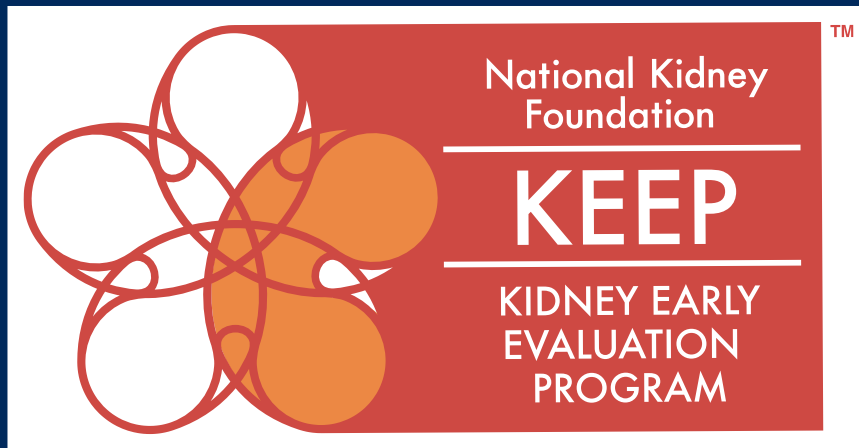


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2008**

**NATIONAL KIDNEY FOUNDATION
KIDNEY EARLY EVALUATION PROGRAM™**

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Executive Summary: Kidney Early Evaluation Program (KEEP) 2008 Annual Data Report

George L. Bakris, MD,¹ Peter A. McCullough, MD, MPH,² and Allan J. Collins, MD^{3,4}

The National Kidney Foundation Kidney Early Evaluation Program (KEEP) is in its ninth year of operation. Comprising data collected from more than 100,000 people who have already been screened for kidney disease in the United States, the KEEP database is the largest database of its type to provide information about chronic kidney disease (CKD) in the United States. Annual Data Reports, published yearly in the *American Journal of Kidney Diseases*, serve as a compendium of information for interested readers. To ease the burden of information and focus the information, 3 key articles are presented this year to summarize the major high points for busy nephrologists. Trend figures and reference tables in the KEEP 2008 Annual Data Report complement these articles. The reference tables present basic and informative participant- and affiliate-level data included for easy reference.

For the present issue, the KEEP Executive Committee developed thematic articles that describe and present KEEP data in the context of known associated cardiovascular risk factors, including diabetes and hypertension. This report includes the most recent data (August 2000 to December 31, 2007) supplied by the KEEP Data Coordinating Center. The articles were written from the perspective of the respective authors. All articles were peer reviewed by the KEEP Executive Committee and reviewers for the *American Journal of Kidney Diseases*.

The articles represent a distillation of data. They focus on key topics agreed upon by the KEEP Steering Committee as the most important issues to highlight from the database. KEEP data are complementary to the nationally representa-

tive National Health and Nutrition Examination Survey (NHANES) 1999-2006 data in looking specifically for awareness of kidney disease in the community and for the presence of cardiovascular risk factors associated with various stages of kidney disease, and the data sets are compared on several dimensions.

In the first article, Bhuriya et al examine 4,472 patients with stages 3 and 4 CKD from the KEEP database and evaluate the association between plasma parathyroid hormone level and prevalent cardiovascular disease. Parathyroid hormone levels greater than 70 pg/mL (the highest tertile) were independently associated with prevalent cardiovascular disease; however, no association was found between parathyroid hormone level and serum phosphorus or calcium level. These data further confirm the association between measures of CKD mineral and bone disorders with cardiovascular disease. Speculation about the biological explanation for this association includes accelerated cardiovascular calcification and increased vascular stiffness. Either of these

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processes, if dominant, could lead to outcomes different from standard treatments for cardiovascular disease and raise interest in new renal-specific diagnostic and therapeutic targets for cardiovascular disease in patients with CKD.

In the second article, Whaley-Connell et al focus on the presence of metabolic abnormalities in KEEP and NHANES; specifically, diabetes and level of glycemia, assessed in the context of participant awareness of CKD. The investigators note that KEEP and NHANES data are congruent regarding greater diabetes prevalence with CKD. However, lack of CKD awareness in KEEP participants with diabetes highlights the need for a new approach in diabetes education with a focus on screening, awareness, and management of CKD risk. As a targeted screening program, KEEP may represent a higher risk and more motivated population; thus, general population awareness likely would be even worse.

In the third article, Kalaitzidis et al compare hypertension prevalence in the KEEP and NHANES populations, with a specific emphasis

on the demographic distribution of similarities and differences between databases. Importantly, this report emphasizes amplification of the frequency and intensity of hypertension as an associated risk factor in patients at risk of and with CKD in the KEEP population. Findings with respect to obesity portend future trends in the NHANES population with respect to increases in hypertension and CKD as a consequence of increasing body mass index.

We hope that this collection of articles describing KEEP data will be informative and useful for researchers, clinicians, and public health officials alike. Our aim is to position these analyses as descriptive and hypothesis-generating pieces to provide a springboard for future population-based and translational research. The overarching goal is to improve health outcomes for patients with CKD by better informing patients and clinicians, as well as the general public, about the risks associated with kidney disease and by influencing public health policy concerning this important disease state.

Plasma Parathyroid Hormone Level and Prevalent Cardiovascular Disease in CKD Stages 3 and 4: An Analysis From the Kidney Early Evaluation Program (KEEP)

Rohit Bhuriya, MD,¹ Suying Li, PhD,² Shu-Cheng Chen, MS,² Peter A. McCullough, MD, MPH,^{3,4,5} and George L. Bakris, MD⁶

Background: Cardiovascular disease (CVD) is the most common cause of death in patients with chronic kidney disease (CKD). Secondary hyperparathyroidism is common in patients with CKD, and its relationship to CVD is not well defined. This analysis aims to assess whether serum intact parathyroid hormone (PTH) level is an independent risk factor for CVD in patients with CKD stages 3 and 4.

Methods: In this cross-sectional study, medical history surveys, including CVD events, were collected from 4,472 patients with stages 3 and 4 CKD identified by the National Kidney Foundation Kidney Early Evaluation Program (KEEP), which included blood pressure measurement and laboratory testing. Age, hemoglobin level, estimated glomerular filtration rate, serum phosphorus level, and serum calcium level were evaluated as continuous variables, and plasma PTH levels, by tertile: less than 35, 35 to 70, and greater than 70 pg/mL. Multivariate logistic regression was used to estimate odds ratios (ORs) of CVD predictor variables.

Results: Mean age was 68.3 ± 11.8 years. Of the study population, 68% were women, 69% were white, 6% were current smokers, 45% were obese, 46% had diabetes, and 83% had hypertension. A history of CVD was present for 1,972 (44.1%), and plasma PTH level greater than 70 pg/mL, for 2,239 (50.1%). Multivariate logistic regression showed ORs for CVD events increasing with age (OR, 1.03; $P < 0.001$), male sex (OR, 1.51; $P < 0.001$), diabetes (OR, 1.73; $P < 0.001$), hypertension (OR, 1.43; $P < 0.001$), and intact PTH level greater than 70 pg/mL (OR, 1.51; $P < 0.001$; reference, < 35 pg/mL).

Conclusions: PTH level greater than 70 pg/mL is independently associated with CVD events in patients with CKD stages 3 and 4. No association was observed between serum phosphorus or calcium level and CVD events. These findings provide support for intact PTH testing, along with testing for other indicators of CKD mineral and bone disorders, at earlier CKD stages.

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INDEX WORDS: Cardiovascular disease; chronic kidney disease; parathyroid hormone.

Chronic kidney disease (CKD) is well established as a risk state that results in greater rates of prevalent and incident cardiovascular disease (CVD),¹⁻³ and CVD is the most common cause of death in patients with CKD. As estimated glomerular filtration rate (eGFR) decreases to less than 60 mL/min/1.73 m² in populations, CVD prevalence and future mortality increase.⁴

Increased attention has been focused on endocrine abnormalities in patients with advanced CKD to help explain these associations.^{5,6} Mineral and bone disorders related to CKD are defined by abnormalities in phosphate retention, hypercalcemia or hypocalcemia, hyperparathyroidism, increased alkaline phosphatase level, abnormalities in bone turnover, and vascular and soft-tissue calcification.⁷ Secondary hyperparathyroidism is often the first and most recognizable laboratory signal of this complication because parathyroid hormone (PTH) is a compensatory mechanism to maintain calcium and phosphorus levels within physiological ranges despite renal

phosphate retention and decreasing 1,25 dihydroxyvitamin D production. Increased PTH levels predict myocardial and coronary heart disease in people with normal calcium levels and no kidney failure.⁸ PTH has been linked to a plethora of adverse cardiovascular events,⁹ and PTH receptors are present in the heart.¹⁰ Increases in PTH levels are known to increase cardiac contrac-

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tility^{11,12} and induce myocardial hypertrophy¹³ and interstitial fibrosis¹⁴ in animal studies. Clinical studies indicate that PTH may contribute to the development of left ventricular hypertrophy.¹⁵ Increased PTH levels can exacerbate atherosclerosis by contributing to hyperlipidemia^{16,17} and impaired glucose tolerance.^{18,19} Effects of PTH on vascular endothelial function and growth may contribute to increased vascular tone and stiffness,²⁰⁻²² thereby leading to hypertension. PTH may have a role in the calcification of atherosclerotic lesions.^{23,24}

Most data related to PTH and CVD outcomes are based on patients with stage 5 CKD who are on dialysis therapy and being treated with a variety of drugs that influence calcium, phosphorus, and PTH. The relationship between secondary hyperparathyroidism and CVD in patients with earlier CKD stages has not been fully studied. We sought to evaluate the independent relationship, if any, between PTH level and prevalent CVD in participants in a nationwide CKD screening program.

METHODS

Kidney Early Evaluation Program

The Kidney Early Evaluation Program (KEEP) is a free community-based health screening program that targets populations 18 years and older with a history of diabetes or hypertension or a first-order relative with diabetes, hypertension, or kidney disease. KEEP was launched by the National Kidney Foundation in August 2000 after a pilot program conducted early in 1997 screened about 900 participants. The KEEP database has been fully described previously.²⁵ Beginning November 1, 2005, PTH tests are performed for participants with eGFR less than 60 mL/min/1.73 m². Our study population includes only eligible KEEP participants from November 1, 2005, through December 31, 2007, with eGFR less than 60 mL/min/1.73 m².

For these participants, additional reflex calcium and phosphorus testing was performed. Calcium and phosphorus levels were determined using the Architect c8000 (Abbott Laboratories, Abbott Park, IL) with Arsenazo-III dye for calcium and ammonium molybdate for phosphorus. Blood for intact PTH testing was collected in EDTA tubes. The intact PTH assay was performed using Immulite 2000 (Siemens Medical Solutions Diagnostics, Los Angeles, CA), a 2-site chemiluminescent enzyme-labeled immunometric assay. All laboratory tests were conducted at Consolidated Laboratory Services, Van Nuys, CA.

Between November 1, 2005, and December 31, 2007, PTH data were available for 4,772 eligible KEEP participants with eGFR less than 60 mL/min/1.73 m². Of these, 29 with eGFR less than 15 mL/min/1.73 m² were excluded, and an additional 271 with missing CVD status were excluded.

The study cohort for this analysis thus included 4,472 eligible KEEP participants.

Definitions

eGFR was calculated using the isotope dilution mass spectrometry–traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation,²⁶ and serum creatinine was calibrated to the Cleveland Clinic Research Laboratory.²⁷ Albumin-creatinine ratios were calculated from urine samples and recorded as less than 30, 30 to 300, or greater than 300 mg/g. The study targeted only patients with CKD stages 3 to 4, defined as stage 3, eGFR of 30 to 59 mL/min/1.73 m², and stage 4, eGFR of 15 to 29 mL/min/1.73 m².

Diabetes mellitus was defined as history of diabetes (self-report or retinopathy) or use of medications for diabetes. Hypertension was defined as history of hypertension (self-report) or use of medications for hypertension. Increased blood pressure was defined as systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater. Self-reported CVD included heart attack, stroke, abnormal heart rhythm, heart angioplasty, heart bypass, or heart failure. Participants were asked, "Have you been told by a doctor or health care professional of having any of the following (mark all that apply)? Heart attack, heart bypass surgery, heart angioplasty, stroke, heart failure (fluid in the lungs), abnormal heart rhythm." Obesity was defined as body mass index of 30 kg/m² or greater.

Statistical Analysis

Participant characteristics by CVD status were compared for demographic differences; χ^2 test was used to assess the statistical significance of these differences. Multivariate logistic regression was used to estimate the odds ratio (OR) of CVD. Age, hemoglobin level, eGFR, plasma PTH level, serum phosphorus level, and serum calcium level were studied as continuous variables. The Cochran-Armitage trend test was used to study the CVD prevalence trend stratified by plasma PTH levels. Because of gaps in the available data, the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (KDOQI) guideline for target range of intact PTH plasma levels for patients with stages 3 and 4 CKD is opinion based. The recommended target ranges are 35 to 70 pg/mL at stage 3 and 70 to 110 pg/mL at stage 4. Therefore, we also studied PTH levels as tertiles with values less than 35, 35 to 70, and greater than 70 pg/mL. Other controlled variables were sex, race, obesity, smoking status, education, self-reported diabetes, self-reported hypertension, increased blood pressure, and albumin-creatinine ratio.

RESULTS

We compared demographic and health variables (Tables 1 and 2, respectively) between groups with missing CVD status ($n = 271$) and known CVD status ($n = 4,472$). There were no statistical differences (all $P \geq 0.10$), except for the increased blood pressure variable ($P = 0.003$). Analysis for events was performed for only par-

Table 1. Demographic Characteristics of the Population

Characteristic	All (N = 4,472)	Parathyroid Hormone (pg/mL)			P*
		<35 (n = 544)	35-70 (n = 1,689)	<70 (n = 2,239)	
Age (y)	68.3 ± 11.8	66.3 ± 12.0	67.5 ± 11.6	69.4 ± 11.8	<0.001
Women (%)	68.3	70.4	69.3	67.0	0.2
Race (%)					<0.001
White	69.1	76.6	73.2	64.2	
African American	19.8	14.0	14.9	24.9	
Other	11.1	9.4	11.8	10.9	
≥High school education (%)	81.3	84.4	83.6	78.7	<0.001
Current smoker (%)	5.9	6.0	6.1	5.8	0.9
Health insurance coverage (%)	89.9	88.9	89.8	90.1	0.7
Family history† (%)	81.6	81.1	82.8	80.8	0.3

Note: Values expressed as mean ± SD or percent. Parathyroid hormone levels expressed in pg/mL and ng/L are equivalent.

*P values refer to parathyroid hormone levels.

†Family history of hypertension, diabetes mellitus, or kidney disease.

participants with known CVD status, and the blood pressure difference disappeared because the number (n = 271) of participants with missing CVD status was too small.

For the 4,472 eligible participants, mean PTH level was 83.9 ± 57.6 pg/mL, and median value was 71 pg/mL. The 75% and 25% quantiles were 104 and 47 pg/mL, respectively.

Table 2. Health Screening Results

Variable	All	Parathyroid Hormone (pg/mL)			P*
		<35	35-70	<70	
Body mass index (kg/m ²)	30.3 ± 6.6	29.9 ± 6.3	30.0 ± 6.5	30.6 ± 6.7	0.002
Self-reported diabetes (%)	45.6	51.0	45.1	44.7	0.03
Self-reported hypertension (%)	82.8	80.7	80.2	85.2	<0.001
Increased blood pressure† (%)	71.8	69.4	71.3	72.7	0.3
Systolic blood pressure (mm Hg)	136.8 ± 20.4	135.1 ± 19.7	136.4 ± 19.9	137.5 ± 20.9	0.007
Diastolic blood pressure (mm Hg)	76.4 ± 12.0	75.9 ± 11.0	76.2 ± 11.4	76.8 ± 12.6	0.08
Albumin-creatinine ratio (mg/g)‡					<0.001
<30 (%)	76.7	84.8	82.2	70.7	
30-300 (%)	18.8	12.6	15.0	23.2	
>300 (%)	4.4	2.6	2.8	6.1	
eGFR (mL/min/1.73 m ²)					<0.001
15-30 (%)	5.3	2.6	2.4	8.2	
31-59 (%)	94.7	97.4	97.6	91.8	
eGFR (mL/min/1.73 m ²)	48.2 ± 9.3	50.1 ± 7.9	50.1 ± 8.0	46.3 ± 10.1	<0.001
Anemia§ (%)	22.1	19.9	17.6	26.0	<0.001
Hyperphosphatemia|| (%)	6.9	9.9	6.9	6.2	0.009
Phosphorus (mg/dL)	3.8 ± 0.7	3.9 ± 0.6	3.8 ± 0.6	3.7 ± 0.7	<0.001
Hypocalcemia¶ (%)	0.5	0.2	0.2	0.9	0.02
Calcium (mg/dL)	9.6 ± 0.5	9.8 ± 0.5	9.6 ± 0.5	9.5 ± 0.5	<0.001

Note: Values expressed as mean ± SD or percent. Conversion factors for units: eGFR in mL/min/1.73 m² to mL/s/1.73 m², ×0.01667; hemoglobin in g/dL to g/L, ×10; phosphorus in mg/dL to mmol/L, ×0.3229; calcium in mg/dL to mmol/L, ×0.2495. Parathyroid hormone levels expressed in pg/mL and ng/L are equivalent.

Abbreviation: eGFR, estimated glomerular filtration rate.

*P values refer to parathyroid hormone levels.

†Systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater.

‡Microalbuminuria, 30 to 300 mg/g; macroalbuminuria, greater than 300 mg/g.

§Hemoglobin level less than 13 g/dL in men and less than 12 g/dL in women.

||Phosphorus level greater than 4.6 mg/dL.

¶Calcium level less than 8.4 mg/dL.

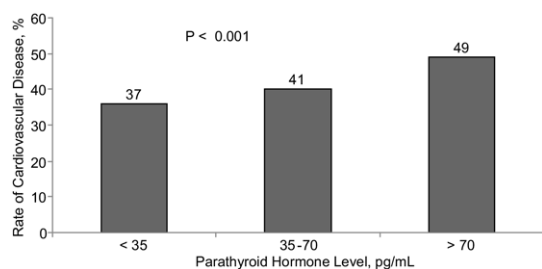


Figure 1. Cardiovascular disease prevalence stratified by parathyroid hormone (PTH) level. $P < 0.001$ for Cochran-Armitage trend test. PTH levels expressed in pg/mL and ng/L are equivalent.

For the total study population, mean age was 68.3 ± 11.8 years; 68% were women, 69% were white, and 6% were current smokers. Grouping by PTH tertiles (Table 1) showed significantly unequal participant distribution for age, race, and educational status. Equal participant distributions for women, smoking status, insurance cov-

erage, and family history of diseases were observed for all tertiles.

For 4,233 participants, eGFR was 30 to 60 mL/min/1.73 m², and for 239, eGFR was 15 to 30 mL/min/1.73 m². Secondary hyperparathyroidism prevalence was 3,928 (88%), with PTH level greater than 70 pg/mL for 2,239 (50.1%). Of the total population, 45% were obese, 46% had diabetes, 83% had hypertension, 22% were anemic, 18.8% had microalbuminuria, 4.4% had macroalbuminuria, 6.9% had hyperphosphatemia, and 0.5% had hypocalcemia. Grouping by PTH tertiles (Table 2) showed significantly unequal participant distribution for all variables except increased blood pressure.

A total of 1,972 participants self-reported a history of CVD. Non-mutually exclusive categories were 721 self-reported heart attacks, 487 strokes, 1,075 abnormal heart rhythms, 470 angioplasties, 482 heart bypass surgeries, and 357

Table 3. Unadjusted Odds Ratios for Prevalent Cardiovascular Disease

Variable	Odds Ratio (95% confidence interval)	P
Age*	1.03 (1.03-1.04)	<0.001
Men	1.45 (1.28-1.65)	<0.001
Race		
White	1.00 (reference)	
African American	0.83 (0.72-0.97)	0.02
Other	0.77 (0.63-0.93)	0.007
Current smoker	1.03 (0.79-1.33)	0.8
≥High school education	0.92 (0.79-1.07)	0.3
Body mass index ≥ 30 kg/m ²	0.93 (0.83-1.05)	0.2
Self-reported diabetes	1.79 (1.58-2.01)	<0.001
Self-reported hypertension	1.87 (1.58-2.20)	<0.001
Increased blood pressure†	0.86 (0.75-0.98)	0.02
Albumin-creatinine ratio (mg/g)		
<30	1.00 (reference)	
30-300	1.35 (1.16-1.57)	<0.001
>300	1.66 (1.24-2.22)	<0.001
eGFR‡	0.97 (0.96-0.98)	<0.001
Hemoglobin*	0.93 (0.89-0.97)	<0.001
Phosphorus*	0.99 (0.91-1.08)	0.8
Calcium*	0.85 (0.75-0.95)	0.006
PTH (pg/mL)		
<35	1.00 (reference)	
35-70	1.16 (0.95-1.42)	0.1
>70	1.61 (1.33-1.95)	<0.001
PTH value‡	1.02 (1.01-1.02)	<0.001

Note: PTH levels expressed in pg/mL and ng/L are equivalent.

Abbreviations: eGFR, estimated glomerular filtration rate; PTH, parathyroid hormone.

*Continuous variables.

†Systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater.

‡Per 5-unit increase.

heart failures. Unadjusted prevalent rates of CVD by PTH level are shown in Fig 1, and unadjusted ORs for prevalent CVD are listed in Table 3. The conventional CVD risk factors of age, male sex, African American race, diabetes, and hypertension were significantly associated with CVD prevalence. We noted a trend toward increased CVD prevalence in smokers, but the OR was not statistically significant. Considering CKD components, albumin-creatinine ratio of 30 mg/g or greater was found to be a marker of CVD. CVD prevalence decreased significantly with increased eGFR and increased hemoglobin level; CVD prevalence increased significantly with increased PTH level when tested as a continuous variable (OR, 1.02; 95% confidence interval [CI], 1.01 to 1.02; $P < 0.001$) and for participants with PTH levels greater than 70 pg/mL (OR, 1.61; 95% CI, 1.33 to 1.95; $P < 0.001$), with a nonsignificant relationship of CVD prevalence with serum phosphorus level.

