Social Determinants of Health

DUSON Dean’s Lecture Series Inaugural Presentation
November 30, 2021

Vincent Guilamo-Ramos, PhD, MPH, LCSW, RN, ANP-BC, PMHNP-BC, AAHIVS, FAAN
Dean and Bessie Baker Professor, Duke University School of Nursing
Vice Chancellor for Nursing Affairs, Duke University
Director, Center for Latino Adolescent and Family Health
An Opportunity for Conversations about Health and the Role of Nursing

Purpose:
• Engage in conversations about the current context and future directions for impact in healthcare
• Critically think together about new ways to leverage nurses for addressing pressing health and social challenges

Format:
Symposia with experts and innovators in health, healthcare, and nursing.
Key Focus Areas of the DUSON Dean’s Lecture Series

- The Social Determinants of Health
- The Nursing Workforce
- Improving Healthcare Access, Outcomes, and Health Equity
- Nursing Education
- Nurses in Public Health Disaster Preparedness
- Payment Models & Nurses as Agents of Change
Focus of Today’s Lecture

The Social Determinants of Health
The current healthcare landscape is undergoing significant change and is being shaped by large-scale transformative events, including contemporary and chronic health and social welfare inequities.
The Nursing Profession is Discussing Solutions to Contemporary Challenges in Healthcare

**NASEM, 2021**
The Future of Nursing 2020-2023: Charting a Path to Achieving Health Equity

**NINR, 2021**
Strategic Plan Working Group Draft Framework for 2022-2026

**NASEM, 2021**
Implementing High-Quality Primary Care: Rebuilding the Foundation of Healthcare

**AACN, 2021**
The Essentials: Core Competencies for Professional Nursing Education

**NONPF, 2021**
The Updated National Task Force Criteria for Evaluation of Nurse Practitioner Programs

**AACN, 2021**
The Research-Focused Doctoral Program in Nursing: Pathways to Excellence (DRAFT)
Overview

The Determinants of Health in the United States

The Mechanisms of Social Determinants of Health: Principles, Theories, and Evidence

A Nurse-Led Framework for Addressing the Social Determinants of Health
The Determinants of Health in the United States
A Global Perspective on Health Outcomes in the United States

The US has the **lowest life expectancy**, but the **highest healthcare expenditure** relative to other developed nations.

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**Life Expectancy**

Norway: 83.3
Switzerland: 83.2
Australia: 83
Sweden: 82.5
France: 82.3
New Zealand: 82.1
Canada: 81.7
Netherlands: 81.5
Germany: 81.1
UK: 80.4
US: 77.3

**Healthcare Spending as a % of GDP**

US: 16.8%
Germany: 11.7%
Switzerland: 11.3%
France: 11.1%
Sweden: 10.9%
Canada: 10.8%
Norway: 10.5%
UK: 10.2%
Netherlands: 10.2%
Australia: 9.4%
New Zealand: 9.1%

Misalignment of US Health & Social Expenditure with Modifiable Determinants of Health

US combined annual health and social expenditure exceeds $4 trillion

but the allocation of funds is misaligned with modifiable determinants of health

Proportion of US Health and Social Expenditure

- 14%, Social Spending (excluding retirement and health expenditure)
- 30%, Other Health (e.g., medical goods, health administration, etc.)
- 3%, Prevention Services

Relative Importance of Modifiable Determinants of Health

- ~50%, Socioeconomic & Environmental Factors
- ~30%, Lifestyle Factors
- ~20%, Clinical Care
- 53%, Clinical Care (inpatient + outpatient care services)
- 14%, Clinical Care

Analyses of OECD Data Sets: Health expenditure and financing, Social Expenditure Database (SOCX), Social Expenditure - Reference series; Magnan (2017), NAM Perspectives
What are Modifiable Determinants of Health?

Modifiable Determinants of Health are lifestyle/behavioral, clinical care, and socioeconomic/environmental factors that influence immediate and long-terms health outcomes.

Unequal distribution of modifiable determinants of health in the population produces health inequities.
Shifting the Explanatory Paradigm for Health Disparities and Inequities

Traditional Explanatory Paradigm for Health Disparities and Inequities

1. Tendency to characterize disparities by sociodemographic factors (e.g., race/ethnicity, SES, sex/gender, etc.)
2. Tendency to view health disparities as associated with “vulnerable communities”
3. Tendency to view health disparities from a deficiency-focused perspective (e.g., “why do communities do poorly?”)

