**Supplementary Tables and Figures**

Table of Contents

[Supplementary Table 1. ICD-9-CM codes and ICD-10-CM codes relevant to fracture 2](#_Toc188002800)

[Supplementary Table 2. Baseline characteristics of included and excluded cohorts at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992) 4](#_Toc188002801)

[Supplementary Table 3. Number of fracture cases by fracture site at visit 2 and visit 5. 6](#_Toc188002802)

[Supplementary Table 4. Adjusted hazard ratios of risk of hospitalization with primary diagnosis of fracture by clinical categories of each electrolyte level, ARIC Study Visit 5 (2011-2013). 7](#_Toc188002803)

[Supplementary Table 5. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of albumin-corrected serum calcium and crude calcium level at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992) 9](#_Toc188002804)

[Supplementary Table 6. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of each electrolyte level including rheumatoid arthritis and osteoporosis as covariates, ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992). 10](#_Toc188002805)

[Supplementary Table 7. Adjusted Fine-Gray proportional hazard ratios and Cox model hazard ratios for risk of hospitalization with fracture by clinical categories of electrolyte levels at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992). 11](#_Toc188002806)

[Supplementary Table 8. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of electrolyte levels, ARIC Study Visit 2 (1990-1992). 13](#_Toc188002807)

[Supplementary Figure 1. Cohort flow at ARIC Study Visit 2 (1990-1992) 15](#_Toc188002808)

[Supplementary Figure 2. Subgroup analysis of incident hospitalized fracture by 1-SD increase in each electrolyte, ARIC Study Visit5 (2011-2013). 16](#_Toc188002809)

[Supplementary Figure 3. Histograms and hazard ratios for hospitalization with fracture by serum levels of A) sodium, B) potassium, C) magnesium, D) calcium, and E) phosphorus, modeled as cubic splines, ARIC Study Visit 2 (1990-1992).](#_Toc188002810) 18

# Supplementary Table 1. ICD-9-CM codes and ICD-10-CM codes relevant to fracture

|  |  |  |
| --- | --- | --- |
| ICD-9CM | ICD-10CM |  |
| 733.1x | M484-485 | Pathologic fracture |
| 733.93-733.98 | Stress fracture |
| 804 | NA | Multiple fractures involving skull or face with other bones |
| 805 | S120-126 ,  S129-220,  S320-322 | Fracture of vertebral column without mention of spinal cord  injury |
| 806 | NA | Fracture of vertebral column with spinal cord injury |
| 807 | S128,  S222-225 | Fracture of rib(s) sternum larynx and trachea |
| 808 | S323-326,  S328-329 | Fracture of pelvis |
| 809 | S229 | Ill-defined fractures of bones of trunk |
| 810 | S420 | Fracture of clavicle |
| 811 | S421 | Fracture of scapula |
| 812 | S422-424,  S429,  S490-491 | Fracture of humerus |
| 813 | S520-523,  S525-526,  S529,  S590-592 | Fracture of radius and ulna |
| 814 | S620-621 | Fracture of carpal bone(s) |
| 818 | S629 | Ill-defined fractures of upper limb |
| 819 | NA | Multiple fractures involving both upper limbs and upper limbs  with rib(s) and sternum |
| 820 | S720-722,  S790 | Fracture of neck of femur |
| 821 | S723-724,  S728X1A-C,  S728X2A-C,  S728X9A-C,  S729,  S791 | Fracture of other and unspecified parts of femur |
| 822 | S820 | Fracture of patella |
| 823 | S821-824,  S828,  S890,  S892 | Fracture of tibia and fibula |
| 824 | S823,  S825-826,  S828,  S891,  S893 | Fracture of ankle |
| 827 | S829 | Other multiple and ill-defined fractures of lower limb |
| 828 | NA | Multiple fractures involving both lower limbs lower with upper  limb and lower limb(s) with rib(s) and sternum |
| 829 | NA | Fracture of unspecified bones |

# Supplementary Table 2. Baseline characteristics of included and excluded cohorts at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992)

Values for categorical variables are given as a number (percentage). Values for continuous variables are given as mean (SD). All P values were from a two-sample t-test (assuming equal variances) for continuous variables and chi-squares test for categorical variables.

