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

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

Kartika Palar, PhD
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
Cycle of food insecurity and poor HIV health

Structural Drivers
- Ecological factors: drought, flooding
- Economic factors: poverty, education
- Social factors: gender, stigma

Food Insecurity
- Nutritional pathways: insufficient quality/quantity of food
- Mental Health pathways: anxiety, deprivation, alienation
- Behavioral pathways: poor coping strategies

HIV/AIDS
- Risk of HIV acquisition and transmission
- HIV/AIDS morbidity and mortality

Weiser, Cohen & Bangsberg, AJCN 2012
Food insecurity is associated with increased healthcare costs

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

Tarasuk et al, CMAJ, 2015
“Food is Medicine”

- Therapeutic meals / Medically-tailored meals
- Medically-appropriate food support
- Emergency food support
- Hunger safety net

MEDICAL NEED

SOCIAL OR ECONOMIC NEED
“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

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

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?

Funded by Kaiser Community Benefits; PIs (Weiser, Palar)
CHEFS Intervention

2x 7-pack frozen meals

OR

1x 7-pack frozen meals

PLUS

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

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

Allocated to control (n=98)
- Lost to follow-up (n=13)
  - Deceased (n=1)
  - Could not be reached (n=10)
  - Unknown reasons (n=2)
- Analyzed (n=85)

Allocated to intervention (n=93)
- Received allocated intervention (n=90)
- Did not receive allocated intervention, withdrew from food program (n=3)
- 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)
- Analyzed (n=83)

Analysis
## Baseline Characteristics (1)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall</th>
<th>Control (n=98)</th>
<th>Intervention (n=93)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current gender identity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male/man</td>
<td>77%</td>
<td>81%</td>
<td>74%</td>
<td>0.72</td>
</tr>
<tr>
<td>Female/woman</td>
<td>18%</td>
<td>16%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Transgender, genderqueer, two-spirit</td>
<td>7%</td>
<td>6%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td><strong>Average age</strong></td>
<td>55.5</td>
<td>55.2</td>
<td>55.8</td>
<td>0.62</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black, African-American</td>
<td>36%</td>
<td>34%</td>
<td>38%</td>
<td>0.73</td>
</tr>
<tr>
<td>White, Caucasian</td>
<td>47%</td>
<td>42%</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>Latino, Hispanic</td>
<td>17%</td>
<td>19%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>13%</td>
<td>11%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7%</td>
<td>8%</td>
<td>5%</td>
<td></td>
</tr>
</tbody>
</table>
# Baseline Characteristics (2)

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<tbody>
<tr>
<td>Monthly income ($)</td>
<td>$1166</td>
<td>$1160.0</td>
<td>$1170.70</td>
<td>0.90</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than HS/GED</td>
<td>14%</td>
<td>13%</td>
<td>14%</td>
<td>0.37</td>
</tr>
<tr>
<td>High school/GED</td>
<td>16%</td>
<td>12%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>More than HS/GED</td>
<td>71%</td>
<td>74%</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td><strong>Illicit substance use, previous 30 days</strong></td>
<td>30%</td>
<td>35%</td>
<td>26%</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes, hypertension or heart disease</td>
<td>56%</td>
<td>61%</td>
<td>51%</td>
<td>0.14</td>
</tr>
<tr>
<td>Depression, anxiety or other mental health condition</td>
<td>60%</td>
<td>66%</td>
<td>54%</td>
<td>0.08</td>
</tr>
</tbody>
</table>
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<tbody>
<tr>
<td><strong>Food security</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>20%</td>
<td>19%</td>
<td>20%</td>
<td>0.89</td>
</tr>
<tr>
<td>Marginal</td>
<td>17%</td>
<td>15%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>23%</td>
<td>24%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Very low</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td><strong>Depressive symptoms severity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None-Minimal</td>
<td>54%</td>
<td>52%</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>25%</td>
<td>29%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>9%</td>
<td>8%</td>
<td>11%</td>
<td>.54</td>
</tr>
<tr>
<td>Moderately severe</td>
<td>7%</td>
<td>8%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>5%</td>
<td>3%</td>
<td>6%</td>
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<tbody>
<tr>
<td>Average adherence %</td>
<td>93</td>
<td>96</td>
<td>90</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Detectable viral load</td>
<td>39%</td>
<td>41%</td>
<td>38%</td>
<td>0.65</td>
</tr>
<tr>
<td>Overnight hospital stay in last 90 days</td>
<td>8%</td>
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<td>0.25</td>
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<tr>
<td>Unprotected penetrative sex in previous 90 days</td>
<td>60%</td>
<td>52%</td>
<td>69%</td>
<td>0.09</td>
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## CHEFS Randomized Trial Results

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<th>Odds ratio</th>
<th>95% CI</th>
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<td>0.09, 0.62 **</td>
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<td>Depressive symptoms (2 weeks)</td>
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<td>0.13, 0.83 *</td>
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<td>≤90% ART adherence (7 days)</td>
<td>0.18</td>
<td>0.038, 0.82 *</td>
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<td>Overnight hospital stay (90 days)</td>
<td>0.11</td>
<td>0.01, 0.09 *</td>
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<tr>
<td>Unprotected sex (90 days)</td>
<td>0.045</td>
<td>0.004, 0.52 *</td>
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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.

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

Thanks to the CHEFS participants!!

**Investigator team:** Sheri Weiser (PI), Mark Ryle, Edward Frongillo, Elise Riley

**Study staff:** Aron O’Donnell, Tessa Napoles, Lila Sheira, Beth Phillips

**Additional CHEFS Collaborators:** Kim Madsen, Anita Raj, Marine Khachatryan, Rodrigo Avila, Andrew Rodriguez, Candy Rui, Jeremy Wang, Karen Wen, Aji Palar

**Many more POH Collaborators, Staff, and Volunteers**

**Funding:** Kaiser Community Benefits (KCB). KCB had no role in the collection or analysis of data, or decisions about which data to report.
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.

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.