

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

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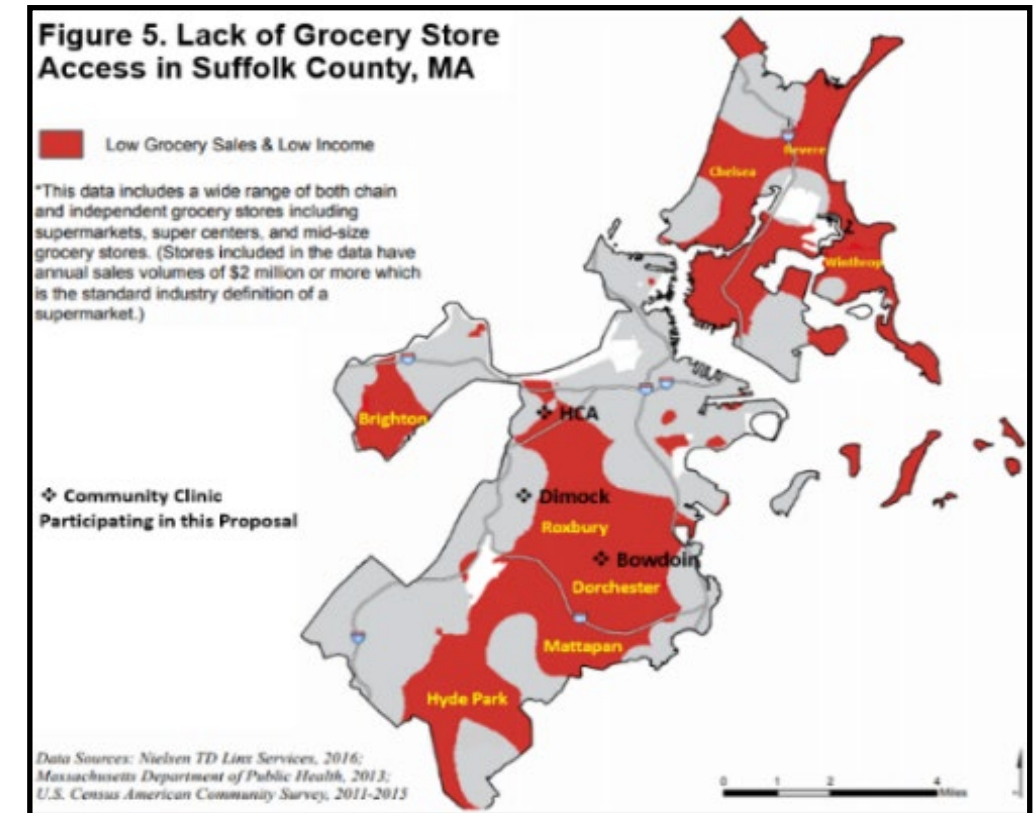
Conflict of Interest Disclosure

Stephen Juraschek, MD PhD:

I have no financial relationships with a commercial entity producing healthcare-related products and/or services.

