Appendix

Food insecurity context in US and NYS
Impact assessment
Promising practices
Innovation
Food insecurity context in the US and in New York State
Five categories of food-insecure individuals

- **Adult only**
  - ~400k adult only households food-insecure¹
  - Not eligible for SNAP working 40 hours/week at minimum wage² (200% FPL)

- **Families**
  - ~335k families food-insecure²
  - Qualify for more SNAP and WIC
  - Balancing work, childcare, sourcing and preparing food

- **Seniors**
  - ~75k seniors living alone food-insecure
  - Less likely to have income and have higher medical costs
  - Limited mobility to access resources

- **Unemployed**
  - Reduces or eliminates a household’s income
  - Can lead to unexpected changes in food security
  - Likely need full nutrition support

- **Homeless**
  - Also likely need full nutrition support
  - Unable to store food or keep produce fresh

¹. Includes households with an adult and senior. ２. NY minimum wage is $12.50/hr. ３. Includes single and dual parent households, and seniors living with children.
Note: Figures based on national averages and adjusted to New York
Source: USDA
Other factors can further amplify food insecurity, such as...

**Language**
Not speaking English can limit ability to participate in interventions (e.g., classes, screening programs)

**Knowledge**
Not knowing how to buy and cook healthy food on a budget can leave people running out of food

**Mobility**
Without a car or good public transportation, will struggle to get to the intervention sites

**Availability**
Might live in areas that have no healthy food options
Medicaid 2.8x over-represented among food-insecure

1 in 2 food-insecure individuals covered by government insurance

1 in 3 food-insecure individuals are privately insured

1. Includes employer-sponsored insurance and non-group
Source: CDC; HHS; Medical Expenditure Panel Survey; Census
Both NYC and rural NYS have high levels of food insecurity...

Estimated % food insecurity (2021)

Source: Feeding America

- 4 of top 5 food-insecure counties in NYS in 2019 were upstate/rural
- Since COVID, top three food-insecure counties are all in NYC

- Highest county rate: Bronx, ~22%
- Highest upstate county rate: Montgomery, ~15%

Rosa Colours:
- 14%+ (Red)
- 12.5%-14% (Dark Pink)
- 11%-12.5% (Pink)
- <11% (Light Pink)

- Buffalo
- Rochester
- Syracuse
- Albany
... but increases during COVID centered around NYC

% change in food insecurity, 2019-2021

Highest increase statewide: Queens ~48%
Highest increase upstate: Schenectady ~14%

- Staten Island: -41%
- Bronx: -36%
- Brooklyn: -34%
- Manhattan: -27%

Source: Feeding America
Impact assessment
Societal impact considers both...

Improved Health Outcomes
E.g., reduced likelihood of contracting conditions like diabetes and hypertension

Socioeconomic Outcomes
E.g., higher productivity and graduation rate among food-secure population
We focused on conditions that:

- Affect a large portion of New York
- Disproportionately affect FL population
- Require expensive treatment
- Have sufficient data available

When assessing impact, it is necessary to quantify improvement on health...

We can estimate total impact using prevalence rate and annual health costs:

<table>
<thead>
<tr>
<th>Condition</th>
<th>FL Individuals Affected (M)</th>
<th>Health Cost per Individual ($K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>0.8</td>
<td>2.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.3</td>
<td>11.1</td>
</tr>
<tr>
<td>COPD(^2)</td>
<td>0.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.1</td>
<td>17.0</td>
</tr>
</tbody>
</table>

1. National average total 2020 estimated direct healthcare costs (inpatient, outpatient, Rx) across all payer types
2. Chronic obstructive pulmonary disease
Source: USDA, American Heart Association, American Diabetes Association, National Institutes of Health
... and consider the socioeconomic ramifications

**Schooling**
- Missed school days
- Graduation rate
- College enrollment rate

**Criminal justice**
- More likely to engage in criminal behavior
- Higher incarceration rate

**Productivity**
- FI population less productive than their FS counterparts

**Substance use**
- Higher chance of drug/alcohol use and addiction

Source: Children's Health Watch, No Kid Hungry, Children's Health Watch, Journal of Urban Health
There are significant savings associated with reducing food insecurity.

