

DASH-Patterned Groceries Reduce Blood Pressure: Results from the GoFresh Randomized Clinical Trial

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NIH Pragmatic Trials Collaboratory Grand Round
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Conflict of Interest Disclosure

Stephen P Juraschek

I disclose the following financial relationships over the past 24 months with any entity whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients:

<u>Company</u>	<u>Relationship</u>	<u>Content Area</u>
American Heart Association	Funder	GoFresh Trial
NIMHD	Funder	GoFreshRx Trial
American Heart Association	Funder	GoFreshSoutheast Trial

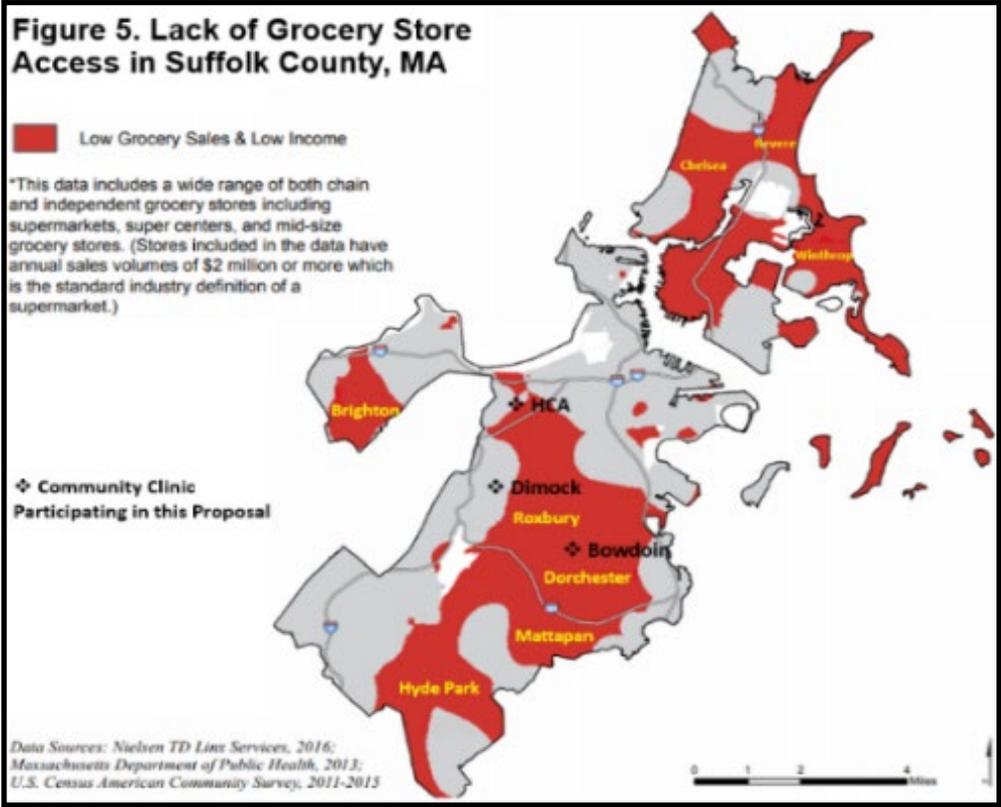
Learning Objectives

At the end of this session, attendees will be able to:

- Learn principles of the DASH diet to reduce blood pressure
- Understand barriers related to healthy eating
- Understand the literature on lifestyle interventions to prevent cardiovascular disease events

Context

- ❑ Hypertension (or high blood pressure) affects 55% of Black adults: more than any population demographic in the U.S.
- ❑ Diet is the most important mediator of excess hypertension risk among Black adults and the DASH diet is especially efficacious among Black adults
- ❑ Access to a healthy diet is a major cause of disparities in blood pressure
- ❑ Goal: Test whether home-delivered, DASH grocery delivery to Black residents of communities with few grocery stores will improve their blood pressure



Addressing Limitations in Prior Studies

- ❑ The DASH diet was able to reduce blood pressure in Black adults in a tightly controlled setting
- ❑ Prior grocery intervention studies have not shown improvements in blood pressure because:
 - There was not enough food for individuals
 - There was not enough food for families



\$50



\$105

Table 1. A greater clinical response is observed with more complete provision of dietary needs.

Prior Trials	5+ Nuts & Beans	DIGO	DASH-Sodium Trial
No. of participants (% Black)	121 (100)	43 (83)	412 (56)
Stipend or food provision	\$30/week	\$105/week	100% of Calorie needs
Servings of fruit & vegetables (per day)*	+1.4‡	+3.2‡	+6.0‡
Urine sodium, %-difference*	-20.3†	-22.4‡	-45.4‡
Systolic blood pressure, mm Hg*	+1.5	-1.0	-8.9‡
LDL cholesterol, mg/dL*	-1.1	-5.0	-12.8‡

*Difference compared to the control group or control period (DIGO). †P < 0.05. ‡P < 0.01

GoFresh Randomized Clinical Trial



Groceries for Black Residents of Boston to Stop
Hypertension among Adults Without Treated Hypertension

