

Supplemental Materials

**Impact of Carbohydrate Quality on the Association Between Low-Carbohydrate Diet
Scores and Longitudinal Changes of Cardiometabolic Risk Factors**

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Supplemental Table 1. Macronutrients Ranges in Low-Carbohydrate Diet Scores

Points	Total Carbohydrate Intake	High-Quality Carbohydrate Intake	Low-Quality Carbohydrate Intake	Total Protein Intake	Total Fat Intake
percentage of energy					
0	60.2 - 82.4	23.6 – 56.1	44.4 - 78.2	6.7 - 13.5	9.3 - 22.9
1	56.9- 60.1	20.2 - 23.5	40.9 - 44.3	13.6 - 14.6	23.0 - 25.4
2	54.6 - 56.8	17.9 - 20.1	38.5 - 40.8	14.7 - 15.4	25.5 - 27.3
3	52.6 - 54.5	16.0 - 17.8	36.7 - 38.4	15.5 - 16.1	27.4 - 28.7
4	51.0 - 52.5	14.4 - 15.9	35.0 - 36.6	16.2 - 16.8	28.8 - 30.2
5	49.3 - 50.9	12.9 - 14.3	33.5 - 34.9	16.9 - 17.4	30.3 - 31.5
6	47.4 - 49.2	11.5 - 12.8	31.8 - 33.4	17.5 - 18.1	31.6 - 32.8
7	45.4 - 47.3	10.0 - 11.4	30.0 - 31.7	18.2 - 18.8	32.9 - 34.3
8	42.8 - 45.3	8.5 - 9.9	27.7 - 29.9	18.9 - 19.7	34.4 - 36.1
9	39.3 - 42.7	6.4 - 8.4	24.5 - 27.6	19.8 - 21.1	36.2 - 38.6
10	8.2 - 39.2	0.7 - 6.3	2.8 - 24.4	21.2 - 40.8	38.7 - 63.8

Supplemental Table 2. Baseline characteristics in participants of the Framingham Offspring Cohort Study ^a

	Total	Males	Females
Characteristics ^b			
n	3294	1508	1786
Age, y	55 (48-62)	55(48-62)	54(47-62)
Weight, kg	75.7 (64.4 - 87.1)	84.4 (77.1 - 94.1)	66.2 (59.4 - 75.7)
BMI, kg/m ²	26.6 (23.8 - 29.6)	27.5 (25.3 - 30.1)	25.5 (22.8 - 29.1)
WC, cm	92.7 (82.6 - 101.6)	97.8 (91.4 - 104.1)	85.1 (76.2 - 96.5)
HDL cholesterol, mg/dL	49 (40 - 60)	42 (35 - 50)	56 (46 - 67)
Non-HDL cholesterol, mg/dL	152 (126 - 177)	157 (134 - 180)	147 (122 - 175)
Triglyceride, mg/dL	115 (83 - 166)	125 (86 - 184)	110 (80 - 154)
Glucose, mg/dL	94 (89 - 101)	97 (92 - 103)	92 (87 - 99)
SBP, mm Hg	124 (112 - 136)	126 (116 - 137)	121 (109 - 136)
DBP, mm Hg	74 (68 - 81)	76.5 (70 - 83)	72 (66 - 79)
PAI score, MET-hr/d	33.6 (30.6 – 37.0)	34.2 (31.2 - 38.5)	32.5 (30.3 - 36.3)
Current smoker n (%)	601 (18.2)	270 (17.9)	331 (18.5)
Hypertension n (%)	1549 (47)	811 (53.8)	738 (41.3)
Blood pressure medication n (%)	587 (17.8)	292 (19.4)	295 (16.5)
Lipid lowering medication n (%)	246 (7.5)	144 (9.6)	102 (5.7)
Multivitamins use, n (%)	998 (30.3)	386 (25.6)	612 (34.3)
Postmenopausal n (%)	1186 (36.0)	-	1186 (66.4)
Dietary intake ^c			

