# Health Impacts of Medically-Appropriate Food Support in the San Francisco Bay Area

Results of the *Changing Health through Food Support* (CHEFS) randomized trial

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13th International Conference on HIV TREATMENT AND PREVENTION ADHERENCE

Project Open Hand
meals with love

# CONFLICT OF INTEREST DISCLOSURE
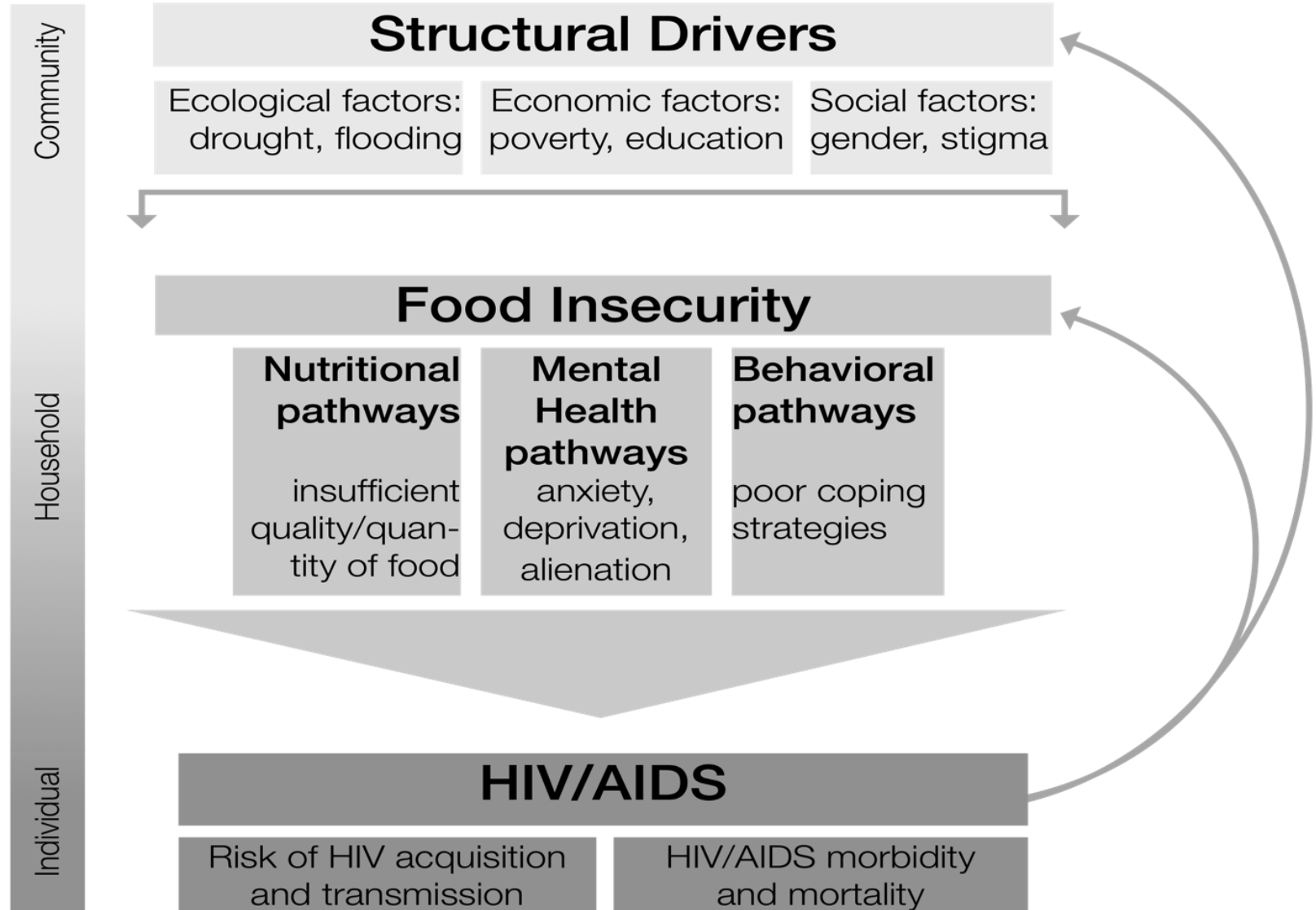
**No disclosures**

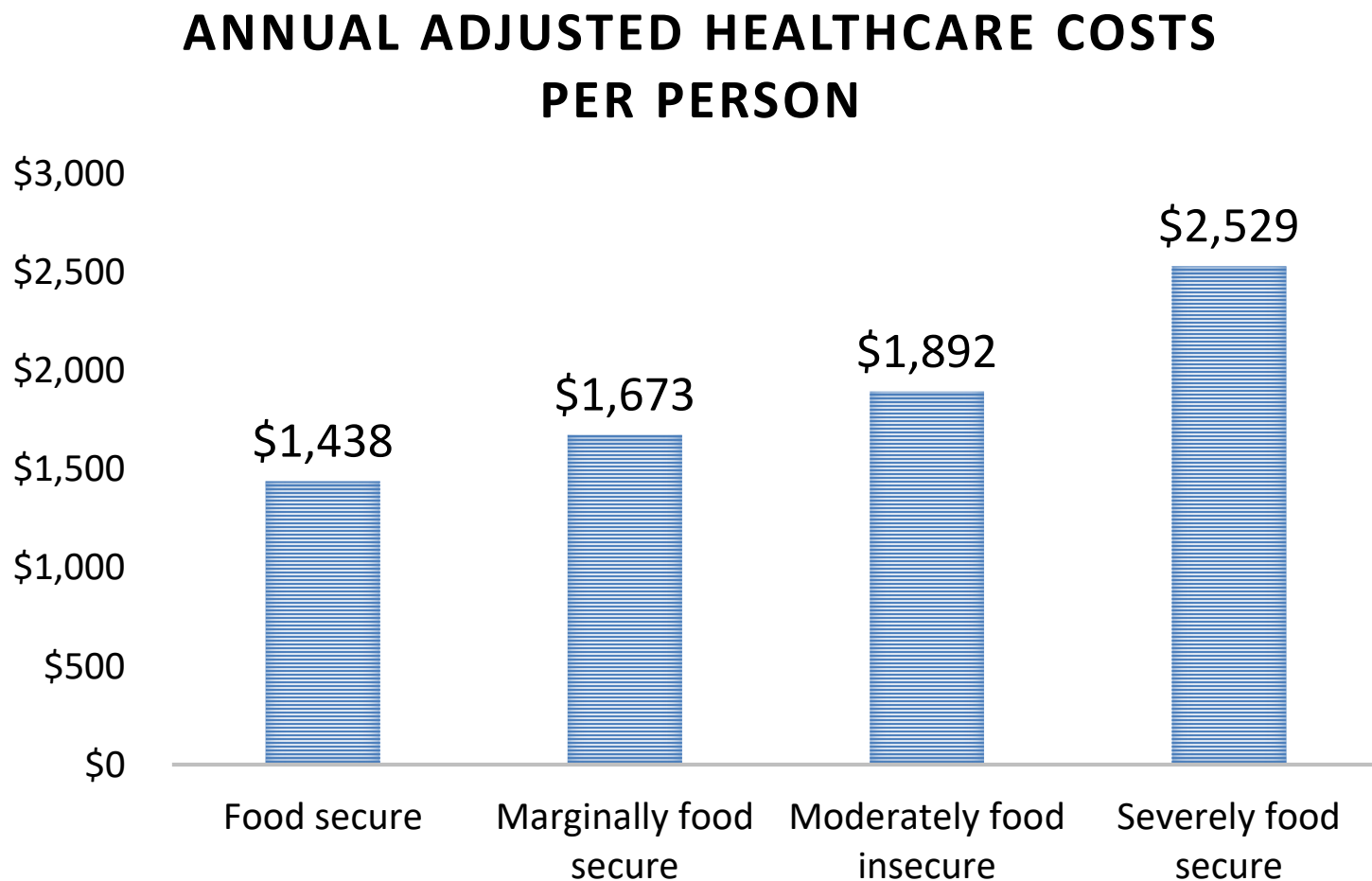# Food insecurity is a serious public health issue in the United States

