KEEP Data Report 2004

Chapter 4: Chronic kidney disease
Figure 4.1
Elevated serum creatinine levels* in KEEP participants, overall & by age, gender, & race

KEEP N=22,846, N=22,166 after further excluding participants with missing values for race. Excludes participants with missing values for serum creatinine. *Serum creatinine: in men >1.5 mg/dl, in women >1.3 mg/dl.
Figure 4.2
CKD* in KEEP, NHANES, & Medicare^ participants, by age, gender, & race/ethnicity


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Figure 4.3
CKD in KEEP & NHANES participants, by CKD stage*

KEEP N=22,846, with total CKD N=11,835 after excluding participants with missing values for CKD stage. NHANES III N=15,853, NHANES 1999–2000 N=4,568. *The sum of the percents for each stage is equal to the percent for “ALL.”

CKD Definition
If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

CKD Stages
Stage 1: eGFR ≥ 90, microalbuminuria +
Stage 2: eGFR 60–89, microalbuminuria +
Stage 3: eGFR 30–59
Stage 4: eGFR 1–29
Stage 5: eGFR <15 or patient on dialysis

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Figure 4.4
Family history of kidney disease in KEEP participants with CKD, overall & by gender

CKD Definition
If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP N=11,539.
Figure 4.5
Family history of kidney disease in KEEP participants with CKD, by race

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP N=11,201. Excludes participants with missing values for race.

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Figure 4.6
Family history of kidney disease in KEEP participants with CKD, by Hispanic ethnicity

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP N=11,539.
Figure 4.7
Percent distribution of hypertension stage (JNC VII) in KEEP & NHANES participants with CKD

KEEP N=11,751, NHANES III N=2,461, NHANES 1999–2000, N=704. Excludes participants with missing values for blood pressure or CKD status.

**CKD Definition**
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

**JNC VII Hypertension**
- normal: systolic < 120 mmHg & diastolic < 80 mmHg
- prehypertension: systolic 120-139 mmHg or diastolic 80-89 mmHg
- stage 1: systolic 140-159 mmHg or diastolic 90-99 mmHg
- stage 2: systolic ≥160 mmHg or diastolic ≥100 mm Hg
Figure 4.8
Self-reported hypertension in KEEP & NHANES participants with CKD, by age, gender, & race/ethnicity

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP N=11, 362,
NHANES III N=2,454,
NHANES 1999–2000 N=727. Excludes participants with missing values for self-reported hypertension, CKD status, or race.
Figure 4.9
Elevated blood pressure (JNC VII*) in KEEP & NHANES participants with CKD, by age, gender, race, & Hispanic ethnicity

KEEP N=11,277, NHANES III N=2,216. Excludes participants with missing values for blood pressure or race. *DM or CKD: systolic BP ≥ 130 or diastolic ≥ 80; no DM or CKD: systolic BP ≥ 140 or diastolic ≥ 90.

** Sample size less than 30.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

JNC VII Hypertension
normal
systolic < 120 mmHg & diastolic < 80 mmHg
prehypertension
systolic 120-139 mmHg or diastolic 80-89 mmHg
stage 1
systolic 140-159 mmHg or diastolic 90-99 mmHg
stage 2
systolic ≥160 mmHg or diastolic ≥100 mm Hg
Figure 4.9 (continued)

Elevated blood pressure (JNC VII*) in KEEP & NHANES participants with CKD, by age, gender, race, & Hispanic ethnicity

**JNC VII Hypertension**
- **normal**
  - systolic < 120 mmHg & diastolic < 80 mmHg
- **prehypertension**
  - systolic 120-139 mmHg or diastolic 80-89 mmHg
- **stage 1**
  - systolic 140-159 mmHg or diastolic 90-99 mmHg
- **stage 2**
  - systolic ≥160 mmHg or diastolic ≥100 mm Hg

**CKD Definition**
- If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
- If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP N=11,277, NHANES III N=2,216. Excludes participants with missing values for blood pressure or race. *DM or CKD: systolic BP ≥ 130 or diastolic ≥ 80; no DM or CKD: systolic BP ≥ 140 or diastolic ≥ 90.

**Sample size less than 30.**
Figure 4.10
Elevated BP (JNC VII*) in KEEP & NHANES participants with CKD, by CKD stage

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KEEP N=8,625, NHANES III 1,769, NHANES 1999–2000 N=487. Excludes participants with missing values for blood pressure or CKD status. *DM or CKD: systolic BP ≥ 130 or diastolic ≥ 80; no DM or CKD: systolic BP ≥ 140 or diastolic ≥ 90.

