**Predicted cardiovascular risk and blood pressure for Americans with diabetes, chronic kidney disease, and ≥65 years of age**

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**MAIN RESULTS**

Table 1: Characteristics of US adults overall and with diabetes, chronic kidney disease, ≥ 65 years of age, and any of the preceding conditions

|  | | **Sub-groups** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristic\*** | **Overall  N = 8,797** | **Diabetes  N = 1,998†** | **Chronic kidney disease  N = 1,566‡** | **Diabetes and chronic kidney disease  N = 689** | **Age 65+ years  N = 2,501** | **Any preceding condition  N = 4,183** |
| Age, years | 56.7 (0.22) | 60.3 (0.35) | 61.8 (0.42) | 62.2 (0.54) | 70.6 (0.14) | 64.2 (0.25) |
| Male | 48.2 | 55.8 | 44.8 | 52.9 | 46.7 | 48.0 |
| Race / ethnicity | | | | | | |
| Hispanic | 12.6 | 15.9 | 13.1 | 15.6 | 8.3 | 11.7 |
| Non-Hispanic Asian | 5.2 | 7.0 | 4.9 | 6.4 | 4.5 | 5.2 |
| Non-Hispanic White | 68.6 | 60.0 | 63.4 | 59.3 | 76.7 | 68.8 |
| Non-Hispanic Black | 10.1 | 13.6 | 15.0 | 15.6 | 7.8 | 10.9 |
| Other Race - Including Multi-Racial | 3.5 | 3.5 | 3.7 | 3.1 | 2.7 | 3.3 |
| Total cholesterol, mg/dl | 197.0 (0.92) | 183.2 (1.8) | 194.6 (1.8) | 186.6 (3.0) | 188.9 (1.3) | 191.1 (1.2) |
| HDL-cholesterol, mg/dl | 54.9 (0.36) | 46.6 (0.51) | 53.0 (0.85) | 45.6 (0.69) | 56.6 (0.72) | 53.7 (0.48) |
| Systolic blood pressure, mm Hg | 126.0 (0.33) | 130.5 (0.65) | 134.2 (0.74) | 136.1 (1.2) | 131.8 (0.60) | 131.0 (0.48) |
| Diastolic blood pressure, mm Hg | 72.8 (0.28) | 71.6 (0.39) | 72.4 (0.37) | 71.4 (0.59) | 68.3 (0.40) | 70.9 (0.35) |
| Antihypertensive medication use | 33.5 | 60.0 | 55.9 | 66.3 | 53.2 | 52.1 |
| Diabetes | 17.2 | 100.0 | 38.3 | 100.0 | 24.7 | 41.9 |
| Chronic kidney disease | 14.1 | 31.3 | 100.0 | 100.0 | 25.3 | 34.3 |
| Aged 65+ years | 25.4 | 36.4 | 45.6 | 45.0 | 100.0 | 61.9 |
| Current smoker | 17.3 | 14.6 | 19.1 | 15.9 | 10.0 | 14.4 |
| Prevalent CVD§ | 10.5 | 22.6 | 23.3 | 29.3 | 21.4 | 19.3 |
| \*Table values are mean (standard error) or proportion. | | | | | | |
| †Diabetes was defined by fasting serum glucose ≥ 126 mg/dL, non-fasting glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or self-reported use of insulin or oral glucose lowering medication. | | | | | | |
| ‡Chronic kidney disease is defined by an albumin-to-creatinine ratio ≥ 30 mg/dl or an estimated glomerular filtration rate <60 ml/min/1.73m² | | | | | | |
| §Prevalent cardiovascular disease was defined by self-report of previous heart failure, coronary heart disease, stroke, or myocardial infarction | | | | | | |
| CVD = cardiovascular disease; HDL = High density lipoprotein | | | | | | |

Table 2: Estimated distribution of blood pressure categories among US adults, overall and for subgroups with diabetes, chronic kidney disease, ≥ 65 years of age, or any of the preceding three conditions.

