Reasons for Disparity in NASH: Nutrition and Activity Islands

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CLDF
Chronic Liver Disease Foundation

Disclosures

- I have no relationships to disclose.

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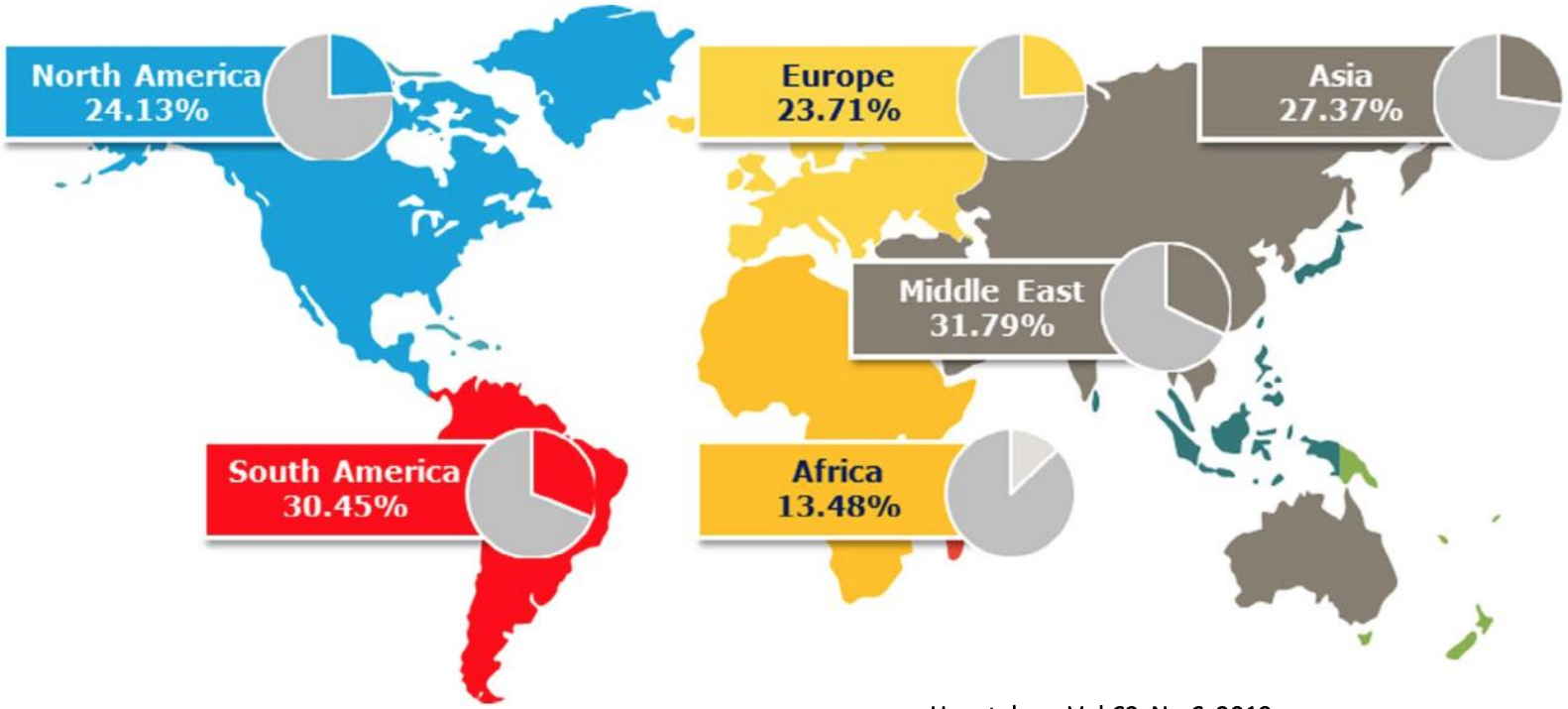
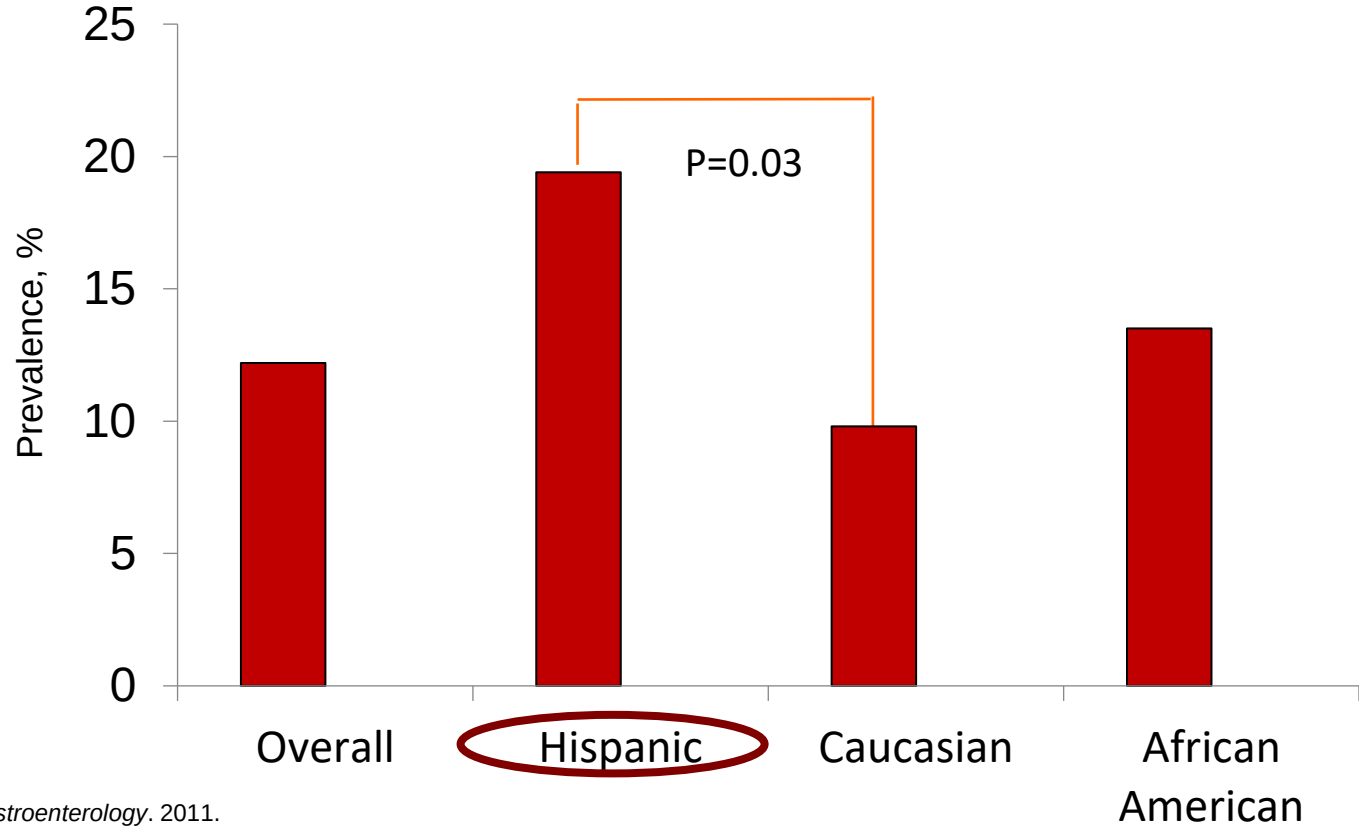
Disparities in NAFLD prevalence