Contemporary Explanatory Paradigm for Health Disparities and Inequities

1. Explores underlying drivers of health disparities and inequities
2. Focuses on exposure, susceptibility, and social processes as explanatory variables
3. Acknowledges resilience as an important factor in addressing health disparities and inequities (e.g., “why do communities do as well as they do despite challenges?”)

Healthy People 2030 SDOH Framework:

Social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.
Vulnerability as Traditionally Conceptualized:

Applied to groups as an attribute of communities experiencing health inequities; predominantly along the lines of race/ethnicity, socioeconomic status, sexual orientation/gender identity, etc.

“vulnerable communities”

Traditional Conceptualization of SDOH Impact on Health Disparities

Lacks consideration of:

- **Social processes**: Interactions between persons, groups, or systems
- **Susceptibility**: Chance of morbidity/mortality given exposure to a risk factor; susceptibility is biological
- **Exposure**: Condition of being affected by a health risk or protective factor; exposure is environmental
- **Resilience**: Ability to thrive despite adversity

Moving Towards Understanding the Mechanisms of Social Determinants of Health

The Mechanisms of Social Determinants of Health: Principles, Theories, and Evidence
There are 14,252 search results for “Social Determinants of Health” in PubMed
Principles About the Mechanisms of SDOH Emerge from the Literature

Landmark conceptual and empirical research supports *principles about the mechanisms in which social determinants impact health*: 

- **Underlying Causes Beyond Individual Factor Drive Health Inequities**
- **Context Matters - The Structural Production of Risk**
- **Environmental Disadvantage is not Deterministic**
- **SDOH Influence Manifests Over the Life Course**
- **SDOH Can Operate Through Biological Embedding**
- **SDOH Can Operate Intergenerationally**
- **The Impacts of SDOH Cluster and Interact Synergistically**
- **Social Injustices and Structural Racism Shape the Impact of SDOH**
Principle #1: Underlying Causes Beyond Individual Factors Drive Health Disparities and Inequities

Fundamental Causes Theory

Landmark theory that moved beyond individual “risk factor epidemiology” to propose distal factors as fundamental for shaping health disparities and inequities.

- **Distal factors/exposures** influence **individual risk** and **protective** factors, and shape disease and health outcomes.

- Distal factors (i.e., education, SES, etc.) represent **fundamental causes** of inequities in disease.

- Fundamental causes **disrupt access to resources** that are important in avoiding or mitigating negative health outcomes.

- Fundamental causes act through **complex mechanisms** and on **diverse health outcomes** → difficult to quantify total effect.

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Empirical Evidence: The Value of Education for Improving Health

**Figure.** Cumulative Survival by Education and Preventability of Death Ages 45 to 64 at Baseline

For preventable deaths, mortality is **significantly associated with education level**

Principle #2: Context Matters – The Structural Production of Risk

Risk Environment Framework:
Type of Environment

Landmark framework that characterizes the structural production of disease risk and outcomes

Understanding the risk environment:

- Comprises all risk-factors exogenous to the individual
- The social situations, structures, and places where factors exogenous to the individual interact to produce disease risk

Four types of risk environment:

- Physical
- Social
- Economic
- Policy

Context Matters: A Tale of Two Communities

Community A

Community B
Principle #3: Environmental Disadvantage is not Deterministic

The Risk Environment Framework outlines influences at three distinct levels that interact to reinforce or weaken the effect of one another.

- **Macro**: Society as a whole, e.g. political, economic, social factors
- **Meso**: Parts of the society, e.g. groups, organizations
- **Micro**: Actions of individuals

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Environmental Disadvantage is not Deterministic: A Tale of Two Swimmers

**Macro:** Prevalence of Sharks

**Meso:** Pool has Lifeguard & Medical Care

**Micro:** Decision to go into the Deep End

Swimmer A

Swimmer B

Same Prevalence

Different Outcome
## Risk Environment Framework: An Applied Exemplar

### Structural Analysis: COVID-19 Associated Deaths in the Bronx

<table>
<thead>
<tr>
<th>Macro Environmental Risk</th>
<th>Meso Environmental Risk</th>
<th>Micro Environmental Risk</th>
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<tbody>
<tr>
<td><strong>Physical</strong></td>
<td></td>
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<tr>
<td>Availability of affordable housing</td>
<td>Neighborhood &amp; household density/isolation</td>
<td>Individual exposure to COVID-19 in neighborhood/household</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
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<tr>
<td>Historical harm and trauma associated with healthcare in underserved communities</td>
<td>Low trustworthiness of health care systems</td>
<td>Individual mistrust of healthcare; forgone care</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
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<tr>
<td>Neighborhood poverty</td>
<td>Scarcity of affordable and healthy food sources (i.e., food desert)</td>
<td>Unhealthy food purchases/diet, obesity</td>
</tr>
<tr>
<td><strong>Political</strong></td>
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<tr>
<td>Lack of COVID-19 mitigation guidelines for socioeconomically disadvantaged households</td>
<td>Suboptimal COVID-19 messaging; misinformation</td>
<td>Misconceptions/lack of information regarding COVID-19</td>
</tr>
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Principle #4: SDOH Influence Manifests Over the Life Course

The life course framework suggests social, economic, psychological, and environmental influences accumulate over the life course to shape health behaviors, mental and physical health.