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

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

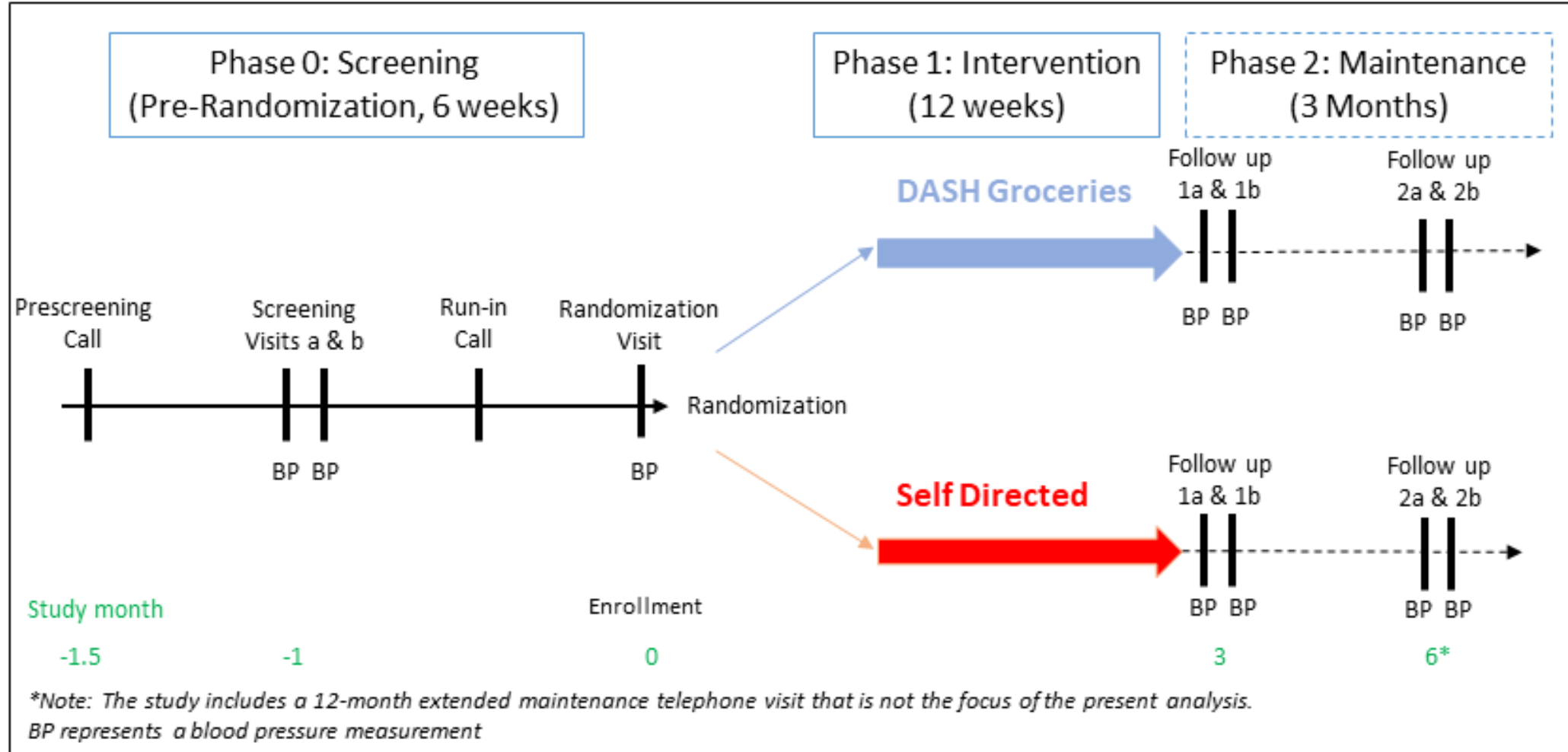
Daily Nutrient Targets	GoFresh Diet
Sodium (mg/day)	<2300 mg/d (2100 kcal)
Potassium (mg/day)	>4700 mg/d (2100 kcal)
Saturated fat	7% of total energy (~15 g/day)
Ratios	
Na/kcal	<1.1
K/kcal	>2.2
K/Na	>2.0