DGAI score	60.4 (52.1 - 68.6)	56.6 (48.6 - 64.2)	63.5 (55.5 - 71)
T- LCDS	15 (10 - 20)	15 (9 - 20)	15 (10 - 20)
HQ-LCDS	15 (10 - 20)	14 (9 - 19)	16 (11 - 21)
LQ-LCDS	15 (11 - 19)	15 (10 - 19)	15 (11 - 19)
Total energy, kcal	1796 (1410 - 2240)	1963 (1524 - 2405)	1681 (1343 - 2075)
Total carbohydrate, %EI	51.2 (45.3 - 56.6)	50 (44.2 - 56.0)	51.8 (46.3 - 57.0)
Total fat, %EI	29.9 (25.7 - 34.1)	30.1 (25.8 - 34.4)	29.7 (25.6 - 33.9)
Total protein, %EI	16.6 (14.6 - 18.8)	15.8 (13.9 - 17.9)	17.4 (15.3 - 19.5)
Alcohol, %EI	1.5 (0 - 5.5)	2.9 (0.4 - 8.2)	0.9 (0 - 3.7)
HQ-carbohydrate, %EI	12.4 (8.1 - 17.7)	11 (7.2 - 15.9)	13.8 (9.4 - 18.8)
LQ-carbohydrate, %EI	35.8 (30.7 - 41.2)	36.5 (31.4 - 41.8)	35.2 (30.1 - 40.7)
Total fiber, gm	17 (12.5 - 22.2)	17 (12.5 - 22.2)	16.9 (12.5 - 22.2)
SFA, %EI	10.3 (8.5 - 12.1)	10.4 (8.5 - 12.2)	10.1 (8.4 - 12.0)
PUFA, %EI	5.6 (4.7 - 6.7)	5.5 (4.6 - 6.5)	5.7 (4.7 - 6.8)
MUFA, %EI	11 (9.3 - 12.7)	11.2 (9.5 - 13)	10.8 (9.2 - 12.5)

^a Values are medians (and interquartile ranges: 25th to 75th percentile) or frequency (and percentages).

DBP, diastolic blood pressure; DGAI, dietary guidelines adherence index; %EI, percent of total daily energy; HDL, high density lipoprotein; LCDS, low-carbohydrate diet pattern scores; HQ-LCDS, high-quality low-carbohydrate dietary pattern score; LQ-LCDS, low-quality low-carbohydrate diet pattern score; MET, Metabolic equivalent task; MUFA, monounsaturated fatty acids; SBP, systolic blood pressure; PAI, physical activity index; PUFA, polyunsaturated fatty acids; SFA, saturated fatty acids; WC, waist circumference.

^b Adjusted for age and sex.

^c All dietary intake variables were adjusted for age, sex and total energy, except total energy variable was adjusted for age and sex only.

Supplemental Table 3. Baseline distribution of micronutrients across quintiles of HQ-LCDS and LQ-LCDS among participants in the Framingham Offspring Study ^a

	HQ-LCDS			LQ-LCDS	
	Total	Quintile 1	Quintile 5	Quintile 1	Quintile 5
Total flavonoids (mg)	214.8 (125.6 - 369.8)	229.9 (142.2 – 370.0)	172.1 (100.7 - 315.2)	285.4 (190.7 - 455.4)	143.0 (86.1 - 259.3)
Magnesium (mg)	292.3 (226.5 - 368.2)	291.6 (227.2 - 363.7)	282 (216.6 - 362.1)	335.1 (258.6 - 409.9)	254.5 (201.6 - 322.9)
Iron (mg)	13.5 (9.8 - 20.6)	13.5 (10.0 - 19.4)	13.2 (9.7 - 20.9)	15.3 (11.2 - 23.8)	12.1 (8.8 - 17.8)
Calcium (mg)	740 (527 - 1064)	708 (515 - 997)	696 (495 - 1067)	759.5 (538 - 1097)	697 (497 - 995)
Vitamin A (IU)	10379 (6650 - 16184)	9395 (5936-15018)	10367 (6548 -16631)	12990 (8575 -20484)	8348 (5240 -12310)
Vitamin B1 (mg)	1.6 (1.1 - 2.5)	1.7 (1.2 - 2.5)	1.4 (1 - 2.4)	2 (1.4 - 3)	1.3 (1.0 - 2.1)
Vitamin B2 (mg)	2 (1.4 - 3)	1.9 (1.4 - 2.9)	1.8 (1.3 - 3)	2.2 (1.6 - 3.4)	1.8 (1.3 - 2.7)
Vitamin B6 (mg)	2.2 (1.6 - 3.5)	2.2 (1.5 - 3.4)	2.2 (1.6 - 3.5)	2.7 (1.9 - 4.3)	1.9 (1.4 – 3.0)
Vitamin B9 (mcg)	347 (241 - 564)	358 (249 - 544)	318 (211 - 522)	438 (311 - 677)	278(189 - 429)
Vitamin B12 (mcg)	6.0 (3.8 - 10.4)	5.1 (3.2 - 8.6)	6.5 (4.4 - 12)	5.8 (3.4 - 10.2)	6.3 (4.4 - 11.2)
Vitamin C (mg)	164 (104 - 272)	208 (120 - 338)	132 (86 - 207)	226 (151 - 367)	110 (68 - 167)