At the individual level, there are two sources of HC savings:

Accounting for hypertension, COPD, diabetes, and stroke gives:

- Lower Cost of Treatment: ~$400 per person per year
- Possible Prevention: ~$1.8K per person per year

For every 1,000 individuals becoming food secure, we can expect:

- Healthcare Savings: ~$1.1M (range of ~$400K to $1.8M)

in annual health care cost savings after applying a 50/50 split to the two savings figures.
# Reducing Food Insecurity

## Past Interventions

<table>
<thead>
<tr>
<th>Example Study</th>
<th>Support</th>
<th>FI Decrease</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasadena Health Center</td>
<td>Participants were given &quot;Food Rx&quot; cards that could be redeemed at local food pantry. Nutrition booklets in English and Spanish</td>
<td>94%¹</td>
<td>After 6 months of support &lt;ul&gt;&lt;li&gt;FI decreased from baseline of 100% to 5.9% by visit 12&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>Franklin Community Health</td>
<td>Individuals received weekly produce from June to November (not delivered)</td>
<td>65%¹</td>
<td>Self-reported surveys &lt;ul&gt;&lt;li&gt;Control group FI dropped from 42% to 32%&lt;/li&gt;&lt;li&gt;Intervention group FI fell from 31% to 11%&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>Project Open Hand</td>
<td>The 6-month intervention provided food meant to meet 100% of daily energy requirements and nutritional guidelines for a healthy diet</td>
<td>64%¹</td>
<td>After 6 months of support &lt;ul&gt;&lt;li&gt;Participants with very low FS dropped from 60% to 12%&lt;/li&gt;&lt;li&gt;Participants with low FS dropped from 21% to 17%&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>SNAP</td>
<td>Provides benefits to eligible individuals to be redeemed on food in retail stores</td>
<td>31%</td>
<td>Considered a sample of low-income households and assessed impact of SNAP during 3 separate years</td>
</tr>
<tr>
<td>National School Lunch Program</td>
<td>Provides eligible school children with free or reduced-price lunch in public schools</td>
<td>15%</td>
<td>FI for kids who received NSLP dropped from 40.5% to 34.6% food insecure</td>
</tr>
</tbody>
</table>

1. Short-term small-scale interventions targeting highly insecure individuals tend to see greater impact
## Return on Investment

### Past Interventions

<table>
<thead>
<tr>
<th>Example Study</th>
<th>Support</th>
<th>ROI Factor</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maine Medical Center</strong></td>
<td>Provider administered home-delivered meals over the course of 2 years to Medicare recipients</td>
<td>4.87x</td>
<td>Cost to administer was $43,540. Savings from reduced readmission rate was $212,160 per patient (readmission rate dropped by 6.3pts)</td>
</tr>
<tr>
<td>2013-2015, ME 622 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SNAP</strong></td>
<td>Provides benefits to eligible individuals to be redeemed on food in retail stores</td>
<td>2.1x-2.7x</td>
<td>Estimates benefits of averted cost of hunger ($2.13 to $2.74) for every $1 spent on federal food aid</td>
</tr>
<tr>
<td>2010, MN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IMPaCT</strong></td>
<td>Community health program delivering tailored support for high-risk patients</td>
<td>2.5x</td>
<td>One team of community health workers spends ~$568K on program expenses to achieve Medicaid savings of ~$1.4M</td>
</tr>
<tr>
<td>2013-2014, PA 302 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SNAP</strong></td>
<td>Provides benefits to eligible individuals to be redeemed on food in retail stores</td>
<td>2.3x</td>
<td>Average monthly supplemental income from SNAP was $129/month per person. SNAP participants had 14% lower odds of hospitalization (average cost of $25,091) in subsequent year</td>
</tr>
<tr>
<td>2012, MD 68,956 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Commonwealth Care Alliance</strong></td>
<td>Provides benefits to eligible individuals to be redeemed on food in retail stores</td>
<td>1.1x-1.6x</td>
<td>Cost to administer was $350/month per patient for tailored meals ($146 for non-tailored). Health savings of $570/month for tailored recipients ($156 for non-tailored)</td>
</tr>
<tr>
<td>2016-2018, MA 3,077 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project Angel Heart</strong></td>
<td>Participants received 5 to 10 free, medically tailored meals, delivered to their homes each week</td>
<td>1.0x</td>
<td>$2,414/year in health care cost savings. Cost: $199.54/month</td>
</tr>
<tr>
<td>2013, CO ~3,000 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Reduction in Health Care Spend