Weekly Goals*

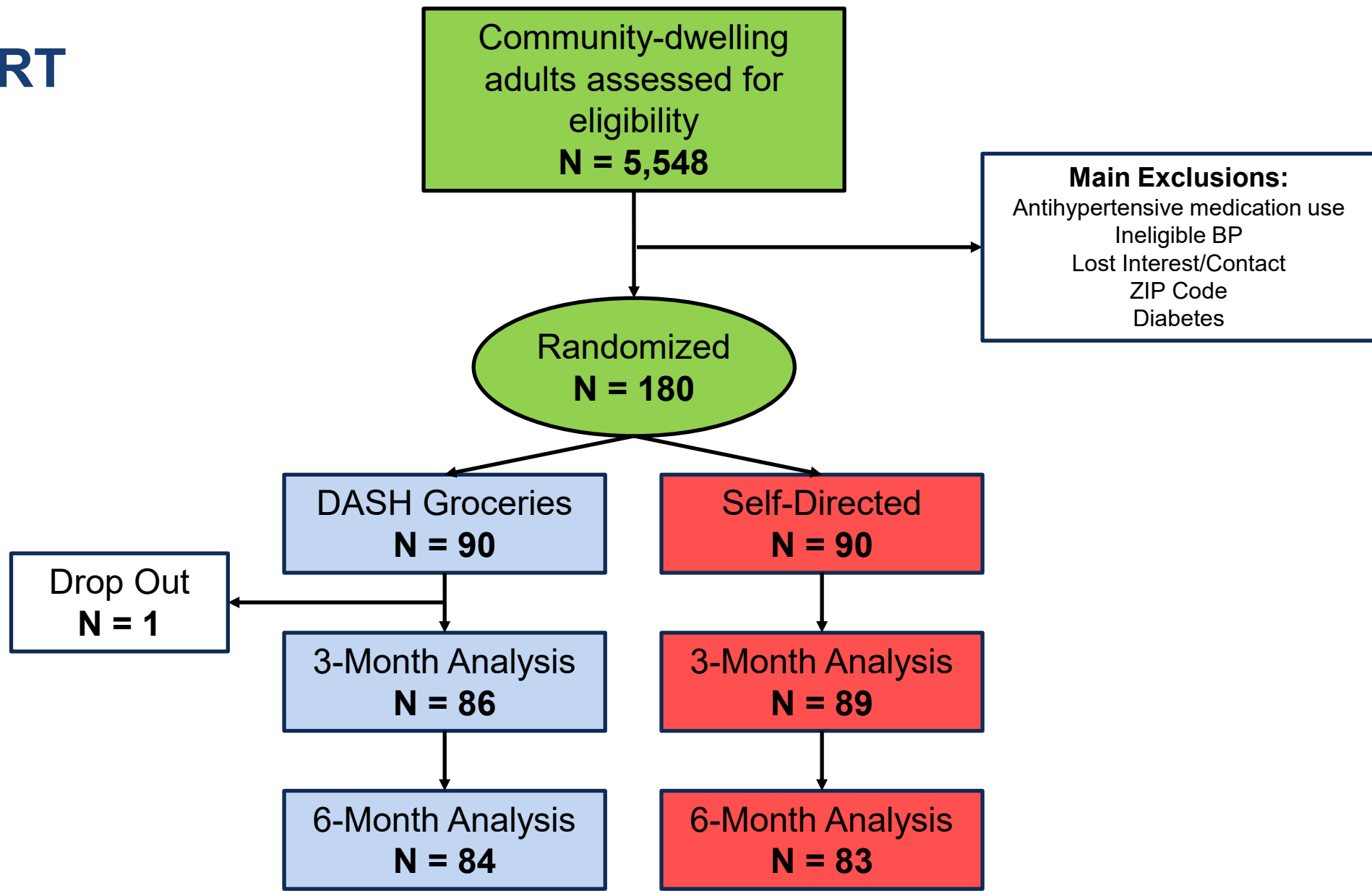
- ≥28 servings of fruit & vegetable
- ≥14 low-fat dairy
- 28-41 oz. meat
- 36-49 servings of grains
- 4-5 servings of nuts, seeds, legumes