Vitamin D (IU)	230 (130 - 460)	210 (116 – 435)	208 (124 - 466)	264 (146 - 513)	191 (123 - 393)
Vitamin E (mg)	7.4 (4.7 – 34.0)	6.6 (4.5 - 29.9)	7.7 (4.8 – 35.0)	9.0 (5.3 - 38.3)	6.6 (4.3 - 22.6)

a Values are medians (and interquartile ranges: 25th to 75th percentile).

b Adjusted for age and sex and total energy.

Supplemental Table 4. Annual change in cardiometabolic risk factors in the Framingham Offspring Study at exams 5 to 9^a

WC, cm	0.64 ± 0.01
HDL cholesterol, mg/dL	0.59 ± 0.02
Non-HDL cholesterol, mg/dL	-1.65 ± 0.06
Triglyceride, mg/dL	-1.57 ± 0.10
Glucose, mg/dL	0.39 ± 0.02
SBP, mm Hg	0.08 ± 0.03
DBP, mm Hg	-0.20 ± 0.02

^a Values are means ± SEs adjusted for exam interval, periodic baseline cardiometabolic risk factor value (continuous, periodic baseline age (continuous), sex (male/ female), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol), and hypertension (for systolic and diastolic blood pressure) (yes/ no).

DBP, diastolic blood pressure; HDL cholesterol, high density lipoprotein cholesterol; SBP, systolic blood pressure; WC, waist circumference.

T-LCDS	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
Annual Δ WC cm						
Model 1 ^c	0.58 ± 0.03	0.60 ± 0.03	0.65 ± 0.02	0.64 ± 0.02	0.72 ± 0.03	<0.001
Model 2 ^d	0.58 ± 0.03	0.59 ± 0.03	0.66 ± 0.02	0.64 ± 0.02	0.72 ± 0.03	<0.001
Annual Δ HDL cholesterol mg/dL						
Model 1	0.50 ± 0.04	0.61 ± 0.04	0.57 ± 0.04	0.63 ± 0.04	0.61 ± 0.04	0.07
Model 2	0.50 ± 0.04	0.61 ± 0.04	0.57 ± 0.04	0.63 ± 0.04	0.62 ± 0.04	0.05
Model 3 ^e	0.51 ± 0.04	0.61 ± 0.04	0.57 ± 0.04	0.61 ± 0.03	0.61 ± 0.04	0.09
Annual Δ Non-HDL cholesterol mg/dL						
Model 1	-1.64 ± 0.13	-1.64 ± 0.12	-1.69 ± 0.11	-1.66 ± 0.11	-1.60 ± 0.13	0.89
Model 2	-1.62 ± 0.13	-1.64 ± 0.12	-1.68 ± 0.11	-1.67 ± 0.11	-1.61 ± 0.13	0.99
Model 3	-1.60 ± 0.13	-1.61 ± 0.12	-1.65 ± 0.11	-1.59 ± 0.10	-1.59 ± 0.13	0.90
Annual Δ Triglyceride mg/dL						