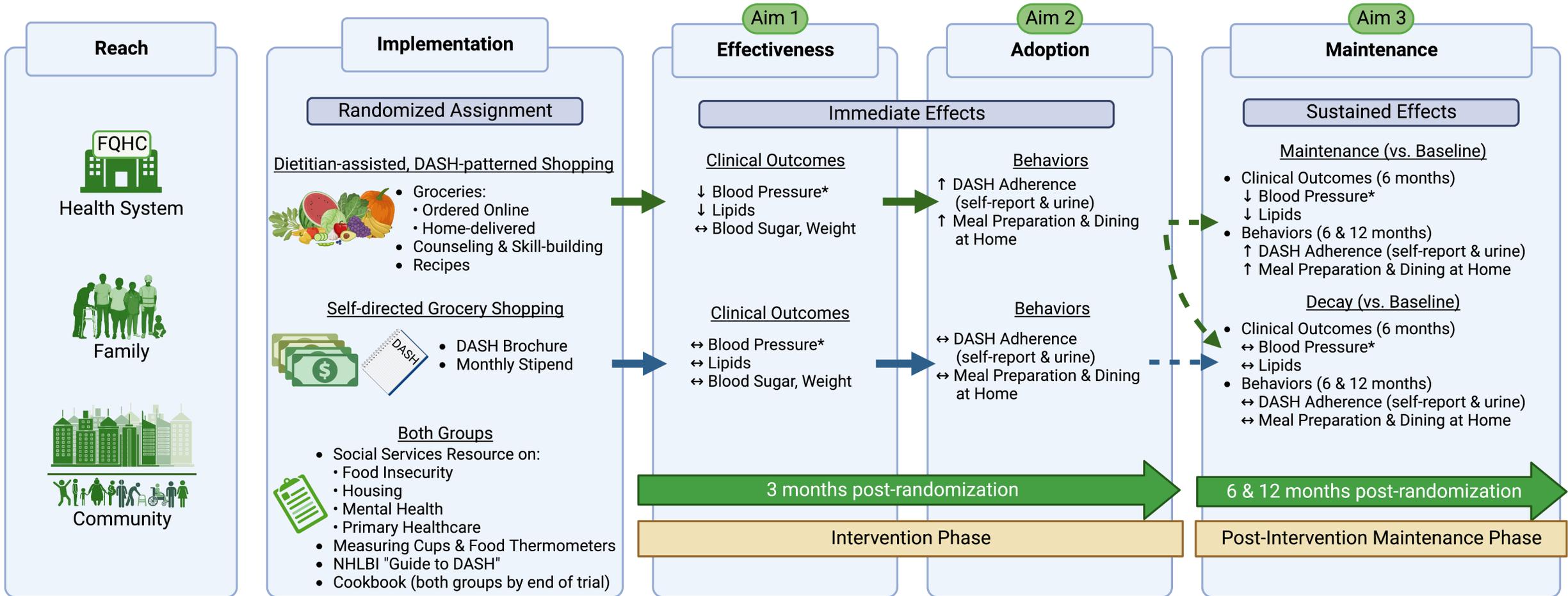
Aims

Aim 1: Determine the effectiveness of coach-assisted, virtually ordered, home-delivered DASH groceries on systolic blood pressure (SBP) among Black adults with elevated blood pressure (BP) or untreated stage 1 or 2 hypertension.

Aim 2: Determine the immediate and sustained effects of coach-assisted grocery shopping on families' adoption of the DASH diet and frequency of home-prepared meals versus out-of-home dining, 3-, 6-, and 12-months post-randomization.

Aim 3: Evaluate the reach, maintenance, and cost-effectiveness of the intervention up to 12 months post-randomization using a RE-AIM framework and mixed methods.

GROceries FOR BLACK RESIDENTS OF BOSTON TO STOP HYPERTENSION



*Automated Office Blood Pressure & Ambulatory Blood Pressure Monitoring Measures
Created with BioRender.com

Figure 1. GoFresh Trial Conceptual Diagram



Inclusion:

- Self-identified Black or African American
- Age 18 years or older
- Resident of a Boston-area healthy food priority area (or “food desert”):
 - Brighton, Chelsea, Dorchester, East Boston, Everett, Hyde Park, Jamaica Plain, Malden, Mattapan, Revere, Roslindale, Roxbury, or Winthrop
- Systolic blood pressure of 120 to <150 mm Hg and diastolic blood pressure <100 mm Hg
- Have access to refrigeration, cooking appliances, and Wi-Fi/cellular service

Exclusion:

- Antihypertensive medication use
- Diabetes, stage 4 or 5 chronic kidney disease, hyperkalemia
- Families with more than 6 adults at dinner time

One of Two 12-week Interventions



Active Intervention: Home-delivered, DASH-patterned groceries, tailored to caloric needs and ordered weekly with dietitian counseling

or

Comparator: 3 \$500 stipends every 4 weeks for self-directed grocery shopping

Daily Nutrient Targets	GoFresh Diet
Sodium (mg/day)	<2300 mg/d (2100 kcal)
Potassium (mg/day)	>4700 mg/d (2100 kcal)
Saturated fat	7% of total energy (~15 g/day)
Ratios	
Na/kcal	<1.1
K/kcal	>2.2
K/Na	>2.0