Hepatology, Vol.69, No.6, 2019

Disparities in NAFLD prevalence



Williams et al. *Gastroenterology*. 2011.

Disparities in NAFLD prognosis

- Among patients with NAFLD, risk of NASH is higher in Hispanics (relative risk, 1.09; 95% CI, 0.98–1.21) and lower in Blacks (relative risk, 0.72; 95% CI, 0.60–0.87) than Whites.

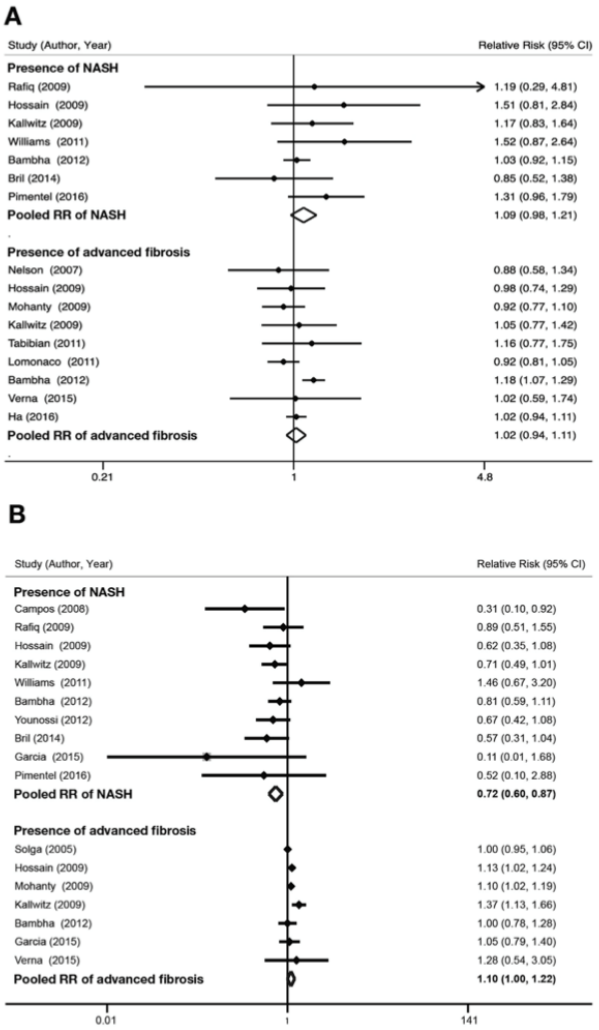
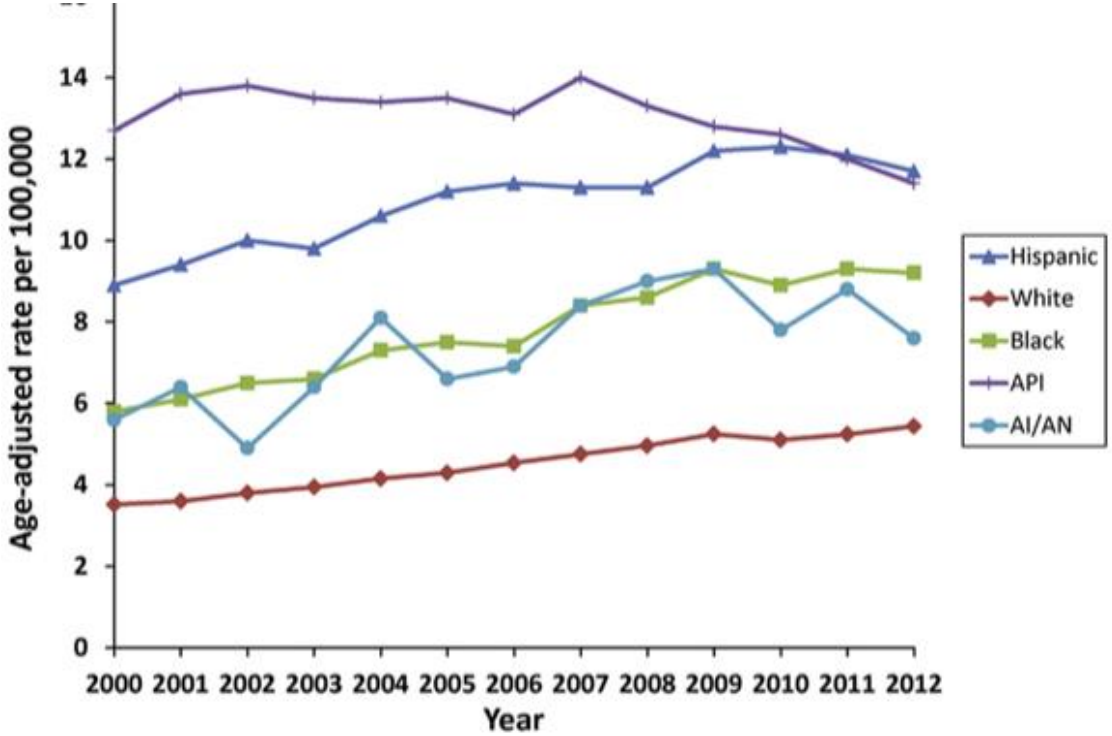