- **Early-life exposure** to risk or protective SDOH factors impacts health outcomes later in life.
- **Spatial/temporal context** influences exposures and life course health trajectories.

~70% of global premature adult mortality is associated with processes that initiate in adolescence. 

Research shows that **protective influences in adolescence are associated with reduced risk of negative health outcomes in adulthood**, independent of adolescent baseline risk factors.

### Adolescent Family Connectedness
(Associated adult outcomes with unit increase on 30-point scale)

<table>
<thead>
<tr>
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<th>n</th>
<th>Multivariable Models</th>
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<td>Adult Sexual Heath</td>
<td></td>
<td></td>
<td>aOR</td>
<td>95% CI</td>
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<td>2+ Sexual Partners (past 12 mo.)</td>
<td>10,064</td>
<td>0.96***</td>
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<td>Condom nonuse (past 12 mo.)</td>
<td>10,055</td>
<td>0.99</td>
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<td>1.01</td>
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<td>STI diagnosis</td>
<td>11,141</td>
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### Adolescent School Connectedness
(Associated adult outcomes with unit increase on 30-point scale)

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### Adult Substance Use

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<tr>
<td>Prescription drug misuse</td>
<td>11,956</td>
<td>0.94***</td>
<td>0.92</td>
<td>0.97</td>
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<tr>
<td>Other illicit drug use</td>
<td>11,974</td>
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Multivariable models include school & family connectedness, sociodemographic characteristics, and relevant baseline risk factors.

Principle #5: SDOH Can Operate Through Biological Embedding

Biological Embedding Framework

Biological Embedding: The process by which social conditions initiate and sustain biological changes that have short- and long-term effects on physical health and well-being.

Properties of Biological Embedding:

- Social conditions alter biological processes (e.g., epigenetic, neurodevelopmental, immune, endocrine)
- Alterations in biological processes are stable and long-term
- Altered biological processes impact health, wellbeing, learning, and/or behavior over the life course

A Case Example: Childhood Psychosocial Adversity

Childhood psychosocial adversity
Care environment mediates stress
- Prenatal maternal stress, depression
- Postnatal caregiver unavailability/absence (mental illness, substance abuse, death)
- Depriving environments (e.g., institutional care)
- Child abuse or neglect

Biological change
- Genetic endowment
  - Genetic variants alter susceptibility to adversity
    - e.g., 5-HTTLPR, BDNF, FKBP5, MAOA poly-morphisms
- DNA methylation
  - (e.g., GR promoter, IGF-2 antisense AVP)
- Epigenetic changes
- Telomere shortening
- Developmental trajectory
  - Biological change is embedded in behaviour
    - (e.g., substance use, exercise, diet, stress management)

Adult outcomes

Sensitive period effects
Specific to developmental functions/domains
- 6–12 months: HPA axis (SHRP)
- 15 months: Language
- 24 months: Attachment, IQ

Neurodevelopmental disruption
- Reduced volume of key regions
- Neurotransmitter changes
- Altered functional activity, tract connectivity

Reprogramming of stress and immune regulatory systems
- Inflammation
- Altered HPA and sympatho-medullary axes

Increased risk of:
- Cognitive deficits
- Disease
- Psychopathology
- Social problems, (unemployment, incarceration)
Figure. Biological Embedding of SDOH to Impact Decision-Making and Risk Behavior (A Case Example)

SDOH Can Operate Through Biological Embedding

Biological embedding is **dynamic** and reflects **ongoing interactions** between the environment and biological processes to affect health, social, and behavioral outcomes.

**Figure.** Epigenetic Embedding (Example)

- Trauma or stressor
- Changes to Epigenome
- Genome
- Poor Mental and Physical Health
Biological Embedding: An Empirical Example

Figure. Association between neighborhood disadvantage and accelerated cardiometabolic aging

Neighborhood disadvantage is associated with accelerated cardiometabolic aging

Principle #6: SDOH Can Operate Intergenerationally

Framework of Biosocial Inheritance

Biosocial Inheritance: “The processes through which social adversity is transmitted across generations through mechanisms both biological and social in nature.”