On multiple logistic regression analysis (Table 4), the conventional CVD risk factors of age, male sex, African American race, diabetes, and hypertension were significantly associ-

ated with CVD prevalence, and CVD was significantly more prevalent in smokers. Considering CKD components, CVD prevalence significantly increased with decreased eGFR; CVD was common in participants with albumin-creatinine ratios of 30 mg/g or greater and low hemoglobin levels. When plasma PTH level was tested as a continuous variable, increases were significantly associated with increases in CVD prevalence (OR, 1.01; 95% CI, 1.01 to 1.02; $P < 0.001$). When tested as tertiles (Table 5), plasma PTH level greater than 70 pg/mL was significantly associated with CVD prevalence (OR, 1.51; 95% CI, 1.21 to 1.88; $P < 0.001$), with a nonsignificant relationship of CVD prevalence with serum calcium and phosphorus levels.

DISCUSSION

We found in a well-characterized population screened for CKD that secondary hyperparathyroidism with plasma PTH levels greater than 70 pg/mL was common and significantly associated with prevalent CVD. This association was independent of eGFR and calcium and phosphorus levels. It is consistent with the biological charac-

Table 4. Odds Ratios for Cardiovascular Disease From Multivariate Logistic Regression, Parathyroid Hormone as a Continuous Variable

Variable	Odds Ratio (95% confidence interval)	P
Age*	1.03 (1.02-1.04)	<0.001
Men	1.51 (1.30-1.77)	<0.001
Race		
White	1.00 (reference)	
African American	0.84 (0.70-1.01)	0.06
Other	0.77 (0.61-0.96)	0.02
Current smoker	1.41 (1.06-1.87)	0.02
≥High school education	1.11 (0.94-1.32)	0.2
Body mass index ≥ 30 kg/m ²	0.98 (0.85-1.13)	0.8
Self-reported diabetes	1.72 (1.50-1.98)	<0.001
Self-reported hypertension	1.43 (1.18-1.73)	<0.001
Increased blood pressure†	0.80 (0.69-0.93)	0.003
Albumin-creatinine ratio (mg/g)		
<30	1.00 (reference)	
30-300	1.13 (0.95-1.34)	0.2
>300	1.21 (0.87-1.70)	0.3
eGFR‡	0.94 (0.90-0.98)	0.003
Hemoglobin*	0.99 (0.94-1.05)	0.8
Phosphorus*	1.09 (0.99-1.21)	0.08
Calcium*	0.99 (0.86-1.14)	0.9
PTH value‡	1.01 (1.01-1.02)	<0.001

Abbreviations: eGFR, estimated glomerular filtration rate; PTH, parathyroid hormone.

*Continuous variables.

†Systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater.

‡Per 5-unit increase.

Table 5. Odds Ratios for Cardiovascular Disease From Multivariate Logistic Regression, Parathyroid Hormone as Tertiles

Variable	Odds Ratio (95% confidence interval)	P
Age*	1.03 (1.02-1.04)	<0.001
Men	1.51 (1.29-1.76)	<0.001
Race		
White	1.00 (reference)	
African American	0.85 (0.71-1.02)	0.08
Other	0.76 (0.61-0.95)	0.02
Current smoker	1.40 (1.05-1.87)	0.02
≥High school education	1.12 (0.94-1.33)	0.2
Body mass index ≥ 30 kg/m ²	0.98 (0.85-1.13)	0.8
Self-reported diabetes	1.73 (1.51-1.99)	<0.001
Self-reported hypertension	1.43 (1.18-1.73)	<0.001
Increased blood pressure†	0.79 (0.68-0.92)	0.002
Albumin-creatinine ratio (mg/g)		
<30	1.00 (reference)	
30-300	1.13 (0.95-1.34)	0.2
>300	1.24 (0.88-1.73)	0.2
eGFR‡	0.93 (0.89-0.97)	<0.001
Hemoglobin*	0.99 (0.94-1.04)	0.8
Phosphorus*	1.10 (0.99-1.21)	0.07
Calcium*	0.99 (0.86-1.14)	0.9
PTH (pg/mL)		
<35	1.00 (reference)	
35-70	1.22 (0.97-1.52)	0.09
>70	1.51 (1.21-1.88)	<0.001

Note: Parathyroid hormone levels expressed in pg/mL and ng/L are equivalent.

Abbreviations: eGFR, estimated glomerular filtration rate; PTH, parathyroid hormone.

*Continuous variables.

†Systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater.

‡Per 5-unit increase.

teristics of CKD mineral and bone disorder, in which PTH is a compensatory hormone working to maintain calcium and phosphorus homeostasis in the setting of reduced vitamin D.

The relationship of CKD and CVD has been described in numerous previous studies. Go et al⁴ observed an independent graded association between reduced eGFR and CVD. McCullough et al²⁸ reported on individual components of CKD, namely anemia and microalbuminuria, as CVD risk states in addition to reduced eGFR. The KDOQI guidelines recommend screening for CKD mineral and bone disorders, including PTH testing, for patients at eGFR less than 60 mL/min/1.73 m². The KDOQI recommendations define desirable serum PTH levels at various CKD stages. Our findings provide further support for these guidelines because increased PTH level appears to signal greater risk of prevalent CVD.

Results from our study and others^{4,28} suggest that screening for CVD could yield high returns in patients with CKD risk markers, including PTH levels, but who do not report a CVD history. Hyperparathyroidism is one measure of the systemic CKD mineral and bone disorder that is quantifiable by using laboratory testing. High PTH levels have been implicated in patients with myocardial hypertrophy, myocardial fibrosis, myocardial calcium deposition, atherosclerosis, calcification of atherosclerotic lesions, vascular stiffness, and hypertension,⁹ all of which may directly contribute to morbidity and mortality from cardiovascular causes secondary to arrhythmias, ischemia, and decreased left ventricular function.

This study has several limitations. Because the mean age of the population was 68 years, these data may not generalize to relatively younger populations. Limitations common to population

screening studies also apply here. Participants were volunteers and likely motivated by their recognized risk of CKD. However, because KEEP screening recruitment materials do not include the terms “heart” or “cardiovascular disease,” participants likely enrolled based on concern about CKD, and CVD likely represents a measured variable. Self-reported CVD has inherent variance related to both overreporting and underreporting. Because of the cross-sectional nature of this study, causal relationships between plasma PTH levels and CVD cannot be defined. Because PTH level potentially is modifiable, if a causal relationship could be proved, testing would provide an opportunity to manage PTH levels.

Lipid values were not measured and could be a source of uncontrolled confounding. We did not have electrocardiographic, echocardiographic, or clinical record confirmation of myocardial infarction, stroke, or abnormal heart rhythm. We did not have information regarding the percentage of patients treated for metabolic complications of CKD. Thus, patients with greater plasma PTH levels could have been misclassified to a lower PTH tertile, thereby diluting CVD events in the higher tertile. PTH level increase is in response to decreases in the renal production of 1,25 dihydroxyvitamin D, and hypovitaminosis D itself has been implicated in CVD.²⁹⁻³² Vitamin D levels were not measured and could be a source of uncontrolled confounding. This was only partially taken into consideration by related markers (serum calcium and phosphate levels).

The current KDOQI guidelines to maintain intact PTH levels within a defined range of optimal values for each stage of CKD and adjust intact PTH-reducing treatments accordingly were derived from Allegro (Nichols Institute, San Juan Capistrano, CA) intact PTH immunoradiometric assay. In this study, the intact PTH assay was performed using Immulite 2000 (Siemens Medical Solutions Diagnostics, Deerfield, IL), a 2-site chemiluminescent enzyme-labeled immunometric assay. Studies have reported marked variability in circulating PTH values caused by the nature of the assay and/or blood specimen type.^{33,34} Because of high intermethod variability in PTH measurement, the association of intact PTH level with CVD may not be comparable when using different methods.

In conclusion, plasma PTH levels greater than 70 pg/mL are significantly associated with prevalent CVD events in patients with CKD stages 3 and 4. Importantly, the association was independent of eGFR and serum phosphorus and calcium levels. These findings provide further support for intact PTH testing, along with testing for other indicators of CKD mineral and bone disorders, at earlier CKD stages.

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Diabetes Mellitus and CKD Awareness: The Kidney Early Evaluation Program (KEEP) and National Health and Nutrition Examination Survey (NHANES)

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Background: Diabetes contributes to increased morbidity and mortality in patients with chronic kidney disease (CKD). We sought to describe CKD awareness and identify factors associated with optimal glycemic control in diabetic and nondiabetic individuals both aware and unaware of CKD.

Methods: This cross-sectional analysis compared Kidney Early Evaluation Program (KEEP) and National Health and Nutrition Examination Survey (NHANES) 1999 to 2006 participants with diabetes and CKD. CKD was defined and staged using glomerular filtration rate (estimated by using the 4-variable Modification of Diet in Renal Disease Study equation) and urine albumin-creatinine ratio. NHANES defined diabetes as self-reported diabetes or fasting plasma blood glucose level of 126 mg/dL or greater, and KEEP as self-reported diabetes or diabetic retinopathy, use of diabetes medications, fasting blood glucose level of 126 mg/dL or greater, or nonfasting glucose level of 200 mg/dL or greater.

Results: Of 77,077 KEEP participants, 20,200 (26.2%) were identified with CKD and 23,082 (29.9%) were identified with diabetes. Of 9,536 NHANES participants, 1,743 (18.3%) were identified with CKD and 1,127 (11.8%) were identified with diabetes. Of KEEP participants with diabetes and CKD ($n = 7,853$), 736 (9.4%) were aware of CKD. Trends in lack of CKD awareness were similar for KEEP participants with and without diabetes. Unaware participants with and without diabetes identified with stages 1 and 2 CKD were less likely to reach target glucose levels, defined as fasting glucose level less than 126 mg/dL or nonfasting glucose level less than 140 mg/dL, than those with stages 3 to 5 (odds ratio, 0.69; 95% confidence interval, 0.62 to 0.78; odds ratio, 0.69; 95% confidence interval, 0.58 to 0.81; $P < 0.001$, respectively).

Conclusion: Our data support that KEEP, as a targeted screening program, is a more enriched population with CKD and comorbid diabetes than NHANES. In addition, our findings highlight the relationship between dysglycemia and early stages of unidentified CKD.

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INDEX WORDS: Chronic kidney disease; diabetes; health screening.

Diabetes mellitus, types 1 and 2, is the leading cause of incident and prevalent chronic kidney disease (CKD), accounting for about 30% to 40% of CKD and up to 45% of end-stage renal disease.^{1,2} The hallmark of diabetic kidney disease is microalbuminuria, defined as a spot urine protein-creatinine ratio of 30 to 299 mg/g and found in approximately 45% of patients with diabetes.¹ Diabetes mellitus is associated with several comorbid conditions, including excess adiposity and traditional Framingham cardiovas-

cular disease (CVD) risk factors (hypertension, dyslipidemia, tobacco use, and increasing age) that collectively predict high mortality.^{3,4}

A relationship between visceral adiposity, insulin resistance, other metabolic risk factors, and microalbuminuria has been established.⁵⁻⁸ This association has been attributed largely to cardiovascular inflammation and oxidative stress, hypertension, and dyslipidemia, which collectively increase the comorbid risk associated with CKD.⁹ In addition, there is sufficient evidence to sug-

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gest a role for glycemic control in improving the morbidity and mortality associated with diabetes.^{3,4} Optimal glucose control reduces the risk of adverse kidney outcomes.¹⁰⁻¹² Insulin resistance and overt diabetes in kidney disease are increasingly recognized as public health problems, highlighting the need for early awareness and detection.

CKD often is silent until advanced stages. Because many people with CKD are unaware of its presence, it often is identified in its later stages, when opportunities to prevent adverse outcomes are limited.^{1,13,14} Detection of CKD at earlier stages would allow more time for evaluation and treatment. To identify individuals at greatest risk of CKD, the Kidney Early Evaluation Program (KEEP) was developed by the National Kidney Foundation to provide screening for early CKD.^{15,16} KEEP is a free voluntary community-based kidney health screening program designed to raise awareness and improve detection of kidney disease in high-risk individuals, those with diabetes mellitus or hypertension, or a first-order relative with diabetes, hypertension, or kidney disease. Participants are recruited based on their perceived risk.

In this report of the KEEP data, we sought to examine the presence of diabetes mellitus in participants with CKD and compare it with National Health and Nutrition Examination Survey (NHANES) 1999 to 2006 data. We further sought to describe CKD awareness and identify factors associated with optimal glycemic control in individuals with and without diabetes both aware and unaware of CKD.

METHODS

KEEP and NHANES Study Participants

The study population included eligible KEEP participants from August 2000 through December 31, 2007, from 47 National Kidney Foundation affiliates and 1,966 screening programs in 49 states and the District of Columbia. This KEEP study cohort includes 77,077 eligible participants with nonmissing values for CKD stage and diabetic status, whereas the NHANES 1999 to 2006 cohort used in this study was limited to participants with fasting plasma glucose values to define diabetes ($n = 9,536$). These NHANES data included participants 18 years or older, and for all analyses using smoking status, self-reported CVD, or self-reported high cholesterol level, included participants were 20 years or older. A complete description of the KEEP study and NHANES database has been previously published.¹⁷

Definitions

We applied common definitions for comorbid conditions across analyses and data sets, with some exceptions as noted in the tables. Diabetes was primarily defined in the KEEP data as recognized history of diabetes (participant self-report or retinopathy), use of medications to treat diabetes, or fasting blood glucose level of 126 mg/dL or greater or nonfasting blood glucose level of 200 mg/dL or greater in the absence of self-report or medication use (labeled “newly diagnosed diabetes” for the purpose of this article). Diabetes was defined in NHANES data as self-reported diabetes or fasting plasma blood glucose level of 126 mg/dL or greater. Unlike the KEEP definition, the NHANES definition does not use nonfasting serum glucose values because this is not recommended by the NHANES investigators. Although these definitions in the 2 data sets are not identical, they are closer than the previous approach of using only self-reported diabetes in NHANES. However, alternative diabetes definitions were used in some KEEP analyses, and these are indicated in the tables. For example, in select KEEP analyses, diabetes was defined as history of diabetes (self-report or retinopathy) or use of diabetic medications. A modified definition was applied to analyses restricted to patients with a fasting plasma blood glucose value: history of diabetes (self-report or retinopathy), use of medications to treat diabetes, or fasting blood glucose level of 126 mg/dL or greater.

Estimated glomerular filtration rate (eGFR) was calculated using the isotope dilution mass spectrometry–traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation¹⁸ after serum creatinine had been calibrated to the Cleveland Clinic Research Laboratory.¹⁹ In NHANES, GFR was estimated by using the MDRD Study equation and based on standardized creatinine values for NHANES 1999-2000, 2001-2002, 2003-2004, and 2005-2006 separately, according to National Center for Health Statistics recommendations. Urine albumin-creatinine ratio (ACR) was categorized as less than 30, 30 to 300, or greater than 300 mg/g. CKD stages were defined as follows: stage 1, eGFR of 90 mL/min/1.73 m² or greater and ACR of 30 mg/g or greater; stage 2, eGFR of 60 to 89 mL/min/1.73 m² and ACR of 30 mg/g or greater; stage 3, eGFR of 30 to 59 mL/min/1.73 m²; stage 4, eGFR of 15 to 29 mL/min/1.73 m²; and stage 5, eGFR less than 15 mL/min/1.73 m². Target blood glucose was defined as fasting blood glucose level less than 126 mg/dL or nonfasting blood glucose level less than 140 mg/dL.²⁰

Hypertension was defined as self-reported history of hypertension, use of medications to treat hypertension, or, based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) guidelines,²¹ systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater for participants with a history of diabetes or CKD or as systolic blood pressure of 140 mm Hg or greater or diastolic blood pressure of 90 mm Hg or greater for participants without diabetes or CKD. NHANES defined hypertension as self-reported history of hypertension or newly diagnosed hypertension using the JNC 7 definition as described.

CVD history was defined as self-reported history of heart attack, heart angioplasty, bypass surgery, heart failure, abnormal heart rhythm, or stroke. NHANES defined CVD history as self-reported history of coronary heart disease, angina/angina pectoris, heart attack, congestive heart failure, or stroke.

Obesity was defined as body mass index of 30 kg/m² or greater (based on fasting weight in NHANES), proteinuria as ACR of 30 mg/g or greater, and dyslipidemia as cholesterol level greater than 200 mg/dL or triglyceride level greater than 150 mg/dL (fasting or nonfasting). Awareness of CKD was defined as an affirmative response to the KEEP questionnaire question "Have you ever been told you have kidney disease?" (the questionnaire includes additional yes/no questions about kidney stones, bladder infections, and polycystic kidney disease) or the NHANES question "(Have you/Has SP [sample person]) ever been told by a doctor or other health professional that (you/she/he) had weak or failing kidneys? Do not include kidney stones, bladder infections, or incontinence."

Prescription medication cost and medical practitioner data were available for only the KEEP cohort and defined according to the KEEP screening questionnaire. Monthly prescription medication cost included self-reported average monthly out-of-pocket costs for prescription medications. Medical practitioner information included self-reports of the types of physicians a participant was seeing; each participant could indicate several types.

Statistical Analysis

Participant demographic characteristics were described in the KEEP and NHANES cohorts according to CKD and diabetic status. To obtain national estimates of each statistic in NHANES, sampling weights and survey design were implemented using SUDAAN (Research Triangle Institute, Research Triangle Park, NC). Diabetic KEEP participants with CKD also were characterized by CKD stage and awareness.

In participants with stages 1 and 2 CKD with fasting blood glucose values, clinical variables were described according to deciles of fasting blood glucose levels and diabetic status. Variables included measurements of systolic blood pressure, diastolic blood pressure, body mass index, cholesterol, triglycerides, and eGFR.

Using logistic regression models by groups aware and unaware of CKD, odds ratios were computed for diabetic and nondiabetic KEEP participants for the outcome of target blood glucose levels. These models compared CKD stages 1 and 2 versus a composite of stages 3 to 5 after adjusting for age, sex, race, current smoking status, hypertension, family history of diabetes, family history of hypertension, and obesity. *P* less than 0.05 indicated statistical significance.

RESULTS

Of 77,077 KEEP participants, 20,200 (26.2%) were identified with CKD and 23,082 (29.9%) were identified with diabetes. Of 9,536 NHANES participants, 1,743 (18.3%) were identified with CKD and 1,127 (11.8%) were identified with

diabetes. The age distribution was similar for KEEP and NHANES participants with and without diabetes; white men were underrepresented in the diabetic KEEP population compared with the NHANES population with CKD (53.0% versus 66.3% white, 33.7% versus 53.7% men; Tables 1 and 2). Diabetes prevalence was greater in participants classified as having CKD in both cohorts than in those without CKD (40.7% and 26.1% in KEEP, 29.7% and 7.8% in NHANES, respectively). Educational achievement was higher (77.3% versus 62.9% with high school or higher) and tobacco use was lower (8.9% versus 19.9%) for diabetic KEEP participants with CKD than for diabetic NHANES participants with CKD, but percentages of obesity, hypertension, and CVD were similar. Of note, fewer participants with diabetes were identified with dyslipidemia and CKD in KEEP than NHANES; however, this result was influenced by missing values for lipid panels in nearly half the KEEP participants. Diabetic participants with and without CKD spent more on prescription medications than their nondiabetic counterparts in the KEEP population. Moreover, most KEEP participants were followed by a family physician, and more participants with diabetes were followed by an endocrinologist than participants without identifiable diabetes. A greater percentage of participants with identified CKD stages 3 to 5, even those with diabetes, were followed by a nephrologist than participants at stages 1 to 2. However, this was still a relatively small percentage of screened participants, suggesting a role for increased CKD awareness, even for participants receiving nephrologist care.

Of KEEP participants with diabetes and CKD (*n* = 7,853), 736 (9.4%) were aware of CKD (Table 3). We found generally similar trends in demographic percentages between aware and unaware participants for advancing age, female sex, white race, health insurance coverage, and seeing family practitioners (Table 3). Of participants with diabetes who were aware they had CKD, 29.6% were followed by nephrologists, whereas 2.7% of those who were unaware of CKD were followed by nephrologists. For participants aware of CKD, greater percentages were followed by nephrologists at stages 3 to 5 than at stages 1 to 2. Percentages of aware diabetic participants with self-reported CVD and dyslipi-

Table 1. Demographic Characteristic Distribution by Diabetes and CKD Status, KEEP and NHANES, Stages 1 to 2 and 3 to 5 CKD

Characteristics	Stages 1-2 CKD				Stages 3-5 CKD			
	KEEP		NHANES		KEEP		NHANES	
	Diabetes	No Diabetes	Diabetes	No Diabetes	Diabetes	No Diabetes	Diabetes	No Diabetes
No. of participants	2,703	3,377	286	593	5,528	8,592	232	632
Age (y)								
18-30	3.4	10.9	—	20	0.2	1.3	0	—
31-45	15.0	25.5	22.4	25.9	3.3	8.7	—	6.6
46-60	38.3	32.4	39.3	24.8	22.0	27.2	15.2	20.2
61-75	33.6	22.2	21.7	18.4	50.2	39.1	49.2	33.4
>75	9.6	9.0	12.9	10.9	24.2	23.7	33.0	39.1
Sex								
Men	37.8	27.6	59.4	37.1	31.6	28.2	45.3	35.5
Women	62.2	72.4	40.6	62.9	68.4	71.8	54.7	64.5
Race								
White	40.1	38.9	57.4	63.7	59.4	63.9	79.1	87.3
African American	35.7	39.9	17.0	15.8	24.3	22.8	11.7	6.7
Others	24.2	21.2	25.5	20.6	16.3	13.3	—	6.0
Ethnicity								
Hispanic	13.5	11.2	20.4	13.9	7.5	7.0	—	—
Non-Hispanic	86.5	88.8	79.6	86.1	92.5	93.0	92.3	95.6
Education								
<High school	22.9	15.3	37.9	23.8	22.6	16.8	36.1	22.8
≥High school	77.1	84.7	62.1	76.2	77.4	83.2	63.9	77.2
Health insurance coverage								
Yes	77.4	77.4	87.5	83.5	88.9	88.6	98.3	94.3
No	22.6	22.6	12.5	16.5	11.1	11.4	—	5.7
Risk factors								
Current smoker	13.8	15.1	25.9	24.8	6.4	8.7	11.2	13.4
Obesity	59.6	42.7	56.4	37.5	55.0	37.0	54.0	26.7
Hypertension	92.5	81.5	89.0	65.5	94.3	87.4	92.0	83.4
Self-reported CVD	33.7	19.6	23.2	11.7	43.0	26.8	43.5	28.4
Proteinuria	100.0	100.0	100.0	100.0	30.2	15.8	34.9	22.6
Dyslipidemia	38.7	32.3	74.3	59.7	36.9	35.3	64.6	65.0
Missing	42.6	48.9			44.2	49.9		
Monthly prescription medication cost* (\$)								
<20	15.9	21.3			11.6	14.6		
20-40	9.6	10.2			8.9	10.7		
41-75	9.2	5.9			8.4	8.4		
76-100	6.4	3.4			7.2	5.1		
101-250	7.9	3.2			9.9	4.9		
>250	3.8	1.3			4.8	1.9		
Missing value	47.2	54.6			49.2	54.4		
Medical practitioner*								
Family practice	63.0	59.6			66.5	64.8		
Internist	17.7	14.7			22.7	20.7		
Endocrinologist	11.7	1.3			11.5	1.6		
Obstetrician/gynecologist	11.9	21.4			11.4	16.9		
Nephrologist	2.3	2.9			6.6	4.2		
Cardiologist	10.0	4.9			15.1	9.1		
Gerontologist	0.9	0.8			1.5	1.2		
Physician assistant	2.3	1.8			2.8	1.6		
Nurse practitioner	3.5	2.4			3.5	1.9		
None	2.4	4.1			1.0	2.0		
Other/unknown	12.4	12.2			15.4	13.9		

Note: Values expressed as percent unless noted otherwise.