Abbreviations: SD, standard deviation; BMI, body mass index; CHD, coronary heart disease; eGFR, estimated glomerular filtration rate calculated using the 2019 CKD-EPI [CKD epidemiology Collaboration] equation, which incorporates serum creatinine level; 25(OH)D, 25-hydroxyvitamin D adjusted for seasonality and by race; PTH, intact parathyroid hormone; FGF23, fibroblast growth factor 23.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Visit 5 |  | Visit 2 |  |
|  | Included cohort | Excluded cohort | Included cohort | Excluded cohort |
|  | N=5,499 | N=1,039 | N=11,708 | N=2,640 |
| Age, y | 75.4 (5.1) | 77.9 (5.7) | 56.9 (5.7) | 57.8 (5.7) |
| Male sex | 2,301 (41.8%) | 383 (37.7%) | 5,303 (45.3%) | 1,089 (41.8%) |
| Black | 1,257 (22.9%) | 281 (28.2%) | 2,814 (24.0%) | 756 (29.5%) |
| BMI, kg/m2 | 28.8 (5.7) | 28.7 (6.4) | 27.9 (5.4) | 28.1 (5.7) |
| Current smoker | 313 (5.7%) | 50 (8.4%) | 2,579 (22.0%) | 629 (24.4%) |
| Current drinker | 2,688 (48.9%) | 283 (47.7%) | 6,679 (57.0%) | 1,356 (52.7%) |
| Diabetes | 1,560 (28.4%) | 257 (36.2%) | 1,698 (14.5%) | 459 (18.2%) |
| Hypertension | 4,091 (74.4%) | 719 (77.8%) | 4,161 (35.5%) | 997 (39.0%) |
| Post-menopausal status | 3,198 (100%) | 656 (100%) | 5,720 (89.3%) | 1,349 (92.5%) |
| Prevalent CHD | 828 (15.3%) | 208 (20.9%) | 676 (5.8%) | 153 ( 6.6%) |
| Glucocorticoids | 147 ( 2.7%) | 54 ( 5.2%) | 152 ( 1.3%) | 48 ( 1.8%) |
| Antidepressants | 668 (12.1%) | 176 (16.9%) | 398 ( 3.4%) | 131 ( 5.0%) |
| Thiazide diuretics | 772 (14.0%) | 136 (13.1%) | 824 ( 7.0%) | 240 ( 9.1%) |
| Bisphosphonates | 241 ( 4.4%) | 53 ( 5.1%) | 0 ( 0.0%) | 0 ( 0.0%) |
| Loop diuretics | 488 ( 8.9%) | 200 (19.2%) | 281 ( 2.4%) | 134 ( 5.1%) |
| Hormone replacement therapy in women | 152 ( 2.8%) | 27 ( 2.6%) | 1,585 (13.5%) | 396 (15.0%) |
| Benzodiazepines | 442 ( 8.0%) | 120 (11.5%) | 686 ( 5.9%) | 199 ( 7.5%) |
| Proton-pump inhibitors | 1,361 (24.7%) | 307 (29.5%) | 25 ( 0.2%) | 4 ( 0.2%) |
| eGFR, ml/min/1.73m2 | 70.2 (17.0) | 64.2 (20.1) | 64.6 (11.7) | 64.4 (12.6) |
| Albumin, g/dL | 3.78 (0.28) | 3.70 (0.33) | 4.18 (0.29) | 4.17 (0.30) |
| Sodium, mEq/L | 138.9 (2.6) | 139.1 (2.8) | 140.8 (2.3) | 140.8 (2.4) |
| Potassium, mEq/L | 4.0 (0.4) | 4.1 (0.4) | 4.2 (0.4) | 4.2 (0.4) |
| Magnesium, mg/dL | 2.01 (0.20) | 2.01 (0.21) | 1.94 (0.20) | 1.92 (0.20) |
| Calcium, mg/dL | 9.4 (0.4) | 9.3 (0.4) | 9.4 (0.4) | 9.4 (0.5) |
| Phosphorus, mg/dL | 3.5 (0.4) | 3.5 (0.5) | 3.5 (0.5) | 3.6 (0.5) |
| 25(OH)D, ng/mL | 36.3 (14.6) | 35.8 (15.1) | 24.4 (8.4) | 23.5 (9.3) |
| PTH, pg/mL | 50.9 (28.0) | 62.6 (54.9) | 42.4 (22.9) | 44.7 (48.9) |
| FGF23, pg/mL | 60.2 (25.7) | 64.7 (30.3) | 48.0 (170.6) | 140.3 (2455.8) |
| Incident fracture post each visit | 191 ( 3.5%) | 33 ( 3.7%) | 579 (4.9%) | 130 ( 5.0%) |

# Supplementary Table 3. Number of fracture cases by fracture site at visit 2 and visit 5.

|  |  |  |
| --- | --- | --- |
| Fracture site | Visit 5 | Visit 2 |
| Hip fracture | 12 (6.3%) | 68 (11.7%) |
| Vertebral fracture | 21 (11.0%) | 61 (10.5%) |
| Others (including site unknown) | 158 (82.7%) | 450 (77.7%) |
| Total | 191 | 579 |

# Supplementary Table 4. Adjusted hazard ratios of risk of hospitalization with primary diagnosis of fracture by clinical categories of each electrolyte level, ARIC Study Visit 5 (2011-2013).

