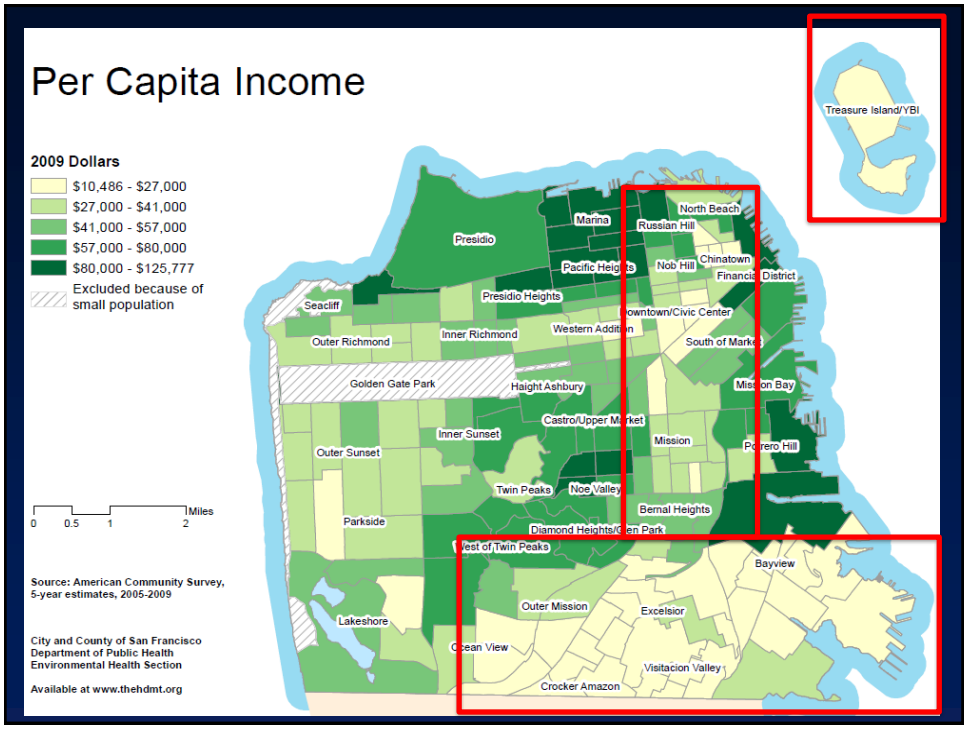
D Freedman et al AJPM 2009

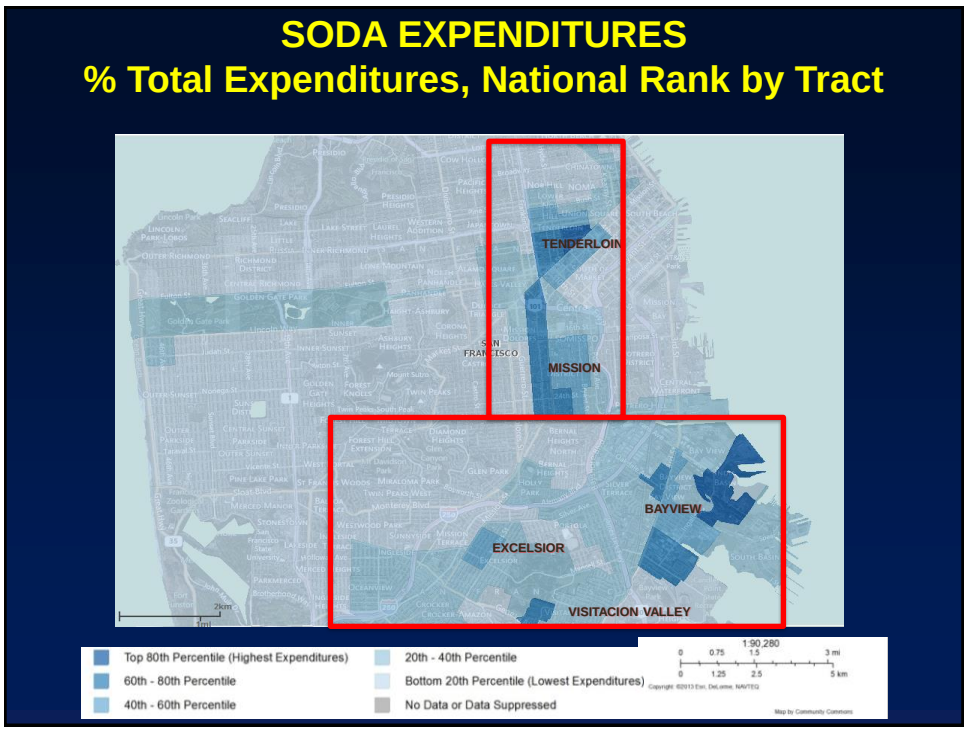
Manifests in Healthcare vs. Social Care Spending (% GDP)



Notes: GDP refers to gross domestic product.
Source: E. H. Bradley and L. A. Taylor, *The American Health Care Paradox: Why Spending More Is Getting Us Less*, Public Affairs, 2013.