Abbreviations: CKD, chronic kidney disease; CVD, cardiovascular disease; KEEP, Kidney Early Evaluation Program; NHANES, National Health and Nutrition Examination Survey.

*Not available in NHANES data.

Table 2. Demographic Characteristic Distribution by Diabetes and CKD Status, KEEP and NHANES, All CKD and Non-CKD

Characteristic	All CKD				Non-CKD			
	KEEP		NHANES		KEEP		NHANES	
	Diabetes	No Diabetes	Diabetes	No Diabetes	Diabetes	No Diabetes	Diabetes	No Diabetes
No. of participants	8,231	11,969	518	1,225	14,851	42,026	609	7,184
Age (y)								
18-30	1.3	4.0	—	10.0	2.7	11.0	3.0	27.9
31-45	7.2	13.5	14.3	15.9	15.9	27.2	19.9	34
46-60	27.4	28.7	29.5	22.4	39.8	36.5	39	25.5
61-75	44.7	34.3	32.9	26.2	34.1	20.2	32.5	10.2
>75	19.4	19.5	21.1	25.5	7.4	5.0	5.7	2.5
Sex								
Men	33.7	28.0	53.7	36.3	32.9	31.6	52.3	49.4
Women	66.3	72.0	46.3	63.7	67.1	68.4	47.7	50.6
Race								
White	53.0	56.8	66.3	75.9	48.8	45.6	67.4	72.2
African American	28.1	27.6	14.9	11.1	31.3	34.3	13.5	10.6
Others	18.9	15.5	18.8	13.0	19.9	20.1	19.1	17.1
Ethnicity								
Hispanic	9.5	8.2	15.2	9.0	11.9	12.7	13.3	12.8
Non-Hispanic	90.5	91.8	84.8	91.0	88.1	87.3	86.7	87.2
Education								
<High school	22.7	16.4	37.1	23.3	17.4	12.6	24.9	18.6
≥High school	77.3	83.6	62.9	76.7	82.6	87.4	75.1	81.4
Health insurance coverage								
Yes	85.1	85.4	91.9	89.1	81.5	79.6	87.7	80
No	14.9	14.6	8.1	10.9	18.5	20.4	12.3	20
Risk factors								
Current smoker	8.9	10.5	19.9	18.8	10.5	12.6	21.7	25.6
Obesity	56.5	38.6	55.4	31.9	55.9	39.5	56.3	29.3
Hypertension	93.7	85.7	90.3	75.1	84.6	56.1	76.4	27.9
Self-reported CVD	40.0	24.8	31.5	20.5	27.2	15.7	16.8	4.7
Proteinuria	54.7	41.6	74.1	60.9	0.0	0.0	0.0	0.0
Dyslipidemia	37.5	34.4	70.4	62.5	38.7	34.4	67.5	55.2
Missing	43.6	49.6			36.7	44.7		
Monthly prescription medication cost* (\$)								
<20	13.0	16.5			17.0	25.0		
20-40	9.2	10.6			12.3	11.2		
41-75	8.6	7.7			10.5	6.3		
76-100	6.9	4.6			7.4	3.5		
101-250	9.2	4.4			8.2	2.8		
>250	4.5	1.7			3.0	1.0		
Missing value	48.5	54.5			41.7	50.2		
Medical practitioner*								
Family practice	65.4	63.4			65.0	61.0		
Internist	21.1	19.0			18.8	14.8		
Endocrinologist	11.5	1.5			10.2	1.4		
Obstetrician/gynecologist	11.6	18.2			17.0	23.9		
Nephrologist	5.2	3.8			1.4	1.0		
Cardiologist	13.4	7.9			8.7	4.3		
Gerontologist	1.3	1.1			0.8	0.5		
Physician assistant	2.7	1.7			2.6	1.6		
Nurse practitioner	3.5	2.1			3.9	2.5		
None	1.4	2.6			2.5	4.7		
Other/unknown	14.4	13.4			12.8	10.8		

Note: Values expressed as percent unless noted otherwise.

Abbreviations: CKD, chronic kidney disease; CVD, cardiovascular disease; KEEP, Kidney Early Evaluation Program; NHANES, National Health and Nutrition Examination Survey.

*Not available in NHANES data.

Table 3. Demographic Characteristic Distribution of KEEP Participants With Diabetes by CKD Stage and Awareness

Characteristic	Stages 1-2 CKD			Stages 3-5 CKD			All CKD		
	All	Unaware	Aware	All	Unaware	Aware	All	Unaware	Aware
No. of participants	2,548	2,394	154	5,305	4,723	582	7,853	7,117	736
Age (y)									
18-30	3.3	3.4	2.6	0.2	0.1	0.9	1.2	1.2	1.2
31-45	14.6	14.5	14.9	3.4	3.1	5.3	7.0	7.0	7.3
46-60	38.2	38.3	37.7	22.0	21.9	23.0	27.3	27.4	26.1
61-75	34.3	34.0	37.7	50.3	50.2	50.7	45.1	44.8	48.0
>75	9.6	9.8	7.1	24.1	24.6	20.1	19.4	19.6	17.4
Sex									
Men	37.3	37.4	35.7	31.6	30.4	41.8	33.5	32.8	40.5
Women	62.7	62.6	64.3	68.4	69.6	58.2	66.5	67.2	59.5
Race									
White	40.9	40.5	47.4	59.4	59.8	56.2	53.4	53.3	54.3
African American	35.2	36.0	23.4	24.3	24.4	23.7	27.9	28.3	23.6
Others	23.8	23.5	29.2	16.3	15.8	20.1	18.7	18.4	22.0
Ethnicity									
Hispanic	13.5	12.8	24.0	7.5	7.1	10.8	9.4	9.0	13.6
Non-Hispanic	86.5	87.2	76.0	92.5	92.9	89.2	90.6	91.0	86.4
Education									
<High school	22.8	22.4	29.1	22.5	22.5	22.3	22.6	22.5	23.7
≥High school	77.2	77.6	70.9	77.5	77.5	77.7	77.4	77.5	76.3
Health insurance coverage									
Yes	77.9	78.5	68.7	89.0	89.4	86.2	85.4	85.7	82.5
No	22.1	21.5	31.3	11.0	10.6	13.8	14.6	14.3	17.5
Risk factors									
Current smoker	13.5	13.5	14.1	6.3	6.3	6.5	8.6	8.7	8.1
Obesity	59.6	59.5	60.3	55.2	55.2	55.7	56.6	56.6	56.6
Hypertension	92.8	93.0	89.6	94.4	94.2	96.2	93.9	93.8	94.8
Self-reported CVD	34.5	34.0	42.2	43.3	41.5	57.4	40.4	39.0	54.2
Proteinuria	100.0	100.0	100.0	30.1	27.3	51.6	54.4	53.6	62.3
Dyslipidemia	38.7	38.2	46.1	36.7	35.5	46.4	37.3	36.4	46.3
Missing	42.9	43.3	35.7	44.5	46.5	28.2	44.0	45.5	29.8
Medical practitioner									
Family practice	63.8	64.5	53.2	66.7	66.8	66.0	65.8	66.1	63.3
Internist	18.1	18.2	16.9	22.7	22.7	22.7	21.2	21.2	21.5
Endocrinologist	12.2	12.0	14.9	11.8	10.7	21.0	11.9	11.1	19.7
Obstetrician/gynecologist	12.0	12.0	11.7	11.4	11.6	10.3	11.6	11.7	10.6
Nephrologist	2.4	1.5	16.2	6.6	3.3	33.2	5.2	2.7	29.6
Cardiologist	10.2	9.9	16.2	15.1	13.9	25.1	13.5	12.5	23.2
Gerontologist	0.8	0.9	0.0	1.5	1.5	1.5	1.3	1.3	1.2
Physician assistant	2.4	2.3	2.6	2.9	2.8	3.6	2.7	2.6	3.4
Nurse practitioner	3.5	3.5	4.5	3.6	3.5	4.1	3.6	3.5	4.2
None	2.1	2.0	3.2	0.9	0.9	1.2	1.3	1.3	1.6
Other/unknown	12.2	12.2	13.0	15.5	15.6	14.6	14.4	14.5	14.3
Albumin-creatinine ratio (mg/g)									
<30				69.9	72.7	48.4	45.6	46.4	37.7
30-300	89.3	90.0	78.6	22.5	21.3	31.6	45.7	46.1	41.9
>300	10.7	10.0	21.4	7.6	6.0	20.1	8.7	7.5	20.4
eGFR (mL/min/1.73 m ²)	86.9 ± 20.5	87.1 ± 20.4	83.6 ± 20.4	47.0 ± 10.5	48.1 ± 9.5	38.4 ± 13.3	60.0 ± 23.6	61.2 ± 23.3	47.9 ± 23.8

Note: Values expressed as percent or mean ± SD unless noted otherwise. Diabetes defined as self-reported history of diabetes or receiving medications for diabetes.

Abbreviations: CKD, chronic kidney disease; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; KEEP, Kidney Early Evaluation Program.

demia were greater than percentages of those unaware. This finding is similar to other KEEP reports, an indication that CKD awareness may increase in the presence of existing comorbidity.²² Percentages of hypertension were high in participants both aware and unaware of CKD at stages 1 to 2 and 3 to 5. Based on our definition of CKD stage, all participants with stages 1 to 2

had proteinuria; however, at stages 3 to 5, a greater percentage of aware than unaware participants had proteinuria.

The presence of diabetes is associated with multiple comorbid conditions, including hypertension, obesity, and dyslipidemia, all of which have been associated with proteinuria. In measured clinical variables for KEEP participants

with CKD stages 1 and 2, we found a general trend toward greater mean systolic blood pressure, body mass index, and triglyceride levels in diabetic than nondiabetic participants across glycemia levels (Table 4). Interestingly, this effect was not observed for total cholesterol level.

To assess factors associated with glycemia in diabetic and nondiabetic groups both aware and unaware of CKD, we then examined the association between risk factors and target blood glucose levels less than 126 mg/dL fasting or less than 140 mg/dL nonfasting. In both aware and unaware participants with diabetes, men were less likely than women to meet optimal blood glucose levels (Table 5). Participants with diabetes who were aware they had CKD who also had comorbid obesity or a family history of diabetes were less likely than those without these conditions to meet glucose targets. Of note, unaware diabetic participants with comorbid hypertension or obesity or a family history of diabetes were also less likely to meet the target. Importantly, both diabetic and nondiabetic participants unaware of CKD who were defined as having stages 1 and 2 CKD were less likely to meet target glucose levels than unaware participants with stages 3 to 5. For unaware nondiabetic participants, factors associated with the likelihood of increased glucose levels were increasing age, male sex, African American or other race, comorbid obesity, and family history of diabetes.

DISCUSSION

This report of KEEP data highlights the relative similarities of diabetic participants with CKD in the KEEP and NHANES populations, as well as CKD awareness in participants with diabetes and prevalent CKD. Our observations are consistent with previous reports of KEEP data and other reports regarding awareness in patients with CKD.^{23,24} Our collective findings in this and previous reports, that overt diabetes is associated with increased prevalence of CKD stages 1 to 2, corroborate previous reports of diabetes in patients with CKD.²⁵ Our data further complement previous investigations using general population screenings, such as NHANES,^{26,27} regarding diabetes and CKD prevalence. Our report suggests that the KEEP health screening population is a more enriched CKD population than NHANES, with comorbid diabetes mellitus and

CKD, largely because of the targeted nature of the screening program.

Importantly, regarding prevalence of comorbid risk factors in the diabetic populations in both KEEP and NHANES, age distribution was similar, but white men were underrepresented in KEEP compared with NHANES. Obesity (a major determinant of dysglycemia), hypertension (a frequent comorbid condition), and self-reported CVD were similar in KEEP and NHANES. Diabetic participants with and without CKD spent more on prescription medications than their nondiabetic counterparts in KEEP. Relatively few KEEP participants with self-reported or identifiable diabetes were receiving endocrinologist care, and most were cared for by family physicians. Overall, these data are consistent with our previously published articles and prior KEEP data reports.²⁸⁻³²

Diabetes prevalence is highest in the age group 65 years and older, although the largest increase in the last decade, corresponding to the obesity pandemic, is in the age group younger than 45 years.³³ The disproportionately greater diabetes prevalence and rate of increase in African Americans and Hispanics is well recognized.³⁴ Although the proportion of diabetic patients remains highest in the United States, the rapid increase in diabetes prevalence is occurring globally, and soon more than 300 million people worldwide will be affected as overnutrition and obesity become more likely than undernutrition.³³ Data from this report extend our understanding of the association of diabetes and CKD in the United States. CKD awareness was similar for diabetic and nondiabetic participants; our finding of an association between CKD awareness and such comorbid conditions as dyslipidemia, proteinuria, and CVD is novel²² and emphasizes the notion that multiple comorbid conditions may be necessary to achieve the needed recognition to increase awareness and ultimately attention to individual medical care. Programs such as KEEP that deliver early aggressive CKD screening and promote awareness represent a timely and important public health care initiative.

We found it noteworthy that compared with CKD stages 3 to 5, unawareness of CKD status in participants defined as CKD stages 1 and 2 was associated with increased blood glucose levels regardless of diabetes status. The strength

Table 4. Clinical Variables by Deciles of Fasting Blood Glucose Levels and Diabetic Status (n = 1,265)

Variable	Fasting Blood Glucose (g/dL)			
	<83		83-<90	
	Diabetes*	No Diabetes	Diabetes*	No Diabetes
Systolic blood pressure (mm Hg)	148.2 ± 22.6	133.1 ± 22.4	139.2 ± 22.1	133.1 ± 22.7
Diastolic blood pressure (mm Hg)	86.5 ± 16.5	82.3 ± 11.9	82.1 ± 10.3	82.8 ± 13.6
Body mass index (kg/m ²)	30.9 ± 7.6	28.1 ± 7.1	31.7 ± 6.1	28.5 ± 7.3
Cholesterol (mg/dL)	194.3 ± 53.4	207.7 ± 47.1	187.3 ± 33.5	203.2 ± 43.1
Triglycerides (mg/dL)	100.9 ± 58.1	140.8 ± 305.7	137.8 ± 66.9	103.0 ± 49.1
eGFR (mL/min/1.73 m ²)	88.3 ± 18.2	92.4 ± 25.4	96.2 ± 20.6	89.2 ± 19.2
Variable	90-<95		95-<100	
	Diabetes*	No Diabetes	Diabetes*	No Diabetes
	Systolic blood pressure (mm Hg)	140.2 ± 20.0	135.5 ± 22.5	134.9 ± 19.5	137.0 ± 23.2
Diastolic blood pressure (mm Hg)	81.9 ± 13.4	83.1 ± 13.1	82.0 ± 13.5	84.5 ± 14.8
Body mass index (kg/m ²)	32.2 ± 8.5	30.0 ± 7.2	28.4 ± 5.3	29.7 ± 7.6
Cholesterol (mg/dL)	197.7 ± 56.1	204.4 ± 38.3	196.5 ± 42.6	205.7 ± 39.3
Triglycerides (mg/dL)	117.3 ± 39.9	108.7 ± 70.0	162.6 ± 144.9	133.9 ± 111.8
eGFR (mL/min/1.73 m ²)	88.1 ± 15.3	88.4 ± 18.6	87.1 ± 15.9	94.0 ± 24.2
Variable	100-<105		105-<113	
	Diabetes*	No Diabetes	Diabetes*	No Diabetes
	Systolic blood pressure (mm Hg)	129.5 ± 11.5	136.8 ± 28.1	138.4 ± 17.6	141.1 ± 24.7
Diastolic blood pressure (mm Hg)	81.8 ± 5.9	82.9 ± 14.1	80.0 ± 9.0	84.1 ± 13.0
Body mass index (kg/m ²)	32.4 ± 6.7	30.1 ± 7.6	32.3 ± 7.4	31.7 ± 8.4
Cholesterol (mg/dL)	185.7 ± 42.6	206.3 ± 41.3	193.6 ± 40.3	194.8 ± 34.8
Triglycerides (mg/dL)	128.6 ± 81.6	114.5 ± 71.6	149.1 ± 76.6	121.5 ± 64.1
eGFR (mL/min/1.73 m ²)	82.8 ± 15.4	91.2 ± 21.4	94.3 ± 30.6	90.4 ± 23.8
Variable	113-<128		128-<152	
	Diabetes*	No Diabetes	Diabetes*	No Diabetes
	Systolic blood pressure (mm Hg)	146.2 ± 22.2	141.8 ± 21.7	145.2 ± 23.8
Diastolic blood pressure (mm Hg)	83.6 ± 9.8	85.3 ± 11.7	84.5 ± 13.1	
Body mass index (kg/m ²)	32.0 ± 7.0	30.7 ± 7.0	33.4 ± 7.6	
Cholesterol (mg/dL)	201.7 ± 47.0	221.6 ± 47.9	190.7 ± 44.8	
Triglycerides (mg/dL)	158.1 ± 124.1	139.9 ± 72.9	157.9 ± 84.5	
eGFR (mL/min/1.73 m ²)	87.5 ± 22.4	84.7 ± 19.8	87.0 ± 21.1	
Variable	152-<213		≥213	
	Diabetes*	No Diabetes	Diabetes*	No Diabetes
	Systolic blood pressure (mm Hg)	145.8 ± 19.6		142.0 ± 20.8
Diastolic blood pressure (mm Hg)	85.0 ± 12.5		85.7 ± 12.1	
Body mass index (kg/m ²)	34.2 ± 7.6		33.1 ± 8.0	
Cholesterol (mg/dL)	205.0 ± 54.3		221.4 ± 53.2	
Triglycerides (mg/dL)	205.2 ± 138.0		251.5 ± 313.0	
eGFR (mL/min/1.73 m ²)	86.8 ± 20.7		96.5 ± 24.2	

Note: Values expressed as mean ± SD. Includes patients with stages 1 and 2 chronic kidney disease with fasting blood glucose values. Conversion factor for units: fasting blood glucose in mg/dL to mmol/L, $\times 0.05551$; cholesterol in mg/dL to mmol/L, $\times 0.02586$; triglycerides in mg/dL to mmol/L, $\times 0.01129$; eGFR in mL/min/1.73 m² to mL/s/1.73 m², $\times 0.01667$.

Abbreviation: eGFR, estimated glomerular filtration rate.

*Defined as self-reported history of diabetes, receiving medications for diabetes, or fasting blood glucose level of 126 mg/dL or greater.

Table 5. Odds of Diabetic and Nondiabetic KEEP Participants With CKD Having Target Blood Glucose Level (<126 mg/dL fasting or <140 mg/dL nonfasting) by CKD Awareness

	Diabetes*				No Diabetes			
	Aware CKD (n = 630)		Unaware CKD (n = 5,972)		Aware CKD (n = 753)		Unaware CKD (n = 9,502)	
	Odds Ratio (95% CI)	P	Odds Ratio (95% CI)	P	Odds Ratio (95% CI)	P	Odds Ratio (95% CI)	P
Age (y; reference, 46-60)								
18-30	1.51 (0.34-6.75)	0.6	0.89 (0.57-1.40)	0.6	2.11 (0.25-18.18)	0.5	2.63 (1.50-4.61)	<0.001
31-45	1.40 (0.72-2.72)	0.3	0.99 (0.80-1.23)	0.9	1.49 (0.49-4.52)	0.5	1.38 (1.05-1.81)	0.02
61-75	1.32 (0.88-1.98)	0.2	1.11 (0.97-1.26)	0.1	0.48 (0.23-0.99)	0.05	0.66 (0.54-0.80)	<0.001
>75	0.89 (0.52-1.53)	0.7	1.14 (0.96-1.34)	0.1	0.71 (0.30-1.69)	0.4	0.56 (0.44-0.71)	<0.001
Sex (reference, women)								
Men	0.50 (0.35-0.70)	<0.001	0.83 (0.74-0.93)	<0.001	0.94 (0.52-1.70)	0.8	0.80 (0.68-0.94)	0.007
Race (reference, white)								
African American	0.85 (0.57-1.28)	0.4	0.96 (0.85-1.09)	0.5	0.40 (0.21-0.75)	0.004	0.80 (0.67-0.95)	0.01
Others	0.61 (0.40-0.93)	0.02	0.71 (0.62-0.82)	<0.001	0.69 (0.32-1.50)	0.4	0.63 (0.51-0.77)	<0.001
Risk factors (reference, without)								
Current smoker	0.75 (0.41-1.38)	0.4	1.00 (0.83-1.20)	0.9	0.66 (0.28-1.54)	0.3	0.87 (0.68-1.11)	0.3
Hypertension	1.12 (0.55-2.26)	0.8	0.68 (0.54-0.84)	<0.001	1.83 (0.70-4.79)	0.2	0.82 (0.63-1.05)	0.1
Family history of diabetes	0.72 (0.50-1.04)	0.08	0.83 (0.74-0.93)	0.002	0.57 (0.32-1.00)	0.05	0.82 (0.70-0.95)	0.009
Family history of hypertension	0.97 (0.65-1.44)	0.9	1.15 (1.02-1.30)	0.03	0.61 (0.27-1.35)	0.2	1.26 (1.06-1.50)	0.009
Obesity	0.63 (0.45-0.89)	0.008	0.85 (0.77-0.95)	0.004	1.00 (0.55-1.81)	0.9	0.66 (0.56-0.77)	<0.001
CKD stage (reference, stages 3-5)								
1-2	0.83 (0.55-1.25)	0.4	0.69 (0.62-0.78)	<0.001	1.64 (0.68-3.96)	0.3	0.69 (0.58-0.81)	<0.001

Abbreviations: CI, confidence interval; CKD, chronic kidney disease; KEEP, Kidney Early Evaluation Program.

