

Supplemental Table S3. Baseline Characteristics of Study Participants after KNHANES (Synthetic Data of m1–m9)-NHIS Matching according to the Development of Diabetes at the End of Follow-up

Characteristic	Progressor to diabetes	Non-progressor	P value
m1			
Total number	208	4,255	
Female sex	141 (67.80)	2,641 (62.10)	0.112
Age, yr	61.76±9.89	59.44±9.38	<0.001 ^a
Employed insurance	139 (66.80)	2,577 (60.60)	0.083
Smoking	70 (33.70)	1,408 (33.10)	0.926
Hypertension	96 (46.20)	1,127 (26.50)	<0.001 ^a
BMI, kg/m ²	25.40±3.25	23.82±2.90	<0.001 ^a
Waist circumference, cm	86.21±8.79	82.13±8.74	<0.001 ^a
Fasting plasma glucose, mg/dL	103.29±10.98	94.77±9.35	<0.001 ^a
Hemoglobin, g/dL	13.88±1.35	13.77±1.44	0.275
Systolic BP, mm Hg	119.02±17.64	119.24±18.02	0.862
Diastolic BP, mm Hg	77.06±10.66	77.26±10.86	0.799
Total cholesterol, mmol/L	199.62±33.57	194.76±35.15	0.051
Fasting insulin, μIU/mL	12.44±7.92	9.41±4.90	<0.001 ^a
HDL-C, mmol/L	49.07±10.52	48.97±11.17	0.897
Triglycerides, mmol/L	128.10±80.63	132.51±97.34	0.520
HOMA-IR	3.21±2.24	2.23±1.31	<0.001 ^a
HOMA-β	117.33±72.51	113.00±58.44	0.302
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	6 (2.90)	656 (15.40)	
HOMA-IR (low), HOMA-β (low)	46 (22.10)	1,419 (33.30)	
HOMA-IR (high), HOMA-β (high)	100 (48.10)	1,530 (36.00)	
HOMA-IR (high), HOMA-β (low)	56 (26.90)	650 (15.30)	
m2			
Total number	209	4,255	
Female sex	109 (52.20)	2,899 (63.70)	0.001 ^a
Age, yr	61.74±9.77	59.31±9.26	<0.001 ^a
Employed insurance	135 (64.6)	2,740 (60.20)	0.230
Smoking	92 (44.00)	1,492 (32.8)	0.001 ^a
Hypertension	99 (47.40)	1,244 (27.30)	<0.001 ^a
BMI, kg/m ²	24.90±3.04	23.85±2.99	<0.001 ^a
Waist circumference, cm	86.18±8.84	82.02±8.91	<0.001 ^a
Fasting plasma glucose, mg/dL	101.61±11.78	94.74±9.43	<0.001 ^a
Hemoglobin, g/dL	14.23±1.46	13.75±1.41	<0.001 ^a
Systolic BP, mm Hg	120.61±17.37	118.89±17.66	0.169
Diastolic BP, mm Hg	77.82±9.95	76.99±10.56	0.268
Total cholesterol, mmol/L	197.80±35.63	194.77±35.88	0.233
Fasting insulin, μIU/mL	10.31±5.86	9.51±5.14	0.028
HDL-C, mmol/L	47.47±10.24	49.42±11.41	0.015

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Characteristic	Progressor to diabetes	Non-progressor	P value
Triglycerides, mmol/L	129.34±78.82	130.08±96.86	0.914
HOMA-IR	2.64±1.70	2.26±1.39	<0.001 ^a
HOMA-β	101.56±53.61	472.04±24,169.66	0.825
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	17 (8.10)	676 (14.90)	
HOMA-IR (low), HOMA-β (low)	66 (31.60)	1,505 (33.10)	
HOMA-IR (high), HOMA-β (high)	66 (31.60)	1,686 (37.00)	
HOMA-IR (high), HOMA-β (low)	60 (28.70)	685 (15.00)	
m3			
Total number	209	4,255	
Female sex	120 (59.40)	2,758 (62.90)	0.355
Age, yr	62.13±9.50	59.28±9.39	<0.001 ^a
Employed insurance	115 (56.90)	2,664 (60.70)	0.313
Smoking	75 (37.10)	1,417 (32.30)	0.176
Hypertension	91 (45.00)	1,140 (26.00)	<0.001 ^a
BMI, kg/m ²	25.31±2.99	23.87±2.98	<0.001 ^a
Waist circumference, cm	86.56±8.80	82.30±8.96	<0.001 ^a
Fasting plasma glucose, mg/dL	101.77±11.18	94.83±9.44	<0.001 ^a
Hemoglobin, g/dL	14.04±1.41	13.78±1.43	0.013 ^a
Systolic BP, mm Hg	117.44±14.62	118.58±17.23	0.354
Diastolic BP, mm Hg	76.85±8.69	77.04±10.25	0.801
Total cholesterol, mmol/L	197.82±36.68	195.80±35.39	0.430
Fasting insulin, μU/mL	12.14±8.51	9.45±5.16	<0.001 ^a
HDL-C, mmol/L	48.77±10.98	48.86±11.12	0.906
Triglycerides, mmol/L	136.93±120.91	131.97±103.31	0.508
HOMA-IR	3.12±2.43	2.25±1.40	<0.001 ^a
HOMA-β	116.18±66.77	881.22±50,932.34	0.831
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	14 (6.90)	686 (15.60)	
HOMA-IR (low), HOMA-β (low)	48 (23.80)	1,466 (33.40)	
HOMA-IR (high), HOMA-β (high)	88 (43.60)	1,562 (35.60)	
HOMA-IR (high), HOMA-β (low)	52 (25.70)	672 (15.30)	
m4			
Total number	225	4,408	
Female sex	136 (60.40)	2,768 (62.80)	0.522
Age, yr	62.99±9.45	59.43±9.36	<0.001 ^a
Employed insurance	137 (60.90)	2,693 (61.10)	1.000
Smoking	80 (35.60)	1,429 (32.40)	0.365
Hypertension	102 (45.30)	1,236 (28.00)	<0.001 ^a
BMI, kg/m ²	25.22±3.21	23.77±2.91	<0.001 ^a
Waist circumference, cm	86.21±8.26	82.07±8.71	<0.001 ^a

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Characteristic	Progressor to diabetes	Non-progressor	P value
Fasting plasma glucose, mg/dL	101.99±11.00	94.85±9.12	<0.001 ^a
Hemoglobin, g/dL	13.96±1.44	13.75±1.41	0.026 ^a
Systolic BP, mm Hg	121.40±18.87	118.65±17.55	0.022 ^a
Diastolic BP, mm Hg	77.63±9.60	76.85±10.48	0.274
Total cholesterol, mmol/L	197.64±34.43	195.46±35.62	0.370
Fasting insulin, μIU/mL	11.80±8.66	9.59±5.29	<0.000 ^a
HDL-C, mmol/L	48.10±10.87	49.25±11.35	0.136
Triglycerides, mmol/L	135.69±96.14	133.71±114.40	0.799
HOMA-IR	3.04±2.50	2.28±1.42	<0.001 ^a
HOMA-β	112.96±71.76	629.18±34,212.91	0.821
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	14 (6.20)	583 (13.20)	
HOMA-IR (low), HOMA-β (low)	66 (29.30)	1,523 (34.60)	
HOMA-IR (high), HOMA-β (high)	88 (39.10)	1,684 (38.20)	
HOMA-IR (high), HOMA-β (low)	57 (25.30)	618 (14.00)	
m5			
Total number	201	4,454	
Female sex	118 (58.70)	2,775 (62.30)	0.340
Age, yr	62.79±9.34	59.33±9.24	<0.001 ^a
Employed insurance	134 (66.70)	2,698 (60.60)	0.098
Smoking	78 (38.80)	1,472 (33.00)	0.106
Hypertension	89 (44.30)	1,224 (27.50)	<0.001 ^a
BMI, kg/m ²	25.30±3.04	23.85±2.91	<0.001 ^a
Waist circumference, cm	86.46±8.68	82.25±8.76	<0.001 ^a
Fasting plasma glucose, mg/dL	101.08±10.78	94.84±9.22	<0.001 ^a
Hemoglobin, g/dL	14.09±1.32	13.79±1.43	0.003 ^a
Systolic BP, mm Hg	121.43±18.69	119.38±17.57	0.107
Diastolic BP, mm Hg	77.83±10.45	77.27±10.40	0.459
Total cholesterol, mmol/L	196.10±38.56	195.33±35.33	0.764
Fasting insulin, μIU/mL	10.88±5.94	9.43±5.15	<0.001 ^a
HDL-C, mmol/L	48.74±10.96	48.74±11.09	0.999
Triglycerides, mmol/L	127.57±82.46	134.04±104.34	0.386
HOMA-IR	2.75±1.67	2.24±1.37	<0.001 ^a
HOMA-β	107.71±53.56	676.91±37,649.91	0.830
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	14 (7.00)	588 (13.20)	
HOMA-IR (low), HOMA-β (low)	51 (25.40)	1,543 (34.60)	
HOMA-IR (high), HOMA-β (high)	82 (40.80)	1,624 (36.50)	
HOMA-IR (high), HOMA-β (low)	54 (26.90)	699 (15.70)	

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Characteristic	Progressor to diabetes	Non-progressor	P value
m6			
Total number	231	4,369	
Female sex	139 (60.20)	2,711 (62.10)	0.615
Age, yr	62.70±9.49	59.48±9.43	<0.001 ^a
Employed insurance	139 (60.20)	2,707 (62.00)	0.635
Smoking	92 (39.80)	1,415 (32.40)	0.023 ^a
Hypertension	107 (46.30)	1,190 (27.20)	<0.001 ^a
BMI, kg/m ²	24.79±3.25	23.89±2.98	<0.001 ^a
Waist circumference, cm	85.57±8.99	82.30±8.83	<0.001 ^a
Fasting plasma glucose, mg/dL	102.37±10.61	94.61±9.37	<0.001 ^a
Hemoglobin, g/dL	13.91±1.38	13.77±1.44	0.167
Systolic BP, mm Hg	120.21±20.49	119.35±17.77	0.474
Diastolic BP, mm Hg	78.27±11.19	77.49±10.61	0.276
Total cholesterol, mmol/L	196.78±38.44	195.41±34.92	0.561
Fasting insulin, μIU/mL	11.17±6.66	9.47±5.13	<0.001 ^a
HDL-C, mmol/L	46.92±9.95	49.27±11.49	0.002 ^a
Triglycerides, mmol/L	135.85±92.02	133.79±103.71	0.767
HOMA-IR	2.87±1.89	2.24±1.38	<0.001 ^a
HOMA-β	106.61±57.24	113.96±60.48	0.071
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	10 (4.30)	637 (14.60)	
HOMA-IR (low), HOMA-β (low)	54 (23.40)	1,441 (33.00)	
HOMA-IR (high), HOMA-β (high)	93 (40.30)	1,642 (37.60)	
HOMA-IR (high), HOMA-β (low)	74 (32.00)	649 (14.90)	
m7			
Total number	215	4,283	
Female sex	118 (54.90)	2,627 (61.30)	0.069
Age, yr	62.08±9.18	59.38±9.36	<0.001 ^a
Employed insurance	125 (58.10)	2,639 (61.60)	0.342
Smoking	89 (41.40)	1,456 (34.00)	0.031
Hypertension	99 (46.00)	1,157 (27.00)	<0.001 ^a
BMI, kg/m ²	25.42±3.05	23.80±2.86	<0.001 ^a
Waist circumference, cm	87.09±8.56	82.07±8.67	<0.001 ^a
Fasting plasma glucose, mg/dL	100.67±11.04	94.73±9.37	<0.001 ^a
Hemoglobin, g/dL	14.02±1.33	13.83±1.44	0.053
Systolic BP, mm Hg	120.90±18.61	119.09±17.59	0.143
Diastolic BP, mm Hg	78.08±11.40	77.28±10.60	0.285
Total cholesterol, mmol/L	196.17±38.19	195.88±34.98	0.906
Fasting insulin, μIU/mL	12.86±10.77	9.44±5.06	<0.001 ^a
HDL-C, mmol/L	49.59±10.66	48.85±11.25	0.345
Triglycerides, mmol/L	129.77±108.33	133.98±109.74	0.583

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Supplemental Table S3. Continued

Characteristic	Progressor to diabetes	Non-progressor	P value
HOMA-IR	3.30±3.17	2.24±1.35	<0.001 ^a
HOMA-β	125.03±79.24	112.25±68.06	0.008 ^a
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	13 (6.00)	594 (13.90)	
HOMA-IR (low), HOMA-β (low)	49 (22.80)	1,492 (34.80)	
HOMA-IR (high), HOMA-β (high)	100 (46.50)	1,562 (36.50)	
HOMA-IR (high), HOMA-β (low)	53 (24.70)	635 (14.80)	
m8			
Total number	220	4,307	
Female sex	117 (53.20)	2,681 (62.20)	0.009 ^a
Age, yr	61.24±9.38	59.31±9.13	0.002 ^a
Employed insurance	134 (60.90)	2,592 (60.20)	0.885
Smoking	93 (42.30)	1,410 (32.70)	0.004 ^a
Hypertension	96 (43.60)	1,137 (26.40)	<0.001 ^a
BMI, kg/m ²	25.03±3.04	23.81±3.01	<0.001 ^a
Waist circumference, cm	85.71±8.28	82.15±8.96	<0.001 ^a
Fasting plasma glucose, mg/dL	101.43±11.56	94.76±9.43	<0.001 ^a
Hemoglobin, g/dL	14.10±1.54	13.77±1.44	0.001 ^a
Systolic BP, mm Hg	119.54±17.57	118.99±17.70	0.650
Diastolic BP, mm Hg	77.80±11.37	77.30±10.58	0.491
Total cholesterol, mmol/L	198.33±36.69	195.65±35.69	0.278
Fasting insulin, μIU/mL	12.11±9.30	9.44±4.74	<0.001 ^a
HDL-C, mmol/L	47.33±10.19	49.10±11.12	0.021 ^a
Triglycerides, mmol/L	150.15±141.50	131.48±104.06	0.011 ^a
HOMA-IR	3.11±2.66	2.24±1.25	<0.001 ^a
HOMA-β	117.49±74.39	113.31±61.48	0.331
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA-β (high)	19 (8.60)	658 (15.30)	
HOMA-IR (low), HOMA-β (low)	47 (21.40)	1,379 (32.00)	
HOMA-IR (high), HOMA-β (high)	83 (37.70)	1,601 (37.20)	
HOMA-IR (high), HOMA-β (low)	71 (32.30)	669 (15.50)	
m9			
Total number	223	4,330	
Female sex	137 (61.40)	2,670 (61.70)	1.000
Age, yr	63.21±9.06	59.34±9.28	<0.001 ^a
Employed insurance	152 (68.20)	2,577 (59.50)	0.012 ^a
Smoking	81 (36.30)	1,407 (32.50)	0.265
Hypertension	90 (40.40)	1,224 (28.30)	<0.001 ^a
BMI, kg/m ²	24.81±2.99	23.84±2.94	<0.001 ^a
Waist circumference, cm	85.18±9.35	82.12±8.61	<0.001 ^a
Fasting plasma glucose, mg/dL	101.84±9.87	94.91±9.39	<0.001 ^a

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Supplemental Table S3. Continued

Characteristic	Progressor to diabetes	Non-progressor	<i>P</i> value
Hemoglobin, g/dL	13.83±1.34	13.78±1.47	0.633
Systolic BP, mm Hg	120.22±18.07	119.14±17.69	0.378
Diastolic BP, mm Hg	76.87±10.59	77.34±10.26	0.497
Total cholesterol, mmol/L	197.66±36.36	195.62±35.29	0.400
Fasting insulin, μ IU/mL	11.32±6.17	9.55±5.52	<0.001 ^a
HDL-C, mmol/L	48.65±10.50	48.85±11.20	0.798
Triglycerides, mmol/L	141.84±101.86	132.29±99.83	0.164
HOMA-IR	2.86±1.68	2.27±1.49	<0.001 ^a
HOMA- β	110.92±60.87	114.04±65.24	0.485
HOMA-IR, β			<0.001 ^a
HOMA-IR (low), HOMA- β (high)	10 (4.50)	605 (14.00)	
HOMA-IR (low), HOMA- β (low)	53 (23.80)	1,471 (34.00)	
HOMA-IR (high), HOMA- β (high)	92 (41.30)	1,611 (37.20)	
HOMA-IR (high), HOMA- β (low)	68 (30.50)	643 (14.80)	

Values are expressed as number (%) or mean±standard deviation. *P* values were calculated using Student's *t* test or chi-square test.

KNHANES, Korea National Health and Nutrition Examination Survey; NHIS, National Health Insurance Service; BMI, body mass index; BP, blood pressure; HDL-C, high-density lipoprotein cholesterol; HOMA-IR, homeostasis model assessment of insulin resistance; HOMA- β , homeostasis model assessment of β -cell function.

^aStatistical significance.