Values for categorical variables are given as a number (percentage). Values for continuous variables are given as mean (SD). All P values were from a two-sample t-test (assuming equal variances) for continuous variables and chi-squares test for categorical variables.

Abbreviations: SD, standard deviation; BMI, body mass index; CHD, coronary heart disease; eGFR, estimated glomerular filtration rate calculated using the 2019 CKD-EPI [CKD epidemiology Collaboration] equation, which incorporates serum creatinine level; 25(OH)D, 25-hydroxyvitamin D adjusted for seasonality and by race; PTH, intact parathyroid hormone; FGF23, fibroblast growth factor 23.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | n. of  subjects | n. of  events | IR,  per 1,000  p-yrs  (95% CI) | HR  (95% CI) | |  |
|  |  |  |  | Model1 | Model2 | Model3 |
| Sodium, mEq/L |  | |  |  |  |  |
| Low sodium (≤135) | 434 | 16 | 5.8  (3.6-9.5) | 1.39  (0.82-2.34) | 1.39  (0.80-2.40) | 1.36  (0.79-2.36) |
| Normal sodium (>135-<145) | 5014 | 117 | 3.6  (3.0-4.3) | ref | ref | ref |
| High sodium (≥145) | 51 | 1 | 3.6  (0.5-25.8) | 1.38  (0.19-9.91) | 1.28  (0.18-9.33) | 1.20  (0.17-8.78) |
| Potassium, mEq/L |  |  |  |  |  |  |
| Low potassium (≤3.5) | 386 | 11 | 4.5  (2.5-8.2) | 1.28  (0.69-2.38) | 1.33  (0.70-2.51) | 1.33  (0.70-2.51) |
| Normal potassium (>3.5-<5.3) | 5093 | 122 | 3.7  (3.1-4.4) | ref | ref | ref |
| High potassium (≥5.3) | 20 | 1 | 11.1  (1.6-78.6) | 5.04  (0.69-36.60) | 4.44  (0.59-33.28) | 2.89  (0.35-24.05) |
| Magnesium, mg/dL |  |  |  |  |  |  |
| Low magnesium (≤1.8) | 1006 | 29 | 4.7  (3.3-6.7) | 1.38  (0.91-2.10) | 1.26  (0.79-2.00) | 1.25  (0.78-1.98) |
| Normal magnesium (>1.8-<2.3) | 4044 | 96 | 3.6  (3.0-4.4) | ref | ref | ref |
| High magnesium (≥2.3) | 449 | 9 | 3.1  (1.6-6.0) | 0.78  (0.39-1.55) | 0.81  (0.41-1.61) | 0.76  (0.38-1.52) |
| Calcium, mg/dL |  |  |  |  |  |  |
| Low calcium (≤8.4) | 39 | 0 | NA | NA | NA | NA |
| Normal calcium (>8.4-<10.4) | 5373 | 132 | 3.8  (3.2-4.5) | ref | ref | ref |
| High calcium (≥10.4) | 87 | 2 | 3.8  (1.0-15.2) | 0.97  (0.24-3.95) | 1.15  (0.28-4.72) | 1.03  (0.25-4.28) |
| Phosphorus, mg/dL |  |  |  |  |  |  |
| Low phosphorus (≤2.5) | 93 | 1 | 1.7  (0.2-11.8) | 0.66  (0.09-4.73) | 0.67  (0.09-4.85) | 0.65  (0.09-4.70) |
| Normal phosphorus (>2.5-<4.5) | 5326 | 126 | 3.6  (3.1-4.3) | ref | ref | ref |
| High phosphorus (≥4.5) | 80 | 7 | 14.8  (7.1-31.0) | 3.72  (1.72-8.03) | 3.78  (1.73-8.27) | 3.35  (1.49-7.50) |

# Supplementary Table 5. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of albumin-corrected serum calcium and crude calcium level at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992)

Models were adjusted for age, gender, race\*center, BMI, smoking status (current vs. former/never), alcohol consumption (current vs. former/never), diabetes mellitus, hypertension, postmenopausal status (in women), prevalent coronary heart disease, specific medication use (glucocorticoids, antidepressants, thiazide diuretics, bisphosphonates, loop diuretics, hormone replacement therapy [in women], benzodiazepines, and proton pump inhibitors), eGFR, serum albumin, 25(OH)D, PTH, and FGF23.