*Defined as self-reported history of diabetes or receiving medications for diabetes.

of the association at CKD stages 1 and 2 highlights the association of CKD in the insulin-resistant state and excess visceral adiposity. Insulin resistance has been associated with CKD in general population observational studies. In a report of 6,453 nondiabetic NHANES III participants, odds of CKD increased as levels of serum insulin, serum C peptide, hemoglobin A_{1c}, and insulin resistance increased.²⁶ Furthermore, recent evidence from the ARIC (Atherosclerosis Risk in Communities) Study, including 10,096 nondiabetic participants with normal baseline kidney function, showed that insulin-resistant participants have greater odds for incident CKD.⁶ After adjustment for the subsequent development of diabetes and hypertension, during the 9 years of follow-up, these participants still had a greater risk of incident CKD.

Tight glycemic control in patients with both type 1 and type 2 diabetes is now widely accepted to reduce the risk of microvascular complications in the general population.^{35,36} Observational studies suggest that tighter glycemic control is associated with reduced risk of these outcomes in patients with CKD.¹⁰⁻¹² The present report extends earlier observations and suggests that in diabetic KEEP participants with CKD, systolic blood pressure, obesity, and triglyceride levels

are higher than for nondiabetic participants. In addition, in unaware diabetic participants, those with comorbid hypertension, obesity, or a family history of diabetes are less likely than those without these conditions to reach optimal blood glucose levels. Lack of CKD awareness with increased blood glucose levels in diabetic and nondiabetic KEEP participants emphasizes the relationship between dysglycemia and early stages of unidentified CKD.

Although the strength of our investigation is in the large sample size and generalizable data regarding a targeted CKD population compared with NHANES, its limitations are common to population studies, and conclusions for population-attributable risk may be limited. Screened participants are volunteers who likely were motivated by their recognized risk of CKD. Thus, diabetes rates were greater, possibly influencing other results. Comparisons between KEEP and NHANES data are limited to be qualitative rather than statistical because of differences in recruitment, design, and questionnaires. However, we believe the targeted nature of the KEEP screening program and the large sample size with clinical characteristics similar to the NHANES database allow for accurate definition of the diabetic CKD population in the United States. In

addition, our findings highlight the relationship between dysglycemia and early stages of unidentified CKD.

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Hypertension in Early-Stage Kidney Disease: An Update From the Kidney Early Evaluation Program (KEEP)

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Background: Chronic kidney disease (CKD) is a worldwide public health problem. Systolic blood pressure as an associated feature of CKD has not been fully explored in community volunteer and nationally representative samples of the US population.

Methods: This cross-sectional analysis evaluated hypertension and early-stage CKD in participants in the Kidney Early Evaluation Program (KEEP), a voluntary community-based health screening program administered by the National Kidney Foundation, and the National Health and Nutrition Examination Survey (NHANES) data to assess similarities and differences between these populations. Participants in both databases were 18 years or older.

Results: The KEEP database included 88,559 participants and the NHANES included 20,095. Hypertension prevalence was greater in KEEP (69.6%) than NHANES (38.1%; $P < 0.001$). Compared with NHANES participants, KEEP participants had greater rates of obesity (79.5% versus 51.5%; $P < 0.001$) and diabetes (28.0% versus 8.9%; $P < 0.001$). In participants with diabetes, KEEP had slightly greater rates of prevalent hypertension (88.5% versus 85.7%; $P = 0.03$). In participants with hypertension, CKD stages 3 and 4 were more prevalent in KEEP than NHANES (79.1% versus 69.3%; $P < 0.001$). Rates of CKD stages 3 and 4 were greater in KEEP than NHANES for the following subgroups: African Americans (72.4% versus 57.4%; $P < 0.001$), smokers (69.1% versus 55.6%; $P = 0.002$), and participants with hypercholesterolemia (80.2% versus 71.9%; $P < 0.001$).

Conclusions: In the volunteer KEEP population, rates of hypertension and CKD were greater than in NHANES, most prominently in African Americans and participants with increased cardiovascular risk. *Am J Kidney Dis* 53(S4):S22-S31. © 2009 by the National Kidney Foundation, Inc.

INDEX WORDS: Chronic kidney disease; hypertension; systolic blood pressure.

The number of adults with hypertension has more than doubled in the last 20 years, and hypertension prevalence is likely to far exceed predictions for 2025.¹ Overall awareness and treatment of hypertension, assessed by means of blood pressure control, in National Health and Nutrition Examination Survey (NHANES) participants increased from 29% in 1999 to 2000 to 37% in 2003 to 2004.² NHANES data show that the age-adjusted hypertension preva-

lence in the US population increased from more than 60 million adults in 2000^{3,4} to 72 million in 2004.³⁻⁵ Increases in prevalence translate into increases in cost of hypertension treatment (estimated in 2006 to exceed \$55 billion⁶) and comorbid conditions.

Chronic kidney disease (CKD) is a worldwide public-health problem.⁷ The prevalence of CKD stages 3 to 5 in the United States has grown by 40% during the past decade to 14.8%. An estimated 8 million people have an estimated glomerular filtration rate (eGFR) less than 60 mL/min/1.73 m² in the United States.⁸ Because CKD is an independent risk factor for cardiovascular death, increases in CKD prevalence are consequential.⁹

The Kidney Early Evaluation Program (KEEP), a National Kidney Foundation screening program to help promote CKD awareness, targets individuals 18 years or older with diabetes or hypertension or otherwise at high risk of CKD. KEEP collects completed participant surveys regarding past medical events and measures blood pressure and laboratory values. Hypertension prevalence at various CKD stages has been compared between KEEP and NHANES.¹⁰ Preva-

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lences of cardiovascular risk¹¹ and anemia¹² and trends in mineral metabolism¹³ also have been compared.

The early decrease in kidney function (CKD stage 1 or 2) caused by increased blood pressure has not been extensively investigated in prospective studies, with only 2 underpowered studies available to date.^{14,15} Systolic blood pressure is the most clinically useful predictor of CKD in people older than 50 years,¹⁶ but this has not been validated in appropriately powered trials with CKD outcomes.¹⁷

Given this background, we evaluated the KEEP and NHANES databases to examine whether systolic blood pressure greater than 130 mm Hg was independently associated with CKD stage. The hypothesis is that rates and severity of hypertension would differ between individuals with CKD who volunteered for CKD screening (KEEP) and those who volunteered to participate in a representative sample assessed for general health status (NHANES).

METHODS

KEEP Participants

KEEP is a free community-based health screening program that targets populations 18 years and older with a history of diabetes or hypertension or a first-order relative with diabetes, hypertension, or kidney disease. The KEEP database was fully described in the 2007 KEEP Annual Data Report.¹⁸ Officially launched nationwide in August 2000 and now in its ninth year, KEEP has screened more than 115,000 participants from 49 states and the District of Columbia.

In this study, we included only eligible KEEP participants from August 2000 through December 31, 2007. Our KEEP study cohort includes 88,559 eligible participants with non-missing values for age and blood pressure.

NHANES (1999 to 2006)

Because NHANES participants are not specifically recruited based on CKD risk factors, they provide a comparison for KEEP with respect to hypertension, CKD, and the interrelationships between these variables according to population. To make comparisons with KEEP data, NHANES 1999 to 2006 data were restricted to participants 18 years or older ($n = 22,624$). For all analyses using smoking status, self-reported cardiovascular disease, or self-reported high cholesterol level, the NHANES study population was limited to participants 20 years or older ($n = 20,311$). A complete description of the NHANES database is available in the 2007 KEEP Annual Data Report.¹⁸

Definitions

In KEEP and NHANES, we applied a common definition for hypertension: self-reported hypertension or increased blood pressure,¹⁹ defined as systolic blood pressure of 130 mm Hg or greater or diastolic blood pressure of 80 mm Hg or greater for participants with a history of diabetes or CKD and systolic blood pressure of 140 mm Hg or greater or diastolic blood pressure of 90 mm Hg or greater otherwise. For analysis purposes, we also categorized participants into 4 groups based on systolic blood pressure measurements less than 130, 130 to 139, 140 to 149, and 150 mm Hg or greater.

In KEEP and NHANES, CKD was defined as eGFR less than 60 mL/min/1.73 m² or albumin-creatinine ratio of 30 mg/g or greater. GFR was estimated using the isotope dilution mass spectrometry–traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation,²⁰ and serum creatinine was calibrated to the Cleveland Clinic Research Laboratory.²¹ CKD stage 2 was defined as eGFR of 60 to 89 mL/min/1.73 m² and albumin-creatinine ratio of 30 mg/g or greater, and stages 3 and 4, as eGFR of 15 to 59 mL/min/1.73 m². In NHANES, GFR is estimated based on a standardized creatinine value for NHANES 1999-2000, 2001-2002, 2003-2004, and 2005-2006 separately, based on National Center for Health Statistics recommendations. The formula used to estimate GFR is $(\text{GFR} = 175 \cdot \text{standardized serum creatinine}^{-1.154} \cdot \text{age}^{-0.203} \cdot 1.212 [\text{African Americans}] \cdot 0.742 [\text{women}])$.²⁰

Other health status variables in KEEP and NHANES include self-reported diabetes, self-reported cardiovascular disease, obesity, and self-reported high cholesterol level. In KEEP, self-reported diabetes included self-reported history of diabetes or use of medication for diabetes. Obesity was defined as body mass index (BMI) of 30 kg/m² or greater. Self-reported cardiovascular disease included history of heart attack, heart angioplasty, bypass surgery, heart failure, abnormal heart rhythm, or stroke. Self-reported high cholesterol level was defined as a participant being told that he or she had a high cholesterol level. NHANES definitions for these conditions were the same as the KEEP definitions, except that self-reported diabetes was defined as self-reported history of diabetes and cardiovascular disease was defined as self-reported history of coronary heart disease, angina/angina pectoris, heart attack, congestive heart failure, or stroke. Race/ethnicity groups in NHANES are non-Hispanic white, non-Hispanic black, and other.

Statistical Analysis

Hypertension prevalence and systolic blood pressure status were calculated based on demographic characteristics, health conditions, eGFR, and albuminuria. To obtain national estimates of each statistic in NHANES, sampling weights and survey design were implemented by using SUDAAN (Research Triangle Institute, Research Triangle Park, NC).²² The *t*-test was used to calculate the *P* value for the comparison of hypertension prevalence between the KEEP and NHANES populations. The prevalence of CKD stages 3 and 4 in each systolic blood pressure group was also calculated for demographic characteristics and health conditions for the cohort with CKD stages 2 to 4.

Table 1. Prevalence of Hypertensive Status by Participant Characteristics

Characteristics	KEEP						NHANES*						P‡
	All	Hypertension†	Systolic Blood Pressure (mm Hg)				All	Hypertension†	Systolic Blood Pressure (mm Hg)				
			<130	130-139	140-149	≥150			<130	130-139	140-149	≥150	
All	88,559	61,609 (69.6)	43.8	20.5	15.9	19.8	20,095	8,537 (38.1)	71	13.3	7	8.7	<0.001
Age (y)													
18-30	6,867	2,072 (30.2)	73.2	16.4	6.7	3.8	5,921	600 (11.2)	91	6.6	2.1	0.3	
31-45	19,063	9,428 (49.5)	60.8	19.3	11	8.8	4,643	1,176 (24.2)	84.6	9.8	3.7	1.9	
46-60	31,008	22,310 (72.0)	42.4	21.3	16.6	19.6	3,756	1,950 (48.0)	63.2	18.4	8.9	9.4	
61-75	23,824	20,723 (87.0)	29.3	21.6	20.3	28.7	3,730	2,903 (73.3)	41.2	21.1	14.9	22.8	
>75	7,797	7,076 (90.7)	25.8	20.2	19.4	34.6	2,045	1,908 (84.6)	29.4	17.1	15.2	38.3	
Sex													
Men	28,035	20,571 (73.4)	38.4	22.8	17.6	21.2	9,662	4,113 (37.7)	70.2	15.9	7.4	6.4	
Women	60,459	40,993 (67.8)	46.3	19.4	15.1	19.2	10,433	4,424 (38.4)	71.8	10.8	6.5	10.8	
Race													
White	41,336	29,540 (71.5)	42.5	21	16.3	20.2	9,689	4,451 (38.9)	70.7	13.5	7.2	8.7	
African American	29,165	21,207 (72.7)	39.7	20.4	17	22.9	4,239	2,048 (46.4)	65	14.8	8.2	12	<0.001
Other	16,375	9,894 (60.4)	53.4	19.7	13.2	13.7	6,167	2,038 (29.1)	76.3	11.6	5.3	6.7	
Hispanic													
Yes	11,024	6,426 (58.3)	53.5	19.2	12.4	14.9	5,525	1,815 (27.4)	78.1	10.5	5.1	6.4	
No	77,535	55,183 (71.2)	42.4	20.7	16.4	20.5	14,570	6,722 (39.6)	70	13.7	7.3	9.1	
Education													
<High school	13,562	10,398 (76.7)	38.4	20.2	16.5	25	6,590	3,129 (45.5)	64.1	14.1	8.5	13.4	
≥High school	73,593	50,220 (68.2)	44.8	20.5	15.8	18.9	13,472	5,377 (36.2)	72.8	13.1	6.6	7.5	
Current smoker	9,832	6,160 (62.7)	50.4	20.2	13.5	15.9	3,916	1,489 (31.9)	75.7	12.4	6.2	5.7	<0.001
Body mass index ≥ 30 kg/m ²	38,648	30,742 (79.5)	35.6	22.4	18.4	23.6	6,186	3,228 (51.5)	64.3	16.9	9	9.8	<0.001
Diabetes§	24,839	21,985 (88.5)	36.0	21.1	17.9	25	1,784	1,594 (85.7)	48.2	20.3	13.2	18.3	0.03||
Cardiovascular disease§	18,861	15,658 (83.0)	37.9	20.8	17.2	24.1	2,031	1,848 (78.0)	48.2	17	13	21.8	<0.001
High cholesterol§	10,634	8,795 (82.7)	39.3	23.2	18.1	19.5	4,873	3,374 (60.1)	58.5	17.1	10.8	13.6	<0.001
eGFR (mL/min/1.73 m ²)													
<30	782	754 (96.4)	28.3	18.2	18	35.5	144	149 (98.2)	32.8	12.8	16.7	37.7	0.2||
30-<40	1,625	1,543 (95.0)	31.7	19.7	18.1	30.5	217	200 (91.7)	39.8	14.4	12.9	33	0.2||
40-<50	3,796	3,491 (92.0)	33.8	21.8	18	26.4	483	434 (89.7)	39.2	23.6	12.8	24.5	0.1||
50-<60	7,786	6,836 (87.8)	36.3	20.9	18	24.8	926	797 (84.6)	44.2	17.5	13.9	24.3	0.06||
≥60	69,994	46,039 (65.8)	45.4	20.6	15.5	18.6	17,164	6,068 (33.6)	73.7	12.9	6.3	7.1	
Albumin-creatinine ratio (mg/g)													
<30	69,314	46,611 (67.3)	45.9	21	15.6	17.5	17,328	6,052 (33.9)	73.7	13.1	6.5	6.7	
30-300	8,149	7,167 (88.0)	32.1	18.6	17.6	31.7	1,967	1,418 (75.1)	49	15.2	10.7	25.1	<0.001
>300	1,049	1,001 (95.4)	20.1	15.7	17.4	46.8	383	356 (91.9)	29.7	15.2	15	40.2	0.1||

Note: Conversion factor for eGFR in mL/s/1.73 m², ×0.01667.

Abbreviations: eGFR, estimated glomerular filtration rate; KEEP, Kidney Early Evaluation Program; NHANES, National Health and Nutrition Examination Survey.

*All analyses related to smoking status, self-reported cardiovascular disease, and self-reported high cholesterol level using NHANES data are limited to participants 20 years and older. Race in NHANES: non-Hispanic white, non-Hispanic black, and other.

†Defined as self-reported hypertension or increased blood pressure (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure).

‡Comparing hypertension, KEEP versus NHANES.

§Self reported.

||Estimate is not reliable because (SD/percentage difference) is greater than 0.30.

Multivariate logistic regressions were used to show predictors for measured hypertension in KEEP participants who self-reported no hypertension and predictors for meeting target blood pressure in KEEP participants who self-reported hypertension. Predictors included age, sex, race, smoking status, self-reported diabetes, family history of diabetes or hypertension, obesity, and CKD.

RESULTS

Overall, 88,559 KEEP participants were evaluated for hypertensive status versus 20,095

NHANES participants (Table 1). Greater proportions of KEEP participants than NHANES participants had hypertension (69.6% versus 38.1%; $P < 0.001$) and diabetes (28.0% versus 8.9%; $P < 0.001$). Hypertension prevalence in African Americans was greater in KEEP than in NHANES (72.7% versus 46.4%; $P < 0.001$). Other significant differences between databases included a greater hypertension prevalence in obese KEEP participants (79.5% versus 51.5% in NHANES;

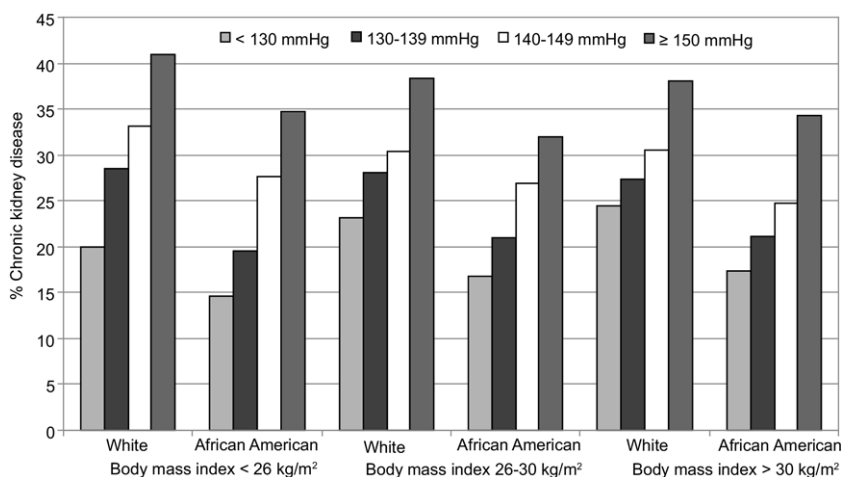


Figure 1. Percentage of KEEP participants with CKD, stratified by African American or white race, systolic blood pressure, and body mass index.

$P < 0.001$) and self-reported diabetic KEEP participants (88.5% versus 85.7% in NHANES; $P = 0.03$). The KEEP population included a greater proportion of current smokers (62.7% versus 31.9% in NHANES; $P < 0.001$) and people with high cholesterol levels (82.7% versus 60.1%; $P < 0.001$). More KEEP than NHANES participants with microalbuminuria had hypertension (88.0% versus 75.1%; $P < 0.001$), and in the higher deciles of systolic blood pressure, albuminuria and microalbuminuria were more prevalent in KEEP than in NHANES participants.

In KEEP, CKD prevalence was greater with greater systolic blood pressure (Fig 1), and CKD stages 3 and 4 prevalence was greater with greater BMI (Fig 2). Relatively more white than African American KEEP participants had a greater sys-

tolic blood pressure regardless of BMI (Fig 2). For white participants at normal body weight (BMI < 26 kg/m²), the percentage of participants with CKD at each decile of systolic blood pressure was greater with greater blood pressure (20% at < 130 mm Hg, 28.5% at 130 to 139 mm Hg, 33.2% at 140 to 149 mm Hg, $P < 0.001$; and 41% at > 150 mm Hg, $P < 0.001$). The same relationship was observed for African American participants; although significant, the percentages of participants at given blood pressure deciles were lower compared with white participants (14.6%, 19.6%, 27.6%, and 34.7%, respectively; $P < 0.001$). Trends were similar for participants with BMI of 26 to 30 kg/m² and obesity (BMI > 30 kg/m²; Fig 1).

In the subgroup of participants with hypertension and CKD stages 2 to 4 (Table 2), the

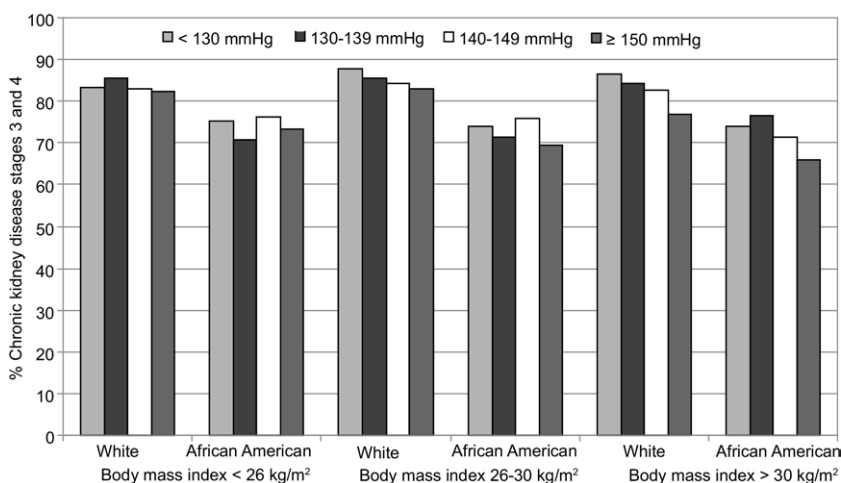


Figure 2. In KEEP participants with CKD, percentage with CKD stages 3 to 4, stratified by African American or white race, systolic blood pressure, and body mass index.