Per Capita Income
2009 Dollars
$10,486 - $27,000
$27,000 - $41,000
$41,000 - $57,000
$57,000 - $80,000
$80,000 - $125,777
Excluded because of small population
0 0.5 1 Miles 2
Source: American Community Survey, 5-year estimates, 2005-2009
City and County of San Francisco
Department of Public Health
Environmental Health Section
Available at www.thehdmt.org
Treasure Island/YBI
Presidio
Marina
North Beach
Russian Hill
Pacific Heights
Nob Hill
Chinatown
Financial District
Presidio Heights
Seacliff
Downtown/Civic Center
Western Addition
Inner Richmond
Outer Richmond
South of Market
Golden Gate Park
Haight Ashbury
Mission Bay
Castro/Upper Market
Inner Sunset
Mission
Potrero Hill
Outer Sunset
Twin Peaks
Noe Valley
Bernal Heights
Parkside
Diamond Heights/Glen Park
West of Twin Peaks
Bayview
Outer Mission
Excelsior
Lakeshore
Ocean View
Visitacion Valley
Crocker Amazon

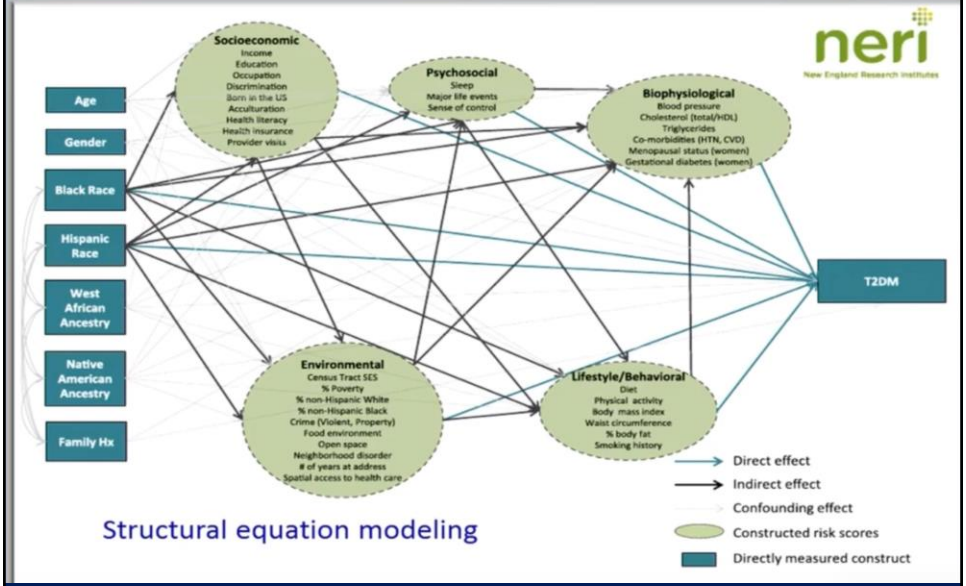

SODA EXPENDITURES
% Total Expenditures, National Rank by Tract
TENDERLOIN
MISSION
BAYVIEW
EXCELSIOR
VISITACION VALLEY
Top 80th Percentile (Highest Expenditures)
60th - 80th Percentile
40th - 60th Percentile
20th - 40th Percentile
Bottom 20th Percentile (Lowest Expenditures)
No Data or Data Suppressed
1:90,280

Relative Contributions of Socioeconomic, Local Environmental, Psychosocial, Lifestyle/Behavioral, Biophysiological, and Ancestral Factors to Racial/Ethnic Disparities in Type 2 Diabetes

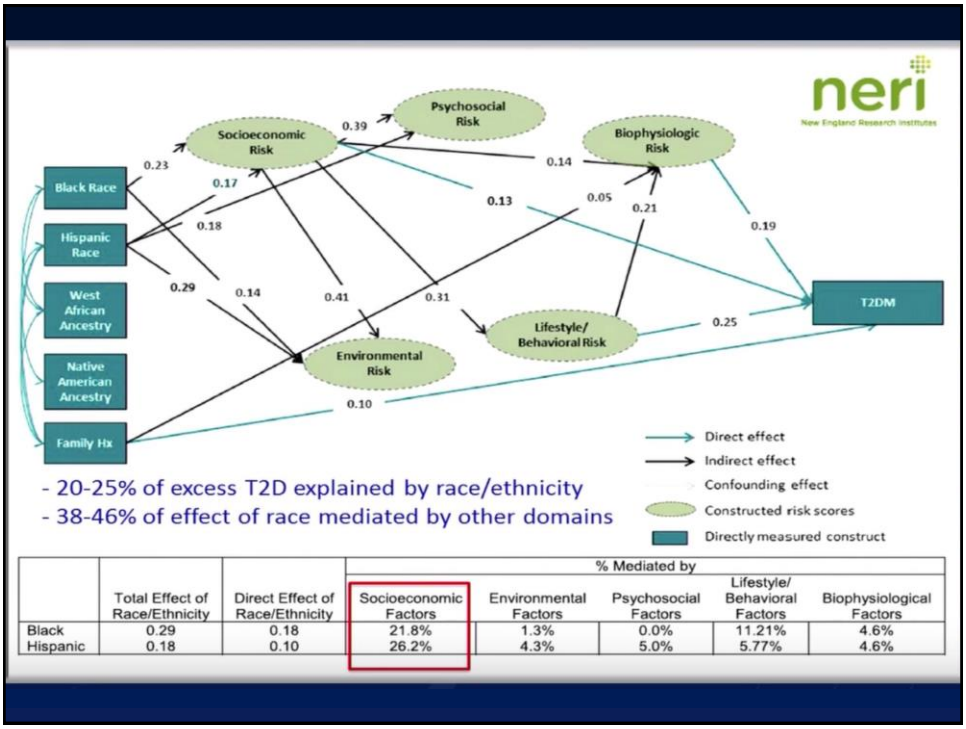
Rebecca S. Piccolo,[1] S.V. Subramanian,[2] Neil Pearce,[1] Jose C. Florez,[3] and John B. McKinlay[4]