Model 1	-1.43 ± 0.22	-1.70 ± 0.20	-1.24 ± 0.18	-1.73 ± 0.18	-1.82 ± 0.21	0.18
Model 2	-1.44 ± 0.22	-1.70 ± 0.20	-1.23 ± 0.18	-1.73 ± 0.18	-1.81 ± 0.21	0.20
Model 3	-1.41 ± 0.22	-1.67 ± 0.19	-1.17 ± 0.18	-1.63 ± 0.17	-1.76 ± 0.21	0.28
Annual Δ Glucose mg/dL						
Model 1	0.33 ± 0.05	0.38 ± 0.04	0.36 ± 0.04	0.41 ± 0.04	0.45 ± 0.04	0.06
Model 2	0.34 ± 0.05	0.38 ± 0.04	0.36 ± 0.04	0.41 ± 0.04	0.45 ± 0.04	0.07
Model 3	0.35 ± 0.05	0.39 ± 0.04	0.38 ± 0.04	0.42 ± 0.04	0.46 ± 0.04	0.08
Annual Δ SBP mm Hg						
Model 1	0.12 ± 0.07	0.21 ± 0.06	0.13 ± 0.06	-0.03 ± 0.06	-0.02 ± 0.07	0.01
Model 2	0.13 ± 0.07	0.22 ± 0.06	0.13 ± 0.06	-0.02 ± 0.06	-0.02 ± 0.07	0.008
Model 3	0.15 ± 0.07	0.25 ± 0.06	0.14 ± 0.06	0.00 ± 0.06	0.01 ± 0.07	0.008
Annual Δ DBP mm Hg						
Model 1	-0.21 ± 0.04	-0.17 ± 0.04	-0.18 ± 0.03	-0.26 ± 0.03	-0.20 ± 0.04	0.54
Model 2	-0.20 ± 0.04	-0.17 ± 0.04	-0.18 ± 0.03	-0.26 ± 0.03	-0.20 ± 0.04	0.42
Model 3	-0.20 ± 0.04	-0.15 ± 0.04	-0.16 ± 0.03	-0.24 ± 0.03	-0.18 ± 0.04	0.57

^a Values are means $\pm$ SE. DBP, Diastolic Blood Pressure; HDL, High Density Lipoprotein; LCDS, low-carbohydrate diet pattern score; SBP, Systolic Blood Pressure; T-LCDS, total low-carbohydrate diet pattern; WC, waist circumference.

^b $P < 0.05$ considered significant.

^c Model 1 adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (except for WC, continuous), total energy (continuous), alcohol intake (%EI/day), current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥ 1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol), and hypertension (for systolic and diastolic blood pressure) (yes/ no) + physical activity index (continuous).

^d Model 2: model 1 + multivitamins use (yes/no) and except for physical activity index.

^e Model 3: model 1 + change in waist circumference (continuous) and except for physical activity index.

HQ-LCDS	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
Annual Δ WC, cm						
Model 1 ^c	0.59 $\pm$ 0.03	0.62 $\pm$ 0.02	0.62 $\pm$ 0.03	0.67 $\pm$ 0.02	0.69 $\pm$ 0.03	0.005
Model 2 ^d	0.59 $\pm$ 0.03	0.62 $\pm$ 0.02	0.62 $\pm$ 0.03	0.67 $\pm$ 0.02	0.69 $\pm$ 0.03	0.004
Annual Δ HDL cholesterol, mg/dL						
Model 1	0.51 $\pm$ 0.05	0.54 $\pm$ 0.03	0.65 $\pm$ 0.04	0.59 $\pm$ 0.03	0.68 $\pm$ 0.04	0.005
Model 2	0.51 $\pm$ 0.05	0.54 $\pm$ 0.03	0.65 $\pm$ 0.04	0.59 $\pm$ 0.03	0.68 $\pm$ 0.04	0.005
Model 3 ^e	0.51 $\pm$ 0.04	0.53 $\pm$ 0.03	0.64 $\pm$ 0.04	0.58 $\pm$ 0.03	0.67 $\pm$ 0.04	0.006
Annual Δ Non-HDL cholesterol, mg/dL						
Model 1	-1.58 $\pm$ 0.14	-1.58 $\pm$ 0.10	-1.85 $\pm$ 0.12	-1.62 $\pm$ 0.10	-1.64 $\pm$ 0.13	0.69
Model 2	-1.58 $\pm$ 0.14	-1.57 $\pm$ 0.1	-1.84 $\pm$ 0.12	-1.63 $\pm$ 0.10	-1.64 $\pm$ 0.14	0.64
Model 3	-1.56 $\pm$ 0.14	-1.52 $\pm$ 0.1	-1.82 $\pm$ 0.12	-1.58 $\pm$ 0.10	-1.60 $\pm$ 0.13	0.69
Annual Δ Triglyceride, mg/dL						