Table 2. Prevalence of Chronic Kidney Disease Stage by Systolic Blood Pressure and Characteristics

	Systolic Blood Pressure (mm Hg)										P†
	Hypertension Only*		<130		130-139		140-149		≥150		
	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	
KEEP (No.)	3,296	12,508	1,117	4,831	680	2,894	666	2,495	1,259	3,649	
Overall	20.9	79.1	18.8	81.2	19.0	81.0	21.1	78.9	25.6	74.4	<0.001
Age (y)											
18-30	52.7	47.3	54.0	46.0	61.5	38.5	41.7	58.3	60.0	40.0	
31-45	42.8	57.2	36.1	63.9	45.1	54.9	38.7	61.3	50.8	49.3	
46-60	26.4	73.6	20.3	79.7	22.5	77.5	28.8	71.2	35.9	64.1	
61-75	17.4	82.6	12.0	88.0	15.5	84.5	17.1	82.9	23.5	76.5	
>75	13.0	87	9.7	90.3	9.4	90.6	14.5	85.5	16.6	83.4	
Sex											
Men	24.1	75.9	18.3	81.7	23.0	77.0	24.7	75.3	30.1	69.9	
Women	19.4	80.6	19.0	81.0	17.1	82.9	19.4	80.6	23.6	76.4	
Race											
White	16.2	83.8	14.3	85.7	15.2	84.8	16.9	83.1	20.0	80.0	
African American	27.6	72.4	25.6	74.4	25.7	74.3	26.6	73.4	32.0	68.0	<0.001
Other	27.4	72.6	25.9	74.1	24.0	76.0	27.0	73.0	35.4	64.6	
Hispanic											
Yes	26.9	73.1	26.7	73.3	25.9	74.1	25.2	74.8	33.5	66.5	
No	20.4	79.6	18.0	82.0	18.5	81.5	20.8	79.2	25	75.0	
Education											
<High school	20.9	79.1	18.4	81.6	16.9	83.1	20.2	79.8	26	74.0	<0.001
≥High school	20.7	79.3	18.7	81.3	19.5	80.5	21.2	78.8	25.4	74.6	<0.001
Current smoker	30.9	69.1	26.5	73.5	30.9	69.1	28.8	71.2	39.6	60.4	0.002‡
Body mass index ≥ 30 kg/m ²	22.6	77.4	18.4	81.6	19.7	80.3	22.4	77.6	28.8	71.2	<0.001
Diabetes§	23.0	77.0	18.5	81.5	19.9	80.1	23.8	76.2	29.0	71.0	<0.001
Cardiovascular disease§	18.7	81.3	14.5	85.5	18.2	81.8	20.7	79.3	23.4	76.6	0.2‡
High cholesterol§	19.8	80.2	16.1	83.9	19.5	80.5	19.6	80.4	27	73.0	<0.001
NHANES|| (No.)	684	1,530	298	630	133	323	97	225	296	544	
Overall	30.7	69.3	35.8	64.2	28.5	71.5	27.4	72.6	35.6	64.4	<0.001
Age (y)											
18-30	78.5	—	87.5	—	98.0	—	100	0	—	—	
31-45	67.6	32.4	72.7	27.3	52.4	47.6	75.2	—	83.7	—	
46-60	40.3	59.7	30.9	69.1	37.7	62.3	47.1	52.9	59.5	40.5	
61-75	27.1	72.9	24.6	75.4	23.9	76.1	20.2	79.8	38.4	61.6	
>75	18.8	81.2	14.5	85.5	16.0	84	12.2	87.8	24.4	75.6	

(Continued)

Table 2 (Cont'd). Prevalence of Chronic Kidney Disease Stage by Systolic Blood Pressure and Characteristics

	Systolic Blood Pressure (mm Hg)										P†
	Hypertension Only*		<130		130-139		140-149		≥150		
	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	Stage 2	Stages 3-4	
Sex											
Men	36.8	63.2	38.9	61.1	36.3	63.7	33.9	66.1	44.0	56.0	
Women	26.4	73.6	33.3	66.7	22.5	77.5	22.6	77.4	31.3	68.7	
Race											
White	27.1	72.9	33.2	66.8	24.2	75.8	22.5	77.5	32.9	67.1	
African American	42.6	57.4	40.1	59.9	42.2	57.8	55.3	44.7	42.5	57.5	<0.001
Other	48.5	51.5	54.7	45.3	49.0	51	49.1	50.9	47.4	52.6	
Hispanic											
Yes	49.2	50.8	50.1	49.9	49.1	50.9	45.6	54.4	52.4	47.6	
No	29.4	70.6	34.7	65.3	26.8	73.2	26.2	73.8	34.4	65.6	
Education											
<High school	30.8	69.2	35.3	64.7	26.9	73.1	26.0	74.0	38.5	61.5	<0.001
≥High school	30.7	69.3	35.9	64.1	29.1	70.9	27.9	72.1	34.3	65.7	<0.001
Current smoker	44.4	55.6	52.0	48.0	38.8	61.2	38.6	61.4	62.2	37.8	0.002‡
Body mass index ≥											
30 kg/m ²	36.9	63.1	41.8	58.2	35.6	64.4	35.2	64.8	41.5	58.5	<0.001
Diabetes§	34.8	65.2	38.6	61.4	42.0	58	29.3	70.7	36.7	63.3	<0.001
Cardiovascular											
disease§	22.3	77.7	20.1	79.9	18.7	81.3	15.5	84.5	28.3	71.7	0.2‡
High cholesterol§	28.1	71.9	29.5	70.5	27.2	72.8	25.7	74.3	30.8	69.2	<0.01

Note: Stage 2 is defined as eGFR of 60 to 89 mL/min/1.73 m² and albumin-creatinine ratio of 30 mg/g or greater; stages 3 to 4, eGFR of 15 to 59 mL/min/1.73 m². Presence of dash in cell indicates missing value because of unreliable estimates. Conversion factor for eGFR in mL/s/1.73 m², ×0.01667.

Abbreviations: eGFR, estimated glomerular filtration rate; KEEP, Kidney Early Evaluation Program; NHANES, National Health and Nutrition Examination Survey.

*KEEP and NHANES, defined as self-reported hypertension or increased blood pressure (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure).

†Comparing NHANES versus KEEP for hypertensive patients with chronic kidney disease stages 2 to 4.

‡Estimate is not reliable because (SE/percentage difference) is greater than 0.30.

§Self reported.

||All analysis related to smoking status, self-reported cardiovascular disease, and self-reported high cholesterol level using NHANES data are limited to participants 20 years or older. Race in NHANES: non-Hispanic white, non-Hispanic black, and other.

databases differed significantly in the proportions with CKD stages 3 and 4 (79.1% in KEEP versus 69.3% in NHANES; $P < 0.01$). The databases also differed in proportions of African Americans (72.4%, KEEP; 57.4%, NHANES; $P < 0.01$), current smokers (69.1%, 55.6%; $P < 0.01$), obesity (77.4%, 63.1%; $P < 0.01$), self-reported diabetes (77%, 65.2%; $P < 0.01$), and hypercholesterolemia (80.2%, 71.9%; $P < 0.01$). Distributions of these variables were similar between databases for any given systolic pressure decile. More KEEP participants than NHANES participants with CKD stages 3 and 4 had hypertension, and the prevalence of CKD stages 3 and 4 increased with age in KEEP and NHANES.

In the KEEP database, the probability of not reporting hypertension when present was greater in participants older than 60 years, African Americans, and participants with self-reported diabetes, family history of hypertension, obesity, and CKD (Table 3). The probability of having a target blood pressure was greatest for participants younger than 46 years and least for those

Table 3. Odds Ratios of Measured Hypertension in KEEP Participants Who Self-Reported No Hypertension

	Odds Ratio (95% confidence interval)	<i>P</i>
Age (y)		
18-30	0.40 (0.36-0.44)	<0.001
31-45	0.62 (0.58-0.66)	<0.001
46-60 (reference)	1.00	
61-75	1.56 (1.44-1.68)	<0.001
>75	1.88 (1.64-2.16)	<0.001
Sex		
Men (reference)	1.00	
Women	0.57 (0.54-0.61)	<0.001
Race		
White	1.00	
African American	1.14 (1.07-1.22)	<0.001
Other	0.85 (0.79-0.91)	<0.001
Current smoker	0.95 (0.88-1.03)	0.2
Self-reported diabetes	3.34 (3.12-3.57)	<0.001
Family history of diabetes	1.03 (0.98-1.09)	0.3
Family history of hypertension	1.26 (1.17-1.35)	<0.001
Body mass index ≥ 30 kg/m ²	2.27 (2.14-2.40)	<0.001
Chronic kidney disease	3.45 (3.21-3.70)	<0.001

Note: Hypertension was defined by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

Abbreviation: KEEP, Kidney Early Evaluation Program.

Table 4. Odds Ratios of Meeting Target Blood Pressure in KEEP Participants Who Self-Reported Hypertension

	Odds Ratio (95% confidence interval)	<i>P</i>
Age (y)		
18-30	1.85 (1.61-2.13)	<0.001
31-45	1.28 (1.19-1.38)	<0.001
46-60 (reference)	1.00	
61-75	0.89 (0.84-0.94)	<0.001
>75	0.77 (0.71-0.84)	<0.001
Sex		
Men (reference)	1.00	
Women	1.22 (1.16-1.28)	<0.001
Race		
White	1.00	
African American	0.77 (0.73-0.81)	<0.001
Other	1.05 (0.99-1.13)	0.1
Current smoker	1.06 (0.98-1.14)	0.2
Self-reported diabetes	0.49 (0.47-0.52)	<0.001
Family history of diabetes	1.03 (0.98-1.08)	0.3
Family history of hypertension	0.94 (0.89-1.00)	0.04
Body mass index ≥ 30 kg/m ²	0.71 (0.68-0.74)	<0.001
Chronic kidney disease	0.42 (0.40-0.44)	<0.001

Abbreviation: KEEP, Kidney Early Evaluation Program.

older than 60 years, African Americans, and those with self-reported diabetes, obesity, or CKD (Table 4).

The probability of not reporting kidney impairment when present was significantly greater for participants older than 60 years (odds ratio [OR], 1.75; 95% confidence interval [CI], 1.64 to 1.87; $P < 0.001$), with pulse pressure greater than 60 mm Hg (OR, 1.35; 95% CI, 1.20 to 1.51; $P < 0.001$), or who were obese (OR, 1.10, 95% CI, 1.03 to 1.17; $P < 0.001$) or had diabetes (OR, 1.08; 95% CI, 1.02 to 1.14; $P < 0.001$) or microalbuminuria (OR, 2.14; 95% CI, 1.99 to 2.29; $P < 0.001$). KEEP participants with systolic blood pressure greater than 160 mm Hg had the greatest probability of reporting kidney impairment when present (OR, 0.61; 95% CI, 0.55 to 0.67; $P < 0.001$).

DISCUSSION

We examined the relationship between CKD stage and systolic blood pressure in the KEEP and NHANES 1999 to 2006 databases. Our data confirm previous reports that at greater systolic blood pressures, the probability of kidney impair-

ment is also greater, a relationship that held regardless of race or sex. Because of the recruitment of participants with CKD risk factors and self-concern for CKD, KEEP was enriched with relatively more participants with early kidney disease than NHANES at all systolic blood pressure deciles greater than 130 mm Hg. The KEEP database also had greater representation of African Americans with hypertension and greater percentages of participants with obesity and diabetes than NHANES.

Both databases showed baseline systolic blood pressure to be independently associated with the presence of early kidney disease, and CKD stages 3 and 4 were more common than stage 2 at all systolic blood pressure deciles greater than 130 mm Hg. Systolic blood pressure level is a clinically useful predictor of CKD in persons with diabetes¹⁷ and an independent cardiovascular risk factor for those older than 50 years.¹⁶ Our results confirm these relationships.

Microalbuminuria was more prevalent in the KEEP than NHANES database. Recent data show that microalbuminuria is a biomarker strongly associated with risk of essential hypertension development,²³ and it determines the need for additional blood pressure medication to achieve blood pressure goals.²⁴ Clearly, early aggressive reduction of systolic blood pressure with appropriate agents increases kidney protection, slows the progression of kidney damage,²⁵ and reduces cardiovascular risk.²⁶ In KEEP, the probability of not reporting kidney impairment when present was significantly greater for participants with microalbuminuria, providing an additional reason to assess microalbuminuria in hypertensive patients, given this lack of awareness.

Interestingly, a greater prevalence of CKD was noted in white than African American participants in these databases. However, in KEEP, numbers of both white and African American participants with CKD were greater at any given systolic blood pressure level, a trend unrelated to BMI. Our data are not in accordance with studies showing that African Americans and members of other minority groups are more likely than whites to develop CKD.²⁷ One possible explanation for this observation is that more African Americans die at earlier CKD stages, before reaching stages 3 and 4. Evidence is strong that African Americans with CKD have more poorly con-

trolled hypertension than white counterparts, particularly in early disease stages,²⁸ and hypertension onset tends to be earlier and more severe in African Americans, leading to more end-organ damage and premature cardiovascular death than in white populations.¹⁹

Hypertension with CKD is much more common in the KEEP than in the NHANES database, and the KEEP database shows greater rates of CKD stages 3 and 4 than the NHANES database in African Americans. Our analysis does not answer the question of whether increases in blood pressure lead to more advanced kidney disease or vice versa. Lack of awareness of CKD presence may lead to less vigilant blood pressure control. CKD can be undetected until advanced stages; KEEP, as a targeted community-based health screening program with a larger CKD sample size than NHANES, may allow improved exploration of these health associations.

In the KEEP database, we found that African Americans not reporting hypertension on history had a 14% rate of having increased measured blood pressure, and African Americans with known hypertension had a 33% greater rate of not meeting blood pressure control guidelines. This analysis provides compelling evidence that the problem of hypertension and kidney impairment may be much greater than estimated rates and delineates the need for strategies to identify and treat people at risk in the community, given the profound heterogeneity among racial groups. KEEP participants receive laboratory results and educational materials about kidney disease risks and treatment opinions, and their physicians receive laboratory results and clinical practice guidelines for CKD care.²⁹ This is an effort to improve knowledge and awareness, leading to improved blood pressure levels and CKD results.

Overweight prevalence in the United States is approximately 66%.³⁰ Obesity was more prevalent in KEEP than NHANES. We noted a consistently greater CKD prevalence with greater weight regardless of race and sex in both KEEP and NHANES. This is consistent with previous studies that evaluated other databases.³¹ Our data also support evidence from long-term observational studies that show a correlation between BMI and CKD progression.^{32,33} Not surprisingly, greater weight was also associated with greater blood pressure deciles. This consistent

relationship is important because obesity increases not only cardiovascular risk, but also the probability of developing CKD.

More KEEP than NHANES participants self-reported diabetes; in both databases, hypertension prevalence was more than 85% in participants who self-reported diabetes. These results are in accordance with earlier results showing that hypertension is a common problem in patients with diabetes.³⁴

Our study is limited by the cross-sectional nature of both databases. These databases rely on voluntary physical examinations and screening histories, including self-reports of such diseases as hypertension, diabetes, and CKD. Another study limitation is the low percentage of NHANES participants with eGFR less than 30 mL/min/1.73 m² to compare with the more robust KEEP data. In addition, KEEP participants may have better hypertension awareness than NHANES participants because the presence of hypertension is a KEEP eligibility criterion.

In conclusion, this analysis shows the magnitude and complexity of systolic hypertension in different groups in the United States. Systolic blood pressure as a component of hypertension was associated with lower eGFR in both people at risk of CKD (KEEP) and the general population (NHANES). White participants had more CKD than African American participants. Obese and diabetic participants had greater rates of early kidney disease at greater systolic blood pressure deciles. Screening programs improve public health, improve knowledge and communication, enhance adherence to recommended therapies, and improve clinical outcomes. The targeted nature of the KEEP screening program and the large number of participants contrast with NHANES and highlight the value of blood pressure assessments in both populations.

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Summary Figures

KEEP DATA ANALYSES

DIABETES

Self-reported diabetes, self reported diabetic retinopathy, receiving medication for diabetes, or elevated blood glucose (WHO); fasting blood sugar ≥ 126 mg/dl, non-fasting blood sugar ≥ 200 mg/dl.

SELF-REPORTED DIABETES

Self-reported diabetes: self-reported diabetes, self-reported diabetic retinopathy.

HYPERTENSION

Self reported history hypertension, receiving a medication for hypertension, or elevated blood pressure (JNC7): Diabetes or CKD; systolic ≥ 130 mmHg or diastolic ≥ 80 mmHg, otherwise systolic ≥ 140 mmHg or diastolic ≥ 90 .

SELF-REPORTED HYPERTENSION

Self-reported hypertension

SELF-REPORTED CARDIOVASCULAR DISEASE

Participant reports any of the following cardiac events: heart attack, bypass surgery, heart

angioplasty, stroke, heart failure, abnormal heart rhythm, or PVD (only for KEEP version 2).

CHRONIC KIDNEY DISEASE

eGFR < 60 mL/min/1.73 m² or eGFR ≥ 60 mL/min/1.73 m² and albumin-creatinine ratio (ACR) ≥ 30 mg/g. GFR estimated using the IDMS-traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation for calibrated serum creatinine (Scr) values: $GFR = 175 \times \text{standardized Scr}^{-1.154} \times \text{age}^{-0.203} \times 1.212$ [African Americans] $\times 0.742$ [women].

CKD STAGES

Stage 1: eGFR ≥ 90 mL/min/1.73 m², and ACR ≥ 30 mg/g
 Stage 2: eGFR 60–89 mL/min/1.73 m², and ACR ≥ 30 mg/g
 Stage 3: eGFR 30–59 mL/min/1.73 m²
 Stage 4: eGFR 15–29 mL/min/1.73 m²
 Stage 5: eGFR < 15 mL/min/1.73 m², or dialysis

ANEMIA**WHO**

Male: hemoglobin < 13 g/dl
 Female: < 12 g/dl

KDOQI (2006)

Males: hemoglobin < 13.5 g/dl
 Women < 12 g/dl

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

EDUCATIONAL STATUS

GSL: Grade school or less
 SHS: Some high school
 HSG: High school graduate
 SC+: Some college, college graduate, post-graduate

NHANES 1999–2006 DATA ANALYSES

SELF-REPORTED DIABETES

To be classified as having self-reported diabetes, participants had to report being told by a doctor, at any time, that they had diabetes or sugar diabetes other than that related to pregnancy. Participants answering “borderline” to the question were classified as non-diabetic

SELF-REPORTED HYPERTENSION

Self-reported hypertension was identified by an affirmative answer to the question: “Have you ever been told by a doctor that you had hypertension, also called high blood pressure.”

SELF-REPORTED CARDIOVASCULAR DISEASE

Participant reports any of the following cardiac events: coronary heart disease, angina/angina pectoris, heart attack, congestive heart failure, or stroke.

CHRONIC KIDNEY DISEASE

eGFR < 60 mL/min/1.73 m² or eGFR ≥ 60 mL/min/1.73 m², and albumin-creatinine ratio (ACR) ≥ 30 mg/g. GFR estimated using the IDMS-traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation for calibrated serum creatinine (Scr) values: $GFR = 175 \times \text{standardized Scr}^{-1.154} \times \text{age}^{-0.203} \times 1.212$ [African Americans] $\times 0.742$ [women].

CKD STAGES

Stage 1: eGFR ≥ 90 mL/min/1.73 m², and ACR ≥ 30 mg/g
 Stage 2: eGFR 60–89 mL/min/1.73 m², and ACR ≥ 30 mg/g
 Stage 3: eGFR 30–59 mL/min/1.73 m²
 Stage 4: eGFR 15–29 mL/min/1.73 m²
 Stage 5: eGFR < 15 mL/min/1.73 m², or dialysis

ANEMIA**WHO**

Male: hemoglobin < 13 g/dl
 Female: < 12 g/dl

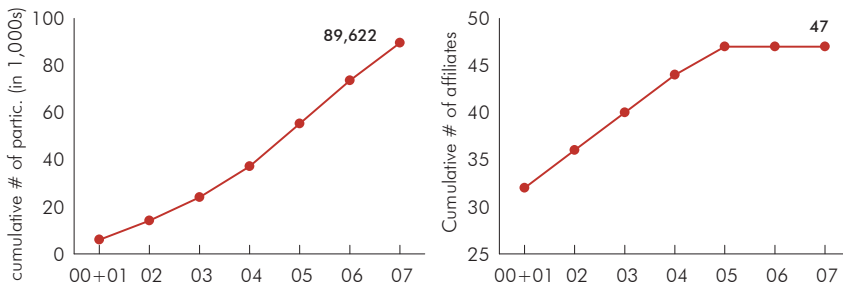
KDOQI (2006)

Males: hemoglobin < 13.5 g/dl
 Women < 12 g/dl

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

EDUCATIONAL STATUS

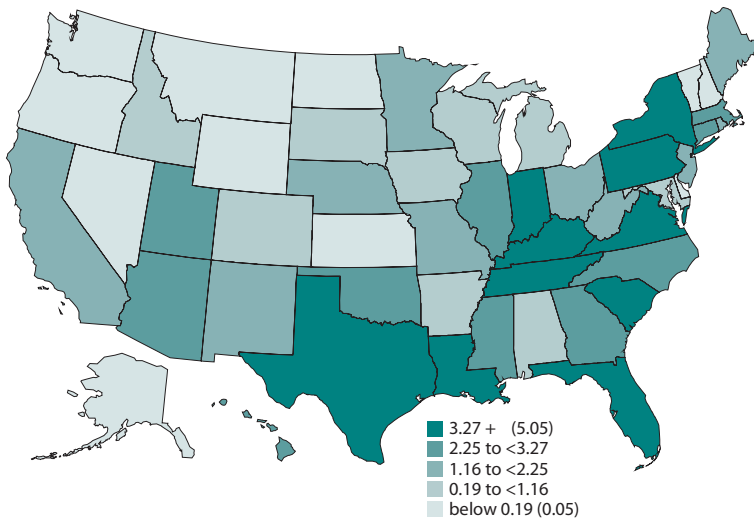


S.1

Cumulative number of eligible KEEP participants & affiliates, by year

KEEP N = 89,622.

In 2007, nearly 90,000 individuals participated in KEEP screening programs which were conducted by a total of 47 affiliates in 49 states and the District of Columbia.