Diabetes Care 2016;39:1208–1217 | DOI: 10.2337/dc15-2255

- Boston Area Community Health (BACH) III survey
- Population-based sample representing NHW, AA and Latinos
- Focus on three neighborhoods in Boston (2010-12)
- n=2,764, evenly divided in 3 race/ethnic groups
- 63 ancestry informative markers (33 Native Am, 30 Af Am)



Structural equation modeling



	Total Effect of Race/Ethnicity	Direct Effect of Race/Ethnicity	% Mediated by Socioeconomic Factors	Environmental Factors	Psychosocial Factors	Lifestyle/ Behavioral Factors	Biophysiological Factors
Black	0.29	0.18	21.8%	1.3%	0.0%	11.21%	4.6%
Hispanic	0.18	0.10	26.2%	4.3%	5.0%	5.77%	4.6%

Can Area-Level Social Determinants Predict Very Poor Diabetes Control (HbA1c>9%)?

A Prediction Model for Uncontrolled Type 2 Diabetes Mellitus Incorporating Area-level Social Determinants of Health

Sanjay Basu, MD, PhD†‡ and Rajiv Narayanaswamy, CPA§*

D Freedman et al AJPM 2009

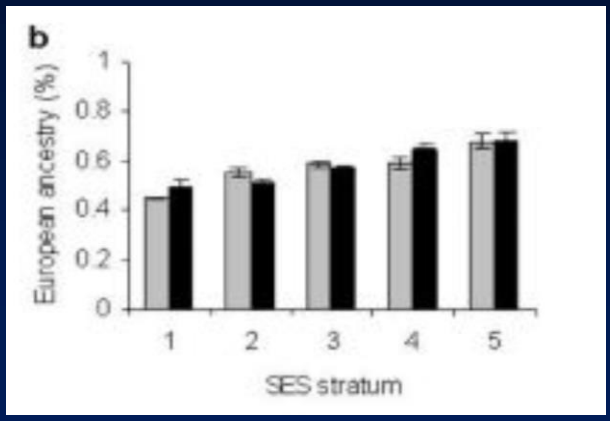
TABLE 2. Area-level Social Determinants of Health Variables Evaluated for Inclusion in the Risk Prediction Models