|  | | **Sub-groups** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Blood pressure category\*** | **Overall  N = 8,797** | **Diabetes  N = 1,998†** | **Chronic kidney disease  N = 1,566‡** | **Diabetes and chronic kidney disease  N = 689** | **Age 65+ years  N = 2,501** | **Any preceding condition  N = 4,183** |
| Normal blood pressure | 28.8 | 12.1 | 13.5 | 7.2 | 15.0 | 15.5 |
| Elevated blood pressure | 12.0 | 7.9 | 6.7 | 4.1 | 11.2 | 10.4 |
| Stage 1 hypertension | 14.6 | 10.5 | 9.5 | 7.6 | 9.1 | 10.4 |
| Stage 2 hypertension | 11.1 | 9.5 | 14.5 | 14.8 | 11.6 | 11.7 |
| Taking antihypertensive medication | 33.5 | 60.0 | 55.9 | 66.3 | 53.2 | 52.1 |
| \*Normal blood pressure: systolic/diastolic blood pressure < 120/80 mm Hg; Elevated blood pressure: systolic/diastolic blood pressure 120-129/<80 mm Hg; Stage 1 hypertension: systolic/diastolic blood pressure 130-139/80-89 mm Hg; Stage 2 hypertension: systolic/diastolic blood pressure ≥ 140/90 mm Hg. | | | | | | |
| †Diabetes was defined by fasting serum glucose ≥ 126 mg/dL, non-fasting glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or self-reported use of insulin or oral glucose lowering medication. | | | | | | |
| ‡Chronic kidney disease is defined by an albumin-to-creatinine ratio ≥ 30 mg/dl or an estimated glomerular filtration rate <60 ml/min/1.73m² | | | | | | |

Table 3: Predicted atherosclerotic cardiovascular risk among US adults with diabetes, chronic kidney disease, ≥ 65 years of age, and any of the preceding conditions, overall and by BP category.