Figure 2. (*A*) Presence of NASH and advanced fibrosis among patients with NAFLD for Hispanic versus white persons. (*B*) Presence of NASH and advanced fibrosis among patients with NAFLD for black versus white persons.

Rich N. CGH 2019

High prevalence of NAFLD likely explains the ethnic disparity in liver cancer in the U.S



White, Kanwal, Thrift, El-Serag. Gastroenterology 2017

Socio-economic status (SES) and NAFLD

- Scoping review of literature from PubMed inception to May 2021
- Examined health inequalities in NAFLD prevalence and outcomes
- Twenty articles; most from the U.S

Patients with low SES had:

↑ NAFLD prevalence (four articles)

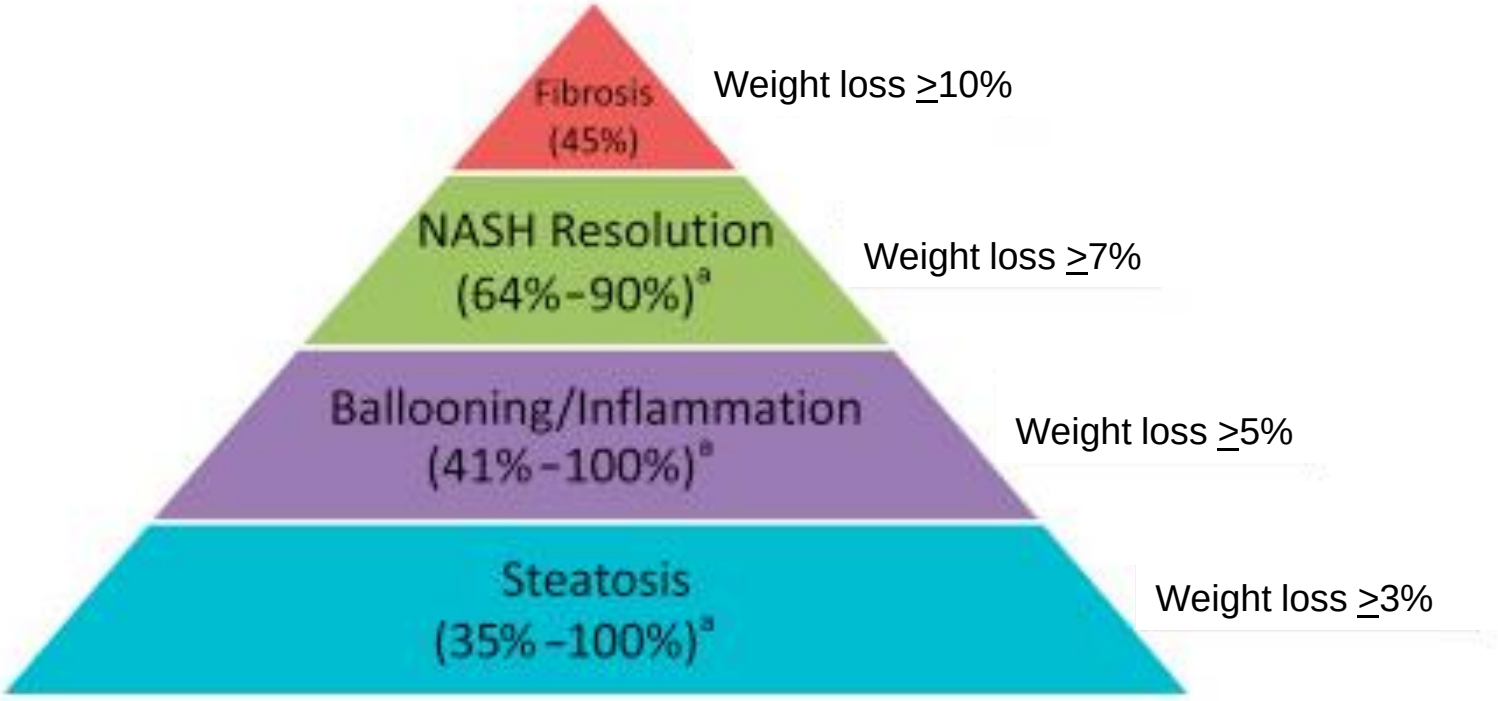
↑ Likelihood of progression and complications (five articles)

Talens M. J Clin Medicine 2021

Summary - 1

- NAFLD prevalence and outcomes show large inequalities by social groups.
  - Hispanics have the highest prevalence of NAFLD
  - Patients with low SES have higher NAFLD prevalence and poorer outcomes

Weight loss is recommended



Hannah WN, et al. *Clin Liver Dis*. 2016;20(2):339-50., Sheka AC, et al. *JAMA*. 2020;323(12):1175-1183., Promrat K, et al. *Hepatology* 2010;51:121-129.

