Health Disparities: Determinants, Mechanisms, and Action

Alika K. Maunakea, Ph.D.
Department of Native Hawaiian Health
John A. Burns School of Medicine
University of Hawai‘i, Mānoa

Ho‘ona‘auao, Hō‘ike, Ho‘ōla a Ho‘opili
Educate, Discover, Heal and Engage

Diabetes Disparity in Hawai‘i

- T2DM prevalence tripled in last 30 years [CDC 2011]
- 9.3% prevalence in US [ADA 2012]
- 8.4% prevalence in State of Hawai‘i [Hawaii BRFSS 2013]
- 7.9% to 8.4% increase in diabetes prevalence from 2005-2013 [Huakai 2014]
Regional and Population Health Disparities

http://www2.jabsom.hawaii.edu/native/comm_ulu-th.htm

Behavioral Risk Factors

http://www2.jabsom.hawaii.edu/native/comm_ulu-
Social-Economic & Education Disparity

http://www2.jabsom.hawaii.edu/native/comm_ulu-th-t

Environment: Social Status

Behavior: Risk Factors

Biology: Genes

Health: Disease Outcomes

Diagram showing social-economic and education disparity with data points for various cities and counties in Hawaii.
Gene-Environment

- **Epigenetics**: Study of heritable changes in phenotype not due to changes in the underlying DNA sequence.

- The majority of cellular processes such as transcription, DNA replication and DNA repair operate at the level of chromatin.

- DNA and histone proteins are post-synthetically modified and these modifications affect chromatin packaging and influence the way cellular processes work.
**Examples of Epigenetic Inheritance**

- Agouti viable yellow (A\textsuperscript{vY}) allele


Maternal diet influences long-term health of offspring

High methyl-donors (i.e. folate) → offspring are more frequently agouti, lower risk for obesity (agouti offspring more likely to give birth to agouti pups)

Low methyl-donors → offspring are more frequently yellow, higher risk for obesity (yellow offspring more likely to give birth to yellow pups)

Dutch Famine Birth Cohort Study (Lumey 1992): children conceived in times of famine had higher risk for metabolic and cardiovascular disease → past down to grandchildren

---

**Epigenetics & Disease**

Lifestyle

- environment
- nutrition
- habits & coping

Epigenetics

Chronic inflammation

Disease

Heart disease

Diabetes

Neurological disorders

Cancer

Reverse

Chronic inflammation

Immune system
toxicants, stress, free radicals, etc.

Gut microbiota

Good

Bad
Finding Solutions

Improvements in health status:

- Community-based integrated approaches to health & well-being
- Initiatives that incorporate cultural knowledge & practice
- Collaborations and partnerships are key to innovative & sustainable solutions: **Prevention-focused health care!**

DNHH-Community Partnerships: 'Ulu network