Abbreviations: BMI, body mass index; CHD, coronary heart disease; eGFR, estimated glomerular filtration rate calculated using the 2019 CKD-EPI [CKD epidemiology Collaboration] equation, which incorporates serum creatinine level; 25(OH)D, 25-hydroxyvitamin D

|  |  |  |  |
| --- | --- | --- | --- |
|  | n. of  subjects | n. of  events | Adjusted HR (95%CI) |
| Visit 5 |  |  |  |
| Alb-corrected calcium, mg/dL |  |  |  |
| Low calcium (≤8.4) | 8 | 0 | NA |
| Normal calcium (>8.4-<10.4) | 5346 | 188 | ref |
| High calcium (≥10.4) | 145 | 3 | 0.50 (0.16-1.61) |
| Crude calcium, mg/dL |  |  |  |
| Low calcium (≤8.4) | 39 | 1 | 1.02 (0.14-7.53) |
| Normal calcium (>8.4-<10.4) | 5373 | 188 | ref |
| High calcium (≥10.4) | 87 | 2 | 0.71 (0.17-2.92) |
| Visit 2 |  |  |  |
| Alb-corrected calcium, mg/dL |  |  |  |
| Low calcium (≤8.4) | 80 | 3 | 0.91 (0.23-3.71) |
| Normal calcium (>8.4-<10.4) | 11513 | 570 | ref |
| High calcium (≥10.4) | 115 | 6 | 1.70 (0.74-3.89) |
| Crude calcium, mg/dL |  |  |  |
| Low calcium (≤8.4) | 161 | 5 | 0.85 (0.31-2.34) |
| Normal calcium (>8.4-<10.4) | 11406 | 567 | ref |
| High calcium (≥10.4) | 141 | 7 | 1.46 (0.68-3.14) |

# Supplementary Table 6. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of each electrolyte level including rheumatoid arthritis and osteoporosis as covariates, ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992).

Model was adjusted for age, gender, and race\*center, BMI, smoking status (current vs. former/never), alcohol consumption (current vs. former/never), diabetes, hypertension, postmenopausal status (in women), prevalent coronary heart disease, specific medication use (glucocorticoids, antidepressants, thiazide diuretics, bisphosphonates, loop diuretics, hormone replacement therapy [in women], benzodiazepines, and proton pump inhibitors), eGFR, serum albumin, 25(OH)D, PTH, FGF23, rheumatoid arthritis, and osteoporosis

|  |  |  |
| --- | --- | --- |
|  | visit 5 | visit 2 |
|  | HR (95% CI) | HR (95% CI) |
| Sodium, mEq/L |  |  |
| Low sodium (≤135) | 1.89 (1.25-2.87) | 1.61 (0.88-2.94) |
| Normal sodium (>135-<145) | ref | ref |
| High sodium (≥145) | 0.86 (0.12-6.18) | 0.90 (0.60-1.36) |
| Potassium, mEq/L |  |  |
| Low potassium (=<3.5) | 1.23 (0.72-2.10) | 1.16 (0.76-1.75) |
| Normal potassium (>3.5-<5.3) | ref | ref |
| High potassium (≥5.3) | 2.33 (0.29-18.57) | 0.71 (0.29-1.73) |
| Magnesium, mg/dL |  |  |
| Low magnesium (≤1.8) | 1.28 (0.88-1.88) | 1.09 (0.91-1.31) |
| Normal magnesium (>1.8-<2.3) | ref | ref |
| High magnesium (≥2.3) | 0.64 (0.34-1.23) | 1.41 (0.82-2.40) |
| Calcium, mg/dL |  |  |
| Low calcium (≤8.4) | 0.79 (0.11-5.92) | 0.64 (0.26-1.55) |
| Normal calcium (>8.4-<10.4) | ref | ref |
| High calcium (≥10.4) | 0.71 (0.17-2.93) | 1.25 (0.58-2.67) |
| Phosphorus, mg/dL |  |  |
| Low phosphorus (≤2.5) | 0.89 (0.22-3.64) | 0.98 (0.46-2.09) |
| Normal phosphorus (>2.5-<4.5) | ref | ref |
| High phosphorus (≥4.5) | 2.40 (1.09-5.30) | 1.22 (0.78-1.90) |

# Supplementary Table 7. Adjusted Fine-Gray proportional hazard ratios and Cox model hazard ratios for risk of hospitalization with fracture by clinical categories of electrolyte levels at ARIC Study Visit 5 (2011-2013) and Visit 2 (1990-1992).