*For a 2100 kcal/day diet

Design Schematic



CONSORT



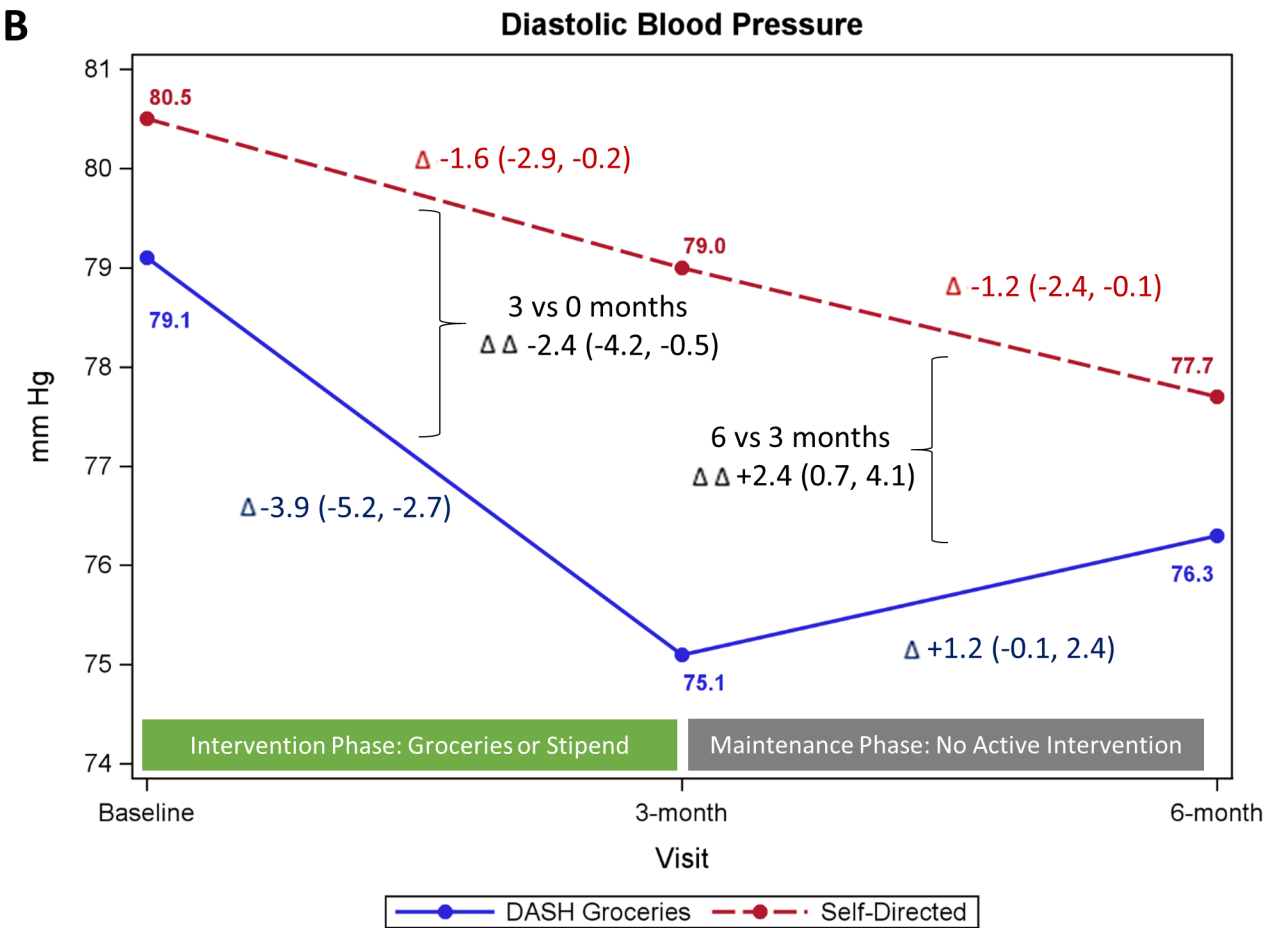
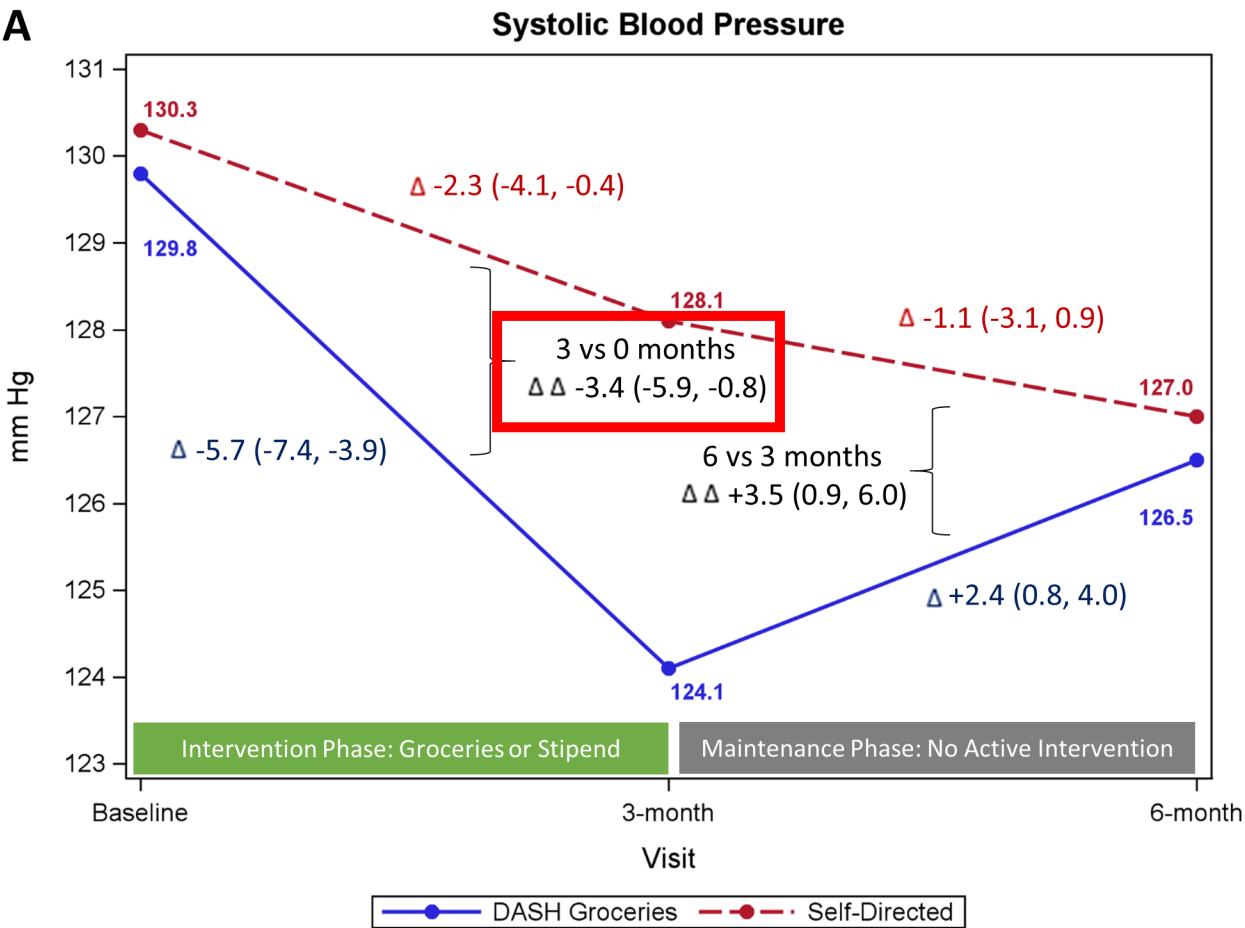
Main reasons for not contributing to analysis were BPs obtained outside the protocol time window or visit non-attendance