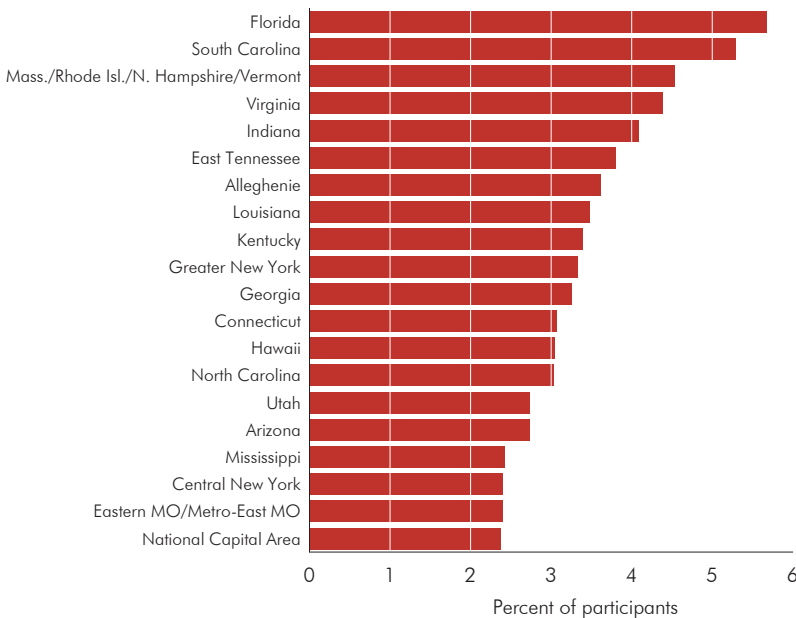


S.2

Geographic variations in the percentage of KEEP participants, by state

KEEP N = 89,622.

The highest rates of participation in the KEEP program occur in states located along the Gulf Coast, the Mid-Atlantic Region, the Ohio Valley, and portions of New England; participation rates average 5.05% for individuals residing in areas represented by the upper map quintile.



S.3

Top twenty (%) KEEP participants, by affiliate (rank order)

KEEP N = 89,622.

Florida continues to have the highest percentage of KEEP participants, at 5.7%, followed by the South Carolina and Mass./Rhode Isl./N. Hampshire/Vermont affiliates, at 5.3 and 4.5%, respectively.

s.a

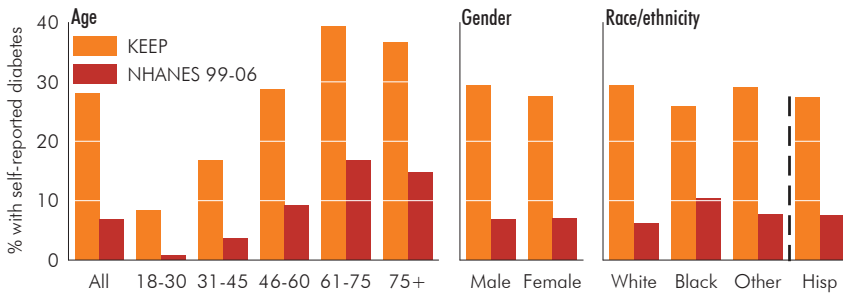
Total eligible KEEP participants

KEEP N = 89,622.

The greatest number of KEEP participants are between ages 46 and 75, female, and white. Approximately 7 times more non-Hispanics are screened compared to Hispanics, while the majority of participants have at least a high school diploma and some type of health insurance.

		2000+2001	2002	2003	2004	2005	2006	2007	All	All (%)
Age	18-30	568	644	1,004	1,085	1,391	1,257	989	6,938	7.7
	31-45	1,491	1,977	2,393	2,939	3,984	3,685	2,870	19,339	21.6
	46-60	2,097	2,651	3,422	4,690	6,437	6,592	5,509	31,398	35.0
	61-75	1,502	2,029	2,382	3,328	4,769	5,111	4,968	24,089	26.9
	>75	424	743	721	1,076	1,548	1,656	1,683	7,851	8.8
	Missing	.	.	.	5	2	.	.	7	0.0
Gender	Male	1,959	2,570	2,944	4,145	5,879	5,684	5,207	28,388	31.7
	Female	4,123	5,473	6,976	8,977	12,194	12,613	10,808	61,164	68.2
	Missing	.	1	2	1	58	4	4	70	0.1
Race	White	2,284	3,104	4,301	5,793	9,027	9,008	8,131	41,648	46.5
	Black	2,652	3,392	3,430	4,276	5,269	5,564	5,041	29,624	33.1
	Other	967	1,358	1,851	2,973	3,415	3,268	2,816	16,648	18.6
	Unknown/missing	179	190	340	81	420	461	31	1,702	1.9
Ethnicity	Hispanic	618	712	1,117	1,891	2,416	2,317	2,075	11,146	12.4
	Non-Hispanic	5,464	7,332	8,805	11,232	15,715	15,984	13,944	78,476	87.6
Education Level	≤ 6 years	362	406	499	814	1,051	1,019	888	5,039	5.6
	<12 years	586	871	921	1,188	1,780	1,763	1,581	8,690	9.7
	12 years	1,585	2,192	2,591	3,491	4,611	4,462	4,190	23,122	25.8
	>12 years	1,629	2,155	2,775	3,460	4,674	4,351	3,815	22,859	25.5
	16 years	1,143	1,463	1,913	2,531	3,616	3,815	3,228	17,709	19.8
	>16 years	688	862	1,132	1,469	2,144	2,452	2,019	10,766	12.0
Health Insurance Status	Yes	4,948	6,428	7,892	10,154	14,058	14,207	12,404	70,091	78.2
	No	883	1,234	1,660	2,494	3,251	3,371	3,292	16,185	18.1
	Missing	251	382	370	475	822	723	318	3,341	3.7
All		6,082	8,044	9,922	13,123	18,131	18,301	16,019	89,622	100.0

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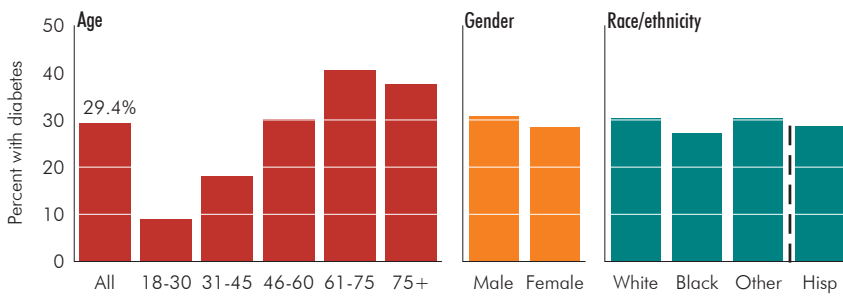


s.4

Self-reported diabetes in KEEP & NHANES participants

KEEP N= 88,812, age; 88,752, gender; 87,208 race; 88,818, ethnicity. NHANES N= 22,606.

Slightly over 28% of KEEP participants report that they have diabetes compared to 6.9% in the NHANES population. Diabetes is more prominent in older participants in both populations and evenly distributed among racial and ethnic groups.

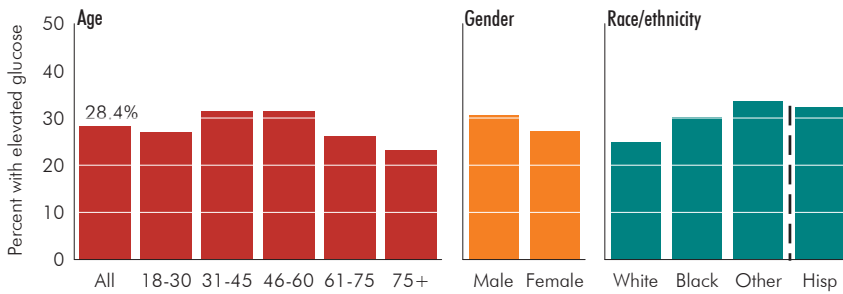


s.5

KEEP participants with diabetes

KEEP N= 89,598.

Diabetes is evident in 29.4% of KEEP participants and is identified in 40.6% of those age 61–75.

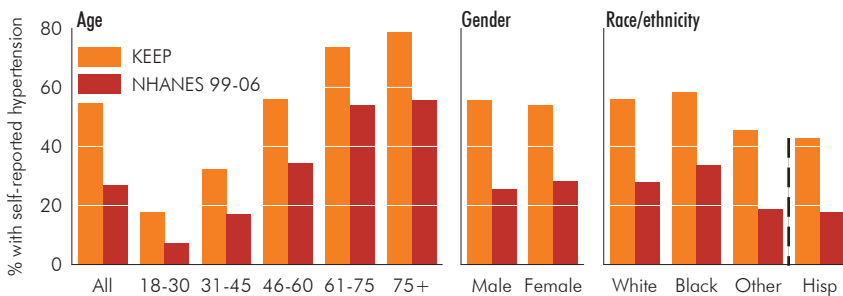


s.6

KEEP participants with diabetes who have elevated glucose levels

KEEP N= 26,307.

Close to 30% of KEEP participants with diabetes were found to have elevated glucose levels; elevated levels are more prominent in those age 31–60, males, and individuals of other races.

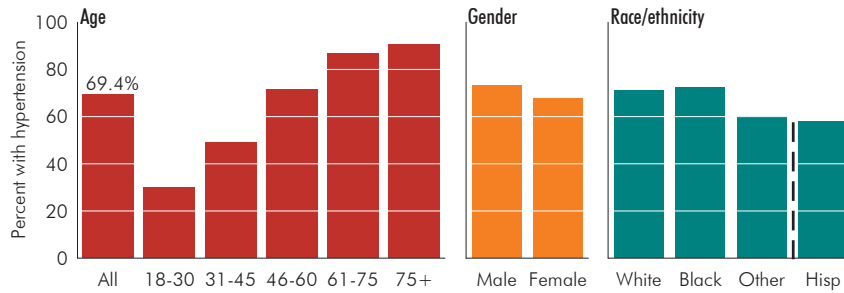


s.7

Self-reported hypertension in KEEP & NHANES participants

KEEP N= 88,183, age; 88,124, gender; 86,610 race; 88,190, ethnicity. NHANES N= 22,366.

Self-reported hypertension exist in 54.6% of KEEP participants and 26.9% of the NHANES population. Not surprisingly, rates of hypertension increase in both populations with age and are generally similar in whites and blacks.

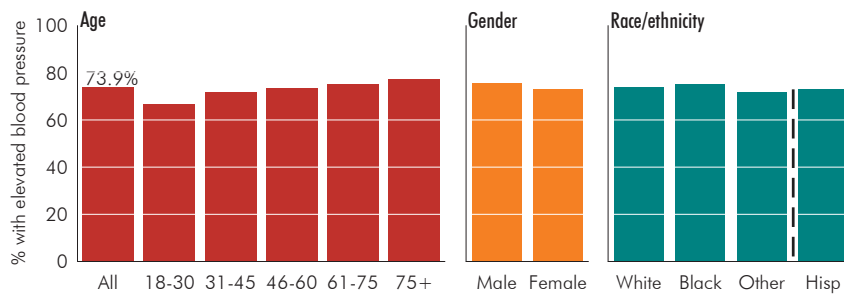


s.8

KEEP participants with hypertension

KEEP N= 89,607.

Hypertension exists in nearly 70% of KEEP participants, and the rate of hypertension increases with age.

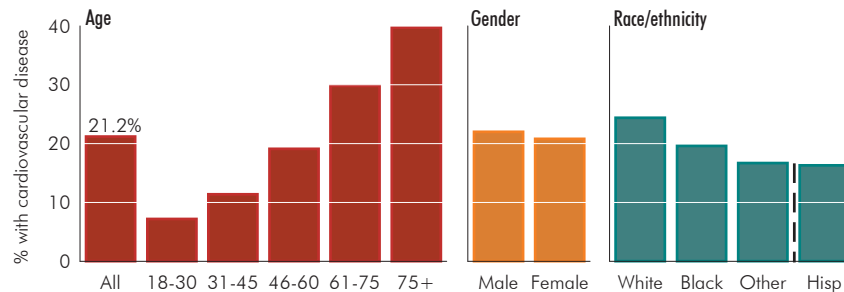


s.9

KEEP participants with hypertension who have an elevated blood pressure

KEEP N= 62,156.

Overall, nearly three in four KEEP participants with hypertension have an elevated blood pressure; rates vary only slightly across all age, gender, race, and ethnicity groups.

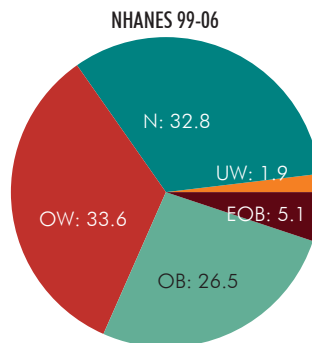
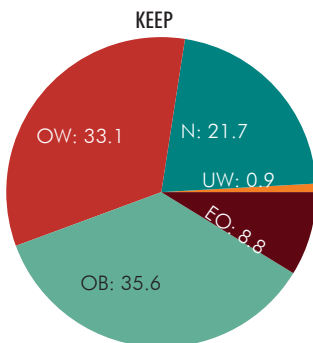


s.10

Self-reported cardiovascular disease in KEEP participants

KEEP N= 89,165, age; 89,552, gender; 87,920, race; 89,622, ethnicity.

Cardiovascular disease exists in one in five KEEP participants, and is most evident in those who are older, male, and white.



s.11

Percent distribution of KEEP & NHANES participants, by BMI

KEEP N= 88,003, NHANES N= 20,567.

One-third of KEEP and NHANES participants are considered to be overweight, while 35.6% of KEEP participants are obese compared to 26.5% in the NHANES population.

s.12

Prevalence of CKD in KEEP & NHANES participants

KEEP N= 77,073, age; 77,080, gender, race, & ethnicity. NHANES N= 19,551.

Overall, CKD is evident in 26.2% and 15.3%, respectively, of KEEP and NHANES participants. Of KEEP participants, 55.2% of those age 75 and older have CKD, compared to 60.4% in the NHANES population, while in KEEP, CKD is most prominent in whites.

s.13

Prevalence of CKD in KEEP & NHANES participants, by CKD stage

KEEP N= 77,080. NHANES= 19,551.

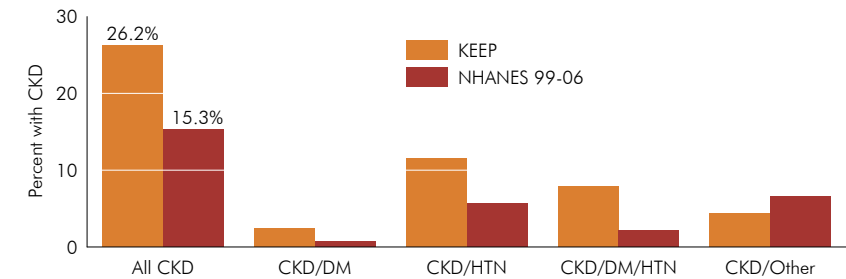
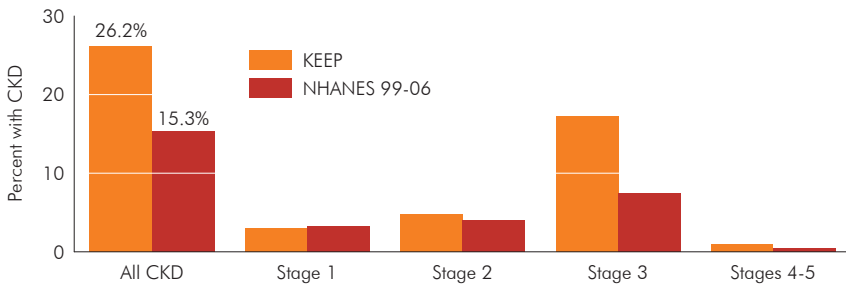
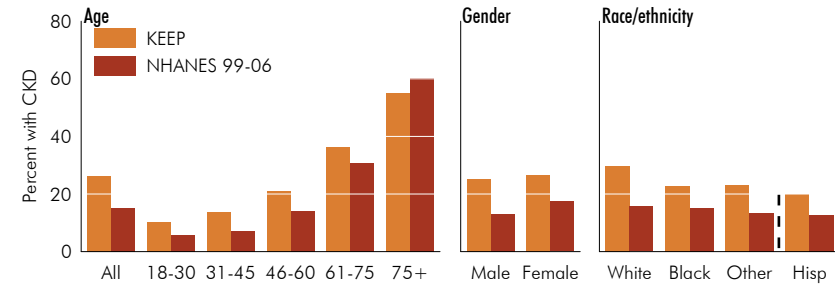
Stage 3 CKD (eGFR 30–59), is most apparent among KEEP participants for whom estimated glomerular filtration data are available, at 17.3%, with Stage 1 and Stage 2 accounting for 3.0 and 4.9% of participants, respectively.

s.14

Prevalence of CKD in KEEP & NHANES participants, by risk factor

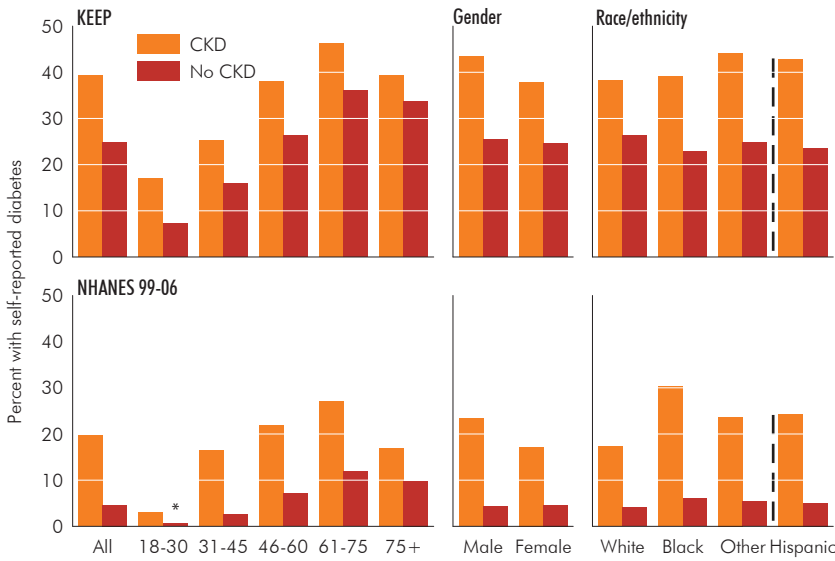
KEEP N= 76,527. NHANES N= 19,352.

Of KEEP participants with CKD, 11.5% have self-reported hypertension, 2.4% have self-reported diabetes, and nearly 8% are shown to have both risk factors; rates in NHANES participants, in contrast, are 5.7, 0.8, and 2.2%, respectively.



	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	5,045	318	143	116	8	1,308	6,938
31-45	13,800	652	616	896	40	3,335	19,339
46-60	21,266	900	1,231	3,406	152	4,443	31,398
61-75	13,569	391	1,265	5,795	333	2,736	24,089
>75	3,196	66	497	3,114	258	720	7,851
Gender							
Male	18,169	658	1,297	3,877	293	4,094	28,388
Female	38,711	1,669	2,456	9,452	498	8,378	61,164
Missing	.	.	.	.	.	70	70
Race							
White	.	.	.	.	.	1,702	1,702
Black	26,421	674	1,722	8,343	429	4,059	41,648
Other	19,058	1,049	1,266	3,098	208	4,945	29,624
Unknown/missing	11,401	604	765	1,888	154	1,836	16,648
Ethnicity							
Hispanic	7,101	352	392	968	52	2,281	11,146
Non-Hispanic	49,779	1,975	3,361	12,361	739	10,261	78,476
U.S. Census Region							
Northeast	13,141	531	879	3,107	184	2,678	20,520
Midwest	8,902	378	602	2,102	137	1,726	13,847
South	27,980	1,143	1,817	6,386	352	6,650	44,328
West	6,842	275	455	1,728	118	1,477	10,895
Missing	15	.	.	6	.	11	32
U.S. Census Division							
New England	4,438	153	304	1,287	53	1,537	7,772
Middle Atlantic	8,703	378	575	1,820	131	1,141	12,748
East North Central	5,640	250	395	1,177	79	764	8,305
West North Central	3,262	128	207	925	58	962	5,542
South Atlantic	13,851	527	900	3,407	162	3,852	22,699
East South Central	7,904	292	505	1,717	92	1,170	11,680
West South Central	6,225	324	412	1,262	98	1,628	9,949
Mountain	4,164	167	253	1,171	64	827	6,646
Pacific	2,678	108	202	557	54	650	4,249
Missing	15	.	.	6	.	11	32
Smoking							
Yes	21,760	984	1,622	5,520	362	4,973	35,221
No	32,542	1,222	1,962	7,170	392	6,735	50,023
Missing	2,578	121	169	639	37	834	4,378
Education Level							
≤ 6 years	2,783	154	252	919	85	846	5,039
<12 years	4,999	274	435	1,537	109	1,336	8,690
12 years	14,093	651	986	3,954	253	3,185	23,122
>12 years	14,789	592	956	3,136	174	3,212	22,859
16 years	12,217	425	635	2,055	94	2,283	17,709
>16 years	7,227	198	409	1,520	67	1,345	10,766
Missing	772	33	80	208	9	335	1,437
Health Insurance Status							
Yes	43,996	1,573	2,949	11,352	675	9,546	70,091
No	10,953	657	666	1,445	80	2,384	16,185
Missing	1,931	97	138	532	36	612	3,346
Doctor Status							
Yes	47,417	1,883	3,273	12,236	733	10,300	75,842
No	8,199	382	397	776	36	1,792	11,582
Missing	1264	62	83	317	22	450	2,198
All	56,880	2,327	3,753	13,329	791	12,542	89,622

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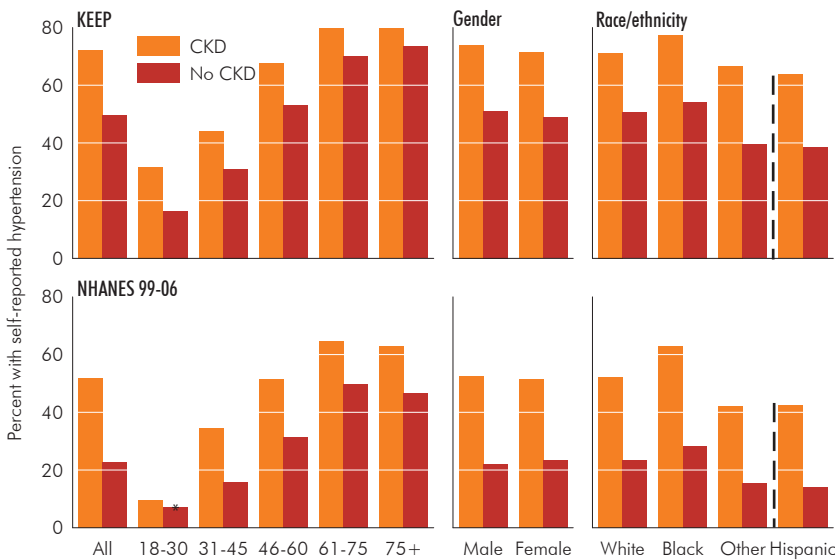
s.15

Self-reported diabetes in KEEP & NHANES participants with or without CKD

KEEP N= 19,960, CKD; 55,945, no CKD. NHANES N= 3,611, CKD; 15,929, no CKD.