Three Types of Biosocial Inheritance

Cross-Generational

SDOH (Parent)

Health of the next generation (fetus)

- Biological
  - Epigenetic
  - Immune
  - Neuroendocrine
  - Metabolic programming

Multi-Generational

SDOH

Health of multiple generations simultaneously

- Biological

Transgenerational

SDOH

Multiple generations consecutively

- Social
  - Social arrangements
  - Historical context
  - Political-economic context

Biosocial Inheritance Mechanisms

US women of reproductive age in the lowest quartile of overall SES have ~ 2 times the exposure to phthalate as compared to the highest quartile of SES.

Phthalate exposure has adverse effects on health outcomes in children, including birth weight, gestational age, preterm birth, diabetes, and asthma.

**Figure.** DNA methylation of imprinted genes in children with prenatal phthalate exposure.
Multi-Generational Impact of SES

Figure. Interplay Between Low SES, Microbiota, and Metabolic Diseases in Higher Income Countries (HIC)

Simultaneous impact on multiple generations
Biosocial Inheritance of SDOH: Transgenerational

Transgenerational Transmission of Trauma

**Parental Exposure**

- **Experience of Traumatic Event**
  - E.g., The Holocaust, the Tutsi Genocide, Slavery

**Impact on Parent**

- PTSD Symptoms
- Biological Impact (e.g., methylation of inflammatory genes)
- Morbidity (e.g., Depression)

**Impact on Offspring**

Principle #7: The Impacts of SDOH Cluster and Interact Synergistically

Syndemic Theory:

A *syndemic* is defined as two or more clustered epidemics interacting synergistically within a community or population, resulting in excess disease burden.

There are two underlying mechanisms that produce syndemics:

- **Biological synergism**, e.g.: inflammation due to STIs facilitating transmission or acquisition of HIV.

  AND / OR

- **Socio-contextual synergism**, e.g.: increased risk of sexual HIV acquisition among substance users due to disinhibited sexual behavior under the influence.

The SDOH may operate through both biological (e.g., inflammatory response) and socio-contextual synergisms.
A Syndemic Perspective on COVID-19: Examples

**Synergies:**
Record-Level Increase in Overdose Deaths During Pandemic

- **Elevated substance use** during the COVID-19 pandemic
- Increased **solitary drug use** has contributed to increasing overdose deaths
- Drugs obtained from **unknown/unreliable sources** has increased risk of overdose (cutting/mixing)
- The pandemic **disrupted access to SUD treatment**

**Monthly Overdose Deaths, 2016–20**


**Clustering:**
COVID-19, Obesity, and Structural Racism

**Perspective**
COVID-19, Obesity, and Structural Racism: Understanding the Past and Identifying Solutions for the Future

Sara N. Bleich1,2 and Jany D. Ard2
1Department of Health Policy and Management, Harvard T.H. Chan School of Public Health, Boston, MA, USA
2Department of Epidemiology and Prevention, Wake Forest School of Medicine, Winston-Salem, NC, USA
*Correspondence: sbleich@hsph.harvard.edu
https://doi.org/10.1016/j.cmet.2021.01.010

“Long-standing **systemic inequalities**—fueling unequal access to critical resources such as healthcare, housing, education, and employment opportunities—are largely responsible for the **significant race disparities in obesity and COVID-19**. Because of this legacy, public health emergencies like the COVID-19 pandemic disproportionately impact communities of color, exacerbated by high rates of pre-existing chronic diseases like obesity.”

Principle #8: Social Injustices & Structural Racism Shape the Impact of SDOH

Ecosocial Framework:
Ecosocial Theory conceptualizes **health inequities** as **biological expressions of social processes**—the result of social injustices.

Example Structural Racism:

Racism: An exploitative and oppressive social process

- Racial/ethnic social inequalities
- Racial/ethnic health inequities

Dynamic, multi-level social and biological processes embedded within historical context

Empirical Examples: The Impact of Structural Racism

Structural Racism: Historical Context


Structural Racism: Residential Segregation

Racial Gap in Survival vs. Segregation.

What Does All This Mean?

8 Principles About Mechanisms of the Social Determinants of Health:

Where do we go from here?