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 <i>P</i>	6M – 3M β (95% CI) or <i>P</i>
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)
	<i>P</i>		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)
	<i>P</i>		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)
	<i>P</i>		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.

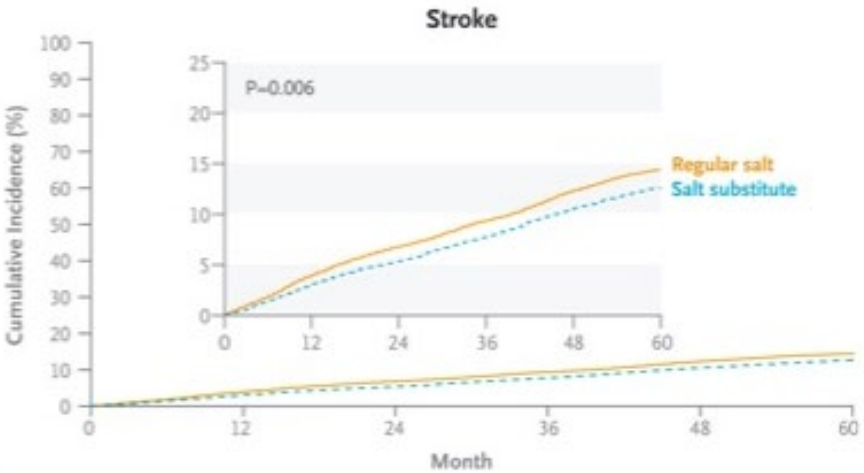
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Urine sodium, %-difference*	-20.3†	-22.4‡	-17.8†	-45.4‡
Systolic blood pressure, mm Hg*	+1.5	-1.0	-3.4‡	-8.9‡
LDL cholesterol, mg/dL*	-1.1	-5.0	-8.0‡	-12.8‡

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

ORIGINAL ARTICLE

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

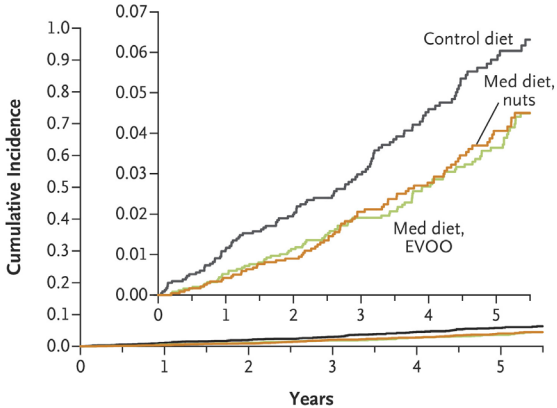


Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts

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)

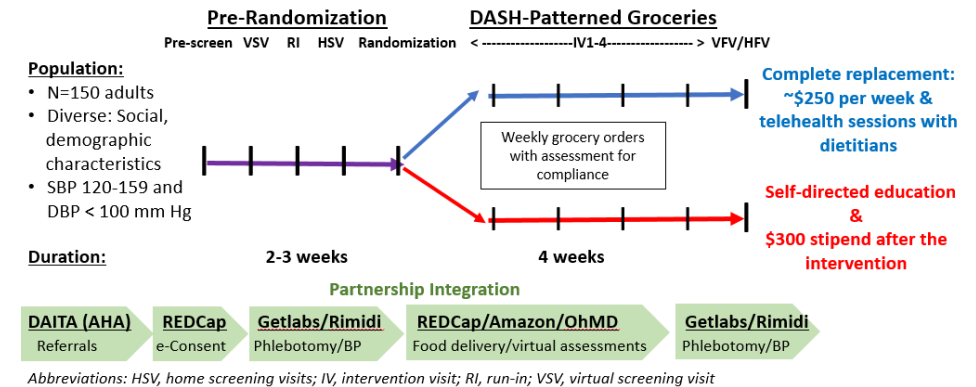


LDL-cholesterol
GoFresh: -8.0 mg/dL
PREDIMED: -5.8 mg/dL

- 3-months of home-delivered, DASH-patterned groceries ordered with dietitian counseling to 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

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Available at jama.com



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On behalf of GoFresh and RESTORE,

Thank you



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RESTORE
N E T W O R K

**Addressing Social Determinants of Health
to Prevent Hypertension**



UCSF Health

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