Covariate	Definition	Data Source
% College	Percent of adults aged 25–44 y with some postsecondary education	Census American Community Survey[14]
% in Poverty	Percent of households below the federal poverty threshold, adjusted for household size	Census Small Area Income and Poverty Estimates[15]
Income inequality	Ratio of household income at the 80th percentile to income at the 20th percentile	Census American Community Survey[14]
% No social-emotional support	Percent of adults reporting no social or emotional support per Centers for Disease Control questions	Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance Study[16]
% Single-parent households	Percent of households with single adult caregiver of at least 1 child	Census American Community Survey[14]
Violent crime rate	Violent crimes per 100,000 population	Uniform Crime Reporting System[17]
Particulate air matter	Average daily measure of fine particulate matter in micrograms per cubic meter (PM2.5)	Centers for Disease Control and Prevention[18]
Healthy food access	One or more supermarkets within 10 miles in rural and 1 mile in urban areas	Census Business Patterns Data[19]
Liquor store density	Number of liquor stores per 10,000 population	Census Business Patterns Data[19]
Primary care provider ratio	Number of primary care providers providing patient care per 100,000 population	Health Resources and Services Administration Area Health Resource File[20]
% Not proficient in English	Percent of adults reporting they are not fluent in English speaking	Census American Community Survey[14]
% High housing costs	Percent of households spending ≥ 50% of monthly income on rent or mortgage costs	Census American Community Survey[14]
% Illiterate	Percent of adults unable to read	National Center for Education Statistics, National Assessment of Adult Literacy[21]
% Driving alone	Percentage of the workforce that drives alone to work	Census American Community Survey[14]
% Physically inactive	Percentage of adults aged 20 and over reporting no leisure-time physical activity	Centers for Disease Control and Prevention, Diabetes Interactive Atlas[22]
% Unemployed	Percentage of population ages 16 and older unemployed but seeking work	Census Current Population Survey[23]
% Fast foods	Percent of all area restaurants that are considered fast food restaurants	Census Business Patterns Data[19]
% Free or reduced lunch	Proportion of children eligible for free or reduced price lunch	National Center for Education Statistics[24]
Food Environment Index	Combined index of access to healthy foods and food security	US Department of Agriculture, Food Environment Atlas[25]
% Park access	Percent of people residing in a census block within 1 mile of a park or within 1 mile (if urban) or 3 miles (if rural) of a recreational facility	Environmental Public Health Tracking Network[26]
High school graduation rate	Percentage of ninth-grade cohort that graduates in 4 y	Department of Education EdFacts Files[27]
% Severe housing problems	Percentage of households with at least 1 of 4 housing problems: overcrowding, high housing costs, or lack of kitchen or plumbing facilities	Comprehensive Housing Affordability Strategy (CHAS) data[28]
% Food insecure	Proportion of households with low or very low food security per US Department of Agriculture scale	Map the Meal Gap[29]
Drug overdose mortality rate	Rate per 100,000 people of deaths classified as due to substance abuse overdose	CDC WONDER mortality data[30]
% Long commute—drives alone	Among workers who commute in their car alone, the percentage that commute more than 30 min	Census American Community Survey[14]
% < 18 y old	% of population below 18 y of age	Census Population Estimates[31]
% African American	% of population African American race	Census Population Estimates[31]
% American Indian/ Alaskan Native	% of population American Indian/Alaskan Native race	Census Population Estimates[31]
% Asian	% of population Asian race	Census Population Estimates[31]
% Hispanic	% of population Hispanic/Latino ethnicity	Census Population Estimates[31]
% Female	% of population female	Census Population Estimates[31]
% Rural	% of population living in a rural area by US Census boundaries	Census Population Estimates[31]
Segregation index	Percentage of either black or white residents that would have to move to a different geographic area to produce a distribution that matches that of the larger county	Census American Community Survey[14]
% Insufficient sleep	% of adults with <7 h of sleep per 24 h period	Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance Study[16]
Household income	Median income in 2016 US dollars, adjusted for inflation by Consumer Price Index	Census Small Area Income and Poverty Estimates[15]

Social Context and Environment Matter

- By combining individual-level characteristics (from medical claims data) and area-level measures of SDH, investigators were able to predict whether a patient would have an HbA1c>9 with greater than 90% accuracy
- The area-level SDH variables alone contributed to 41.2% of the explained variation.

Studies to Determine the Genetic Basis of Excess Diabetes in "Racially Admixed" Populations Have Been Confounded by Socioeconomic Status, and Have Explained Vanishingly Small Contributions