- **Food insecurity disproportionately affects people with HIV**
  - ~50% are food insecure vs. 14% of US adults, and 40% of low-income adults
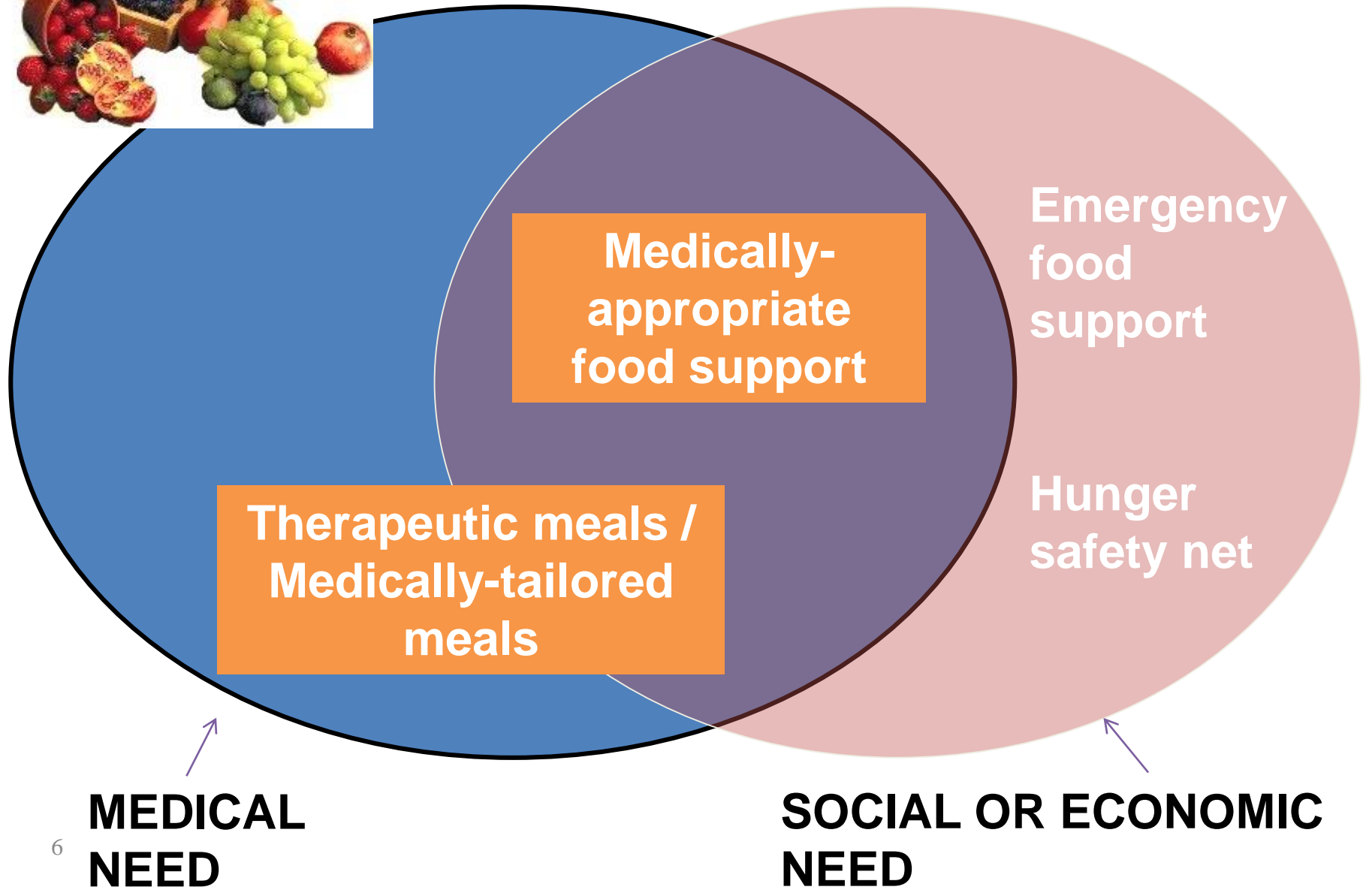
Insufficient food quantity

Anxiety about food supplies

Poor diet quality

# Cycle of food insecurity and poor HIV health



Weiser, Cohen & Bangsberg, AJCN 2012

# Food insecurity is associated with increased healthcare costs

## ANNUAL ADJUSTED HEALTHCARE COSTS PER PERSON



Bar chart of annual adjusted healthcare costs per person:
- Food secure: $1,438
- Marginally food secure: $1,673
- Moderately food insecure: $1,892
- Severely food secure: $2,529