|  | | **Sub-groups** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Blood pressure category\*** | **Overall  N = 8,797** | **Diabetes  N = 1,998†** | **Chronic kidney disease  N = 1,566‡** | **Diabetes and chronic kidney disease  N = 689** | **Age 65+ years  N = 2,501** | **Any preceding condition  N = 4,183** |
| *Proportion (95% confidence interval) with predicted risk ≥ 10% or prevalent cardiovascular disease§‖* | | | | | | |
| Overall | 36.6 (34.7, 38.6) | 72.5 (69.3, 75.6) | 65.4 (61.7, 69.0) | 81.2 (76.7, 85.8) | 83.8 (81.6, 86.0) | 70.3 (68.0, 72.7) |
| Normal blood pressure | 13.7 (11.4, 16.0) | 46.8 (39.0, 54.6) | 32.3 (21.6, 43.0) | 58.6 (38.4, 78.7) | 64.4 (57.7, 71.2) | 46.3 (40.5, 52.1) |
| Elevated blood pressure | 27.4 (23.3, 31.5) | 57.7 (49.6, 65.8) | 47.9 (36.9, 59.0) | 58.5 (42.4, 74.6) | 69.8 (59.6, 79.9) | 57.9 (50.5, 65.3) |
| Stage 1 hypertension | 24.3 (20.7, 27.9) | 55.0 (43.7, 66.4) | 38.5 (27.4, 49.6) | 48.7 (30.2, 67.3) | 72.6 (63.2, 81.9) | 55.2 (47.0, 63.3) |
| Stage 2 hypertension | 45.7 (40.4, 51.0) | 79.0 (69.3, 88.7) | 65.6 (54.7, 76.4) | 84.4 (73.0, 95.8) | 90.2 (83.8, 96.6) | 75.6 (69.5, 81.7) |
| Taking antihypertensive medication | 61.9 (59.4, 64.5) | 81.6 (78.0, 85.2) | 79.9 (75.9, 84.0) | 88.1 (82.0, 94.2) | 92.8 (91.0, 94.5) | 81.8 (79.4, 84.2) |
| *Median (25th - 75th percentile) predicted risk¶* | | | | | | |
| Overall | 5.1 (1.9, 11.4) | 14.4 (7.0, 27.3) | 12.1 (4.8, 22.8) | 19.3 (9.3, 31.6) | 17.9 (11.2, 27.3) | 13.6 (7.0, 22.3) |
| Normal blood pressure | 2.0 (0.79, 4.8) | 6.8 (2.9, 15.8) | 3.0 (0.96, 8.1) | 9.1 (3.3, 24.6) | 10.6 (6.7, 16.0) | 7.0 (3.3, 12.9) |
| Elevated blood pressure | 4.3 (1.9, 9.3) | 11.4 (4.2, 17.3) | 6.2 (1.5, 13.8) | 9.2 (3.4, 17.2) | 14.6 (7.5, 19.9) | 11.8 (5.8, 17.4) |
| Stage 1 hypertension | 4.2 (1.9, 8.5) | 8.9 (4.5, 19.3) | 6.8 (2.6, 12.3) | 8.5 (4.6, 18.9) | 13.8 (8.6, 22.3) | 9.8 (5.3, 16.6) |
| Stage 2 hypertension | 8.1 (4.2, 16.0) | 18.8 (10.1, 30.2) | 13.9 (5.7, 21.3) | 19.0 (10.9, 30.3) | 20.4 (16.0, 29.6) | 17.3 (9.2, 25.4) |
| Taking antihypertensive medication | 10.5 (5.2, 19.8) | 17.2 (9.8, 31.6) | 17.0 (9.0, 29.0) | 22.4 (12.0, 36.5) | 21.2 (14.0, 31.6) | 17.2 (10.1, 27.3) |
| \*Normal blood pressure: systolic/diastolic blood pressure < 120/80 mm Hg; Elevated blood pressure: systolic/diastolic blood pressure 120-129/<80 mm Hg; Stage 1 hypertension: systolic/diastolic blood pressure 130-139/80-89 mm Hg; Stage 2 hypertension: systolic/diastolic blood pressure ≥ 140/90 mm Hg. | | | | | | |
| †Diabetes was defined by fasting serum glucose ≥ 126 mg/dL, non-fasting glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or self-reported use of insulin or oral glucose lowering medication. | | | | | | |
| ‡Chronic kidney disease is defined by an albumin-to-creatinine ratio ≥ 30 mg/dl or an estimated glomerular filtration rate <60 ml/min/1.73m² | | | | | | |
| §Prevalent cardiovascular disease was defined by self-report of previous heart failure, coronary heart disease, stroke, or myocardial infarction | | | | | | |
| ‖Predicted risk for cardiovascular disease was computed using the Pooled Cohort Risk equations, based on the guideline by American College of Cardiology / American Heart Association, 2013 | | | | | | |
| ¶Data from survey participants with prevalent cardiovascular disease were not included for these statistics | | | | | | |

Figure 1: Distribution of 10-year predicted atherosclerotic cardiovascular risk among survey participants with predicted risk < 10% and diabetes, chronic kidney disease, ≥ 65 years of age, or any of the preceding conditions.



Results do not include data from survey participants with prevalent cardiovascular disease or 10-year predicted risk for atherosclerotic cardiovascular disease ≥ 10%.

Figure 2: Ten-year predicted risk for atherosclerotic cardiovascular disease as a function of age for survey participants overall and among those with diabetes, chronic kidney disease, or both diabetes and chronic kidney disease.



Figure 3: Probability of ten-year predicted risk for atherosclerotic cardiovascular disease ≥ 10% as a function of age for survey participants overall and among those with diabetes, chronic kidney disease, or both diabetes and chronic kidney disease.



**SUPPLEMENT**

Table S1: Participants included in the current analysis

| **Criteria** | **N included** | **N excluded** |
| --- | --- | --- |
| Participated in 2013-2014, 2015-2016, or 2017-2018 exam | 29,400 | 0 |
| Aged 40-79 years | 10,308 | 19,092 |
| Valid survey weight values | 9,937 | 371 |
| 3 or more systolic and diastolic blood pressure measurements | 9,372 | 565 |
| Complete data for variables used in the pooled cohort risk equations | 8,797 | 575 |