Weekly Goals*

- ≥28 servings of fruit & vegetable
- ≥14 low-fat dairy
- 28-41 oz. meat
- 36-49 servings of grains
- 4-5 servings of nuts, seeds, legumes

*For a 2100 kcal/day diet

Dietitian-directed intervention

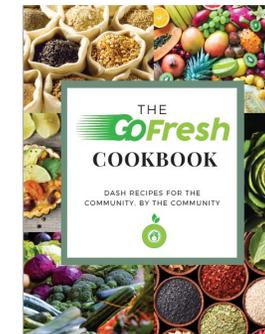
- ❑ Weekly calls with the study dietitian

- ❑ These calls will serve three purposes:
 - (1) Order groceries for the week (GoFresh Order Sheet)
 - (2) Assess compliance from the prior week's order
 - (3) Provide education on fundamentals of healthy grocery shopping, meal storage, preparation, and in-home eating (Didactic Modules)

- ❑ Additional resources:
 - GoFresh DASH recipe book
 - 24 demonstration videos led by Black chefs in the Boston area



Kayla Ferro,
MPH, RDN



Didactic Modules

Modules	Description
1	Principles of DASH
2	Food storage to reduce waste
3	Sodium and potassium: What do they mean for your health?
4	Quick food safety tips
5	Enhance your favorite meal and explore something new
6	Understanding nutritional labels
7	Strategies to increase fruits and vegetables servings
8	Quick and healthy meal prep
9	DASH at Home
10	DASH at restaurants and special events
11	Smart Shopping
12	Recap and DASH principles
Holiday	Adherence to DASH around the holidays

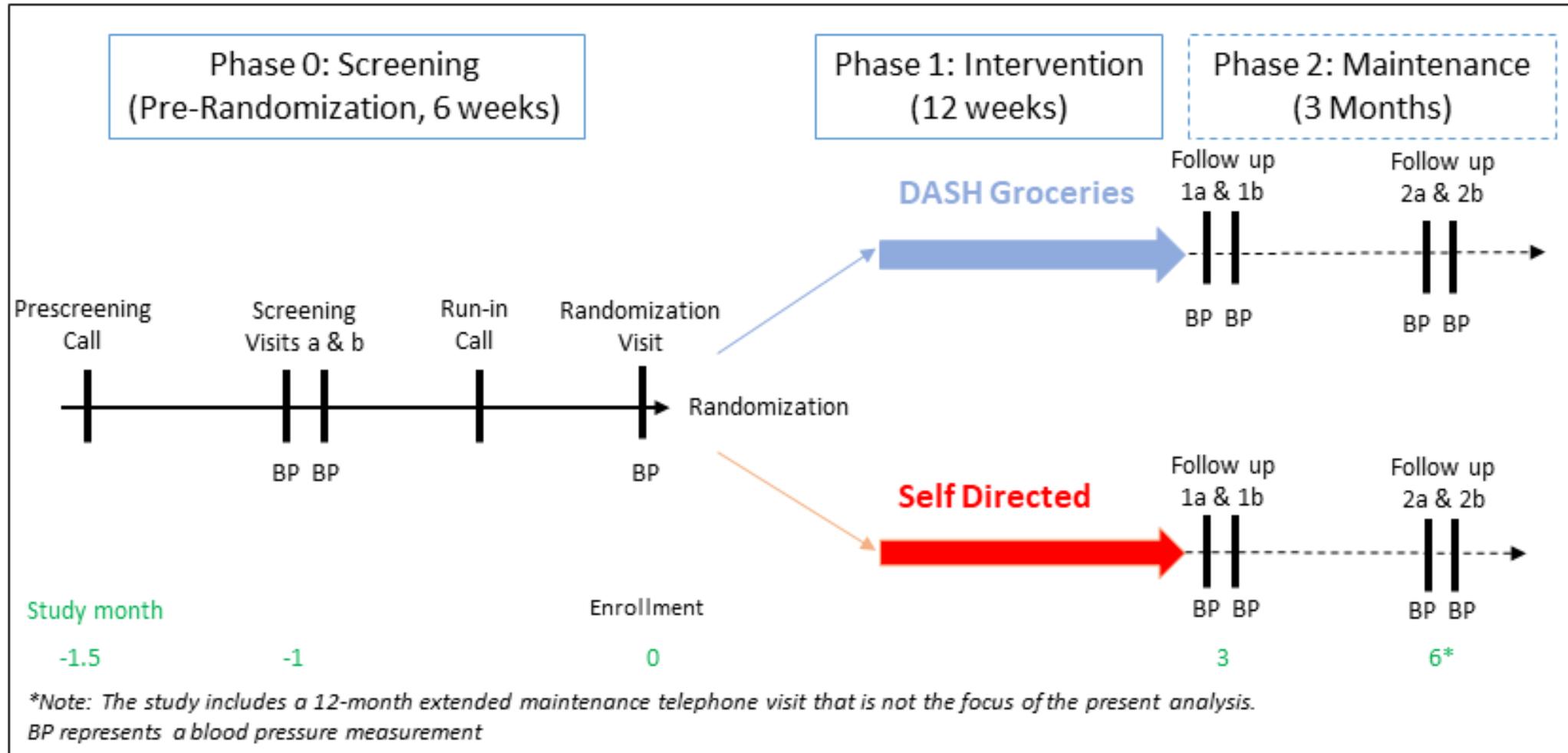
The last 15-20 minutes of each weekly phone call will focus on the education module