# "Food is Medicine"

**Medically-appropriate food support**

**Emergency food support**

**Therapeutic meals / Medically-tailored meals**

**Hunger safety net**

**MEDICAL NEED**

**SOCIAL OR ECONOMIC NEED**

6

# "Food is Medicine"
# Policy Environment

- Ryan White HIV/AIDS Program
  - Only federally-funded food support for *any* population with a defined health condition
  - Works through local organizations to provide food and nutrition services
- Very limited inclusion in public insurance
- Current innovations for other health conditions building on HIV model at state-level
  - Medi-Cal pilot in CA providing medically-appropriate food support to heart failure patients

# CHEFS Pilot Study

- Pre-post study (n=70), with HIV and/or diabetes
- Comprehensive medically-appropriate food support for 6 months
- In HIV cohort, improved:
  - Food security and diet quality
  - Depressive symptoms
  - ART adherence

*Palar, Napoles and Weiser et al (2017) J Urban Health*

# CHEFS Randomized Trial

**Intervention (6 months)**

100% daily energy requirements plus group nutritional education

**Control (standard of care)**

33%-66% daily energy requirements

100 HIV+ participants

outcomes

100 HIV + participants

**Health Outcomes:**
• Viral Suppression
• Hospitalizations

**Hypothesized Pathways:**
• Nutritional
• Mental Health
• Behavioral

Assessments at baseline and 6-month follow-up

## Research Questions:

• **What is the impact of a food support intervention on HIV clinical outcomes?**

• **What is the impact on intermediate outcomes which may be on the pathway to improved HIV clinical outcomes?**

# CHEFS Intervention

**2x 7-pack frozen meals**

Based on Mediterranean diet, compliant with heart- and diabetes-health guidelines

**OR**

**1x 7-pack frozen meals**

**1 bag of groceries** (primarily fresh foods)

**PLUS**

**1 supplementary grocery bag** to round out nutritional intake, provide cooking supplies

**PLUS**

**Group nutritional education**

3 sessions, with Registered Dietician

# Participants

**Inclusion Criteria:**

- Adults (over 18) living with HIV

- Client of Project Open Hand (new or existing)

- Income ≤200% FPL

- Have access to a refrigerator or freezer for food storage, and an appliance to reheat food.

- Speak English or Spanish

**Exclusion Criteria**:

- Has renal disease requiring a special renal diet

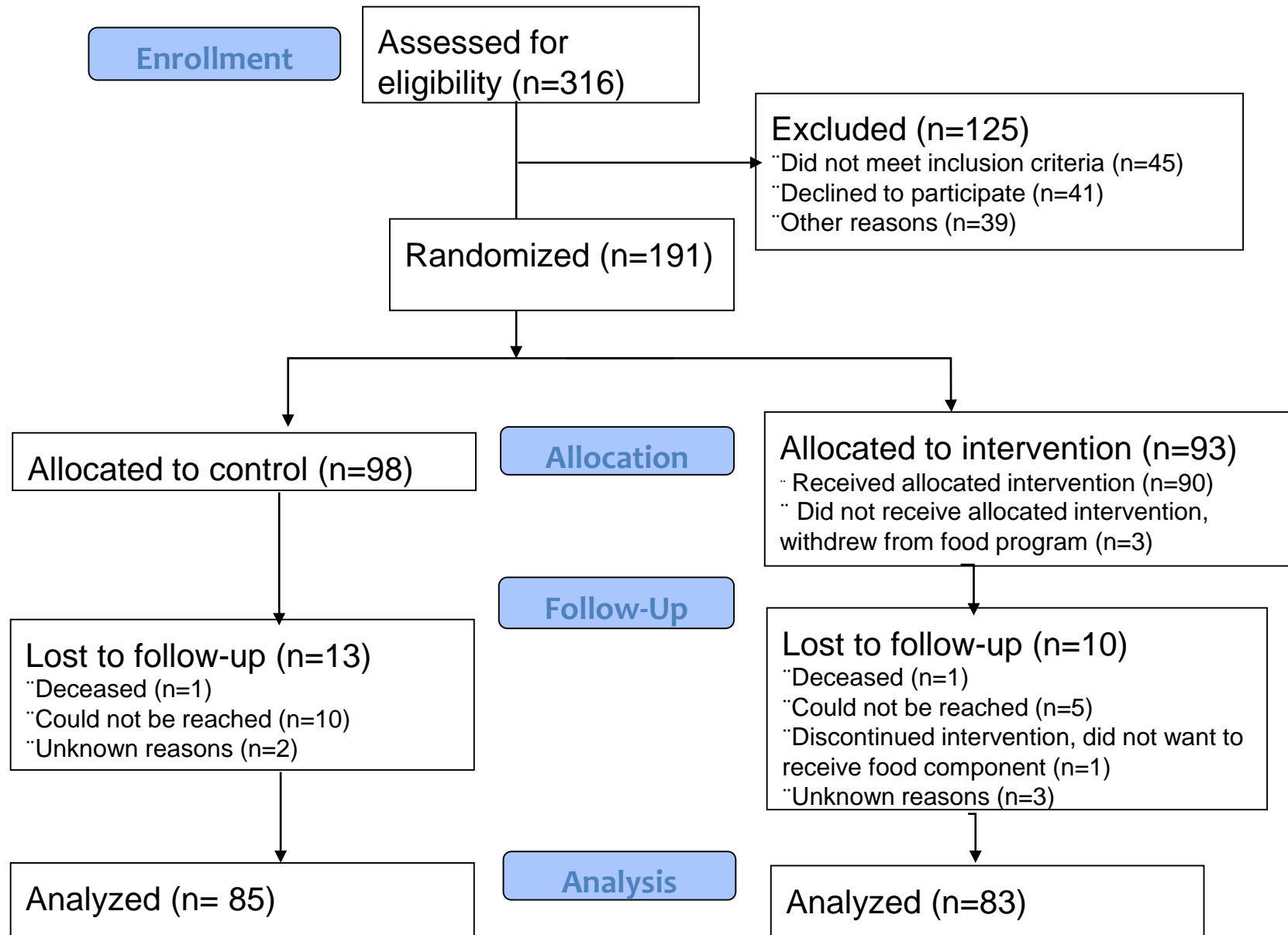- Currently pregnant or <6 months postpartum