Model 1	-1.24 ± 0.23	-1.15 ± 0.17	-1.79 ± 0.20	-1.79 ± 0.17	-2.00 ± 0.22	<0.001
Model 2	-1.25 ± 0.23	-1.15 ± 0.17	-1.79 ± 0.20	-1.79 ± 0.17	-2.00 ± 0.22	<0.001
Model 3	-1.20 ± 0.22	-1.09 ± 0.17	-1.75 ± 0.20	-1.72 ± 0.17	-1.92 ± 0.22	<0.001
Annual Δ Glucose, mg/dL						
Model 1	0.34 ± 0.05	0.37 ± 0.04	0.37 ± 0.04	0.43 ± 0.04	0.41 ± 0.05	0.13
Model 2	0.35 ± 0.05	0.37 ± 0.04	0.37 ± 0.04	0.43 ± 0.04	0.41 ± 0.05	0.16
Model 3	0.36 ± 0.05	0.38 ± 0.04	0.38 ± 0.04	0.44 ± 0.03	0.42 ± 0.05	0.18
Annual Δ SBP, mm Hg						
Model 1	0.16 ± 0.07	0.11 ± 0.06	0.15 ± 0.06	-0.01 ± 0.05	0.00 ± 0.07	0.03
Model 2	0.16 ± 0.07	0.12 ± 0.06	0.15 ± 0.06	0.00 ± 0.05	0.01 ± 0.07	0.03
Model 3	0.21 ± 0.07	0.14 ± 0.06	0.17 ± 0.06	0.01 ± 0.05	0.01 ± 0.07	0.01
Annual Δ DBP, mm Hg						
Model 1	-0.22 ± 0.04	-0.17 ± 0.03	-0.19 ± 0.04	-0.24 ± 0.03	-0.19 ± 0.04	0.72
Model 2	-0.22 ± 0.04	-0.17 ± 0.03	-0.19 ± 0.04	-0.24 ± 0.03	-0.19 ± 0.04	0.69
Model 3	-0.20 ± 0.04	-0.16 ± 0.03	-0.16 ± 0.04	-0.23 ± 0.03	-0.18 ± 0.04	0.64

^a Values are means $\pm$ SE. DBP, diastolic blood pressure; HDL, high density lipoprotein; HQ-LCDS, high-quality low-carbohydrate diet pattern score; SBP, systolic blood pressure; WC, waist circumference.

^b $P < 0.05$ considered significant.

^c Model 1 adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (except for WC, continuous), total energy (continuous), alcohol intake (%EI/day) , current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥ 1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol) , and hypertension (for SBP and DBP) (yes/ no) + physical activity index (continuous).

^d Model 2: model 1 + Multivitamins use (yes/no) and except for physical activity index.

^e Model 3: model 1 + change in waist circumference (continuous) and except for physical activity index.