A Counselor's Guide standardizes content between study dietitians

Smart shopping focuses on cost-effective shopping for sustainability after the intervention is complete

- Primary outcome: 3-month office systolic blood pressure
- Secondary outcomes (3 and 6 months):
 - Office systolic blood pressure (6-months only)
 - Office diastolic blood pressure
 - Ambulatory blood pressure monitoring: wake-time SBP/DBP
 - Body mass index
 - Hemoglobin A1c
 - Serum lipids, potassium, creatinine
- Adherence measures (3 and 6 months):
 - 24-hour urine potassium
 - 24-hour urine sodium
 - Daily intake of fat, fruits, and vegetables (rapid food frequency questionnaire)
 - 24-hour dietary recall

Design Schematic



Community Engagement

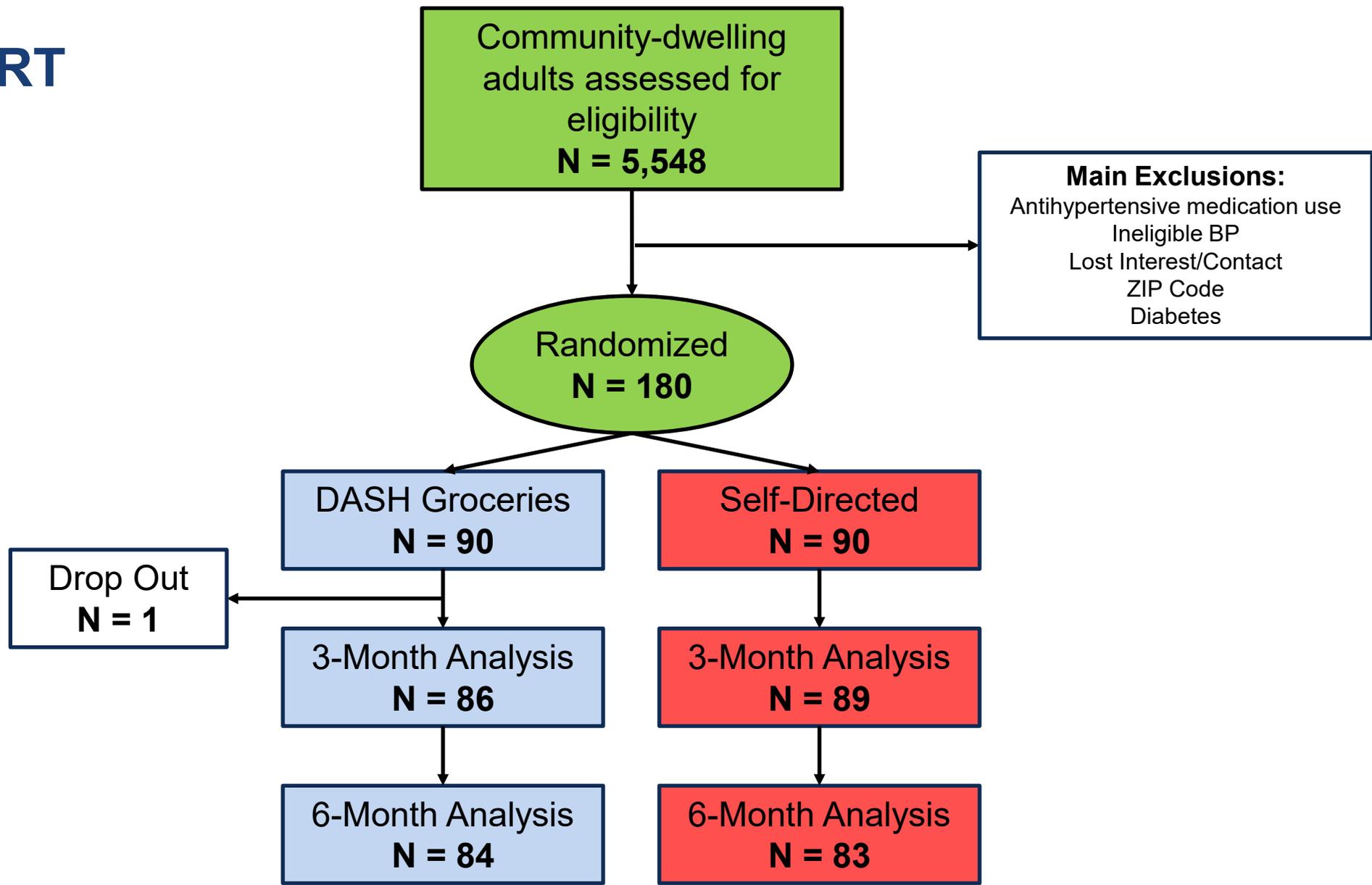


Community Outreach





CONSORT



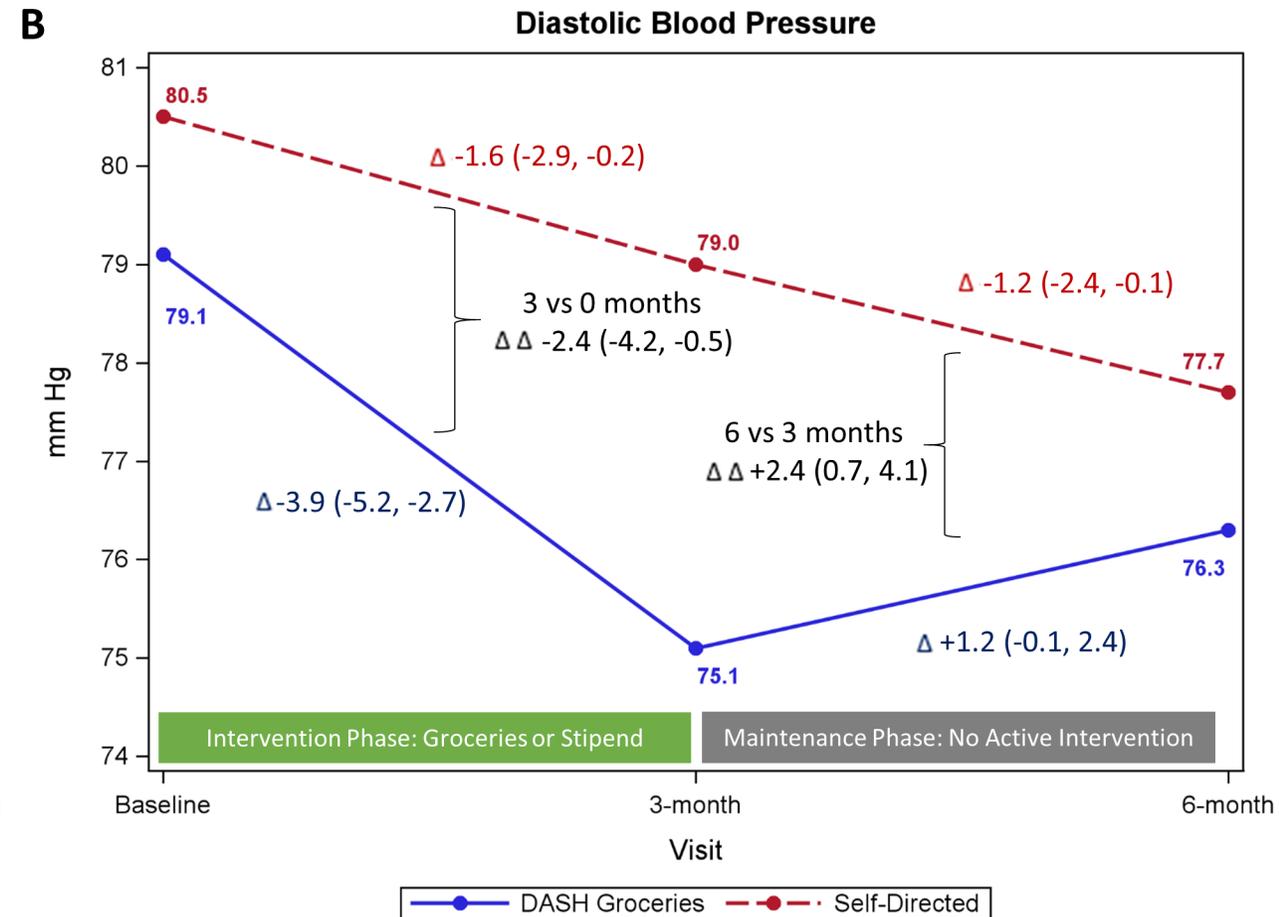
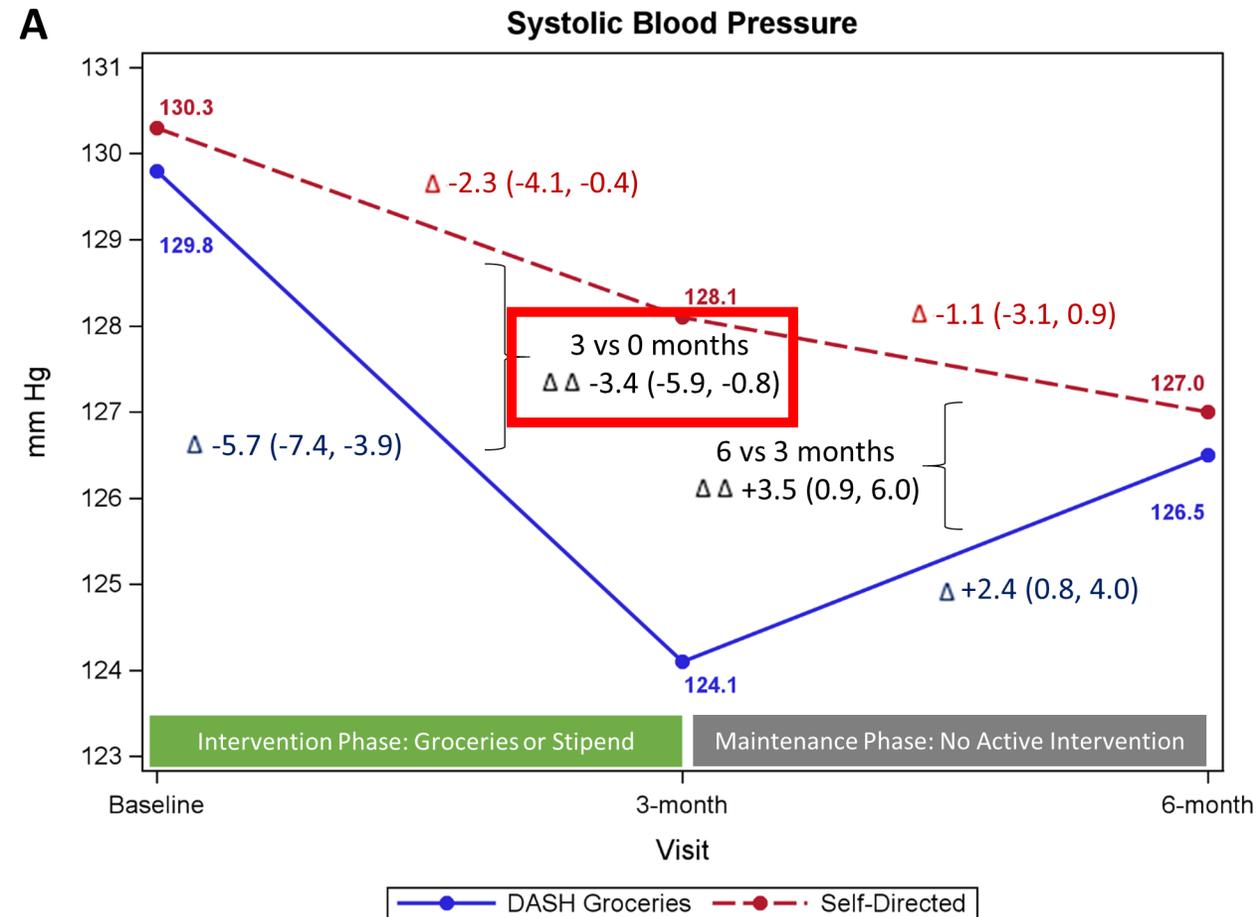
Main reasons for not contributing to analysis were BPs obtained outside the protocol time window or visit non-attendance