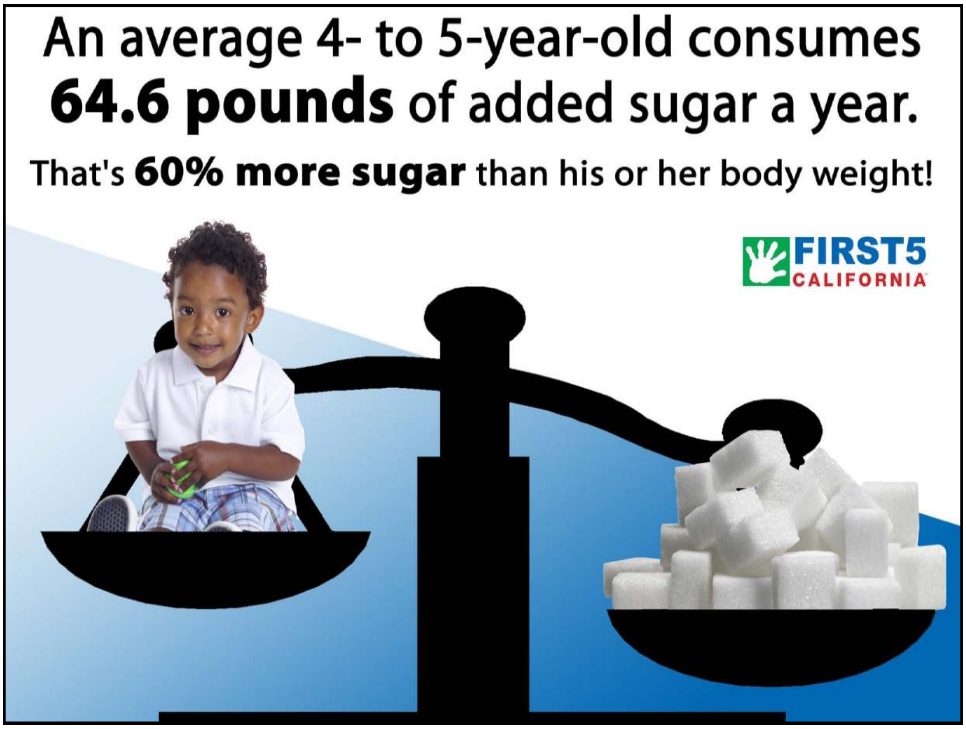
JC Florez Diabetologia 2009

The Social-Ecological Model

"Harmony and Balance in Life: Applying the Social-Ecological Model in AI/AN Communities," below, is a concentric 5-ring model. In the fifth and outermost ring is SOCIETY, Tribal and Federal Government ,Tribal and Federal Laws, Tribal Regulations, and Policy. Next, in the fourth ring, is COMMUNITY, including Grocery Stores and Markets, Neighborhood, Child Care, Community Organizations, and Built Environment. In the third ring is ORGANIZATIONAL, with Quality Health Care, Clinics, Hospitals, Worksites, Schools, Media, Food, Industry, and Tribal Organizations. The Second ring includes INTERPERSONAL, with Language, Family, Culture, Traditional, and Values. First and at the center is the INDIVIDUAL (*Adapted from: Diabetes Care, November 2008, Vol. 31 (11), page 2217*).

Harmony and Balance in Life: Applying the Social-Ecological Model in AI/AN Communities


#DrinkDiabetes
Diabetes


An average 4- to 5-year-old consumes
64.6 pounds of added sugar a year.
That's 60% more sugar than his or her body weight!
FIRST5
CALIFORNIA

What is Responsible for the Rapid Rise in Global Diabetes?

Table 2. Fractional food composition and diabetes prevalence.

	(6)	(7)	(8)
	Diabetes prevalence (%)	**Diabetes prevalence (%)**	**Diabetes prevalence (%)**
Fraction of total calories from sugar	18.1**	15.7**	16.7**
	(5.53)	(5.16)	(5.41)
Fraction of total calories from fiber	3.97	1.00	1.70
	(2.98)	(3.24)	(3.37)
Fraction of total calories from fruit	−0.58	−1.98	−1.64
	(5.22)	(5.89)	(5.84)
Fraction of total calories from meat	3.97	9.31	7.82
	(7.01)	(5.89)	(5.89)
Fraction of total calories from cereal	0.96	2.27	2.73
	(2.97)	(2.99)	(3.07)
Fraction of total calories from veg oils	1.93	2.80	4.85
	(4.46)	(4.44)	(4.92)
Obesity	0.12***	0.092***	0.094***
	(0.029)	(0.021)	(0.021)
Log GDP per capita		1.03*	1.19*
		(0.44)	(0.47)
Change in log GDP		2.03	1.85
		(2.52)	(2.58)
Aging		0.036	0.036
		(0.086)	(0.087)
Urbanization			0.015
			(0.011)
Countries	147	137	137
R^2	0.49	0.54	0.55

The fraction of total calories from added sugar was the only food fraction correlated with diabetes, with a 1% rise in the fraction of total food calories as sugar corresponding to a 0.167% rise in diabetes prevalence.

A Linear Correlation Between Change in Added Sugar Availability and Change in Diabetes Prevalence

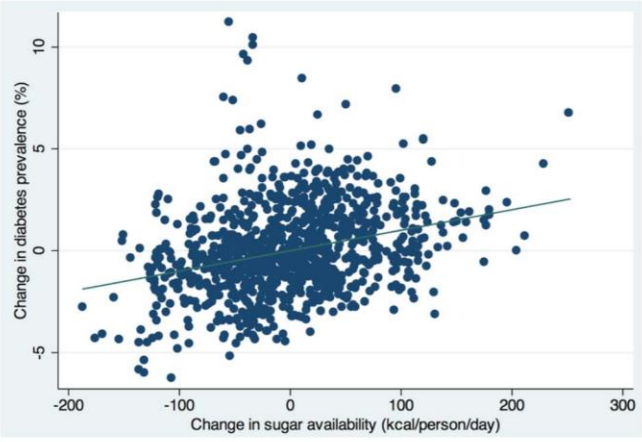
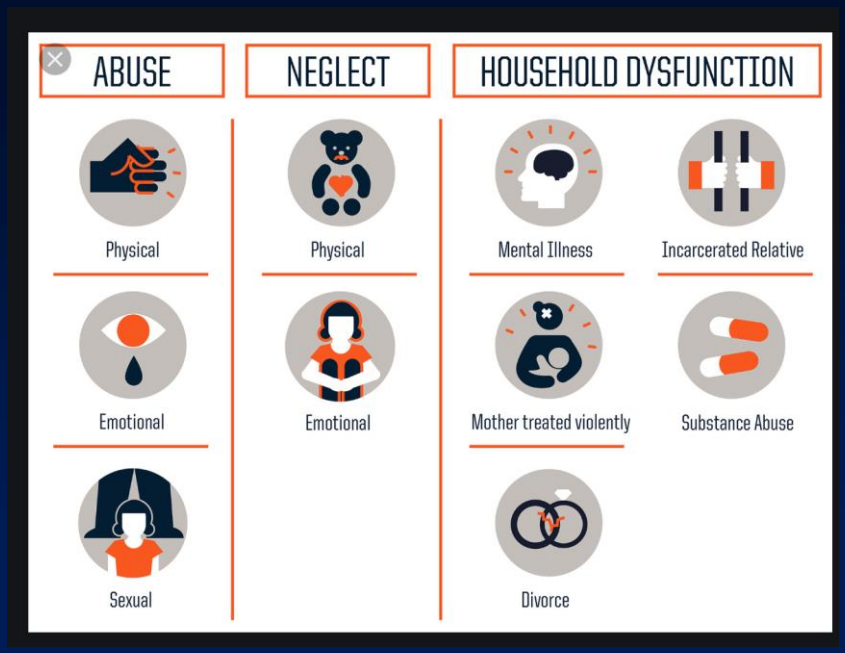


Figure 2. Adjusted association of sugar availability (kcal/person/day) with diabetes prevalence (% adults 20–79 years old).