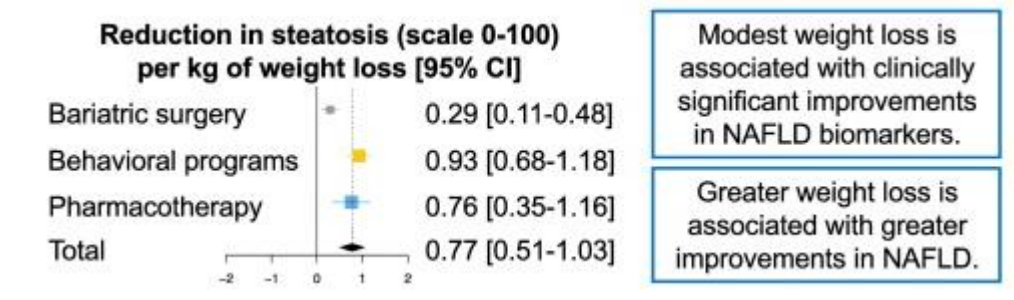
Diet

- AGA’s clinical practice update recommends Mediterranean diet.
- Mediterranean diet is associated with a decrease in hepatic steatosis, improved insulin sensitivity, and lower mortality

Younossi et al. Gastroenterology 2021;160:912-918
Ryan et al. J Hepatol 2013;59:138-43.
Ma J et al. Gastroenterology 2018;155:107-117

Lifestyle modification

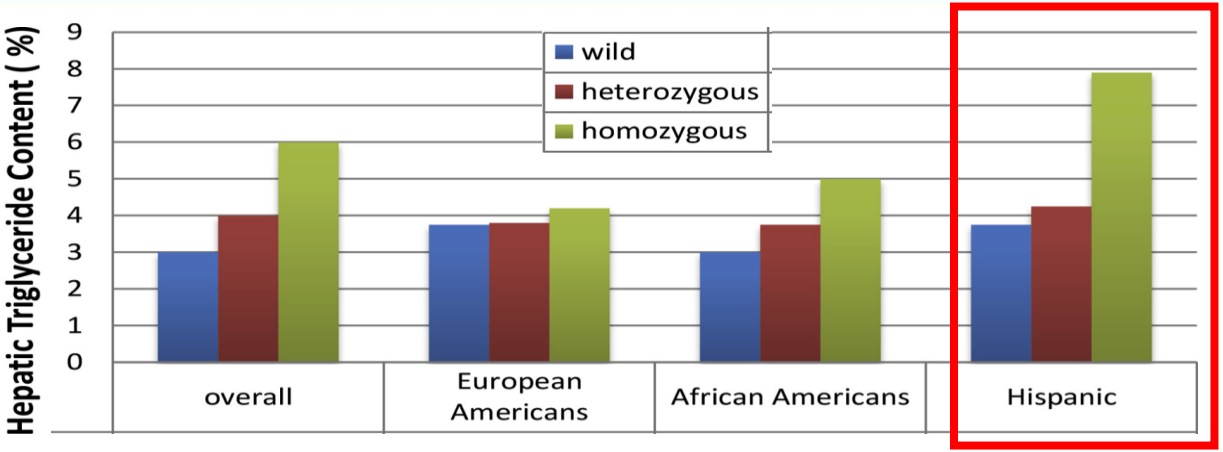
- Meta-analysis of 43 studies (median duration 6 months), including 2,809 individuals treated either with weight loss programs, pharmacotherapy, or bariatric surgery.
- A dose-response relationship between weight loss and resolution of NASH, but not for fibrosis.



- Most structured weight-loss programs included both an energy-restricted diet and an exercise component.
- Compared with no, minimal or lower-intensity interventions, more-intensive interventions were associated with greater weight change
- Increased physical activity (e.g., 2-3 sessions of aerobic exercise 30-60 minutes per week) decreased aminotransferases and steatosis, even in the absence of significant weight loss
- Limited data on duration, long-term health outcomes

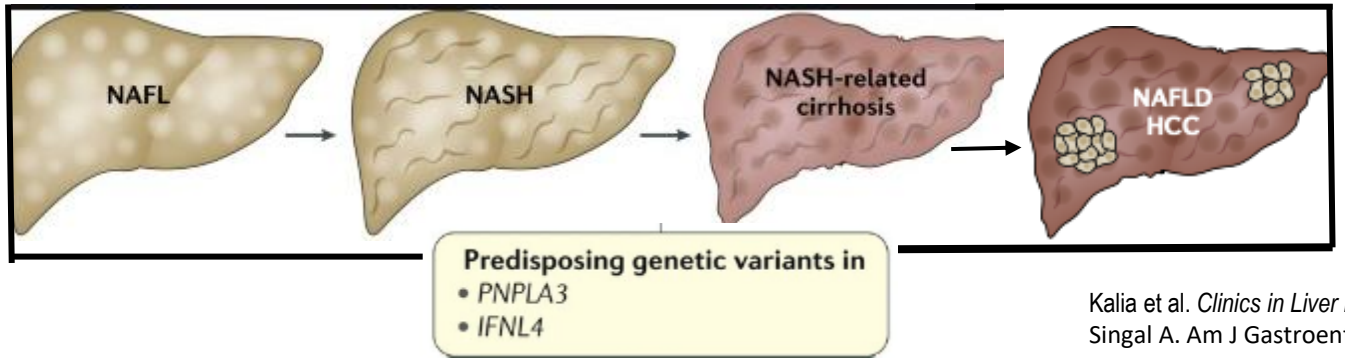
Koutoukidis DA. JAMA IM 2019
Koutoukidis DA. Metabolism 2021

Genetic factors
PNPLA3 single-nucleotide polymorphism



Associated with
- ↑ hepatic fat
- ↑ ALT
- ↑ Risk of HCC (in NASH)