**CKD Definition**
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

**CKD Stages**
Stage 1: eGFR ≥ 90, microalbuminuria +
Stage 2: eGFR 60–89, microalbuminuria +
Stage 3: eGFR 30–59
Stage 4: eGFR 1–29
Stage 5: eGFR <15 or patient on dialysis
Figure 4.11
Self-reported diabetes or diabetes comorbidity from claims in KEEP, NHANES, & Medicare^ participants with CKD*, by age, gender, & race/ethnicity

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +


KEEP Data Report, 2004
Figure 4.12
Self-reported diabetes in KEEP & NHANES participants with CKD, by BMI category & gender

KEEP N=11,600, NHANES III N=2,456, NHANES 1999–2000 N=711. Excludes participants with missing values for self-reported diabetes, CKD status, or BMI. ** Sample size less than 30.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.13
Self-reported diabetes in KEEP participants with CKD, by CKD stage

KEEP N=1,102. Excludes participants with missing values for self-reported diabetes or CKD status.
Figure 4.14
BMI in KEEP participants with CKD, by age & gender

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KEEP N=11,730, NHANES III N=2,458, NHANES 1999–2000 N=712. Excludes participants with missing values for CKD status or BMI.
Figure 4.14 (continued)

BMI in NHANES participants with CKD, by age & gender

NHANES III N=2,458. Excludes participants with missing values for CKD status or BMI.
Figure 4.14 (continued)
BMI in NHANES participants with CKD, by age & gender

**Body Mass Index Categories**
- UW: underweight: BMI < 18.5
- N: normal: BMI 18.5–24.9
- OW: overweight: BMI 25–29.9
- EOB: extremely obese: BMI ≥ 40

**CKD Definition**
- If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
- If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

NHANES 1999–2000 N=712. Excludes participants with missing values for CKD status or BMI.
Figure 4.15
BMI in KEEP participants with CKD, by age, gender, race, & Hispanic ethnicity

KEEP N=11,382. Excludes participants with missing values for race, CKD status, or BMI.

Body Mass Index Categories
UW: underweight: BMI <18.5
N: normal: BMI 18.5–24.9
OW: overweight: BMI 25–29.9
OB: obese: BMI 30–39.9
EOB: extremely obese: BMI ≥ 40

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.15 (continued)
BMI in NHANES III participants with CKD, by age gender, race, & Hispanic ethnicity

NHANES III N=2,458. Excludes participants with missing values for race, CKD status, or BMI.

Body Mass Index Categories
- UW: underweight: BMI < 18.5
- N: normal: BMI 18.5–24.9
- OW: overweight: BMI 25–29.9
- EOB: extremely obese: BMI ≥ 40

CKD Definition
- If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
- If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.16

Obesity (BMI $\geq 30$ kg/m$^2$) in KEEP participants with CKD, by gender & Hispanic ethnicity

KEEP N=1,107. Excludes participants with missing values for BMI or CKD status.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m$^2$ or;
If eGFR by K/DOQI MDRD $\geq$ 60 ml/min/1.73 m$^2$ and microalbuminuria +

Body Mass Index Categories
UW: underweight: BMI<18.5
N: normal: BMI 18.5–24.9
OW: overweight: BMI 25–29.9
OB: obese: BMI 30–39.9
EOB: extremely obese: BMI $\geq$ 40
Figure 4.17
BMI in KEEP & NHANES participants with CKD, by self-reported hypertension or diabetes


CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or; If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.18
Smoking status in KEEP & NHANES participants with CKD, by age & gender

KEEP N=11,101, NHANES III N=2,415, NHANES 1999–2000 N=698. Excludes participants with missing values for CKD status or smoking status.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.19
Elevated blood pressure (JNC VII*) in KEEP & NHANES participants, by CKD stage & smoking status

KEEP N=8,089, NHANES III N=2,415, NHANES 1999–2000 N=698. Excludes participants with missing values for CKD status, blood pressure, or smoking status. *DM or CKD: systolic BP ≥ 130 or diastolic ≥ 80; no DM or CKD: systolic BP ≥ 140 or diastolic ≥ 90.