Supplemental Table 7. Annual change in cardiometabolic risk factors across quintiles of HQ-LCDS 2 in the Framingham Offspring Study at exams 5 to 9 ^a

HQ-LCDS 2	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
Median	6	11	15	18.5	23.5	
Range	0 - 8	8.5 - 13	13.5 - 16	16.5 - 21	21.5 - 30	
WC, n (observations)	1391	2499	1832	2593	1390	
Annual change, cm ^c	0.60 ± 0.03	0.63 ± 0.02	0.61 ± 0.03	0.66 ± 0.02	0.70 ± 0.03	0.006
HDL cholesterol, n (observations)	1335	2419	2368	1978	1383	
Annual change, mg/dL	0.48 ± 0.05	0.57 ± 0.03	0.61 ± 0.04	0.61 ± 0.04	0.65 ± 0.04	0.007
Non-HDL cholesterol, n (observations)	1332	2419	2363	1980	1393	
Annual change, mg/dL	-1.47 ± 0.14	-1.66 ± 0.11	-1.66 ± 0.11	-1.72 ± 0.12	-1.67 ± 0.13	0.30
Triglyceride, n (observations)	1321	2421	2356	1978	1389	
Annual change, mg/dL	-1.17 ± 0.23	-1.18 ± 0.17	-1.64 ± 0.18	-2.01 ± 0.19	-1.93 ± 0.22	<0.001
Glucose, n (observations)	1317	2375	1770	2507	1348	.
Annual change, mg/dL	0.35 ± 0.05	0.36 ± 0.04	0.36 ± 0.04	0.43 ± 0.04	0.44 ± 0.05	0.06

SBP, n (observations)	1441	2553	1881	2674	1453	
Annual change, mm Hg	0.20 ± 0.07	0.13 ± 0.06	0.15 ± 0.06	-0.03 ± 0.05	-0.02 ± 0.07	0.003
DBP, n (observations)	1445	2561	1884	2679	1461	
Annual change, mm Hg	-0.20 ± 0.04	-0.18 ± 0.03	-0.19 ± 0.04	-0.23 ± 0.03	-0.22 ± 0.04	0.39

^a Values are means ± SE. DBP, diastolic blood pressure; HDL, high density lipoprotein; HQ-LCDS2, high-quality low-carbohydrate diet pattern score (a second version where plain yogurt, low and reduced-fat and skim milk included in high-quality carbohydrate group); SBP, systolic blood pressure; WC, waist circumference.

^b P < 0.05 considered significant.

^c Models adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (except for WC, continuous), total energy (continuous), alcohol intake (%EI/day) , current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol) , and hypertension (for systolic and diastolic blood pressure) (yes/ no).

LQ-LCDS	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
Annual Δ WC, cm						
Model 1 ^c	0.56 $\pm$ 0.03	0.61 $\pm$ 0.02	0.62 $\pm$ 0.03	0.67 $\pm$ 0.02	0.74 $\pm$ 0.03	<0.001
Model 2 ^d	0.56 $\pm$ 0.03	0.60 $\pm$ 0.02	0.62 $\pm$ 0.03	0.67 $\pm$ 0.02	0.74 $\pm$ 0.03	<0.001
Annual Δ HDL cholesterol, mg/dL						
Model 1	0.56 $\pm$ 0.05	0.61 $\pm$ 0.03	0.57 $\pm$ 0.04	0.59 $\pm$ 0.04	0.61 $\pm$ 0.04	0.65
Model 2	0.55 $\pm$ 0.05	0.61 $\pm$ 0.03	0.57 $\pm$ 0.04	0.6 $\pm$ 0.04	0.61 $\pm$ 0.04	0.45
Model 3 ^e	0.56 $\pm$ 0.05	0.61 $\pm$ 0.03	0.57 $\pm$ 0.04	0.58 $\pm$ 0.04	0.61 $\pm$ 0.04	0.69
Annual Δ Non-HDL cholesterol, mg/dL						
Model 1	-1.71 $\pm$ 0.14	-1.67 $\pm$ 0.11	-1.75 $\pm$ 0.12	-1.55 $\pm$ 0.11	-1.59 $\pm$ 0.13	0.37
Model 2	-1.69 $\pm$ 0.14	-1.66 $\pm$ 0.11	-1.75 $\pm$ 0.12	-1.56 $\pm$ 0.11	-1.6 $\pm$ 0.13	0.47
Model 3	-1.64 $\pm$ 0.14	-1.65 $\pm$ 0.10	-1.71 $\pm$ 0.11	-1.49 $\pm$ 0.11	-1.57 $\pm$ 0.13	0.41
Annual Δ Triglyceride, mg/dL						