More common in Hispanics



Kalia et al. *Clinics in Liver Disease*. 2015
Singal A. Am J Gastroenterol 2014

Mechanisms of Disparities

Individual

Biological

Genetic variants

NIMHD Framework tailored to NAFLD

Mechanisms of Disparities

Individual

Biological

Genetic variants
Age, sex, comorbidity including diabetes, obesity

Behavioral

Diet
exercise
smoking

Socio-cultural

Race/ethnicity, socioeconomic status, acculturation

Healthcare system

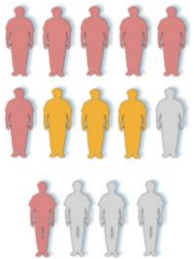
Insurance, perceived barriers to care, health literacy

NIMHD Framework tailored to NAFLD

Mechanisms of Disparities

Community

Individual



Biological

Genetic variants

Prevalence of diabetes, obesity

Age, sex

comorbidity including diabetes, obesity

Behavioral

Quality of food environment, sedentary lifestyle

Diet

exercise

smoking

lifestyle

Socio-cultural

Segregation, neighborhood SES, density/proximity to transportation, liquor stores, parks/ markets

Race/ethnicity, socioeconomic status, acculturation

Healthcare system

Insurance, barriers to care, healthcare

Density, and proximity to

perceived health literacy

NIMHD Framework tailored to NAFLD

Mechanisms of Disparities

INDIVIDUAL-LEVEL

***Biological**: Genetic variants*: *PNLPA3*

age, gender, comorbidity including diabetes, obesity, physical activity.

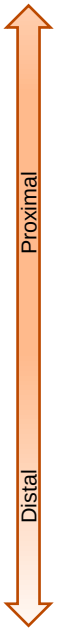
***Behavioral**:* adherence to diet and exercise

Sociocultural/physical environment: Race/ethnicity, socioeconomic status, acculturation

Healthcare system: Insurance, perceived barriers to care, health literacy

NIMHD Framework tailored to NAFLD

Mechanisms of Disparities



COMMUNITY-LEVEL

Biological: Prevalence of diabetes, obesity;

Behavioral: Quality of food environment

Sociocultural/physical environment: racial/ethnic segregation, neighborhood socioeconomic status, density and proximity to transportation, liquor stores, parks/ markets

Healthcare system: Density and proximity to healthcare

INDIVIDUAL-LEVEL

Biological: *Genetic variants*: *PNLPA3*

age, gender, comorbidity including diabetes, obesity, physical activity.

Behavioral: adherence to diet and exercise

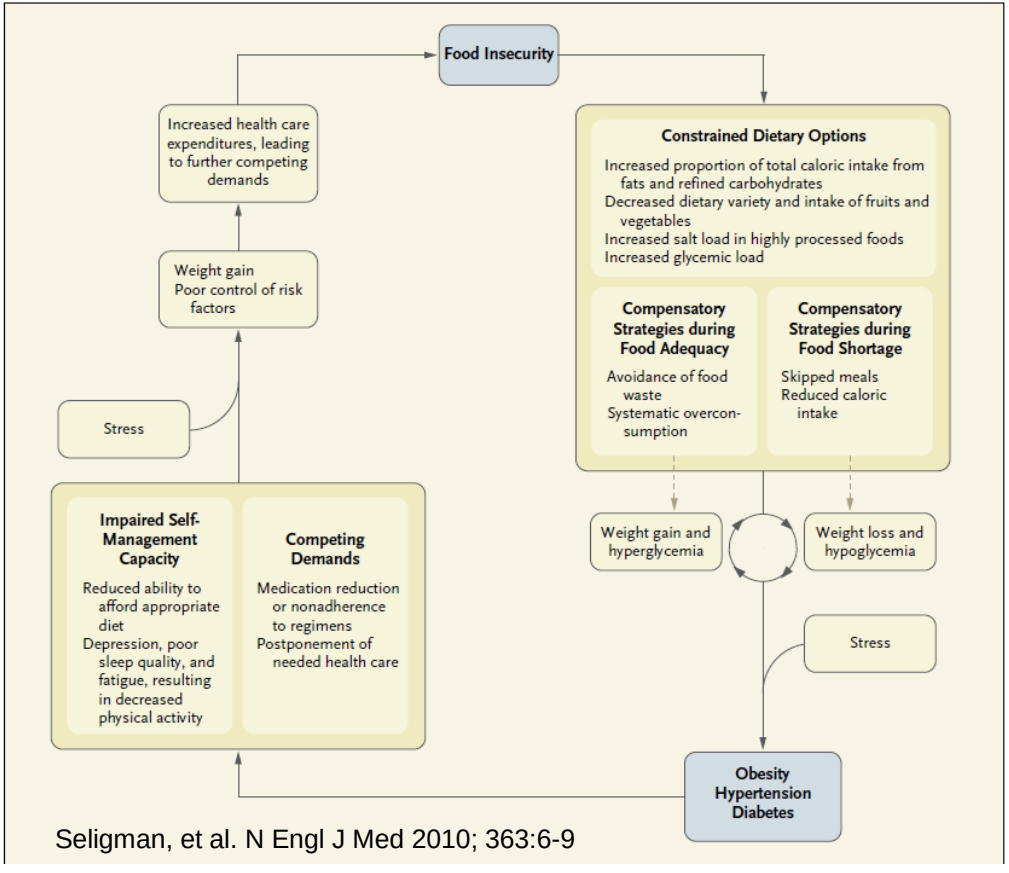
Sociocultural/physical environment: Race/ethnicity, socioeconomic status, acculturation

Healthcare system: Insurance, perceived barriers to care, health literacy

NIMHD Framework tailored to NAFLD

Food Security (and Insecurity)

Food insecurity: household-level economic and social condition of limited or uncertain access to adequate food.