### Past Interventions

<table>
<thead>
<tr>
<th>Example Study</th>
<th>Support</th>
<th>Reduction in Annual HC Spend</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizon Blue Cross Blue Shield</td>
<td>Community health program targeting high-cost members, sponsored by a payer-provider partnership</td>
<td>$2,900</td>
<td>Fully insured high-risk members were provided with support. Participants saw a 25% reduction in total cost of care (~$11,500 annual average)</td>
</tr>
<tr>
<td>2020, NJ ~1,000 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Angel Heart</td>
<td>Medically tailored meals provided to individuals living with life-threatening illnesses. Organized by a partnership made up provider, payers, and local org</td>
<td>$2,400</td>
<td>Estimated savings of $4.2M for 1,740 people</td>
</tr>
<tr>
<td>2013, CO ~3,000 participants</td>
<td></td>
<td></td>
<td>• $736/month for participants with CHF¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• $453/month for participants with diabetes</td>
</tr>
<tr>
<td>Commonalty Care Alliance</td>
<td>Recipients received 5 days' worth of lunches, dinners, and snacks delivered to their homes each week</td>
<td>$1,800 to $6,800</td>
<td>Due to reduced readmission rate, savings of:</td>
</tr>
<tr>
<td>2016-2018, MA 3,077 participants</td>
<td></td>
<td></td>
<td>• $570/month per individual for the medically tailored group</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• $156/month per individual for non-tailed group</td>
</tr>
<tr>
<td>SNAP</td>
<td>Provides benefits to eligible individuals to be redeemed on food in retail stores</td>
<td>$1,400</td>
<td>Compared 2012 and 2013 health expenditures between those who received SNAP during 2011 (intervention) and those who did not but were eligible (control)</td>
</tr>
<tr>
<td>2011-2013, all US 4,447 participants</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Congestive heart failure
Quantifying Health Care Savings
General Approach: Using a Probability-Based Model

Probabilistic approach

Our methodology builds up health care costs for an individual person with FI status, allowing us to calculate the average impact for a transition out of FI.

Accounting for comorbidities

Considering the likelihood that any person will have any of the 4 separate conditions accounts for the possibility of them having >1 condition.

Example:

<table>
<thead>
<tr>
<th>Condition</th>
<th>FI Patient w/Condition</th>
<th>Avg. FI Person Modeled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Only</td>
<td>$11K</td>
<td>$3.8K</td>
</tr>
<tr>
<td>Stroke Only</td>
<td>$17K</td>
<td></td>
</tr>
<tr>
<td>Diabetes + Stroke</td>
<td>$30K</td>
<td></td>
</tr>
</tbody>
</table>

1. By using average treatment costs as inputs to the model, we are partially accounting for the different rates paid by patients with comorbidities.
2. The true cost of treating 2 conditions simultaneously is expected to be higher than treating each individual condition separately, making the savings figures estimated conservative; per BMC Medicine study the incremental cost factor to treat stroke if you already have diabetes is 1.15.
3. Includes all 4 of the conditions studied (diabetes, stroke, COPD, hypertension) weighted according to their likelihood.
Quantifying improved health outcomes
Reduced Spend - Methodology

Savings associated with lowering treatment cost down to FS level
Modeled at the individual person level, taking likelihood of each separate condition into account