In both the KEEP and NHANES populations, self-reported diabetes is more evident in those with CKD—at 39.5 and 19.7%, respectively—compared to 24.9 and 4.6% in those with no diagnosis for CKD. By gender, diabetes is 13–19% more common in male and females with CKD compared to those without the diagnosis. In white and black KEEP participants with CKD, 38–39% report having diabetes compared to 23–26% of those with no CKD who report the condition.

**estimate not reliable*



s.16

Self-reported hypertension in KEEP & NHANES participants with or without CKD

KEEP N= 19,963 CKD; 55,949 no CKD. NHANES N= 3,589 CKD; 15,769 no CKD.

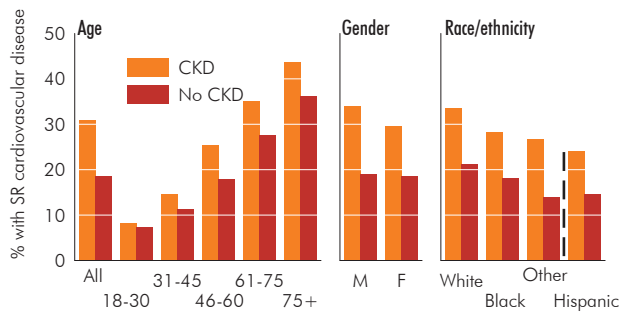
Among KEEP participants with or without CKD, 72.2 and 49.6%, respectively, report that they are hypertensive, while 52% of NHANES participants with CKD report being hypertensive compared to 22.6% of participants with no CKD. Nearly three of four male and female KEEP participants self-report hypertension compared to one in two participants with no CKD. In the NHANES population, 51–52% of male and female participants with CKD report being hypertensive compared to 22–23% of those with no CKD. Self-reported hypertension is evident in 71.2, 77.5, 66.8, and 63.7%, respectively, of whites, blacks, individuals of other races, and Hispanics with CKD, compared to 50.6, 54.2, 39.4, and 38.4% of participants with no CKD.

s.b (to the left)

Total eligible KEEP participants with CKD, by CKD stage

KEEP N= 86,622.

Of the total eligible KEEP participants with CKD, Stage 3 (eGFR 30–59) is most apparent; CKD exists in greater proportions of females, whites, and older age groups. Geographically, CKD is most prominent in the South U.S. census region; a high concentration of participants reside in the South Atlantic census division. More non-smokers than smokers have CKD, as do those with health insurance compared to those with no insurance.

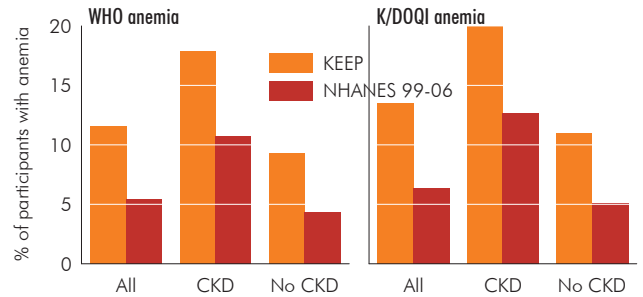


s.17

Self-reported cardiovascular disease in KEEP participants with or without CKD

KEEP N= 77,073, age: 77,080, gender, race, & ethnicity.

Cardiovascular disease (CVD) is present in 31% of KEEP participants with CKD compared to 18.7% of those with no CKD. Proportions of patients with CVD increase with age in both CKD and non-CKD participants, and CVD is most prominent in whites regardless of CKD status.

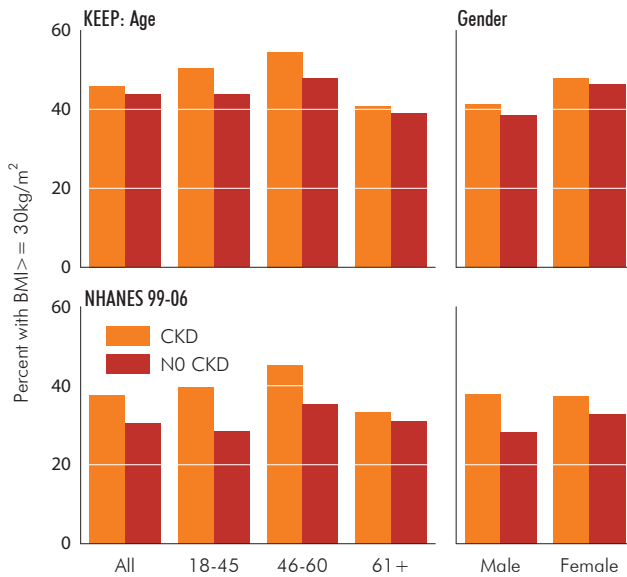


s.19

Anemia (WHO & KDOQI definitions) in KEEP & NHANES participants, by CKD status

KEEP N= 76,148. NHANES N= 19,531.

Using the WHO definition for anemia, 11.6% of all eligible KEEP participants are classified as anemic compared to 5.4% in the NHANES population. By the KDOQI definition, 13.5% of KEEP participants are classified as anemic compared to 6.4% in the NHANES population.

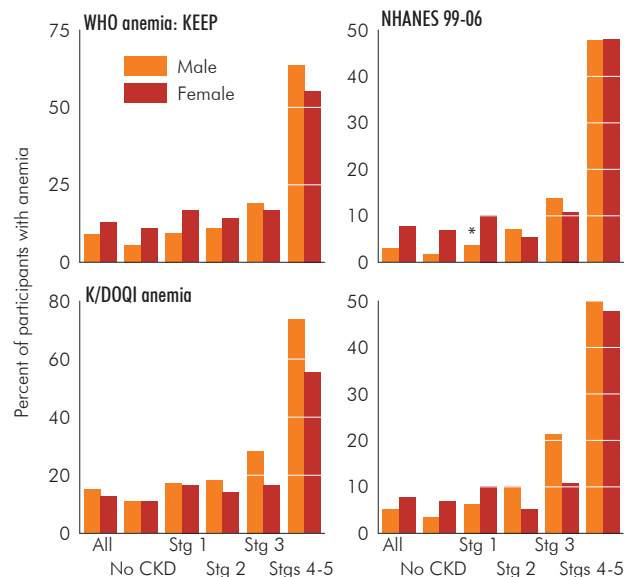


s.18

BMI ≥30 kg/m² in KEEP & NHANES participants with or without CKD

KEEP N= 75,733. NHANES N= 19,146.

The percent of KEEP participants classified as obese is similar in participants with or without CKD, at 45.9% and 43.8%, respectively; in the NHANES population, 37.7% of those with CKD are classified as obese compared to 30.6% of those without a CKD diagnosis.



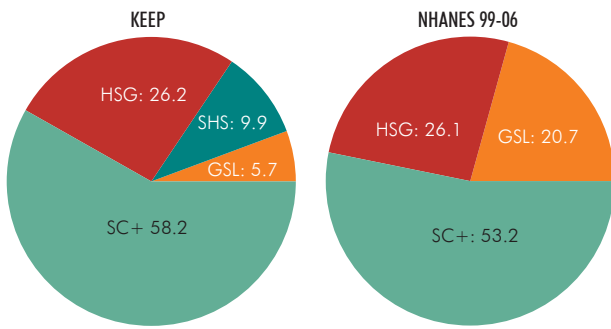
s.20

Anemia (WHO & KDOQI definitions) in KEEP & NHANES participants, by CKD stage & gender

KEEP N= 76,148. NHANES N= 19,531

Regardless of anemia definition (WHO or KDOQI), the condition becomes more apparent in both the KEEP and NHANES populations as the severity of CKD increases, and in the advanced stages of CKD is generally more evident in males than in females.

*estimate not reliable

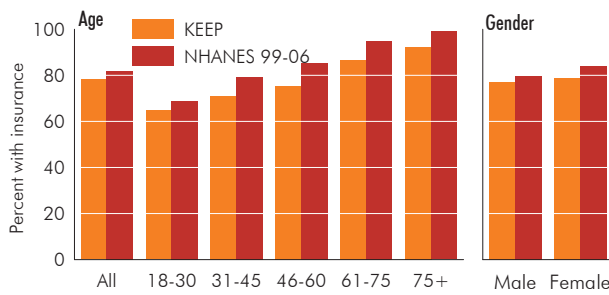


s.21

Percent distribution of KEEP & NHANES participants, by educational status

KEEP N= 88,185. NHANES N= 22,553

In the KEEP and NHANES populations, 26% of participants have completed high school and more than half—58.2 and 53.2%, respectively—have some level of college.

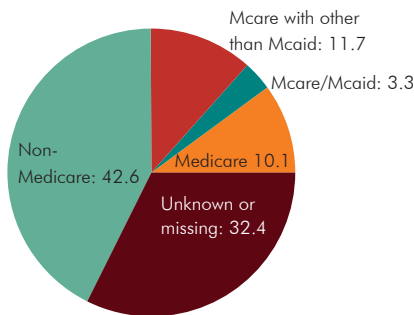


s.22

Insurance coverage in KEEP & NHANES participants, by age & gender

KEEP N= 70,089, age: 70,045 gender. NHANES N= 22,300.

Overall, 78.2 and 81.9% of KEEP and NHANES participants, respectively, have some type of insurance coverage. The proportions of participants with coverage increases with age, and is generally evenly distributed between males and females.

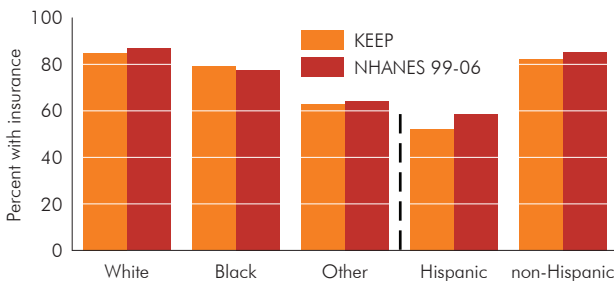


s.23

Percent distribution of types of insurance in KEEP participants reporting they have insurance

KEEP N= 89,622.

In KEEP participants reporting they have insurance, 10.1% are covered by Medicare, while 3.3% are dually covered by Medicare and Medicaid. The majority of participants (42.6%) have some type of coverage other than Medicare, while 11.7% have Medicare coverage with supplemental insurance provided by a carrier other than Medicaid.

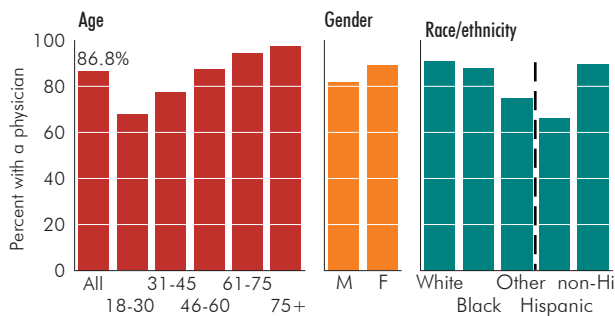


s.24

Insurance coverage in KEEP & NHANES participants, by race & ethnicity

KEEP N= 87,915, race; 89,617, ethnicity. NHANES N= 40,897

By race or ethnicity, 84.9, 79.0, 62.7, 52.2, and 82.1%, respectively, of whites, blacks, individuals of other races, Hispanics, and non-Hispanics participating in KEEP are insured; in the NHANES population, 86.8, 77.5, 64.4, 58.8, and 85.3%, respectively, have coverage.

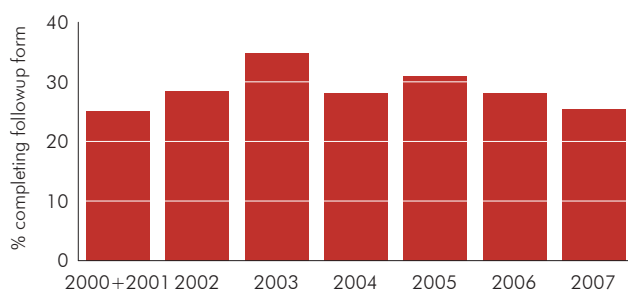


s.25

KEEP participants with a physician

KEEP N= 87,417, age; 87,359, gender; 85,856, race; 87,424, ethnicity.

Nearly 90% of all eligible KEEP participants have a physician. Slightly more females have physicians compared to males—89 versus 82%—and whites are more inclined to have a physician when compared to blacks and individuals of other races, at 91.2 and 87.9%, respectively.

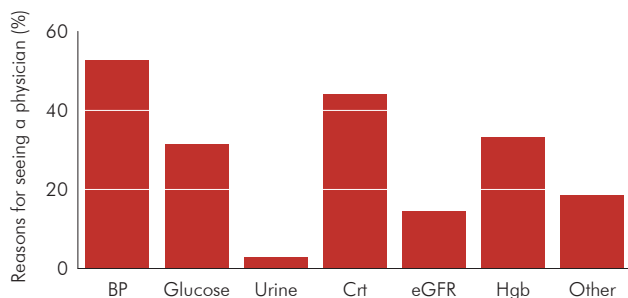


s.26

KEEP follow-up response rate (%)

Percent represents the number of participants who received follow-up forms divided by the number who returned the form & answered the question of seeing a doctor about screening results.

The percent of KEEP participants who returned follow-up forms peaked in 2003 with a response rate of 34.8%. The response rate has declined each year since 2005, reaching its lowest level since the combined year of 2000 and 2001, and now stands at 25.5%.



s.27

Reasons for seeing a physician in KEEP participants who return their follow-up forms

KEEP N= 18,323.

Among KEEP participants who returned their follow-up forms, the main reason for seeing a physician about test results was related to issues with blood pressure, at 52.8%, followed by abnormal results related to blood glucose, serum creatinine, or hemoglobin, at 31.6, 44.2, and 33.3%, respectively.

Table s.1

In 2007, nearly 90,000 individuals participated in KEEP screening programs, these programs were conducted by 47 affiliates nationwide.

Figure s.5

Diabetes is evident in 29.4% of KEEP participants and is identified in 40.6% of those age 61–75.

Figure s.8

Hypertension exists in nearly 70% of KEEP participants, and the rate of hypertension increases with age.

Figure s.12

Overall, CKD is evident in 26.2% and 15.3%, respectively, of KEEP and NHANES participants.

Figure s.13

Stage 3 CKD (eGFR 30–59), is most apparent among KEEP participants for whom estimated glomerular filtration data are available, at 17.3%, with Stage 1 and Stage 2 accounting for 3.0 and 4.9% of participants, respectively.

Table s.b

CKD exists in greater proportions of females, whites, and non-Hispanics. Geographically, CKD is most prominent in the South U.S. census region; a high concentration of participants reside in the South

Atlantic census division.

Figure s.15

In both the KEEP and NHANES populations, self-reported diabetes is more evident in those with CKD—at 39.5 and 19.7% respectively—compared to 2.4.9 and 4.6% in those with no diagnosis for CKD.

Figure s.16

Among KEEP participants with or without CKD, 72.2 and 49.6% report that they are hypertensive, while 52% of NHANES participants with CKD report this condition compared to 22.6% of those without CKD who report the diagnosis.

Figure s.17

Self-reported cardiovascular disease (CVD) is present in 31% of KEEP participants with CKD compared to 18.7% in participants with no CKD. Proportions of patients with CVD increase with age in both CKD and non-CKD participants, and CVD is most prominent in whites regardless of CKD status.

Figure s.26

The percent of KEEP participants who returned follow-up forms peaked in 2003 with a response rate of 34.8%. Since 2005, the response rate has declined each year, reaching its lowest level since the combined year of 2000 and 2001; it now stands at 25.5%.

KEEP 2008

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Abnormal Phosphorus*, by region/census division

Table 20.15

High cholesterol*, by region/census division

Table 1
Total eligible KEEP participants

	2000+2001	2002	2003	2004	2005	2006	2007	All
Age								
18-30	568	644	1,004	1,085	1,391	1,257	989	6,938
31-45	1,491	1,977	2,393	2,939	3,984	3,685	2,870	19,339
46-60	2,097	2,651	3,422	4,690	6,437	6,592	5,509	31,398
61-75	1,502	2,029	2,382	3,328	4,769	5,111	4,968	24,089
>75	424	743	721	1,076	1,548	1,656	1,683	7,851
Missing	.	.	.	5	2	.	.	7
Gender								
Male	1,959	2,570	2,944	4,145	5,879	5,684	5,207	28,388
Female	4,123	5,473	6,976	8,977	12,194	12,613	10,808	61,164
Missing	.	1	2	1	58	4	4	70
Race								
White	2,284	3,104	4,301	5,793	9,027	9,008	8,131	41,648
Black	2,652	3,392	3,430	4,276	5,269	5,564	5,041	29,624
N Am	324	575	686	820	723	434	346	3,908
Other	643	783	1,165	2,152	2,691	2,509	1,986	11,929
Unknown/missing	179	190	340	82	421	786	515	2,513
Ethnicity								
Non-Hispanic	5,464	7,332	8,805	11,232	15,715	15,984	13,944	78,476
Hispanic	618	712	1,117	1,891	2,416	2,317	2,075	11,146
U.S. Census Region								
Northeast	1,221	1,849	2,280	3,035	4,479	4,081	3,575	20,520
Midwest	837	1,224	1,707	2,464	2,593	3,012	2,010	13,847
South	3,559	4,078	4,750	6,310	8,573	8,882	8,176	44,328
West	455	888	1,184	1,314	2,482	2,318	2,254	10,895
Missing	10	5	1	.	4	8	4	32
Self-reported Diabetes								
Yes	1,498	1,940	2,417	3,392	4,842	5,425	5,471	24,985
No	4,446	6,046	7,411	9,593	13,155	12,679	10,503	63,833
Missing	138	58	94	138	134	197	45	804
Self-reported HTN								
Yes	3,100	4,177	5,076	6,841	9,606	9,930	9,459	48,189
No	2,905	3,804	4,739	6,162	8,168	7,863	6,360	40,001
Missing	77	63	107	120	357	508	200	1,432
Self-reported CVD								
Yes	996	1,319	1,566	2,040	4,003	4,681	4,408	19,013
No	5,086	6,725	8,356	11,083	14,128	13,620	11,611	70,609
Missing								
Family history of Diabetes								
Yes	4,041	5,322	6,701	8,764	10,271	9,165	8,347	52,611
No	1,805	2,512	2,986	3,965	6,997	8,150	7,129	33,544
Missing	236	210	235	394	863	986	543	3,467
Family history of HTN								
Yes	4,705	6,275	7,750	10,148	13,954	13,896	12,188	68,916
No	1,204	1,540	1,866	2,523	3,628	3,708	3,448	17,917
Missing	173	229	306	452	549	697	383	2,789
Family history of Kidney disease								
Yes	1,497	1,867	2,294	2,943	3,218	2,663	2,447	16,929
No	4,421	5,994	7,409	9,818	13,919	14,571	12,948	69,080
Missing	164	183	219	362	994	1,067	624	3,613
Smoking								
Yes	2,531	3,452	4,039	5,335	6,948	6,728	6,188	35,221
No	3,153	4,061	5,304	6,869	10,369	11,026	9,241	50,023
Missing	398	531	579	919	814	547	590	4,378
Education Level								
≤6 years	362	406	499	814	1,051	1,019	888	5,039
<12 years	586	871	921	1,188	1,780	1,763	1,581	8,690
12 years	1,585	2,192	2,591	3,491	4,611	4,462	4,190	23,122
>12 years	1,629	2,155	2,775	3,460	4,674	4,351	3,815	22,859
16 years	1,143	1,463	1,913	2,531	3,616	3,815	3,228	17,709
>16 years	688	862	1,132	1,469	2,144	2,452	2,019	10,766
Missing	89	95	91	170	255	439	298	1,437
Health Insurance Status								
Yes	4,948	6,428	7,892	10,154	14,058	14,207	12,404	70,091
No	883	1,234	1,660	2,494	3,251	3,371	3,292	16,185
Missing	251	382	370	475	822	723	323	3,346
Doctor Status								
Yes	5,223	6,935	8,468	10,964	15,345	15,465	13,442	75,842
No	652	874	1,224	1,700	2,364	2,444	2,324	11,582
Missing	207	235	230	459	422	392	253	2,198
All	6,082	8,044	9,922	13,123	18,131	18,301	16,019	89,622

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Table 1.1

Total eligible KEEP participants, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	2,559	2,196	462	1,424	297	1,526	5,412	6,938
31-45	6,971	7,088	1,003	3,476	801	3,716	15,623	19,339
46-60	13,777	11,558	1,255	4,024	784	3,544	27,854	31,398
61-75	13,083	7,135	947	2,433	491	1,929	22,160	24,089
>75	5,257	1,644	239	571	140	430	7,421	7,851
Missing	1	3	2	1	.	1	6	7
Gender								
Male	14,072	8,283	995	4,218	820	3,729	24,659	28,388
Female	27,553	21,320	2,909	7,703	1,679	7,401	53,763	61,164
Missing	23	21	4	8	14	16	54	70
U.S. Census Region								
Northeast	10,892	5,597	385	3,004	642	2,216	18,304	20,520
Midwest	6,898	4,351	720	1,500	378	1,788	12,059	13,847
South	19,143	18,980	1,510	3,783	912	4,938	39,390	44,328
West	4,703	684	1,291	3,637	580	2,198	8,697	10,895
Missing	12	12	2	5	1	6	26	32
Self-reported Diabetes								
Yes	12,179	7,558	1,448	3,138	662	3,014	21,971	24,985
No	29,236	21,789	2,449	8,675	1,684	8,007	55,826	63,833
Missing	233	277	11	116	167	125	679	804
Self-reported HTN								
Yes	22,995	17,098	1,910	5,135	1,051	4,674	43,515	48,189
No	18,114	12,121	1,963	6,562	1,241	6,212	33,789	40,001
Missing	539	405	35	232	221	260	1,172	1,432
Self-reported CVD								
Yes	10,145	5,813	736	1,908	411	1,813	17,200	19,013
No	31,503	23,811	3,172	10,021	2,102	9,333	61,276	70,609
Missing								
Family history of Diabetes	22,700	18,328	2,982	7,092	1,509	7,202	45,409	52,611
Yes	17,363	10,088	823	4,426	844	3,496	30,048	33,544
No	1,585	1,208	103	411	160	448	3,019	3,467
Missing								
Family history of HTN	30,979	24,664	2,804	8,702	1,767	8,008	60,908	68,916
Yes	9,194	4,244	965	2,889	625	2,782	15,135	17,917
No	1,475	716	139	338	121	356	2,433	2,789
Missing								
Family history of Kidney diseases	7,089	6,058	943	2,334	505	2,465	14,464	16,929
Yes	32,864	22,443	2,860	9,102	1,811	8,157	60,923	69,080
No	1,695	1,123	105	493	197	524	3,089	3,613
Missing								
Smoking	17614	11001	2131	3624	851	3759	31462	35221
Yes	22,518	16,853	1,621	7,568	1,463	6,642	43,381	50,023
No	1,516	1,770	156	737	199	745	3,633	4,378
Missing								
Education Level								
≤6 years	1,510	988	209	1,813	519	2,369	2,670	5,039
<12 years	3,235	3,067	569	1,403	416	1,768	6,922	8,690
12 years	11,977	7,064	1,069	2,470	542	2,566	20,556	23,122
>12 years	10,821	8,302	1,207	2,134	395	2,096	20,763	22,859
16 years	8,420	5,940	533	2,598	218	1,459	16,250	17,709
>16 years	5,302	3,803	262	1,289	110	656	10,110	10,766
Missing	383	460	59	222	313	232	1,205	1,437
Health Insurance Status								
Yes	35,357	23,394	2,678	7,331	1,331	5,760	64,331	70,091
No	5,081	4,991	1,095	4,071	947	4,779	11,406	16,185
Missing	1,210	1,239	135	527	235	607	2,739	3,346
Doctor Status								
Yes	37,218	25,405	3,233	8,367	1,619	7,068	68,774	75,842
No	3,597	3,510	581	3,179	715	3,592	7,990	11,582
Missing	833	709	94	383	179	486	1,712	2,198
All	41,648	29,624	3,908	11,929	2,513	11,146	78,476	89,622