Seligman, et al. N Engl J Med 2010; 363:6-9

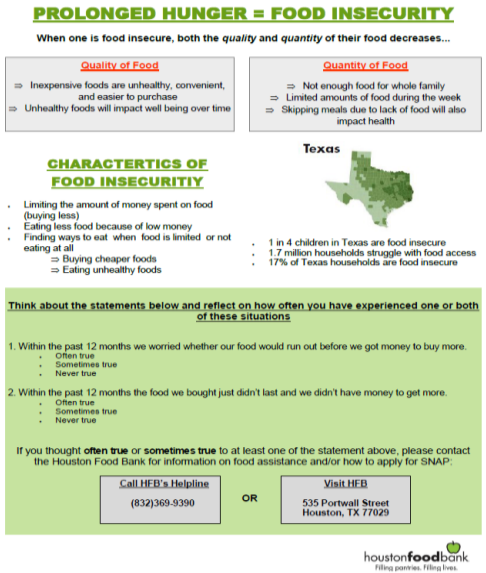
- While food insecurity is considered to be associated with reduced intake, this condition is highly prevalent in patients with obesity and obesity related conditions such as diabetes and hypertension

Obesity and food insecurity

- Obesity in individuals with very low food security may be counterintuitive.
- Resource scarcity could lead to compensatory behavioral and physiologic actions
- Hunger may lead to choosing energy dense foods that provide more calories per cost/per dollar.
  - The cost of fresh produce has risen 118% between 1985-2000, but the cost of foods only containing refined sugars only rose 46%
  - Low-cost sources of energy often have high caloric density and low nutritional value

Dinour, et al. J Am Diet Assoc. 2007 Nov;107(11):1952-61, Seligman, et al. J Nutr. 2010 Feb;140(2):304-10, Drewnowski, et al. Am J Clin Nutr. 2004 Jan;79(1):6-16, Drewnowski, et al. Am J Clin Nutr. 2005 Jul;82(1 Suppl):265S-273S.

Moderate to severe food insecurity affects one quarter of the world



PROLONGED HUNGER = FOOD INSECURITY

When one is food insecure, both the *quality* and *quantity* of their food decreases...

Quality of Food

⇒ Inexpensive foods are unhealthy, convenient, and easier to purchase
⇒ Unhealthy foods will impact well being over time

Quantity of Food

⇒ Not enough food for whole family
⇒ Limited amounts of food during the week
⇒ Skipping meals due to lack of food will also impact health

CHARACTERTICS OF FOOD INSECURITIY

- Limiting the amount of money spent on food (buying less)
- Eating less food because of low money
- Finding ways to eat when food is limited or not eating at all
  - ⇒ Buying cheaper foods
  - ⇒ Eating unhealthy foods

Texas

- 1 in 4 children in Texas are food insecure
- 1.7 million households struggle with food access
- 17% of Texas households are food insecure

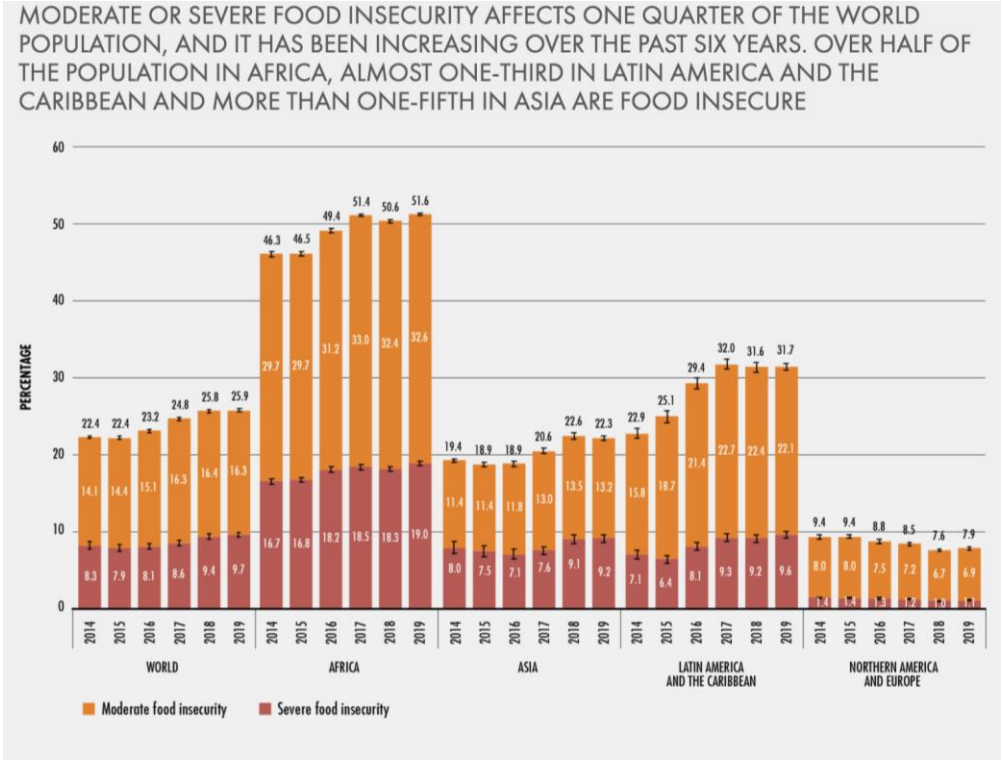
Think about the statements below and reflect on how often you have experienced one or both of these situations

1. Within the past 12 months we worried whether our food would run out before we got money to buy more.
   - Often true
   - Sometimes true
   - Never true
2. Within the past 12 months the food we bought just didn't last and we didn't have money to get more.
   - Often true
   - Sometimes true
   - Never true

If you thought **often true** or **sometimes true** to at least one of the statement above, please contact the Houston Food Bank for information on food assistance and/or how to apply for SNAP:

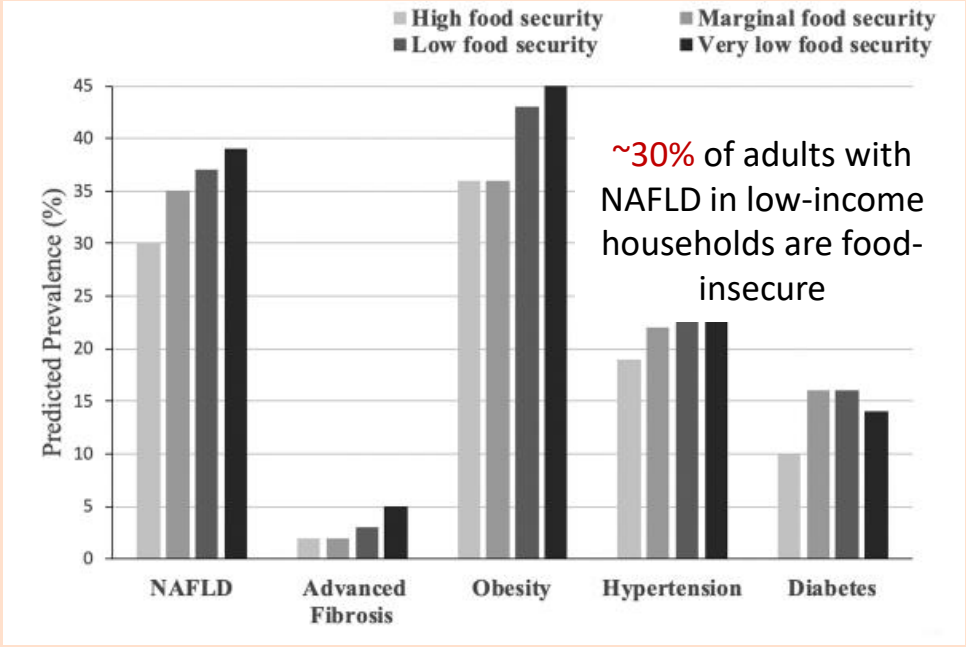
Call HFB's Helpline (832)369-9390 OR Visit HFB 535 Portwall Street Houston, TX 77029

houstonfoodbank
Filling pantries. Filling lives.



- Over 35 million Americans are food insecure
- These numbers are estimated to have risen dramatically in the past year due to the COVID-19 pandemic

Food insecurity is an independent risk factor associated with NAFLD

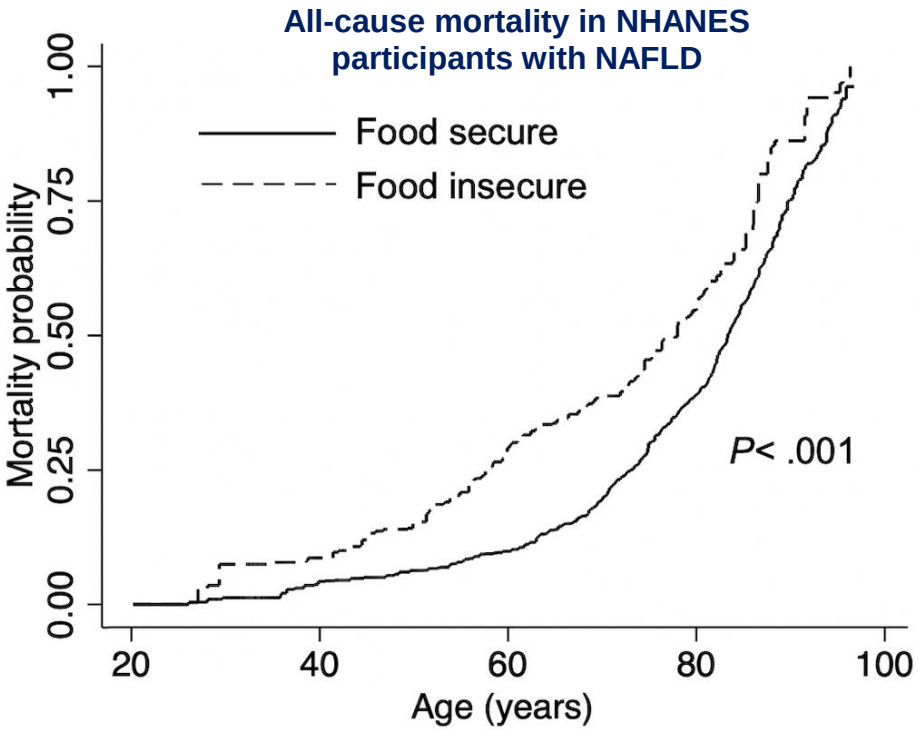


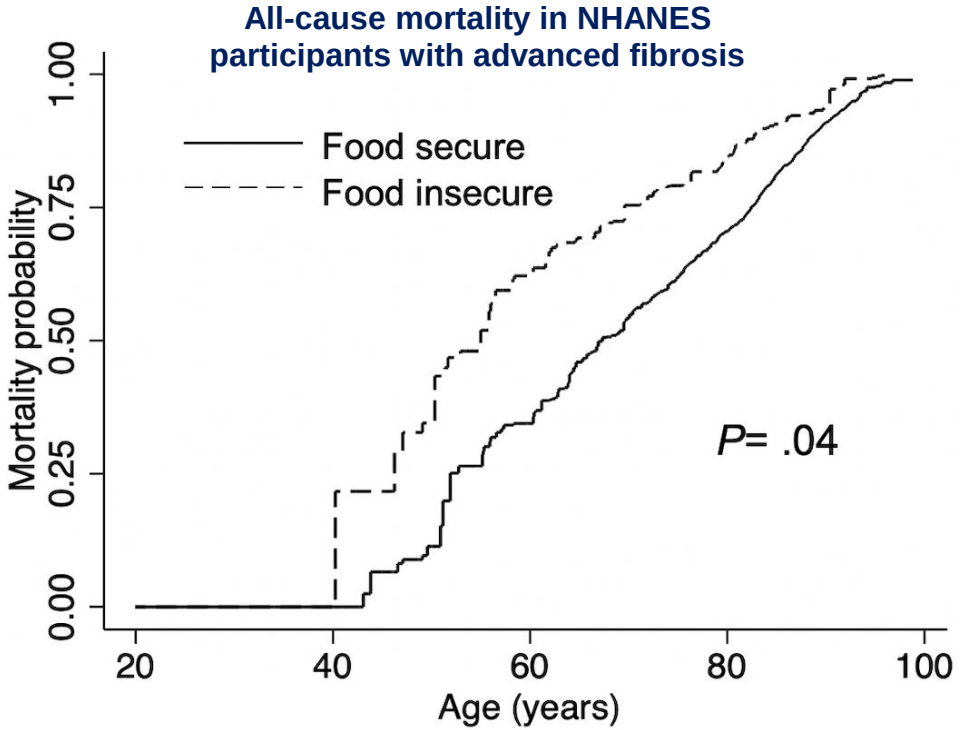
- There was an increased association of estimated NAFLD among adults living in food-insecure households, after adjusting for sociodemographic and behavioral factors.
- The magnitude of association between food insecurity and estimate of advanced liver disease was similar to associations with traditional cardiometabolic diseases, such as obesity and diabetes.
- These findings suggest that food insecurity may be a contributor to the burgeoning prevalence of NAFLD in the United States.