<table>
<thead>
<tr>
<th>Condition</th>
<th>Avg. Annual Cost of Treatment</th>
<th>FI Increased Cost</th>
<th>FI Incremental Cost of Treatment</th>
<th>Condition Prevalence Rate (FI)</th>
<th>Annual Savings / Avg. Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>$2,137</td>
<td>16%</td>
<td>$331</td>
<td>x</td>
<td>32%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>$10,128</td>
<td>11%</td>
<td>$1,116</td>
<td>x</td>
<td>12%</td>
</tr>
<tr>
<td>Stroke</td>
<td>$15,390</td>
<td>12%</td>
<td>$1,770</td>
<td>x</td>
<td>4%</td>
</tr>
<tr>
<td>COPD</td>
<td>$7,466</td>
<td>8%</td>
<td>$570</td>
<td>x</td>
<td>12%</td>
</tr>
</tbody>
</table>

Note: select figures have been rounded for presentation purposes
1. Adjusted to discount for high upfront cost of stroke
Source: CDC, USDA, American Heart Association, American Diabetes Association, NIH, CMS, Kaiser Family Foundation

~$400 ~$500
~$350
Quantifying improved health outcomes
Potential Prevention - Methodology

Savings associated with decreased likelihood of condition
Modeled at the individual person level, taking likelihood of each separate condition into account

<table>
<thead>
<tr>
<th>Condition</th>
<th>Prevalence Rate (FI)</th>
<th>Prevalence Rate (FS)</th>
<th>FI Annual Cost of Treatment</th>
<th>Annual Savings / Avg. Individual</th>
<th>OOP / Payer Cost Split %</th>
<th>Savings Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>(32% – 20%)</td>
<td>$2,425</td>
<td>$277</td>
<td>22%</td>
<td>$61</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>(12% – 7%)</td>
<td>$11,096</td>
<td>$589</td>
<td>21%</td>
<td>$127</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>(4% – 2%)</td>
<td>$16,927</td>
<td>$421</td>
<td>9%</td>
<td>$382</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>(12% – 5%)</td>
<td>$7,961</td>
<td>$515</td>
<td>4%</td>
<td>$19</td>
<td></td>
</tr>
</tbody>
</table>

Note: select figures have been rounded for presentation purposes
Source: CDC, USDA, American Heart Association, American Diabetes Association, NIH, CMS, Kaiser Family Foundation

Food insecurity is only one of several factors that influences higher prevalence rate

~$1,800 ~$250
~$1,550
## Quantifying improved health outcomes

**Sources and Assumptions**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Metric</th>
<th>Number</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>Prevalence Rate FI</td>
<td>32%</td>
<td>USDA, 2017</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>Prevalence Rate FS</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>Avg. Annual Cost of Treatment</td>
<td>$2,137</td>
<td>American Heart Association, 2014</td>
</tr>
<tr>
<td>Diabetes</td>
<td>$10,128</td>
<td>American Diabetes Association, 2017</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>$15,390</td>
<td>National Institute of Health, 2017</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>$7,466</td>
<td>National Institute of Health, 2016</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>FI/FS Increased Cost Multiple</td>
<td>1.16</td>
<td>CDC, 2015</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>1.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>1.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>OOP vs Payer Cost Split</td>
<td>22/78</td>
<td>Chronic Condition Data Warehouse, 2018 and Kaiser Family Foundation, 2016</td>
</tr>
<tr>
<td>Diabetes</td>
<td>21/79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>9/91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>4/96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Lifetime cost divided by remaining years of life after stroke
2. This is an overall health expense figure; we assume the ratio is the same for just expenses related to the condition
3. Take out-of-pocket cost from KFF as a portion of total cost from CCDW (this is an overall health expense figure; we assume the ratio is the same for just expenses related to disease)

---

All $ figures inflated to 2020
All sources denote national averages
All cost figures are blended (private and public payer)
Promising Practices
Of three identified pillars, access and tracking are foundational to effectively tackle food insecurity.

Each pillar “unlocks” the next:

- **Access**
  - Aim to simplify access
  - Ensure use of allocated resources
  - Differentiate promising practices by key demographics

- **Tracking**
  - Track interventions over time
  - Spend resources effectively

- **Scaling**
  - Amplify intervention impact
  - Leverage identified best practices

Methodology to prioritize promising practices:

- Promising practices were prioritized based on impact and estimated investment.