Basu PLOS One 2013

Social Disadvantage and Adverse Childhood Experiences(ACE's)

- ACEs are associated with an increased risk of diabetes in adulthood
- >/= 3 ACEs out of 11 associated with an 59% increase in the odds of diabetes in adulthood compared with those without ACEs
- Study of low-income primary care patients demonstrated that a greater number of ACEs was associated with an increased risk of diabetes in a dose-response manner
- A meta- analysis of found a pooled odds ratio (OR) of 1.32 for the association between experiencing >/= 1 ACEs and diabetes



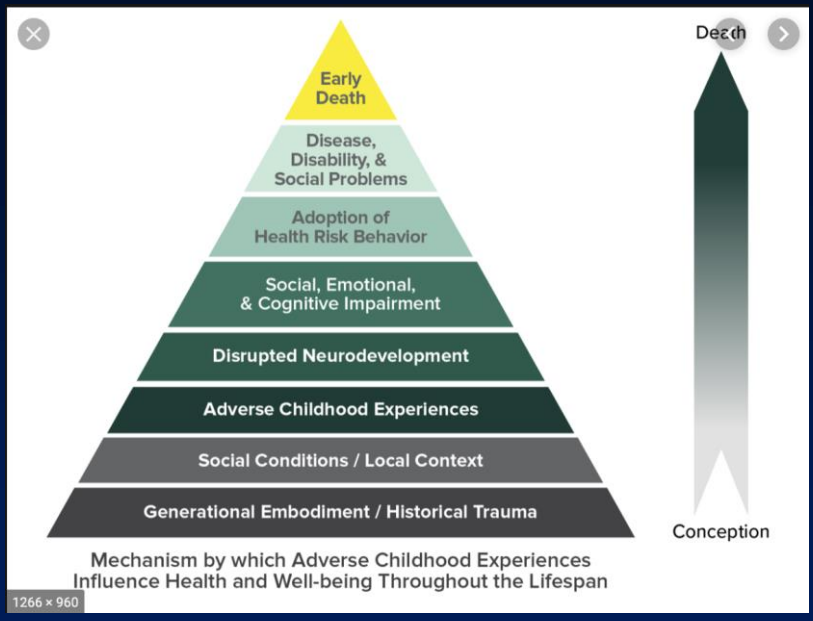
WHITEHALL PROSPECTIVE STUDY (UK)
N~ 5,000, 15 years of follow-up

- Adverse childhood experiences (ACEs) were associated with an increased risk of diabetes in adulthood.
- Every addition of ACE associated with an ~11% increase in odds of diabetes

Table 2—Proportion of each ACE reported

ACE category	*n* (%)
Parental arguments	973 (19.8)
Parental divorce	202 (4.1)
Parental mental illness or alcohol abuse	309 (6.3)
Parental unemployment	521 (10.6)
Physical abuse	119 (2.4)
Long-term hospitalization (4 weeks or more)	612 (12.4)
Orphanage during childhood	73 (1.5)
Separated from mother for 1 year or more	603 (11.9)

Deschenes, 2018 Diab Care



How Does Historical Trauma Fit In?

- Sotero's (2006) conceptual framework of historical trauma includes 3 successive phases.
- 1. Dominant culture perpetrating mass traumas on a population, resulting in cultural, familial, societal and economic devastation
- 2. Original generation of the population responds to the trauma showing biological, societal and psychological symptoms
- 3. Initial responses to trauma conveyed to successive generations through environmental and psychological factors, prejudice and discrimination
- Native Americans subjected to traumas that are defined in specific *historical losses* of population, land, family and culture.
- These traumas resulted in *historical loss symptoms* related to social-environmental and psychological functioning that continue today (Whitbeck, Adams, Hoyt, & Chen, 2004)
- Excellent resource http://tpcjournal.nbcc.org/examining-the-theory-of-historical-trauma-among-native-americans/
- 2 caveats: Not just "historical losses"; What is the 4th phase (recovery)?