Next Steps:

1. Integration of SDOH principles and mechanisms into a framework with applicability and utility

2. Conceptualization of applied mitigation approaches aligned with SDOH principles and mechanisms
A Unified Framework of Principles and Mechanisms of SDOH

Cross- and Trans-Generational

Multi-Generational (Family Context)

- Exposure
- Susceptibility
- Vulnerability
- Resilience

SDOH

Social Processes

Macro

Meso

Micro

Life Course

Disparity

Opportunities for Mitigation of SDOH

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<th>Approach for Mitigation</th>
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<td>Underlying Causes Beyond Individual Factor Drive Health Inequities</td>
<td>Meaningful Community Engagement in Identifying Data-Driven Priority Disparities &amp; Disparity Drivers</td>
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A Nurse-Led Framework for Addressing the Social Determinants of Health
Nurses are Uniquely Positioned to Implement Approaches for SDOH Mitigation

Key Nursing Workforce Characteristics for SDOH Mitigation:

- **Largest segment of the healthcare and public health workforce**
  - More than 4 million nurses in the US

- **Indispensable for scale, reach and effectiveness of health services**

- **Most trusted profession for nearly 20 years running**
  - Most trusted profession since 2002

Key Nursing Competencies for SDOH Mitigation:

- **Clinical care expertise**
  - (i.e., nurses are highly trained clinicians delivering most direct patient care services in the US)

- **Care coordination**
  - (i.e., nurses routinely coordinate interdisciplinary care teams and comprehensive patient care plans)

- **Whole-person perspective on health**
  - (i.e., nursing takes a holistic view of health and wellbeing that goes beyond biomedical treatment of disease)

- **Locational flexibility**
  - (i.e., nurses provide services in a variety of centralized and decentralized settings, including clinics, schools, homes, etc.)
Development, evaluation, and scale-up of **integrated, nurse-led strategies** that address the mechanisms of SDOH at three distinct levels—**multi-level interventions**:
Exemplar: A Multi-Level Toolbox for Nurse-Driven Intervention

1. Proactive Intervention Focus on Prevention and Health Promotion
   - Delivery of behavioral & biomedical prevention interventions for each stage of the life course.

2. Family-Based Approaches to Health & Prevention
   - The family defined as unit of intervention; family involvement in care self-management, and prevention

3. Health-Social Service Partnerships that Amplify Protective/Resilience Factors
   - Active navigation to ancillary services for psychosocial support (e.g., transportation, food assistance, etc.)

4. Community Engagement in Identifying Priority Disparities & Drivers
   - Systematic, community-engaged health needs assessment as formative work for intervention development

5. Decentralized Community-Based Care Tailored to Context
   - Nurse home visitations for primary care + nurse telehealth platform and home health tech

6. Health Care System Responsiveness to Exposures & Susceptibility
   - Assessment and targeted mitigation of exposures and susceptibility indicators (e.g., stress, microbiota shifts)

7. Biological Markers of Negative SDOH Impact to Inform Intervention
   - Routine assessment of biomarkers for SDOH impact + trend tracking at individual, family and community levels (e.g., AI-based approaches)

8. Comprehensive, Interdisciplinary, Team-Based Care
   - Nurse-coordinated interdisciplinary care teams within a value-based reimbursement scheme
Key Considerations for All Stages of the Intervention Life-Cycle

Formative Intervention Development Phase
- Relationship-building with key community stakeholders
- Community needs assessment to identify priority health disparities & underlying drivers
- Define multi-level intervention package based on community needs and priorities

Intervention Implementation Phase
- Aligning service delivery with community needs and priorities
- Hiring and training of a diverse care team across all levels (positionality)
- Ongoing involvement of key community stakeholders

Intervention Evaluation Phase
- Understand the mediators of intervention effects and relative contributions of “active intervention components”
- Use insights to iterate & optimize the multi-level intervention

Intervention Scale-up Phase
- Implementation and evaluation of multi-level intervention in different contexts, informed by implementation science approach
- Engage policy makers, decision makers, and the community to promote scale-up
What Does This Mean for DUSON?

5 Priorities for DUSON’s Role in Positioning Nurses as Leaders in Addressing the Social Determinants of Health

- Advancing the Science of Addressing SDOH, Structural Racism, and Social Injustice in Health
- Prioritizing the Development of Nurse-Led, Multi-Level, SDOH Interventions
- Methodological Expertise in the Development and Evaluation of Multi-Level SDOH Interventions (E.g., causal inference methods)
- Adopting Approaches to Optimize the Scale-up, Reach, and Real-World Impact of Multi-Level SDOH Interventions
- Incorporation of SDOH Competencies in Nursing Education and Training (I.e., competencies at the clinical, psychosocial, structural levels)