# Measures

- **Primary outcome**
  - Detectable viral load (≥ 40 copies/ml)
- **Secondary outcomes**
  - Food insecurity (Household Food Security Survey Module; four ordinal categories) in past 6 months
  - Depressive symptoms (PHQ-9; five ordinal categories) in past 2 weeks
  - ART adherence (Visual analogue scale; ≥ 90%) in previous 7 days
  - Overnight hospitalizations in previous 90 days
  - Unprotected penetrative sex in previous 90 days

# Analysis

- Intent-to-treat analysis
- Repeated-measures regression was used to estimate intervention effects as difference-in-differences
  - Group, time and group X time interaction term
- Ordinal logistic, binary logistic, or linear regression models, depending on the outcome

# CHEFS CONSORT Diagram

**Enrollment**

Assessed for eligibility (n=316)

Excluded (n=125)
¨Did not meet inclusion criteria (n=45)
¨Declined to participate (n=41)
¨Other reasons (n=39)

Randomized (n=191)

**Allocation**

Allocated to control (n=98)

Allocated to intervention (n=93)
¨ Received allocated intervention (n=90)
¨ Did not receive allocated intervention, withdrew from food program (n=3)

**Follow-Up**

Lost to follow-up (n=13)
¨Deceased (n=1)
¨Could not be reached (n=10)
¨Unknown reasons (n=2)

Lost to follow-up (n=10)
¨Deceased (n=1)
¨Could not be reached (n=5)
¨Discontinued intervention, did not want to receive food component (n=1)
¨Unknown reasons (n=3)

**Analysis**

Analyzed (n= 85)

Analyzed (n=83)

# Baseline Characteristics (1)

| Characteristic | Overall | Control (n=98) | Intervention (n=93) | *p-value* |
|---|---|---|---|---|
| **Current gender identity** | | | | |
| Male/man | **77%** | 81% | 74% | |
| Female/woman | **18%** | 16% | 20% | 0.72 |
| Transgender, genderqueer, two-spirit | **7%** | 6% | 8% | |
| **Average age** | **55.5** | 55.2 | 55.8 | 0.62 |
| **Race/Ethnicity** | | | | |
| Black, African-American | **36%** | 34% | 38% | |
| White, Caucasian | **47%** | 42% | 52% | |
| Latino, Hispanic | **17%** | 19% | 14% | 0.73 |
| Native American | **13%** | 11% | 15% | |
| Asian/Pacific Islander | **7%** | 8% | 5% | |