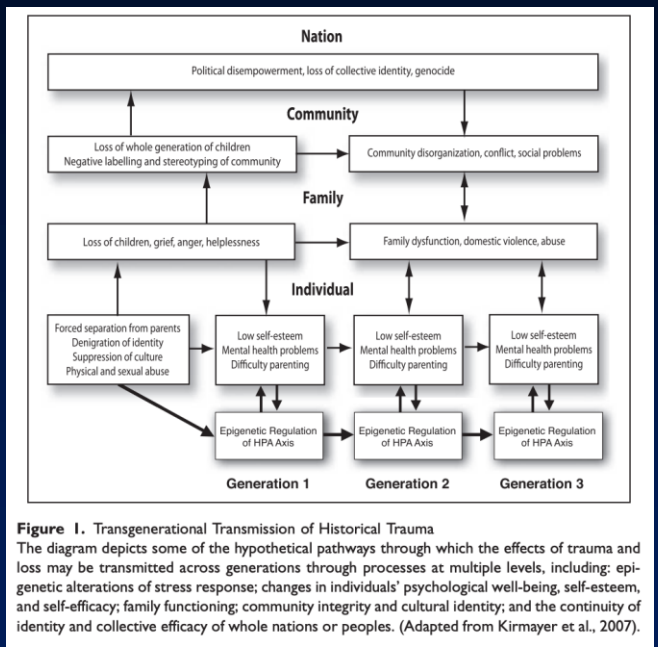


Figure 1. Transgenerational Transmission of Historical Trauma
The diagram depicts some of the hypothetical pathways through which the effects of trauma and loss may be transmitted across generations through processes at multiple levels, including: epigenetic alterations of stress response; changes in individuals' psychological well-being, self-esteem, and self-efficacy; family functioning; community integrity and cultural identity; and the continuity of identity and collective efficacy of whole nations or peoples. (Adapted from Kirmayer et al., 2007).

What's Stress Got to Do With It?

- Pervasive and enduring effects of the neurobiological toll of stress on hypothalamic- pituitary-adrenal (HPA) axis and metabolic dysfunction
- Hypercortisolemia (abnormally high levels of cortisol) increases susceptibility to diabetes
- Neuroendocrine response to stress can be transmitted to future generations by means of nongenomic (epigenetic) mechanisms—environmental stressors in one generation can influence the disease risk of subsequent generations
- Maternal psychological and nutritional stress can lead to biological changes that predispose their offspring to diabetes
- Overfeeding and overeating during critical developmental periods following periods of poor nutrition could lead to metabolic adaptations over generations—particularly high diabetes related mortality
- Consensus that environmental influences can contribute to health disparities by influencing biological processes and responses at key developmental periods throughout the life course and across generations.

Karina L. Walters 2011

Trauma and Vulnerability are Not Just Historic

- The notions of historical trauma, loss, and grief have drawn attention to the enduring effects of colonization, marginalization, and cultural oppression in the lives of Indigenous peoples and communities.
- The recognition that the violence and suffering experienced by one generation can have effects on subsequent generations provides an important insight into the origins of health problems.
- However, the kinds of adversity faced by each generation differ, and the construct of trauma does not capture many of the important elements that are rooted in structural problems, including ongoing poverty and discrimination.
- Understanding the ways in which trauma impacts health requires a broader view of identity, community, adaptation and resistance as forms of resilience

Major Caveat to Studies of HTR and Stress as it Relates to Diabetes

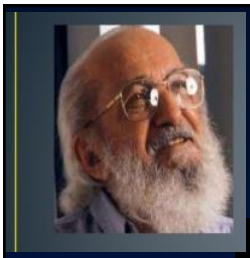
Studies of historical trauma response (HTR) must be balanced by:

- Analyses of how political and economic dynamics interact with community wellbeing
- How those forces can be aligned to produce contexts that allow individuals and communities to pursue ways of living that they value.
- For clinicians and policymakers, it points to the need to supplement “cultural safety” and “cultural competence” with structural competence, including systematic attention to (and engagement with) the social determinants of health.

Kirmayer 2014 Transcultural Psychiatry

Implications of Social Ecological Model of Diabetes Causation

- Increased socio-economic risk suggests policy interventions affecting social conditions
- Environmental risk suggests community and policy interventions
- Risk associated with Historical Trauma Response and oppression suggests policy interventions aimed at reparations and cultural interventions affirmatively restoring that which has been lost
- Psychosocial risk suggests primary prevention aimed at reducing psychological strain and increasing coping mechanisms
- Lifestyle/ behavioral risk suggests primary prevention directed at increasing healthy, and decreasing unhealthy, behaviors
- Biophysiological risk suggests secondary prevention efforts aimed at stopping/ slowing the progression of disease.
- Efforts should be focused on maternal/child stages and adolescence



Changing the Conversation About Diabetes:
A Focus on Youth

Paolo Freire

"Education either functions as an instrument which is used to facilitate integration of the younger generation into the logic of the present system and bring about conformity or it becomes the practice of freedom, the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world."

– *Paulo Freire, Pedagogy of the Oppressed*

Young People as Messengers of Change - Not Targets for Metabolic Dysfunction

THE BIGGER PICTURE.ORG

Raise Your Voice and Join the Conversation about Diabetes. Take a Look at The Bigger Picture.

The New York Times

Using Art to Tackle Diabetes in Youth

Example Poem

- *Chocolate Smile*
  - » by Marje Kilpatrick, age 16
- What did the video poem make you *feel*?
- What *public health literacy message* was the poet trying to convey?