Demographic Information of Randomized Participants

	DASH Groceries Group, N=90	Self-Directed Group, N=90
	Mean (SD) or N (%)	Mean (SD) or N (%)
Age (years), mean (SD)	46.5 (12.7)	45.8 (14.0)
Female Sex	47 (52)	55 (61)
Black or African American	90 (100)	90 (100)
Hispanic or Latino	5 (6)	7 (8)
Household Income		
<\$30,000	23 (26)	16 (18)
\$30,000 to \$59,999	23 (26)	20 (22)
≥\$60,000	35 (39)	43 (48)
Unsure/Prefer not to answer	9 (10)	11 (12)
Family Size, mean (SD)	2.6 (1.3)	2.4 (1.2)
Systolic BP (mm Hg), mean (SD)	129.8 (6.7)	130.3 (6.7)
Diastolic BP (mm Hg), mean (SD)	79.1 (7.4)	80.5 (8.7)
BMI (kg/m ²), mean (SD)	30.8 (6.0)	31.1 (6.5)
Hemoglobin A1c (%), mean (SD)	5.5 (0.4)	5.5 (0.4)
LDL-cholesterol, mean (SD)	121.0 (34.6)	112.9 (29.5)

Abbreviations: BP, blood pressure; BMI, body mass index; LDL, low density lipoprotein; SD, standard deviation

Primary Outcome: Difference in 3-month vs Baseline SBP



Adherence: 24-hr Urine

Outcome	Assignment	BL Mean (SE)	3M – BL β (95% CI) or <i>P</i>	6M – 3M β (95% CI) or <i>P</i>
Urine Sodium, mg/24 hr N*=179, 172, 164	SDG	2994 (135)	-85 (-424, 254)	165 (-172, 502)
	DASH	3123 (164)	-630 (-992, -268)	116 (-233, 465)
	DASH minus SDG		-545 (-1041, -50)	-49 (-534, 436)
	<i>P</i>		0.031	0.84
Urine Potassium, mg/24 hr N*=179, 172, 164	SDG	1900 (72)	-45 (-216, 126)	34 (-142, 209)
	DASH	1940 (83)	113 (-61, 287)	-289 (-498, -80)
	DASH minus SDG		158 (-86, 402)	-323 (-596, -50)
	<i>P</i>		0.20	0.02

Change values were generated via generalized estimating equations (exchangeable correlation structure, normal family, identity link, robust variance estimator). Diets were compared with the visit-by-assignment interaction.