Golovaty *et al*. J. Nutr. 2020;150:91–98

Cross-sectional study of adults from the NHANES (2005–2014). Participants included adults in low-income households (≤200% of the federal poverty level) without chronic viral hepatitis or self-reported heavy alcohol use. Outcome was NAFLD (US Fatty Liver Index) and advanced fibrosis (NAFLD fibrosis score).

Food insecurity is associated with mortality among adults with NAFLD and Fibrosis



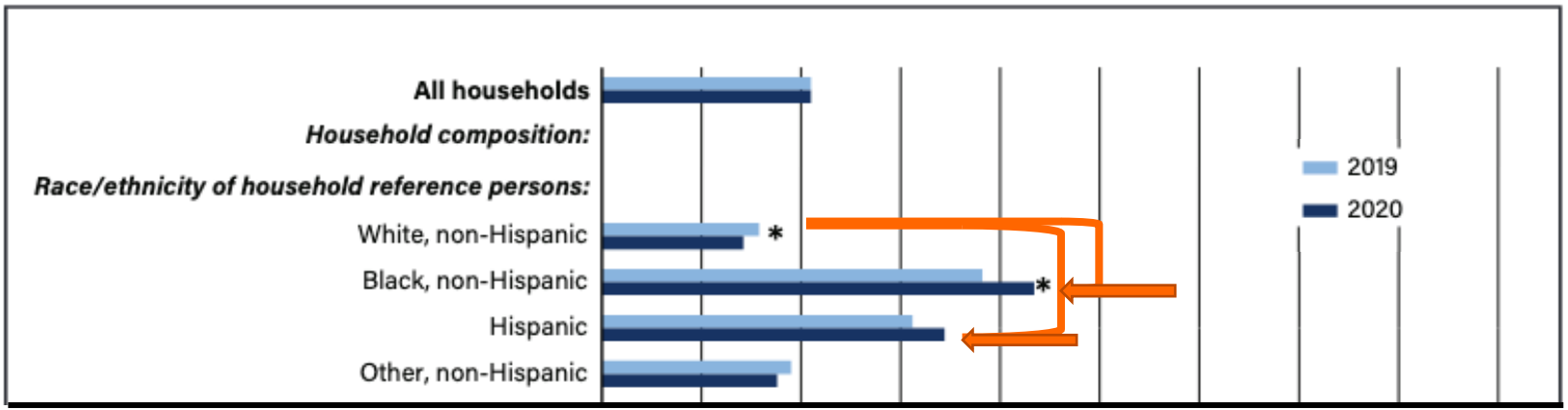


Of 34,134 eligible participants, 4,816 had NAFLD and 1,654 had advanced fibrosis with food insecurity present in 28% and 21%, respectively.

Kardashian, CGH 2022

Prevalence of food insecurity in the U.S

Prevalence of food insecurity, 2019 and 2020



*Change from 2019 to 2020 was statistically significant with 90-percent confidence (t > 1.645).

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census, 2019 and 2020 Current Population Survey Food Security Supplement.

Mechanisms of disparities

Characteristic of participants [% or mean ± SE]	NAFLD		Advanced fibrosis	
	Food secure	Food insecure	Food secure	Food insecure
Number of participants (n)	3,459	1,357	1,305	349
Number of deaths (n)	546	147	524	99
Age (years)	52 (0.4)	45 (0.5)	70 (0.5)	61 (0.9)
Male gender, %	61 (1.0)	50 (1.7)	56 (1.8)	53 (3.6)
Race/ethnicity, %				
Non-Hispanic White	78 (1.3)	52 (2.8)	81 (1.4)	59 (4.3)
Non-Hispanic Black	5 (0.4)	10 (1.0)	10 (0.9)	20 (3.0)
Mexican	9 (0.9)	24 (2.2)	3 (0.6)	11 (0.2)
Other**	8 (0.7)	14 (1.9)	6 (0.9)	10 (2.0)

Kardashian, CGH 2022

Summary -2

- NAFLD prevalence and outcomes show large inequalities by social groups.
  - Hispanics have the highest prevalence of NAFLD
  - Patients with low SES have higher NAFLD prevalence and poorer outcomes
- Globally there are lack of data looking at various causes (axes) of disparities
- Although biological factors (genetic variants, metabolic traits) may play a role, social determinants of health (food insecurity, limited access to exercise) play a major role in causing health disparities

Conclusion

- Several professional organizations such as the AAFP, AAP and the Academy of Nutrition and Dietetics have statements on the need for social determinant and food insecurity screening
  - The USDA offers multiple validated screening tools.
- The Veterans Health Administration has implemented a 2-question clinical reminder to screen for food insecurity.
- In addressing weight management in NAFLD, systematic screening for food insecurity should be considered.
  - When food insecurity is diagnosed, collaboration with social work and local partners such as food banks is essential to provider resources
  - Currently providers are dependent on state and local resources, which have significant heterogeneity by region.