# Baseline Characteristics (2)

| Characteristic | Overall | Control (n=98) | Intervention (n=93) | *p-value* |
|---|---|---|---|---|
| **Monthly income ($)** | **$1166** | $1160.0 | $1170.70 | *0.90* |
| **Education** | | | | |
| Less than HS/GED | **14%** | 13% | 14% | |
| High school/GED | **16%** | 12% | 19% | *0.37* |
| More than HS/GED | **71%** | 74% | 62% | |
| **Illicit substance use**, previous 30 days | **30%** | 35% | 26% | *0.29* |
| **Comorbidites** | | | | |
| Diabetes, hypertension or heart disease | **56%** | 61% | 51% | *0.14* |
| Depression, anxiety or other mental health condition | **60%** | 66% | 54% | *0.08* |

# Baseline Characteristics (3)

| Characteristic | Overall | Control (n=98) | Intervention (n=93) | *p-value* |
|---|---|---|---|---|
| **Food security** | | | | |
| High | **20%** | 19% | 20% | |
| Marginal | **17%** | 15% | 18% | *0.89* |
| Low | **23%** | 24% | 20% | |
| Very low | **41%** | 41% | 41% | |
| **Depressive symptoms severity** | | | | |
| None-Minimal | **54%** | 52% | 56% | |
| Mild | **25%** | 29% | 20% | |
| Moderate | **9%** | 8% | 11% | *.54* |
| Moderately severe | **7%** | 8% | 6% | |
| Severe | **5%** | 3% | 6% | |

# Baseline Characteristics (4)

| Characteristic | Overall | Control (n=98) | Intervention (n=93) | *p-value* |
|---|---|---|---|---|
| **Average adherence %** | **93** | 96 | 90 | **<0.01** |
| **Detectable viral load** | **39%** | 41% | 38% | *0.65* |
| **Overnight hospital stay in last 90 days** | **8%** | 6% | 11% | *0.25* |
| **Unprotected penetrative sex in previous 90 days** | **60%** | 52% | 69% | *0.09* |

# CHEFS Randomized Trial Results

|  | Odds ratio | 95% CI |
|---|---|---|
| Detectable viral load | 0.82 | 0.21, 3.16 |
| Food insecurity (6 months) | 0.23 | 0.09 , 0.62 ** |
| Depressive symptoms (2 weeks) | 0.32 | 0.13 , 0.83 * |
| ≤90% ART adherence (7 days) | 0.18 | 0.038, 0.82 * |
| Overnight hospital stay (90 days) | 0.11 | 0.01, 0.09 * |
| Unprotected sex (90 days) | 0.045 | 0.004, 0.52 * |

*** p<0.001, ** p<0.01, * p<0.05

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# Implications - Is food medicine?

- **Healthy food support improved multiple health outcomes for people with HIV**

- **Reduced hospitalizations were a key finding**
  - Average cost of in-patient stay (HIV) was $14,805 in 2013 (AHRQ)
  - Majority of hospitalizations for people with HIV are for non-HIV-related causes

- **Did not find impact on viral load**
  - San Francisco Bay Area context – major population-level efforts to improve HIV health, Getting to Zero

# Limitations

- No pure control group – everyone was getting some level of food

- Programmatic changes over course of study resulted in some control participants increasing their level of food support

- Due to intervention model, some important populations were excluded (e.g. homeless, those not in care)

# Conclusions

Policies prioritizing medically-appropriate food support may positively impact health and reduce hospitalizations for people living with HIV

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Further research is needed to understand how addressing food security may improve HIV clinical outcomes in resource rich settings, particularly for the most vulnerable populations

# ACKNOWLEDGEMENTS

# FOOD IS MEDICINE PYRAMID

**Food is Medicine** interventions, such as prescribed medically-tailored meals, should be covered services within public and private health insurance systems as they improve health outcomes and reduce healthcare costs for individuals living with chronic health conditions

Treatment

Prevention

Healthcare-funded Interventions

**Prescribed medically-tailored meals for those diagnosed with serious illness or disability who cannot shop or cook for themselves**

**Prescribed medically-tailored food for those diagnosed with acute or chronic illness**

**Prescribed medically-tailored food for those diagnosed as at risk for acute or chronic illness**

**Healthy food for those who are malnourished or food insecure**

**Medically-tailored Food:** Food designated by a Registered Dietitian as an appropriate part of a treatment plan for an individual with a defined health condition or combination of conditions