### Investment for Scaling Promising Practices

- **Quick wins** (Low investment, low impact)
- **Priorities** (Low investment, high impact)
- **Not assessed** (High investment, low impact)
- **Long-term goals** (High investment, high impact)

1. Daily impact on lives of food insecure population
Methodology - Investment to scale promising practices

Focusing on scaling promising practices for investment analysis
- Access and tracking pillars are baseline requirements to enable the successful scaling of promising practices
- Tracking requires a top-to-bottom rework that involves coordination between providers, CBOs, government, and payers
  - Integrated nature makes differentiating costs likely inaccurate

Scaling investment methodology
- Estimated relative investment, based on assumptions, to understand comparative size of promising practices
- Low investment promising practices under $2k per person per year
- High investment promising practices range from $2k-20k per person per year
- Assessed impact based on promising practice’s tangible effect on food insecure population
Partnering with government and retailers shows highest potential immediate impact on food insecure population

Who invests

Providers/Payers
1. Expand prevention interventions (e.g., paying livable wage, housing subsidies)
2. Prescribe food for patients to pick up specific items from grocery stores
3. Fund organizations addressing socioeconomic factors of food insecurity
4. Working group to collect and highlight intervention results
5. Study root causes of food insecurity
6. Publish results of interventions

CBOs
7. Online requests for emergency food
8. Mobile food pantries to food swamps/deserts

Government
9. Advocate for increased government support for food insecurity
10. Publish required SDoH reports by VBP contractors

Retailers
11. Grocery retailer rebates for SNAP recipients
12. Leverage health systems purchasing power to negotiate lower food prices
13. Assist grocery stores in accepting SNAP

Low or minimal investment
Quick wins
(Low investment, low impact)
4  5  6  10

Priorities
(Low investment, high impact)
3  9  11  12  13

Initiative affects ~500k households increasing SNAP costs in NYS by 11-13%

Low impact
Not assessed
(High investment, low impact)

Long-term goals
(High investment, high impact)
1  2  7  8

High impact
High investment (up to $20k annually per person)

1. Daily impact on lives of food insecure population


days

4  5  6  10

3  9  11  12  13

1  2  7  8

1  2  7  8
Innovation
Food Rescue Hero app solves the logistics problem of surplus food by connecting volunteers, food retailers, and CBOs.

Food Rescue Hero in NYC and other NYS cities

Evolve...
partnerships with ride-share companies to expand reach and decrease volunteer reliance

direct access for food insecure individuals to pick up surplus food within a certain radius (e.g., notification through specialized app)

Leveraging surplus food to target food insecurity is promising...

~20M+ pounds of food to be redirected in 2021

90% of recipients report improved food security

1. Triangulated based on pounds of food redirected from 2015-2020, 2021 to date, and monthly estimates

and can be brought to and optimized in NYS

1. Initiate...
Food Rescue Hero in NYC and other NYS cities

2. Evolve...

190% of recipients report improved food security
Logistics and Grocery potential "unlocks" to food security

Amazon

Currently
Delivered 12M+ meals in 25 cities to "vulnerable families" since March 2020 in partnership with food banks

Potential evolutions
Donate percent of Whole Foods/Prime Now deliveries in-kind to food insecure households

Enable FI individuals to pick up certain items from 24/7 Amazon Go stores for constant emergency food access

Ride-share companies

Currently
Uber committed ~$1M in two-year partnership with Feeding America for free rides to food pantries and food delivery

Potential evolutions
Strive to increase the portion of total rides or meal deliveries donated to food insecure population (In some instances, ~0.01% of US total revenue)

Grocery retailers

Currently
Contributes surplus food to CBOs through Feeding America, Food Rescue Hero, and to stock community fridges

Potential evolutions
In-store rebates to SNAP beneficiaries to increase effective purchasing power

Non-exhaustive, illustrative examples