Model 1	-1.97 ± 0.23	-1.57 ± 0.17	-1.46 ± 0.19	-1.45 ± 0.18	-1.56 ± 0.21	0.19
Model 2	-1.99 ± 0.23	-1.58 ± 0.17	-1.46 ± 0.19	-1.45 ± 0.18	-1.55 ± 0.21	0.16
Model 3	-1.91 ± 0.23	-1.56 ± 0.17	-1.39 ± 0.19	-1.33 ± 0.18	-1.54 ± 0.21	0.15
Annual Δ Glucose, mg/dL						
Model 1	0.35 ± 0.05	0.37 ± 0.04	0.35 ± 0.04	0.39 ± 0.04	0.48 ± 0.05	0.04
Model 2	0.35 ± 0.05	0.37 ± 0.04	0.35 ± 0.04	0.39 ± 0.04	0.48 ± 0.05	0.06
Model 3	0.37 ± 0.05	0.39 ± 0.04	0.36 ± 0.04	0.41 ± 0.04	0.49 ± 0.05	0.06
Annual Δ SBP, mm Hg						
Model 1	0.21 ± 0.07	0.11 ± 0.06	0.10 ± 0.06	0.05 ± 0.06	-0.05 ± 0.07	0.01
Model 2	0.21 ± 0.07	0.12 ± 0.06	0.10 ± 0.06	0.05 ± 0.06	-0.05 ± 0.07	0.01
Model 3	0.25 ± 0.08	0.13 ± 0.06	0.11 ± 0.06	0.07 ± 0.06	-0.01 ± 0.07	0.01
Annual Δ DBP, mm Hg						
Model 1	-0.19 ± 0.04	-0.20 ± 0.03	-0.23 ± 0.03	-0.20 ± 0.03	-0.19 ± 0.04	0.95
Model 2	-0.18 ± 0.04	-0.19 ± 0.03	-0.23 ± 0.03	-0.20 ± 0.03	-0.20 ± 0.04	0.83
Model 3	-0.17 ± 0.04	-0.19 ± 0.03	-0.21 ± 0.03	-0.18 ± 0.03	-0.18 ± 0.04	0.99

^a Values are means $\pm$ SE. DBP, diastolic blood pressure; HDL, high density lipoprotein; LQ-LCDS, low-quality low-carbohydrate diet pattern score; SBP, systolic blood pressure; WC, waist circumference.

^b $P < 0.05$ considered significant.

^c Model 1 adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (except for WC, continuous), total energy (continuous), alcohol intake (%EI/day) , current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥ 1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol) , and hypertension (for SBP and DBP) (yes/ no) + physical activity index (continuous).

^d Model 2: model 1 + Multivitamins use (yes/no) and except for physical activity index.

^e Model 3: model 1 + change in waist circumference (continuous) and except for physical activity index.

Supplemental Table 9. Annual change in cardiometabolic risk factors across quintiles of LQ-LCDS 2 in the Framingham Offspring Study at exams 5 to 9 ^a