*N of participants contributing measurements at baseline, 3 months, and 6 months

Abbreviations: CI, confidence interval; DASH, Dietary Approaches to Stop Hypertension or grocery intervention group; SDG, self-directed group; SE, standard error

Adherence: 24-hr Recall

Outcome	Assignment	BL Mean (SE)	3M – BL β (95% CI) or <i>P</i>	6M – 3M β (95% CI) or <i>P</i>
Saturated fat (24-hr recall), g/24 hr N*=179, 171, 168	SDG	22.1 (1.6)	2.0 (-2.1, 6.1)	-3.3 (-6.3, -0.3)
	DASH	27.2 (2.1)	-8.5 (-12.7, -4.4)	2.7 (-0.4, 5.7)
	DASH minus SDG		-10.6 (-16.4, -4.7)	5.9 (1.7, 10.2)
	<i>P</i>		<0.001	0.006
DASH Diet Index (24-hr recall), points** N*=179, 171, 168	SDG	3.80 (0.15)	-0.08 (-0.46, 0.29)	0.02 (-0.39, 0.43)
	DASH	3.71 (0.14)	0.61 (0.23, 0.98)	-0.32 (-0.72, 0.08)
	DASH minus SDG		0.69 (0.16, 1.22)	-0.35 (-0.92, 0.23)
	<i>P</i>		0.011	0.24

Change values were generated via generalized estimating equations (exchangeable correlation structure, normal family, identity link, robust variance estimator). Diets were compared with the visit-by-assignment interaction.

*N of participants contributing measurements at baseline, 3 months, and 6 months

**DASH index: 1 is lowest DASH adherence, while 11 is highest DASH adherence.

Abbreviations: CI, confidence interval; DASH, Dietary Approaches to Stop Hypertension or grocery intervention group; SDG, self-directed group; SE, standard error

Secondary Outcomes

Outcome	Assignment	BL Mean (SE)	3M – BL β (95% CI) or P	6M – 3M β (95% CI) or P
Serum LDLc, mg/dL N*=179, 175, 165	SDG	112.9 (3.1)	-3.4 (-7.4, 0.6)	0.9 (-2.5, 4.2)
	DASH	121.2 (3.6)	-11.4 (-15.5, -7.3)	4.2 (0.2, 8.2)
	DASH minus SDG		-8.0 (-13.7, -2.3)	3.3 (-1.9, 8.5)
	P		0.006	0.21
BMI, kg/m ² N*=180, 175, 167	SDG	31.33 (0.70)	0.02 (-0.18, 0.23)	0.00 (-0.21, 0.21)
	DASH	30.81 (0.63)	-0.02 (-0.27, 0.23)	-0.05 (-0.26, 0.17)
	DASH minus SDG		-0.04 (-0.37, 0.28)	-0.05 (-0.35, 0.25)
	P		0.80	0.75
HbA1c (whole blood), % N*=180, 175, 169	SDG	5.47 (0.04)	0.04 (-0.00, 0.08)	0.02 (-0.01, 0.05)
	DASH	5.50 (0.04)	0.03 (-0.01, 0.07)	0.04 (0.01, 0.07)
	DASH minus SDG		-0.01 (-0.07, 0.05)	0.02 (-0.03, 0.07)
	P		0.74	0.42

Change values were generated via generalized estimating equations (exchangeable correlation structure, normal family, identity link, robust variance estimator). Diets were compared with the visit-by-assignment interaction.

*N of participants contributing measurements at baseline, 3 months, and 6 months

Abbreviations: BMI, body mass index; CI, confidence interval; DASH, Dietary Approaches to Stop Hypertension or grocery intervention group; HbA1c, hemoglobin A1c; LDLc, low density lipoprotein cholesterol; SDG, self-directed group; SE, standard error

Limitations

- Did not examine isolated factors of the intervention (dietitian counselling, groceries)
- Median cost was \$240/week per household
- \$500 stipend may have been more or less valuable than the groceries
- Urban setting
- Did not include treated hypertension, diabetes

Table 1. A greater clinical response is observed with more complete provision of dietary needs.

Prior Trials	5+ Nuts & Beans	DIGO	GoFresh	DASH-Sodium Trial
No. of participants (% Black)	121 (100)	43 (83)	180 (100)	412 (56)
Stipend or food provision	\$30/week	\$105/week	100% of Calorie needs	100% of Calorie needs
Servings of fruit & vegetables (per day)*	+1.4‡	+3.2‡	+0.9‡	+6.0‡
Urine sodium, %-difference*	-20.3†	-22.4‡	-17.8†	-45.4‡
Systolic blood pressure, mm Hg*	+1.5	-1.0	-3.4‡	-8.9‡
LDL cholesterol, mg/dL*	-1.1	-5.0	-8.0‡	-12.8‡

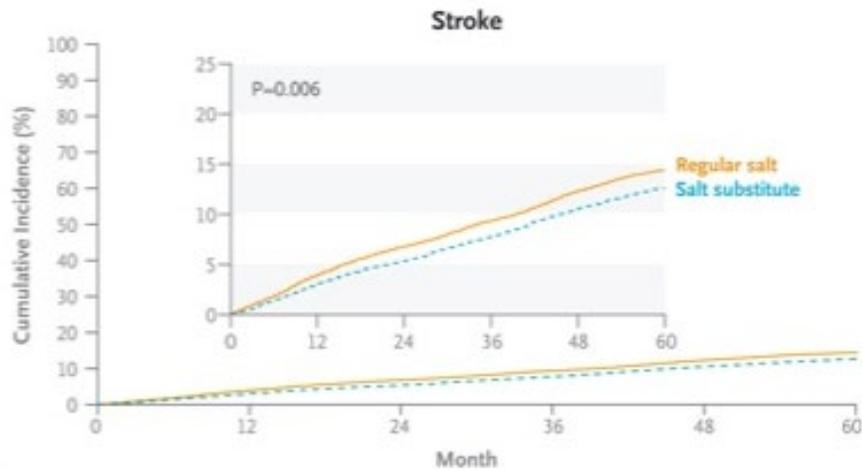
*Difference compared to the control group or control period (DIGO). † $P < 0.05$. ‡ $P < 0.01$