Models were adjusted for age, gender, race\*center, BMI, smoking status (current vs. former/never), alcohol consumption (current vs. former/never), diabetes mellitus, hypertension, postmenopausal status (in women), prevalent coronary heart disease, specific medication use (glucocorticoids, antidepressants, thiazide diuretics, bisphosphonates, loop diuretics, hormone replacement therapy [in women], benzodiazepines, and proton pump inhibitors) eGFR, serum albumin, 25(OH)D, PTH, and FGF23.

|  |  |  |
| --- | --- | --- |
|  | Visit 5 | Visit 2 |
|  | Competing risk analysis  HR   (95% CI) | Competing risk analysis  HR   (95% CI) |
| Sodium, mEq/L |  |  |
| Low sodium (≤135) | 1.78  (1.18-2.71) | 1.21  (0.66-2.24) |
| Normal sodium (>135-<145) | ref | ref |
| High sodium (≥145) | 0.61  (0.08-4.73) | 0.82  (0.54-1.24) |
| Potassium, mEq/L |  |  |
| Low potassium (=<3.5) | 1.27  (0.74-2.20) | 1.13  (0.74-1.73) |
| Normal potassium (>3.5-<5.3) | ref | ref |
| High potassium (≥5.3) | 1.90  (0.32-11.31) | 0.72  (0.30-1.76) |
| Magnesium, mg/dL |  |  |
| Low magnesium (≤1.8) | 1.22  (0.83-1.78) | 1.03  (0.86-1.24) |
| Normal magnesium (>1.8-<2.3) | ref | ref |
| High magnesium (≥2.3) | 0.62  (0.32-1.20) | 1.36  (0.80-2.33) |
| Calcium, mg/dL |  |  |
| Low calcium (≤8.4) | 0.88  (0.12-6.60) | 0.63  (0.26-1.55) |
| Normal calcium (>8.4-<10.4) | ref | ref |
| High calcium (≥10.4) | 0.66  (0.16-2.73) | 1.10  (0.51-2.34) |
| Phosphorus, mg/dL |  |  |
| Low phosphorus (≤2.5) | 0.87  (0.21-3.50) | 0.94  (0.44-2.00) |
| Normal phosphorus (>2.5-<4.5) | ref | ref |
| High phosphorus (≥4.5) | 2.07  (0.92-4.67) | 1.15  (0.74-1.79) |

# Supplementary Table 8. Adjusted hazard ratios of risk of hospitalization with fracture by clinical categories of electrolyte levels, ARIC Study Visit 2 (1990-1992).

Model 1: adjusted for age, gender, and race\*center.

Model 2: adjusted for Model 2 covariates, plus BMI, smoking status (current vs. former/never), alcohol consumption (current vs. former/never), diabetes mellitus, hypertension, postmenopausal status (in women), prevalent coronary heart disease, specific medication use (glucocorticoids, antidepressants, thiazide diuretics, bisphosphonates, loop diuretics, hormone replacement therapy [in women], benzodiazepines, and proton pump inhibitors).

Model 3: adjusted for Model 2 covariates, plus eGFR, serum albumin, 25(OH)D, PTH, and FGF23.

Abbreviations: n, number; IR, incidence rate; p-yrs, person-years; ref, reference