Table S2: Characteristics of US adults with stage 1 hypertension, overall and with diabetes, chronic kidney disease, ≥ 65 years of age, or any of the three preceding conditions

|  | | **Sub-groups** | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristic\*** | **Overall  N = 1,271** | **Diabetes  N = 204†** | **Chronic kidney disease  N = 155‡** | **Diabetes and chronic kidney disease  N = 57** | **Age 65+ years  N = 236** | **Any preceding condition  N = 453** |
| Age, years | 54.0 (0.41) | 56.8 (1.2) | 57.0 (1.2) | 56.0 (2.1) | 69.7 (0.45) | 61.5 (0.78) |
| Male | 52.3 | 58.5 | 48.8 | 66.0 | 51.5 | 51.9 |
| Race / ethnicity | | | | | | |
| Hispanic | 14.2 | 19.9 | 19.2 | 28.2 | 10.3 | 15.1 |
| Non-Hispanic Asian | 6.0 | 7.6 | 7.0 | 4.6 | 4.2 | 6.0 |
| Non-Hispanic White | 66.3 | 60.0 | 59.1 | 52.9 | 73.8 | 65.5 |
| Non-Hispanic Black | 9.8 | 11.4 | 12.7 | 11.7 | 7.4 | 10.3 |
| Other Race - Including Multi-Racial | 3.7 | 1.2 | 1.9 | 2.5 | 4.4 | 3.1 |
| Total cholesterol, mg/dl | 205.0 (2.4) | 188.8 (4.6) | 198.4 (5.0) | 197.2 (9.6) | 195.4 (3.5) | 195.8 (2.9) |
| HDL-cholesterol, mg/dl | 54.0 (0.73) | 47.1 (1.5) | 53.2 (2.3) | 46.0 (3.2) | 57.9 (1.4) | 53.8 (1.0) |
| Systolic blood pressure, mm Hg | 129.6 (0.31) | 131.1 (0.66) | 131.2 (0.68) | 132.1 (1.2) | 132.5 (0.59) | 131.3 (0.43) |
| Diastolic blood pressure, mm Hg | 78.6 (0.39) | 76.7 (0.96) | 76.5 (0.81) | 76.2 (1.5) | 72.2 (1.0) | 75.3 (0.64) |
| Antihypertensive medication use | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Diabetes | 12.3 | 100.0 | 30.7 | 100.0 | 21.0 | 42.4 |
| Chronic kidney disease | 9.1 | 22.6 | 100.0 | 100.0 | 16.1 | 31.3 |
| Aged 65+ years | 15.7 | 26.9 | 27.8 | 18.6 | 100.0 | 54.2 |
| Current smoker | 19.3 | 18.8 | 23.3 | 20.7 | 10.7 | 16.4 |
| Prevalent CVD§ | 5.8 | 15.2 | 12.8 | 16.1 | 13.2 | 11.4 |
| \*Table values are mean (standard error) or proportion. | | | | | | |
| †Diabetes was defined by fasting serum glucose ≥ 126 mg/dL, non-fasting glucose ≥ 200 mg/dL, HbA1c ≥ 6.5%, or self-reported use of insulin or oral glucose lowering medication. | | | | | | |
| ‡Chronic kidney disease is defined by an albumin-to-creatinine ratio ≥ 30 mg/dl or an estimated glomerular filtration rate <60 ml/min/1.73m² | | | | | | |
| §Prevalent cardiovascular disease was defined by self-report of previous heart failure, coronary heart disease, stroke, or myocardial infarction | | | | | | |
| CVD = cardiovascular disease; HDL = High density lipoprotein | | | | | | |

Figure S1: Distribution of 10-year predicted atherosclerotic cardiovascular risk among survey participants with stage 1 hypertension, predicted risk < 10% and diabetes, chronic kidney disease, ≥ 65 years of age, or any of the preceding conditions.



Results do not include data from survey participants with prevalent cardiovascular disease or 10-year predicted risk for atherosclerotic cardiovascular disease ≥ 10%.

Figure S2: Ten-year predicted risk for atherosclerotic cardiovascular disease as a function of age for participants with stage 1 hypertension overall and among those with diabetes, chronic kidney disease, or both diabetes and chronic kidney disease.



Figure S3: Probability of ten-year predicted risk for atherosclerotic cardiovascular disease ≥ 10% as a function of age for participants with stage 1 hypertension overall and among those with diabetes, chronic kidney disease, or both diabetes and chronic kidney disease.