ORIGINAL ARTICLE

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Effect of Salt Substitution on Cardiovascular Events and Death

Authors: Bruce Neal, M.B., Ch.B., Ph.D., Yangfeng Wu, M.D., Ph.D., Xiangxian Feng, Ph.D., Ruijuan Zhang, M.Sc., Yuhong Zhang, M.Med., Jingpu Shi, Ph.D., Jianxin Zhang, Ph.D., [+24](#), and Paul Elliott, M.B., B.S., Ph.D. [Author Info & Affiliations](#)



Systolic Blood Pressure

GoFresh: -3.4 mm Hg

SSaSS: -3.3 mm Hg

ORIGINAL ARTICLE

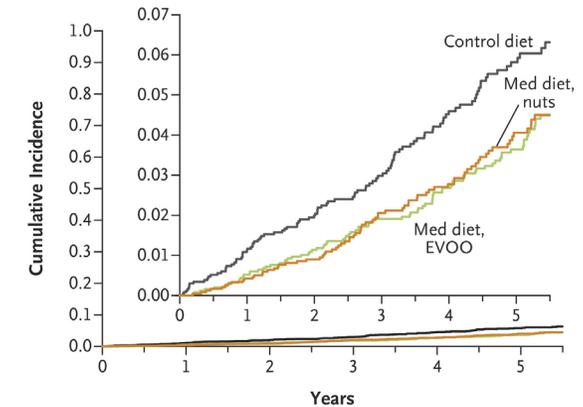
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Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts

Authors: Ramón Estruch, M.D., Ph.D., Emilio Ros, M.D., Ph.D., Jordi Salas-Salvadó, M.D., Ph.D., Maria-Isabel Covas, D.Pharm., Ph.D., Dolores Corella, D.Pharm., Ph.D., Fernando Arós, M.D., Ph.D., Enrique Gómez-Gracia, M.D., Ph.D., [+14](#), for the PREDIMED Study Investigators* [Author Info & Affiliations](#)

A Primary End Point (acute myocardial infarction, stroke, or death from cardiovascular causes)

Med diet, EVOO: hazard ratio, 0.69 (95% CI, 0.53–0.91)
 Med diet, nuts: hazard ratio, 0.72 (95% CI, 0.54–0.95)



LDL-cholesterol

GoFresh: -8.0 mg/dL

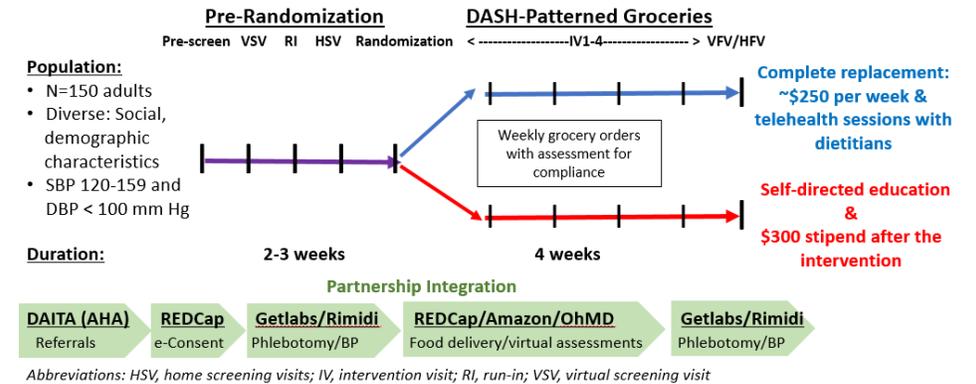
PREDIMED: -5.8 mg/dL

Key Points

- 3-months of home-delivered, DASH-patterned groceries ordered with dietitian counseling for Black residents of Boston communities with fewer grocery stores reduced:
 - Urine sodium
 - SBP, DBP
 - LDL-cholesterol
- Longer-term maintenance of these benefits will likely require sustained access to healthy groceries and nutrition counseling

- GoFreshRx: Treated Adults – results coming soon!

- Healthcare-by-Food Pilot: GoFreshSoutheast



- Scalable application to automate grocery strategy
- International Consortium (GoFreshWorld): A global collaboration focused on developing universal standards in healthy grocery shopping to prevent cardiovascular disease
 - Argentina, Australia, Canada, Ghana, Netherlands, South Korea, Vietnam, and United Kingdom

Juraschek SP, Col H, Ferro K, et al

DASH-Patterned Groceries and Effects on Blood Pressure

The GoFresh Randomized Clinical Trial

Published online November 9, 2025

AHA Scientific Sessions

Available at jama.com



Scan to read the article

On behalf of GoFresh and RESTORE,

Thank you



RESTORE

NETWORK

Addressing Social Determinants of Health to Prevent Hypertension



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