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | n. of   subjects | n. of   events | IR,   per 1,000 p-yrs (95% CI) | HR (95% CI) |  |  |
|  |  |  |  | Model1 | Model2 | Model3 |
| Sodium, mEq/L |  |  |  |  |  |  |
| Low sodium (≤135) | 166  (1.4) | 11 | 3.7  (2.0-6.7) | 1.71  (0.94-3.10) | 1.63  (0.90-2.98) | 1.61  (0.88-2.94) |
| Normal sodium (>135-<145) | 10945  (93.5) | 544 | 2.3  (2.1-2.5) | ref | ref | ref |
| High sodium (≥145) | 597  (5.1) | 24 | 2.0  (1.3-2.9) | 0.93  (0.62-1.41) | 0.90  (0.59-1.35) | 0.90  (0.60-1.36) |
| Potassium, mEq/L |  |  |  |  |  |  |
| Low potassium (=<3.5) | 578  (4.9) | 28 | 2.4  (1.7-3.5) | 1.15  (0.78-1.69) | 1.24  (0.79-1.95) | 1.23  (0.78-1.93) |
| Normal potassium (>3.5-<5.3) | 11002  (94.0) | 546 | 2.3  (2.1-2.5) | ref | ref | ref |
| High potassium (≥5.3) | 128  (1.1) | 5 | 1.9  (0.8-4.6) | 0.74  (0.31-1.80) | 0.61  (0.19-1.91) | 0.63  (0.20-1.98) |
| Magnesium, mg/dL |  |  |  |  |  |  |
| Low magnesium (≤1.8) | 3859  (33.0) | 181 | 2.3  (2.0-2.6) | 1.11  (0.93-1.33) | 1.10  (0.88-1.37) | 1.09  (0.87-1.36) |
| Normal magnesium (>1.8-<2.3) | 7618  (65.1) | 384 | 2.3  (2.1-2.5) | ref | ref | ref |
| High magnesium (≥2.3) | 231  (1.9) | 14 | 2.9  (1.7-4.8) | 1.38  (0.81-2.36) | 1.68  (0.92-3.08) | 1.74  (0.95-3.19) |
| Calcium, mg/dL |  |  |  |  |  |  |
| Low calcium (≤8.4) | 161  (1.4) | 5 | 1.5  (0.6-3.5) | 0.67  (0.28-1.63) | 0.95  (0.35-2.55) | 0.85  (0.31-2.34) |
| Normal calcium (>8.4-<10.4) | 11406  (97.4) | 567 | 2.3  (2.1-2.5) | ref | ref | ref |
| High calcium (≥10.4) | 141  (1.2) | 7 | 2.5  (1.2-5.2) | 1.16  (0.55-2.46) | 1.34  (0.63-2.85) | 1.46  (0.68-3.14) |
| Phosphorus, mg/dL |  |  |  |  |  |  |
| Low phosphorus (≤2.5) | 199  (1.7) | 7 | 1.7  (0.8-3.5) | 0.96  (0.45-2.03) | 1.07  (0.26-4.31) | 1.06  (0.26-4.27) |
| Normal phosphorus (>2.5-<4.5) | 11172  (95.4) | 551 | 2.3  (2.1-2.5) | ref | ref | ref |
| High phosphorus (≥4.5) | 337  (2.9) | 21 | 3.3  (2.1-5.0) | 1.38  (0.89-2.14) | 1.38  (0.88-2.15) | 1.38  (0.88-2.16) |

# Supplementary Figure 1. Cohort flow at ARIC Study Visit 2 (1990-1992)

A screenshot of a black and white screen

AI-generated content may be incorrect.

# Supplementary Figure 2. Subgroup analysis of incident hospitalized fracture by 1-SD increase in each electrolyte, ARIC Study Visit5 (2011-2013).

Hazard ratios for hospitalization with fracture by 1-SD increase in serum levels of A) sodium, B) potassium, C) magnesium, D) calcium, and E) phosphorus. Model was adjusted for age, gender, and race\*center, BMI, smoking status (current vs. former/never), alcohol consumption (current vs. former/never), diabetes, hypertension, postmenopausal status (in women), prevalent coronary heart disease, specific medication use (glucocorticoids, antidepressants, thiazide diuretics, bisphosphonates, loop diuretics, hormone replacement therapy [in women], benzodiazepines, and proton pump inhibitors), eGFR, serum albumin, 25(OH)D, PTH, and FGF23.

Abbreviation: SD, standard deviation

A white background with black and red lines

AI-generated content may be incorrect.

# Supplementary Figure 3. Histograms and hazard ratios for hospitalization with fracture by serum levels of A) sodium, B) potassium, C) magnesium, D) calcium, and E) phosphorus, modeled as cubic splines, ARIC Study Visit 2 (1990-1992).

Solid lines represent point estimates. Dotted lines represent corresponding 95% confidence intervals. Models were adjusted for demographics (age, sex, race, and body mass index), health behaviors (smoking status and alcoholic consumption), medical history (hypertension status, diabetes status, and prevalent CHD), medication use (steroid, antidepressant, thiazide, bisphosphonate, loop diuretic, menopausal hormone replacement [in women], benzodiazepine, and proton-pump inhibitor), and bone-related labs (eGFR, serum albumin, vitamin D, PTH, and FGF23).

A screenshot of a computer generated image

AI-generated content may be incorrect.