CKD Stages
Stage 1: eGFR ≥ 90, microalbuminuria +
Stage 2: eGFR 60–89, microalbuminuria +
Stage 3: eGFR 30–59
Stage 4: eGFR 1–29
Stage 5: eGFR <15 or patient on dialysis

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.20
Smoking status in KEEP & NHANES participants with CKD, by age, race, & Hispanic ethnicity

KEEP N=10,786, NHANES III N=2,469. Excludes participants with missing values for CKD status, race, or smoking status.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.20 (continued)
Smoking status in KEEP & NHANES participants with CKD, by age, race, & Hispanic ethnicity

KEEP N=10,786, NHANES III N=2,469. Excludes participants with missing values for CKD status, race, or smoking status.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.21
Anemia (WHO anemia definition) in KEEP, NHANES, & Medicare^ participants with CKD, by age & gender


WHO anemia definition
Male: Hemoglobin <13 g/dl
Female: Hemoglobin <12 g/dl

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.22
Anemia (WHO anemia definition) in KEEP & NHANES participants with CKD, by age, race, & Hispanic ethnicity

KEEP N=11,264, NHANES III N=2,447. Excludes participants with missing values for CKD status, hemoglobin, or race.

WHO anemia definition
Male: Hemoglobin <13 g/dl
Female: Hemoglobin <12 g/dl

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.23

Anemia (WHO anemia definition) in KEEP & NHANES participants with CKD, by CKD stage & self-reported diabetic status

CKD Definition
If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

CKD Stages
Stage 1: eGFR ≥ 90, microalbuminuria +
Stage 2: eGFR 60–89, microalbuminuria +
Stage 3: eGFR 30–59
Stage 4: eGFR 1–29
Stage 5: eGFR <15 or patient on dialysis

WHO anemia definition
Male: Hemoglobin < 13 g/dl
Female: Hemoglobin < 12 g/dl

Figure 4.24
Percent distribution of KEEP & NHANES participants with CKD, by number of risk factors for CKD


CKD Definition
If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m2 or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m2 and microalbuminuria +

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Figure 4.25
Elevated blood pressure (JNC VII*) in KEEP & NHANES participants with CKD, by BMI category & self-reported diabetic status

KEEP N=11,527, NHANES III N=2,209, NHANES 1999–2000 N=611. Excludes participants with missing values for CKD status, BMI, blood pressure, or self-reported diabetes. *DM or CKD: systolic BP ≥ 130 or diastolic ≥ 80; no DM or CKD: systolic BP ≥ 140 or diastolic ≥ 90. **Sample size less than 30.

CKD Definition
If eGFR by K/DOQI MDRD < 60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.26
Elevated blood pressure (JNC VII*) in KEEP & NHANES participants with CKD, by BMI & smoking status

KEEP N=10,825, NHANES III N=2,165, NHANES 1999–2000 N=582 Excludes participants with missing values for CKD status, BMI, blood pressure, or smoking status. *DM or CKD: systolic BP ≥130 or diastolic ≥80; no DM or CKD: systolic BP ≥140 or diastolic ≥90. **Sample size less than 30.

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +
Figure 4.27
Elevated blood pressure (JNC VII*) in KEEP & NHANES participants with CKD, by BMI category & anemia (WHO anemia definition) status

KEEP N=11,319, NHANES III N=2,189, NHANES 1999–2000 N=610. Excludes participants with missing values for CKD status, BMI, blood pressure, or hemoglobin. *DM or CKD: systolic BP $\geq 130$ or diastolic $\geq 80$; no DM or CKD: systolic BP $\geq 140$ or diastolic $\geq 90$. **Sample size less than 30.

WHO anemia definition
Male: Hemoglobin <13 g/dl
Female: Hemoglobin <12 g/dl

CKD Definition
If eGFR by K/DOQI MDRD $<60$ ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD $\geq 60$ ml/min/1.73 m² and microalbuminuria +
Figure 4.28
Number of risk factors for cardiovascular disease in KEEP & NHANES participants, by CKD stage


CKD Stages
Stage 1: eGFR ≥ 90, microalbuminuria +
Stage 2: eGFR 60–89, microalbuminuria +
Stage 3: eGFR 30–59
Stage 4: eGFR 1–29
Stage 5: eGFR <15 or patient on dialysis

Risk factors for CV disease
BMI ≥25 kg/m2
Self-reported diabetes
History of smoking
Anemia (WHO definition)
Elevated blood pressure (JNC VII)

CKD Definition
If eGFR by K/DOQI MDRD <60 ml/min/1.73 m² or;
If eGFR by K/DOQI MDRD ≥ 60 ml/min/1.73 m² and microalbuminuria +

KEEP Data Report, 2004