"How can the oppressed participate in developing the pedagogy of their liberation? This pedagogy makes oppression and its causes objects of reflection by the oppressed, and from that reflection will come their necessary engagement in the struggle for their liberation. And in the struggle this pedagogy will be made and remade".

-Paulo Freire

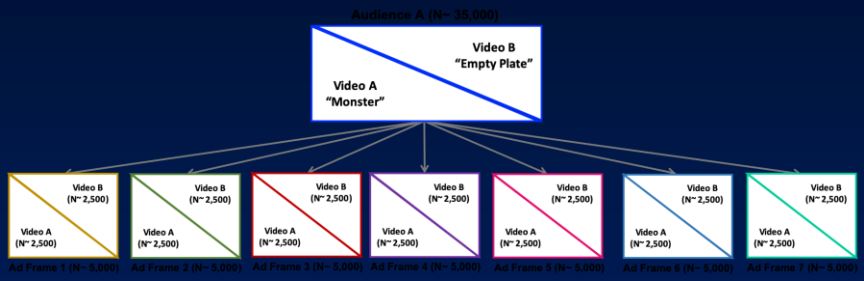
How Can We Engage the Public to View Diabetes as a Socially Constructed Disease?

- A study of >200,000 people on Facebook
- Created a FB Ad with Bigger Picture video content
- Compared the effects of different values-based framing messages across disparate FB audiences
- Outcome: video views, link clicks, donations
- Hypothesis: different values-based messages would engage different audiences at different rates

Schillinger 2019 in review

Study Design within Each Audience Segment

(each color is a different framing message)



*This design was replicated across 6 audience segments:

Young Adults, Social Justice, Public Health, Philanthropist, Nutrition Enthusiasts, Conservatives.

S. No	Values-Based Frame Name	Message
1	CE: Common Enemy/War Metaphor	During the Iraq/Afghanistan War, about 1,650 of our American soldiers lost a limb in combat. During that same period, over 1 million regular Americans lost a limb to diabetes. Watch how young people are fighting back.
2	DAA: Defiance Against Authority	A modern David and Goliath story: Can Big Poetry actually beat Big Soda and Big Ag? Watch this.
3	EE: Entertainment & Emotional Appeal	A Star is Born: Watch how this young artist is saving our communities.
4	SHSE: Second Hand Smoke Equivalent/Environmental Appeal	The war on tobacco turned when we discovered that second hand smoke kills kids. Now kids are getting Type 2 diabetes. Is there a second-hand smoking gun in Type 2? Watch this.
5	FF: Information/Facts and Figures	Type 2 diabetes used to be known as "adult-onset" diabetes. Now nearly 1 in 100 kids have it. Watch how these young people are fighting to end Type 2.
6	SRJ: Social/Racial Justice Appeal	Young Lives Matter: Watch this and join the movement to defend our kids from the forces behind the Type 2 diabetes epidemic.
7	HC: Healthcare Costs/Tax Burden Appeal	Want healthcare to be more affordable? 1 in 5 dollars spent on healthcare in the US is due to diabetes. Watch how these young people are trying to change this stat.
8	PPR: Play on Personal Responsibility	We all want to make our own choices. But what about when we have no choice? Help these kids have the right choices to make by watching this.
9	PG: Play on Genetics	That Type 2 Diabetes is in the genes is Fake News. Find out the real truth behind the diabetes epidemic. Watch here.
10	PFF: Protect Family and Friends	Your Friends & Family aren't safe. Wanna be a Superhero? Check this out.
11	DB: Direct Behavioral Appeal	Avoid diabetes by watching this dope video.

Results: A Divisive Issue or Common Ground?

- Across disparate segments of society, there appears to be a set of common values that communication initiatives can tap into to catalyze a more inclusive movement to confront the T2D epidemic through policy, systems and environmental approaches.
- Ad frames that ranked highly with most audiences included *Entertainment and Emotional Appeal*; *Defiance Against Authority Appeal*; and *Second Hand Smoke/Environmental Appeal*, and to a lesser extent, *Common Enemy/War Metaphor Appeal*.
- Ad frames that ranked in the bottom included *Facts and Figures, Social/Racial Injustice* and *Healthcare Costs/Tax Burden Appeal*.

Where Have We Been?

- Deconstructed the construct of vulnerable populations as one related to
  - » social marginalization and oppression
  - » maldistribution of exposures to risks and resources
- Demonstrated how social vulnerabilities in individuals can influence diabetes outcomes
- Reframed the diabetes epidemic in the US as a multi-level **social phenomenon** that disproportionately affects vulnerable populations – a reframing with direct relevance to Indian Country
- Discussed implications of this reframing for healthcare, social and public policy
- Shared recent examples of health communications work whose goal is to effectively convey this reframing→ increase public health literacy

"Medicine is a social science. And ***politics*** is nothing else but Medicine on a large scale. Medicine as a social science, as the science of human beings, has the ***obligation*** to point out problems and to attempt their theoretical solution."

- Rudolf Virchow MD (1821-1902)

Founder of modern pathology, the science of the causes and effects of diseases, especially the branch of medicine that deals with the laboratory examination of samples of body tissue for diagnostic or forensic purposes.

Promoting Resilience: