Figure S1 Patterns of missing data
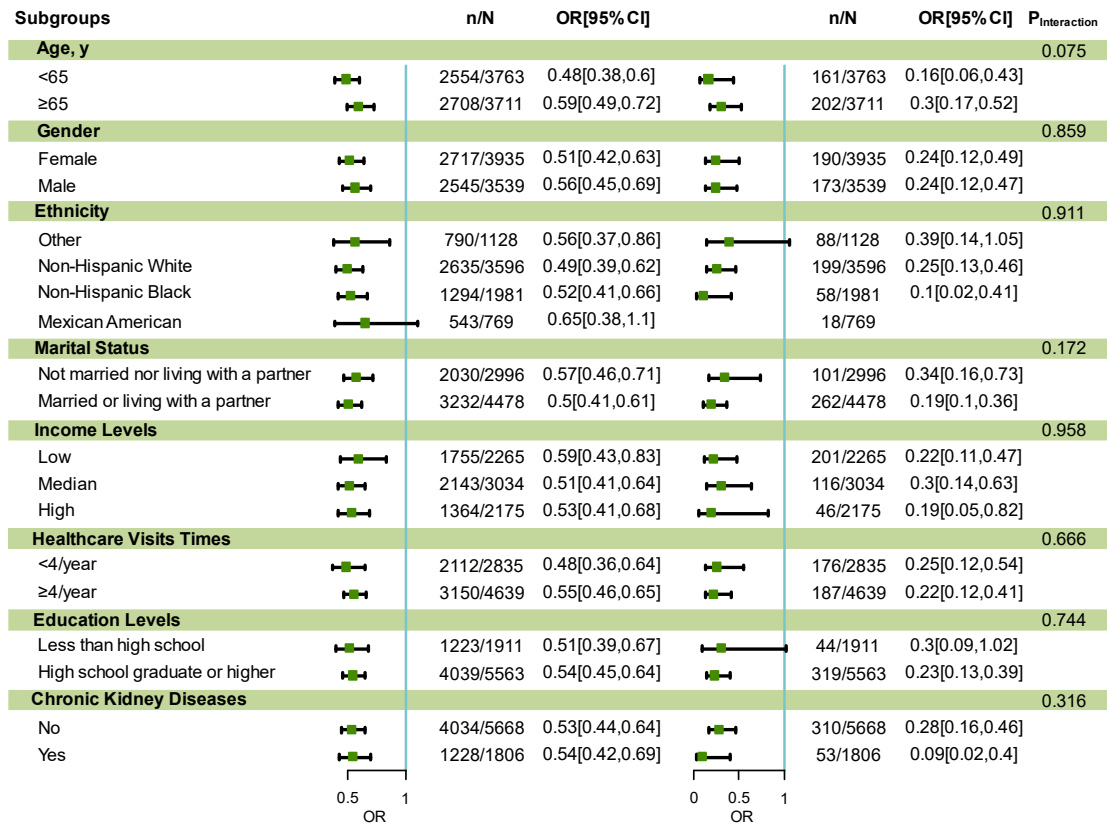
| Subgroups | | n/N | OR[95% CI] | | n/N | OR[95% CI] | $P_{Interaction}$ |
|---|---|---|---|---|---|---|---|
| **Age, y** | | | | | | | 0.075 |
| <65 | | 2554/3763 | 0.48[0.38,0.6] | | 161/3763 | 0.16[0.06,0.43] | |
| ≥65 | | 2708/3711 | 0.59[0.49,0.72] | | 202/3711 | 0.3[0.17,0.52] | |
| **Gender** | | | | | | | 0.859 |
| Female | | 2717/3935 | 0.51[0.42,0.63] | | 190/3935 | 0.24[0.12,0.49] | |
| Male | | 2545/3539 | 0.56[0.45,0.69] | | 173/3539 | 0.24[0.12,0.47] | |
| **Ethnicity** | | | | | | | 0.911 |
| Other | | 790/1128 | 0.56[0.37,0.86] | | 88/1128 | 0.39[0.14,1.05] | |
| Non-Hispanic White | | 2635/3596 | 0.49[0.39,0.62] | | 199/3596 | 0.25[0.13,0.46] | |
| Non-Hispanic Black | | 1294/1981 | 0.52[0.41,0.66] | | 58/1981 | 0.1[0.02,0.41] | |
| Mexican American | | 543/769 | 0.65[0.38,1.1] | | 18/769 | | |
| **Marital Status** | | | | | | | 0.172 |
| Not married nor living with a partner | | 2030/2996 | 0.57[0.46,0.71] | | 101/2996 | 0.34[0.16,0.73] | |
| Married or living with a partner | | 3232/4478 | 0.5[0.41,0.61] | | 262/4478 | 0.19[0.1,0.36] | |
| **Income Levels** | | | | | | | 0.958 |
| Low | | 1755/2265 | 0.59[0.43,0.83] | | 201/2265 | 0.22[0.11,0.47] | |
| Median | | 2143/3034 | 0.51[0.41,0.64] | | 116/3034 | 0.3[0.14,0.63] | |
| High | | 1364/2175 | 0.53[0.41,0.68] | | 46/2175 | 0.19[0.05,0.82] | |
| **Healthcare Visits Times** | | | | | | | 0.666 |
| <4/year | | 2112/2835 | 0.48[0.36,0.64] | | 176/2835 | 0.25[0.12,0.54] | |
| ≥4/year | | 3150/4639 | 0.55[0.46,0.65] | | 187/4639 | 0.22[0.12,0.41] | |
| **Education Levels** | | | | | | | 0.744 |
| Less than high school | | 1223/1911 | 0.51[0.39,0.67] | | 44/1911 | 0.3[0.09,1.02] | |
| High school graduate or higher | | 4039/5563 | 0.54[0.45,0.64] | | 319/5563 | 0.23[0.13,0.39] | |
| **Chronic Kidney Diseases** | | | | | | | 0.316 |
| No | | 4034/5668 | 0.53[0.44,0.64] | | 310/5668 | 0.28[0.16,0.46] | |
| Yes | | 1228/1806 | 0.54[0.42,0.69] | | 53/1806 | 0.09[0.02,0.4] | |

0.5 1
OR

0 0.5 1
OR

Figure S2 Odds Ratios for Middle and High Levels of Life's Essentials Compared to Low Level in Subgroup Analyses. $P_{Interaction}$, p values for interaction. For binary variables (age, gender, marital status, healthcare visits times, education levels, and chronic kidney diseases ), p-values of the interaction obtained by directly adding it to the model; for multiple category variables (ethnicity and income levels), p values of the difference between the model with interaction and the model without interaction compared by likelihood ratio test.

Table S1 Classes of Antihypertension Drugs [1]

| Class | | Drug |
|---|---|---|
| Diuretics | Thiazide or thiazide-type diuretics | Chlorthalidone |
| | | Hydrochlorothiazide |
| | | Indapamide |
| | | Metolazone |
| | Diuretics-loop | Bumetanide |
| | | Furosemide |
| | | Torsemide |
| | Diuretics-potassium sparing | Amiloride |
| | | Triamterene |
| | Diuretics-aldosterone antagonists | Eplerenone |
| | | Spironolactone |
| Angiotensin-converting enzyme inhibitors | | Benazepril |
| | | Captopril |
| | | Enalapril |
| | | Fosinopril |
| | | Lisinopril |
| | | Moexipril |
| | | Perindopril |
| | | Quinapril |
| | | Ramipril |
| | | Trandolapril |
| Angiotensin receptor blocker | | Azilsartan |
| | | Candesartan |
| | | Eprosartan |
| | | Irbesartan |
| | | Losartan |
| | | Olmesartan |
| | | Telmisartan |
| | | Valsartan |
| Calcium channel blockers (CCB) | CCB-dihydropyridines | Amlodipine |
| | | Felodipine |
| | | Isradipine |
| | | Nicardipine SR |
| | | Nifedipine LA |
| | | Nisoldipine |
| | CCB-non dihydropyridines | Diltiazem ER |
| | | Verapamil IR |
| | | Verapamil SR |
| | | Verapamil-delayed onset ER |

| | | |
|---|---|---|
| Beta Blockers | Beta blockers-cardioselective | Atenolol |
| | | Betaxolol |
| | | Bisoprolol |
| | | Metoprolol tartrate |
| | | Metoprolol succinate |
| | Beta blockers- cardioselective and vasodilatory Beta blockers-noncardioselective | Nebivolol |
| | | Nadolol |
| | | Propranolol IR |
| | | Propranolol LA |
| | Beta blockers-intrinsic sympathomimetic activity | Acebutolol |
| | | Penbutolol |
| | | Pindolol |
| | Beta blockers-combined alpha- and beta-receptor | Carvedilol |
| | | Carvedilol phosphate |
| | | Labetalol |
| Direct renin inhibitor | | Aliskiren |
| Alpha-1 blockers | | Doxazosin |
| | | Prazosin |
| | | Terazosin |
| Central aloha2-agonist and other centrally acting drugs | | Clonidine oral |
| | | Clonidine patch |
| | | Methyldopa |
| | | Guanfacine |
| Direct Vasodilators | | Hydralazine |
| | | Minoxidil |

IR, immediate release; LA, long-acting; and SR, sustained release

Table S2 Calculation method for life's essential 8 [2]

| Life's Essential 8 metric | Method of measurement | Quantification of Life's Essential 8 metric |
|---|---|---|
| Diet | Measurement: healthy eating index-2015 (HEI-2015) | Quantiles of HEI-2015 (population)<br>Points    Quantile<br>100    ≥95th percentile (top/ideal diet)<br>80    75th–94th percentile<br>50    50th–74th percentile<br>25    25th–49th percentile<br>0    1st–24th percentile (bottom/least ideal quartile) |
| Physical Activity (PA) | Measurement: Self-reported minutes of moderate or vigorous PA per week<br>Example tools for measurement: NHANES PAQ-K questionnaire[3] | Metric: Minutes of moderate- (or greater) intensity activity per week<br>Scoring:<br>Points    Minutes<br>100    ≥150<br>90    120–149<br>80    90–119<br>60    60–89<br>40    30–59<br>20    1–29<br>0    0 |
| Nicotine exposure | Measurement: Self-reported use of cigarettes or inhaled NDS<br>Example tools for measurement: NHANES SMQ[4] | Metric: Combustible tobacco use or inhaled NDS use; or secondhand smoke exposure<br>Scoring:<br>Points    Status<br>100    Never smoker |

| | | |
|---|---|---|
| | 75 | Former smoker, quit ≥5 y |
| | 50 | Former smoker, quit 1–<5 y |
| | 25 | Former smoker, quit <1 y, or currently using inhaled NDS |
| | 0 | Current smoker |
| | Subtract 20 points (unless score is 0) for living with active indoor smoker in home | |
| Sleep health | Measurement: Self-reported average hours of sleep per night<br>Example tools for measurement: "On average, how many hours of sleep do you get per night?"<br>Consider objective sleep/ actigraphy data from wearable technology if available | Metric: Average hours of sleep per night<br>Scoring:<br>Points    Level<br>100    7–<9<br>90    9–<10<br>70    6–<7<br>40    5–<6 or ≥10<br>20    4–<5<br>0    <4 |
| Body Mass Index | Measurement: Body weight (kilograms) divided by height squared (meters squared) Example tools for measurement: Objective measurement of height and weight | Metric: BMI (kg/m2)<br>Scoring:<br>Points    Level<br>100    <25<br>70    25.0–29.9<br>30    30.0–34.9<br>15    35.0–39.9<br>0    ≥40.0 |
| Blood lipids | Measurement: Plasma total and HDL cholesterol with calculation of non–HDL | Metric: Non–HDL cholesterol (mg/dL)<br>Scoring: |

| | | |
|---|---|---|
| | cholesterol Example tools for measurement: Fasting or non-fasting blood sample | Points Level<br>100 <130<br>60 130–159<br>40 160–189<br>20 190–219<br>0 ≥220<br>If drug-treated level, subtract 20 points |
| Blood glucose | Measurement: FBG or casual HbA1c<br>Example tools for measurement: Fasting (FBG, HbA1c) or non-fasting (HbA1c) blood sample | Metric: FBG (mg/dL) or HbA1c (%)<br>Scoring:<br>Points Level<br>100 No history of diabetes and FBG <100 (or HbA1c <5.7)<br>60 No diabetes and FBG 100–125 (or HbA1c 5.7–6.4) (prediabetes)<br>40 Diabetes with HbA1c <7.0<br>30 Diabetes with HbA1c 7.0–7.9<br>20 Diabetes with HbA1c 8.0–8.9<br>10 Diabetes with Hb A1c 9.0–9.9<br>0 Diabetes with HbA1c ≥10.0 |
| Blood Pressure (BP) | Measurement: Appropriately measured systolic and diastolic BPs<br>Example tools for measurement: Appropriately sized BP cuff | Metric: Systolic and diastolic BPs (mmHg)<br>Scoring:<br>Points Level<br>100 <120/<80 (optimal)<br>75 120–129/<80 (elevated)<br>50 130–139 or 80–89 (stage 1hypertension)<br>25 140–159 or 90–99 |

| | 0 | ≥160 or ≥100 |
|---|---|---|
| | | Subtract 20 points if treated level |

HEI-2015 is designed to be scored from zero to 100, and than Identify the set of foods under consideration, determine the amount of each relevant dietary constituent, and derive the pertinent densities and score each HEI component using the relevant standards.[5]

To assess self-reported PA, participants were asked the frequency and duration of recreational physical activities over the past 30 days.

The assessment of smoking status was conducted through the administration of questionnaires that inquired about cigarette consumption over a span of 30 days, as well as the utilization of e-cigarettes or other forms of tobacco within a 5-day timeframe.

Sleep health was assessed with interviewer-administered questions about sleep habits and disorders.

BMI was calculated as the weight in kilograms divided by the square of the height in meters from standardized height and weight measurements.

Blood samples were obtained and sent to central laboratories for the determination of blood lipids, plasma glucose, and hemoglobin A1c. BP was measured manually after 5 minutes of seated rest in a quiet room and determination of the maximal inflation level; 3 measurement attempts were recorded, and we averaged the readings after excluding.

Overall CVH was calculated for each individual by summing the scores for each of the 8 metrics together and dividing the total by 8, to provide a LE8 score ranging from 0 to 100

Table S3 Association between life's essential 8 and 1~2 antihypertensive drugs uncontrolled hypertension and 3~4 antihypertensive drugs uncontrolled hypertensions

| Life's Essential 8 | Model1[a] | P Values | Model2[a] | P Values | Model3[a] | P Values |
|---|---|---|---|---|---|---|
| Uncontrolled Hypertension in 1~2 Antihypertensive Drugs[b] | | | | | | |
| Low | Ref | Ref | Ref | Ref | Ref | Ref |
| Median | 0.63[0.54,0.72] | <0.001 | 0.62[0.54,0.73] | <0.001 | 0.65[0.56,0.76] | <0.001 |
| High | 0.39[0.24,0.64] | <0.001 | 0.4[0.24,0.66] | <0.001 | 0.46[0.28,0.76] | 0.003 |
| P Values for Trend | <0.001 | | <0.001 | | <0.001 | |
| Uncontrolled Hypertension in 3~4 Antihypertensive Drugs[c] | | | | | | |
| Low | Ref | Ref | Ref | Ref | Ref | Ref |
| Median | 0.61[0.41,0.92] | 0.017 | 0.61[0.4,0.93] | 0.022 | 0.59[0.39,0.9] | 0.015 |
| High | 0.1[0.04,0.26] | <0.001 | 0.08[0.03,0.24] | <0.001 | 0.07[0.02,0.2] | <0.001 |
| P Values for Trend | <0.001 | | <0.001 | | <0.001 | |

[a] odd ratios (OR) and 95% confidence intervals (CI) were calculated by logistic regressions. b Uncontrolled Hypertension in 1~2 Antihypertensive Drugs was defined as hypertension which was uncontrolled with 1~2 antihypertensive drugs or using 3 or more antihypertensive drugs; c Uncontrolled Hypertension in 3~4 Antihypertensive Drugs was defined as participants with resistant hypertension with uncontrolled hypertension in 4 antihypertensive drugs or using 5 or more antihypertensive drugs; Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, marital status, income level, healthcare visit times last years, educational level and data cycles; Model3, Model2 +chronic kidney diseases.

Table S4 Association between life's essential 8 and resistant hypertension in sensitivity analyses

| Life's Essential 8 | Model1[a] | P Values | Model2[a] | P Values | Model3[a] | P Values |
|---|---|---|---|---|---|---|
| Cutoff= 140/90mmHg[b] | | | | | | |
| Low | Ref | Ref | Ref | Ref | Ref | Ref |
| Median | 0.49[0.42,0.57] | <0.001 | 0.49[0.41,0.57] | <0.001 | 0.5[0.43,0.59] | <0.001 |

| | Model1 | | Model2 | | Model3 | |
| --- | --- | --- | --- | --- | --- | --- |
| High | 0.25[0.15,0.4] | <0.001 | 0.26[0.16,0.43] | <0.001 | 0.28[0.17,0.47] | <0.001 |
| P Values for Trend | <0.001 | | <0.001 | | <0.001 | |
| **Complete-case Analysis (n=6741)[c]** | | | | | | |
| Low | Ref | Ref | Ref | Ref | Ref | Ref |
| Median | 0.49[0.42,0.57] | <0.001 | 0.49[0.42,0.58] | <0.001 | 0.51[0.44,0.6] | <0.001 |
| High | 0.2[0.12,0.34] | <0.001 | 0.22[0.13,0.36] | <0.001 | 0.24[0.14,0.39] | <0.001 |
| P Values for Trend | <0.001 | | <0.001 | | <0.001 | |
| **Life's Essential 8 in Continuous[d]** | | | | | | |
| Per 1 SD | 0.64[0.6,0.69] | <0.001 | 0.63[0.58,0.68] | <0.001 | 0.64[0.59,0.7] | <0.001 |
| **Without Blood Pressure in LE8[e]** | | | | | | |
| Low | Ref | Ref | Ref | Ref | Ref | Ref |
| Median | 0.6[0.51,0.71] | <0.001 | 0.6[0.51,0.72] | <0.001 | 0.63[0.53,0.74] | <0.001 |
| High | 0.45[0.34,0.6] | <0.001 | 0.46[0.34,0.62] | <0.001 | 0.5[0.36,0.67] | <0.001 |
| P Values for Trend | <0.001 | | <0.001 | | <0.001 | |

[a] Odds ratios (OR) and their respective 95% confidence intervals (CI) were computed using logistic regression analysis. [b] The criteria for defining resistant hypertension were set at a blood pressure threshold of 140/90 mmHg. [c] Analyses were restricted to participants with complete data, excluding cases with missing data. [d] OR values were standardized for Life's Essential 8 by expressing the change in OR for every one standard deviation (SD). [e] Life's Essential 8 scores were calculated after excluding components related to blood pressure. Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, marital status, income level, healthcare visit times last years, educational level and data cycles; Model3, Model2 +chronic kidney diseases.

## References

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