LQ-LCDS 2	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
Median	7.5	11.5	15	18	22.5	
Range	0 - 9	9.5 - 13	13.5 - 16	16.5 - 20	20.5 - 30	
WC, n (observations)	1376	2375	2102	2297	1558	
Annual change, cm ^c	0.55 ± 0.03	0.60 ± 0.02	0.63 ± 0.03	0.67 ± 0.02	0.75 ± 0.03	<0.001
HDL cholesterol, n (observations)	1340	2310	2063	2246	1526	
Annual change, mg/dL	0.57 ± 0.05	0.63 ± 0.04	0.54 ± 0.04	0.58 ± 0.04	0.61 ± 0.04	0.91
Non-HDL cholesterol, n (observations)	1339	2305	2069	2250	1524	
Annual change, mg/dL	-1.77 ± 0.14	-1.68 ± 0.11	-1.68 ± 0.11	-1.63 ± 0.11	-1.50 ± 0.13	0.15
Triglycerides, n (observations)	1327	2315	2064	2240	1517	
Annual change, mg/dL	-2.11 ± 0.23	-1.51 ± 0.17	-1.44 ± 0.19	-1.36 ± 0.18	-1.70 ± 0.21	0.19
Glucose, n (observations)	1321	2271	2032	2204	1488	
Annual change, mg/dL	0.36 ± 0.05	0.39 ± 0.04	0.34 ± 0.04	0.41 ± 0.04	0.45 ± 0.05	0.13

SBP, n (observations)	1425	2441	2160	2378	1599	
Annual change, mm Hg	0.19 ± 0.07	0.07 ± 0.06	0.14 ± 0.06	0.06 ± 0.06	-0.03 ± 0.07	0.04
DBP, n (observations)	1438	2445	2175	2374	1597	
Annual change, mm Hg	-0.17 ± 0.04	-0.24 ± 0.03	-0.18 ± 0.03	-0.20 ± 0.03	-0.20 ± 0.04	0.93

^a Values are means ± SE. DBP, Diastolic Blood Pressure; HDL, High Density Lipoprotein; LQ-LCDS2, low-quality low-carbohydrate diet pattern (a second version where plain yogurt, low and reduced-fat and skim milk included in high-quality carbohydrate group score); SBP, Systolic Blood Pressure; WC, waist circumference.

^b P < 0.05 considered significant.

^c Models adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (except for WC, continuous), total energy (continuous), alcohol intake (continuous), current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for triglyceride, HDL- and non-HDL cholesterol), and hypertension (for systolic and diastolic blood pressure) (yes/ no).

Supplemental Table 10. Annual Change in cardiometabolic risk factors across quantiles of high and low-quality LCDs in the Framingham Offspring Study at exams 5 to 9, stratified by presence of impaired fasting glucose status ^a

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	p-trend ^b
HQ-LCDS						
Glucose mg/dL, n (observations)						
Normal fasting glucose	851	1519	1100	1539	816	
Impaired fasting glucose	476	885	639	965	527	
Annual Δ Glucose mg/dL ^c						
Normal fasting glucose	0.72 ± 0.06	0.72 ± 0.05	0.67 ± 0.06	0.72 ± 0.05	0.72 ± 0.06	0.98
Impaired fasting glucose	-0.29 ± 0.11	-0.18 ± 0.08	-0.06 ± 0.10	-0.08 ± 0.08	-0.11 ± 0.11	0.18
LQ-LCDS						
Non-HDL cholesterol mg/dL, n (observations)						
Normal fasting glucose	874	1472	1254	1354	873	
Impaired fasting glucose	461	871	741	920	653	
Annual Δ Non-HDL cholesterol mg/dL						

Normal fasting glucose	-1.26 ± 0.23	-1.38 ± 0.17	-0.94 ± 0.19	-0.99 ± 0.18	-0.98 ± 0.23	0.15
Impaired fasting glucose	-2.59 ± 0.31	-2.16 ± 0.22	-2.95 ± 0.24	-2.44 ± 0.21	-2.57 ± 0.26	0.74

^a Values are means ± SE. HDL, High-density lipoprotein; HQ-LCDS, high- carbohydrates low-carbohydrate dietary pattern score; LQ-LCDS, low-quality low-carbohydrate dietary pattern score.

^b P < 0.05 considered significant.

^c Models adjusted for baseline of exam interval (exam5, exam 6, exam7, exam8), periodic baseline cardiometabolic risk value (continuous), periodic baseline age (continuous), sex (male/ female), BMI (continuous), total energy (continuous), alcohol intake (continuous) , current smoker (yes/ no), menopausal status (yes/no periods had stopped for ≥1 y), medication use for hyperglycemia (for fasting glucose), dyslipidemia (for non-HDL cholesterol) (yes/ no).