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Table 2

Total eligible KEEP participants with chronic kidney disease (CKD)*

	2000+2001*	2002	2003	2004	2005	2006	2007	All
Total (non-missing eGFR & ACR)	969	5,618	8,724	12,430	16,724	17,248	15,367	77,080
Age								
18-30	14	53	97	111	126	102	82	585
31-45	93	199	308	417	535	380	272	2,204
46-60	265	445	661	1,017	1,287	1,133	881	5,689
61-75	410	649	805	1,209	1,742	1,552	1,417	7,784
>75	184	355	405	569	769	816	837	3,935
Missing	.	.	.	2	1	.	.	3
Gender								
Male	291	475	677	974	1,358	1,192	1,158	6,125
Female	675	1,226	1,599	2,351	3,102	2,791	2,331	14,075
Missing								
Race								
White	521	855	1,172	1,751	2,500	2,282	2,087	11,168
Black	271	585	683	971	1,129	1,075	907	5,621
N Am	59	129	198	181	218	109	91	985
Other	115	132	223	422	613	453	322	2,280
Unknown/missing	.	.	.	.	.	64	82	146
Ethnicity								
Non-Hispanic	871	1,622	2,142	2,985	3,996	3,646	3,174	18,436
Hispanic	95	79	134	340	464	337	315	1,764
U.S. Census Region								
Northeast	243	375	542	864	1,035	909	733	4,701
Midwest	115	290	418	701	568	663	464	3,219
South	517	867	1,087	1,458	2,183	1,878	1,708	9,698
West	88	169	229	302	673	532	583	2,576
Missing	3	.	.	.	1	1	1	6
U.S. Census Division								
New England	159	140	243	370	417	268	200	1,797
Middle Atlantic	84	235	299	494	618	641	533	2,904
East North Central	35	162	186	430	310	456	322	1,901
West North Central	80	128	232	271	258	207	142	1,318
South Atlantic	326	575	487	732	1,106	982	788	4,996
East South Central	71	80	285	405	513	594	658	2,606
West South Central	120	212	315	321	564	302	262	2,096
Mountain	27	76	129	213	470	357	383	1,655
Pacific	61	93	100	89	203	175	200	921
Missing	3	.	.	.	1	1	1	6
Smoking								
Yes	456	765	992	1,414	1,796	1,553	1,512	8,488
No	458	816	1,160	1,681	2,486	2,293	1,852	10,746
Missing	52	120	124	230	178	137	125	966
Education Level								
≤ 6 years	87	119	145	246	312	258	243	1,410
<12 years	116	223	262	385	503	473	393	2,355
12 years	275	539	641	965	1,252	1,120	1,052	5,844
>12 years	227	388	587	814	1,135	910	797	4,858
16 years	150	248	371	506	735	645	554	3,209
>16 years	99	163	255	356	461	478	382	2,194
Missing	12	21	15	53	62	99	68	330
Health Insurance Status								
Yes	832	1,403	1,893	2,755	3,529	3,253	2,884	16,549
No	92	195	301	458	712	563	527	2,848
Missing	42	103	82	112	219	167	78	803
Doctor Status								
Yes	891	1,543	2,045	2,947	3,946	3,605	3,148	18,125
No	46	102	181	262	425	294	281	1,591
Missing	29	56	50	116	89	84	60	484
All	966	1,701	2,276	3,325	4,460	3,983	3,489	20,200

*CKD: eGFR <60 mL/min/1.73 m² or eGFR ≥60 mL/min/1.73 m² and albumin-creatinine ratio (ACR) ≥30 mg/g.

* ACR data was not available until April, 2002. All CKD patients in 2000 & 2001 were at stages 3-5.

“.” Zero values in this cell.

Table 2.1

Total eligible KEEP participants by CKD stage*

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	5,045	318	143	116	8	1,308	6,938
31-45	13,800	652	616	896	40	3,335	19,339
46-60	21,266	900	1,231	3,406	152	4,443	31,398
61-75	13,569	391	1,265	5,795	333	2,736	24,089
>75	3,196	66	497	3,114	258	720	7,851
Missing	4	.	1	2	.	.	7
Gender							
Male	18,169	658	1,297	3,877	293	4,094	28,388
Female	38,711	1,669	2,456	9,452	498	8,378	61,164
Missing	.	.	.	.	.	70	70
Race							
White	26,421	674	1,722	8,343	429	4,059	41,648
Black	19,058	1,049	1,266	3,098	208	4,945	29,624
N Am	2,393	199	210	524	52	530	3,908
Other	8,353	376	512	1,292	100	1,296	11,929
Unknown/missing	655	29	43	72	2	1,712	2,513
Ethnicity							
Non-Hispanic	49,779	1,975	3,361	12,361	739	10,261	78,476
Hispanic	7,101	352	392	968	52	2,281	11,146
U.S. Census Region							
Northeast	13,141	531	879	3,107	184	2,678	20,520
Midwest	8,902	378	602	2,102	137	1,726	13,847
South	27,980	1,143	1,817	6,386	352	6,650	44,328
West	6,842	275	455	1,728	118	1,477	10,895
Missing	15	.	.	6	.	11	32
U.S. Census Division							
New England	4,438	153	304	1,287	53	1,537	7,772
Middle Atlantic	8,703	378	575	1,820	131	1,141	12,748
East North Central	5,640	250	395	1,177	79	764	8,305
West North Central	3,262	128	207	925	58	962	5,542
South Atlantic	13,851	527	900	3,407	162	3,852	22,699
East South Central	7,904	292	505	1,717	92	1,170	11,680
West South Central	6,225	324	412	1,262	98	1,628	9,949
Mountain	4,164	167	253	1,171	64	827	6,646
Pacific	2,678	108	202	557	54	650	4,249
Missing	15	.	.	6	.	11	32
Smoking							
Yes	21,760	984	1,622	5,520	362	4,973	35,221
No	32,542	1,222	1,962	7,170	392	6,735	50,023
Missing	2,578	121	169	639	37	834	4,378
Education Level							
≤6 years	2,783	154	252	919	85	846	5,039
<12 years	4,999	274	435	1,537	109	1,336	8,690
12 years	14,093	651	986	3,954	253	3,185	23,122
>12 years	14,789	592	956	3,136	174	3,212	22,859
16 years	12,217	425	635	2,055	94	2,283	17,709
>16 years	7,227	198	409	1,520	67	1,345	10,766
Missing	772	33	80	208	9	335	1,437
Health Insurance Status							
Yes	43,996	1,573	2,949	11,352	675	9,546	70,091
No	10,953	657	666	1,445	80	2,384	16,185
Missing	1,931	97	138	532	36	612	3,346
Doctor Status							
Yes	47,417	1,883	3,273	12,236	733	10,300	75,842
No	8,199	382	397	776	36	1,792	11,582
Missing	1,264	62	83	317	22	450	2,198
All	56,880	2,327	3,753	13,329	791	12,542	89,622

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

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Table 2.2

Total eligible KEEP participants by CKD stage*: White

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	1,952	90	63	63	2	389	2,559
31-45	5,216	162	225	491	19	858	6,971
46-60	9,674	270	479	1,867	51	1,436	13,777
61-75	7,458	119	641	3,654	167	1,044	13,083
>75	2,121	33	313	2,268	190	332	5,257
Missing	.	.	1	.	.	.	1
Gender							
Male	9,210	215	614	2,490	165	1,378	14,072
Female	17,211	459	1,108	5,853	264	2,658	27,553
Missing	.	.	.	.	.	23	23
U.S. Census Region							
Northeast	6,979	193	473	2,113	116	1,018	10,892
Midwest	4,512	142	307	1,353	83	501	6,898
South	12,004	300	798	3,777	177	2,087	19,143
West	2,921	39	144	1,096	53	450	4,703
Missing	5	.	.	4	.	3	12
U.S. Census Division							
New England	2,281	52	154	842	30	607	3,966
Middle Atlantic	4,698	141	319	1,271	86	411	6,926
East North Central	2,622	87	185	731	44	175	3,844
West North Central	1,890	55	122	622	39	326	3,054
South Atlantic	5,643	137	416	2,025	74	1,214	9,509
East South Central	4,142	84	243	1,138	60	399	6,066
West South Central	2,219	79	139	614	43	474	3,568
Mountain	2,258	25	109	926	46	333	3,697
Pacific	663	14	35	170	7	117	1,006
Missing	5	.	.	4	.	3	12
Smoking							
Yes	11,083	306	781	3,513	198	1,733	17,614
No	14,455	344	873	4,486	213	2,147	22,518
Missing	883	24	68	344	18	179	1,516
Education Level							
≤6 years	788	37	92	423	32	138	1,510
<12 years	1,831	54	158	819	53	320	3,235
12 years	7,284	216	504	2,700	145	1,128	11,977
>12 years	6,931	169	452	2,028	109	1,132	10,821
16 years	5,813	129	303	1,300	56	819	8,420
>16 years	3,561	61	192	977	31	480	5,302
Missing	213	8	21	96	3	42	383
Health Insurance Status							
Yes	22,211	476	1,436	7,432	384	3,418	35,357
No	3,516	173	229	621	31	511	5,081
Missing	694	25	57	290	14	130	1,210
Doctor Status							
Yes	23,326	570	1,565	7,774	401	3,582	37,218
No	2,620	88	117	375	16	381	3,597
Missing	475	16	40	194	12	96	833
All	26,421	674	1,722	8,343	429	4,059	41,648

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 2.3

Total eligible KEEP participants by CKD stage*: Black

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	1,557	134	37	17	5	446	2,196
31-45	4,960	290	246	216	13	1,363	7,088
46-60	7,744	410	504	977	62	1,861	11,558
61-75	4,079	194	380	1,355	87	1,040	7,135
>75	716	21	99	532	41	235	1,644
Missing	2	.	.	1	.	.	3
Gender							
Male	5,194	272	413	756	72	1,576	8,283
Female	13,864	777	853	2,342	136	3,348	21,320
Missing	.	.	.	.	.	21	21
U.S. Census Region							
Northeast	3,683	235	248	530	36	865	5,597
Midwest	2,655	144	206	517	36	793	4,351
South	12,323	653	785	1,992	130	3,097	18,980
West	392	17	27	58	6	184	684
Missing	5	.	.	1	.	6	12
U.S. Census Division							
New England	1,197	66	89	178	11	343	1,884
Middle Atlantic	2,486	169	159	352	25	522	3,713
East North Central	2,026	117	163	356	28	330	3,020
West North Central	629	27	43	161	8	463	1,331
South Atlantic	7,016	349	410	1,159	80	2,203	11,217
East South Central	3,274	185	241	537	30	552	4,819
West South Central	2,033	119	134	296	20	342	2,944
Mountain	151	3	12	29	2	68	265
Pacific	241	14	15	29	4	116	419
Missing	5	.	.	1	.	6	12
Smoking							
Yes	6,817	444	530	1,257	88	1,865	11,001
No	11,214	548	657	1,640	107	2,687	16,853
Missing	1,027	57	79	201	13	393	1,770
Education Level							
≤6 years	506	38	56	208	18	162	988
<12 years	1,798	109	163	458	33	506	3,067
12 years	4,354	299	308	791	66	1,246	7,064
>12 years	5,482	299	357	741	42	1,381	8,302
16 years	4,084	196	207	454	25	974	5,940
>16 years	2,541	93	146	385	23	615	3,803
Missing	293	15	29	61	1	61	460
Health Insurance Status							
Yes	14,970	768	1,002	2,542	167	3,945	23,394
No	3,332	233	212	396	27	791	4,991
Missing	756	48	52	160	14	209	1,239
Doctor Status							
Yes	16,183	879	1,099	2,882	193	4,169	25,405
No	2,444	145	142	146	9	624	3,510
Missing	431	25	25	70	6	152	709
All	19,058	1,049	1,266	3,098	208	4,945	29,624

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 2.4

Total eligible KEEP participants by CKD stage*: Native American

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	335	42	12	14	.	59	462
31-45	723	56	45	37	3	139	1,003
46-60	785	68	56	143	14	189	1,255
61-75	480	28	69	229	22	119	947
>75	69	5	28	100	13	24	239
Missing	1	.	.	1	.	.	2
Gender							
Male	598	52	81	120	14	130	995
Female	1,795	147	129	404	38	396	2,909
Missing	.	.	.	.	.	4	4
U.S. Census Region							
Northeast	214	13	20	82	7	49	385
Midwest	460	31	31	125	8	65	720
South	790	48	74	216	28	354	1,510
West	928	107	85	100	9	62	1,291
Missing	1	.	.	1	.	.	2
U.S. Census Division							
New England	67	4	4	51	3	34	163
Middle Atlantic	147	9	16	31	4	15	222
East North Central	79	2	10	26	.	3	120
West North Central	381	29	21	99	8	62	600
South Atlantic	72	1	3	29	2	16	123
East South Central	40	.	1	4	.	2	47
West South Central	678	47	70	183	26	336	1,340
Mountain	903	105	83	87	9	54	1,241
Pacific	25	2	2	13	.	8	50
Missing	1	.	.	1	.	.	2
Smoking							
Yes	1,257	102	111	296	29	336	2,131
No	1,044	91	97	203	22	164	1,621
Missing	92	6	2	25	1	30	156
Education Level							
≤6 years	93	13	19	50	8	26	209
<12 years	315	48	42	87	7	70	569
12 years	641	53	61	142	17	155	1,069
>12 years	776	56	54	150	12	159	1,207
16 years	368	19	19	50	1	76	533
>16 years	166	6	10	37	5	38	262
Missing	34	4	5	8	2	6	59
Health Insurance Status							
Yes	1,600	119	132	408	43	376	2,678
No	714	77	68	96	8	132	1,095
Missing	79	3	10	20	1	22	135
Doctor Status							
Yes	1,920	166	181	473	49	444	3,233
No	420	30	25	39	3	64	581
Missing	53	3	4	12	.	22	94
All	2,393	199	210	524	52	530	3,908

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 2.5

Total eligible KEEP participants by CKD stage*: Other race

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	1,130	48	28	21	1	196	1,424
31-45	2,666	132	95	147	5	431	3,476
46-60	2,858	143	179	398	25	421	4,024
61-75	1,435	46	160	530	55	207	2,433
>75	263	7	50	196	14	41	571
Missing	1	.	.	.	.	.	1
Gender							
Male	2,950	111	177	494	40	446	4,218
Female	5,403	265	335	798	60	842	7,703
Missing	.	.	.	.	.	8	8
U.S. Census Region							
Northeast	2,083	83	130	365	24	319	3,004
Midwest	1,181	59	56	100	10	94	1,500
South	2,691	126	141	385	16	424	3,783
West	2,394	108	185	442	50	458	3,637
Missing	4	.	.	.	.	1	5
U.S. Census Division							
New England	775	27	52	206	8	261	1,329
Middle Atlantic	1,308	56	78	159	16	58	1,675
East North Central	831	42	35	58	7	55	1,028
West North Central	350	17	21	42	3	39	472
South Atlantic	1,073	39	65	188	5	160	1,530
East South Central	434	23	17	35	2	63	574
West South Central	1,184	64	59	162	9	201	1,679
Mountain	729	32	45	109	7	95	1,017
Pacific	1,665	76	140	333	43	363	2,620
Missing	4	.	.	.	.	1	5
Smoking							
Yes	2,413	125	185	431	47	423	3,624
No	5,410	219	308	797	48	786	7,568
Missing	530	32	19	64	5	87	737
Education Level							
≤6 years	1,251	63	75	220	27	177	1,813
<12 years	946	57	65	161	16	158	1,403
12 years	1,688	71	108	308	25	270	2,470
>12 years	1,491	65	86	210	11	271	2,134
16 years	1,892	77	106	249	12	262	2,598
>16 years	937	37	55	120	8	132	1,289
Missing	148	6	17	24	1	26	222
Health Insurance Status							
Yes	4,885	197	349	921	79	900	7,331
No	3,101	159	149	316	14	332	4,071
Missing	367	20	14	55	7	64	527
Doctor Status							
Yes	5,593	250	396	1,049	88	991	8,367
No	2,491	110	105	206	8	259	3,179
Missing	269	16	11	37	4	46	383
All	8,353	376	512	1,292	100	1,296	11,929

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 2.6

Total eligible KEEP participants by CKD stage*: Hispanic

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	1,065	48	25	14	1	373	1,526
31-45	2,556	121	98	147	5	789	3,716
46-60	2,253	126	127	305	20	713	3,544
61-75	1,039	52	109	368	19	342	1,929
>75	187	5	33	134	7	64	430
Missing	1	.	.	.	.	.	1
Gender							
Male	2,395	105	127	311	21	770	3,729
Female	4,706	247	265	657	31	1,495	7,401
Missing	.	.	.	.	.	16	16
U.S. Census Region							
Northeast	1,340	67	65	174	9	561	2,216
Midwest	1,299	55	56	87	7	284	1,788
South	3,071	173	188	495	21	990	4,938
West	1,387	57	83	212	15	444	2,198
Missing	4	.	.	.	.	2	6
U.S. Census Division							
New England	615	25	33	106	5	437	1,221
Middle Atlantic	725	42	32	68	4	124	995
East North Central	943	43	40	65	5	202	1,298
West North Central	356	12	16	22	2	82	490
South Atlantic	1,037	49	73	230	6	329	1,724
East South Central	343	18	15	32	.	164	572
West South Central	1,691	106	100	233	15	497	2,642
Mountain	965	37	47	149	10	338	1,546
Pacific	422	20	36	63	5	106	652
Missing	4	.	.	.	.	2	6
Smoking							
Yes	2,294	112	151	345	26	831	3,759
No	4,337	217	217	565	22	1,284	6,642
Missing	470	23	24	58	4	166	745
Education Level							
≤6 years	1,460	82	89	208	20	510	2,369
<12 years	1,073	64	55	149	8	419	1,768
12 years	1,587	77	85	249	11	557	2,566
>12 years	1,388	62	85	163	7	391	2,096
16 years	1,020	47	41	122	3	226	1,459
>16 years	430	15	25	61	2	123	656
Missing	143	5	12	16	1	55	232
Health Insurance Status							
Yes	3,514	148	227	623	35	1,213	5,760
No	3,253	184	149	288	13	892	4,779
Missing	334	20	16	57	4	176	607
Doctor Status							
Yes	4,294	223	294	743	43	1,471	7,068
No	2,525	112	88	191	6	670	3,592
Missing	282	17	10	34	3	140	486
All	7,101	352	392	968	52	2,281	11,146

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 2.7

Total eligible KEEP participants by CKD stage*: non-Hispanic

	Non-CKD	Stage 1 & Abnormal ACR	Stage 2 & Abnormal ACR	Stage 3	Stages 4-5	Missing	All
Age							
18-30	3,980	270	118	102	7	935	5,412
31-45	11,244	531	518	749	35	2,546	15,623
46-60	19,013	774	1,104	3,101	132	3,730	27,854
61-75	12,530	339	1,156	5,427	314	2,394	22,160
>75	3,009	61	464	2,980	251	656	7,421
Missing	3	.	1	2	.	.	6
Gender							
Male	15,774	553	1,170	3,566	272	3,324	24,659
Female	34,005	1,422	2,191	8,795	467	6,883	53,763
Missing	.	.	.	.	.	54	54
U.S. Census Region							
Northeast	11,801	464	814	2,933	175	2,117	18,304
Midwest	7,603	323	546	2,015	130	1,442	12,059
South	24,909	970	1,629	5,891	331	5,660	39,390
West	5,455	218	372	1,516	103	1,033	8,697
Missing	11	.	.	6	.	9	26
U.S. Census Division							
New England	3,823	128	271	1,181	48	1,100	6,551
Middle Atlantic	7,978	336	543	1,752	127	1,017	11,753
East North Central	4,697	207	355	1,112	74	562	7,007
West North Central	2,906	116	191	903	56	880	5,052
South Atlantic	12,814	478	827	3,177	156	3,523	20,975
East South Central	7,561	274	490	1,685	92	1,006	11,108
West South Central	4,534	218	312	1,029	83	1,131	7,307
Mountain	3,199	130	206	1,022	54	489	5,100
Pacific	2,256	88	166	494	49	544	3,597
Missing	11	.	.	6	.	9	26
Smoking							
Yes	19,466	872	1,471	5,175	336	4,142	31,462
No	28,205	1,005	1,745	6,605	370	5,451	43,381
Missing	2,108	98	145	581	33	668	3,633
Education Level							
≤6 years	1,323	72	163	711	65	336	2,670
<12 years	3,926	210	380	1,388	101	917	6,922
12 years	12,506	574	901	3,705	242	2,628	20,556
>12 years	13,401	530	871	2,973	167	2,821	20,763
16 years	11,197	378	594	1,933	91	2,057	16,250
>16 years	6,797	183	384	1,459	65	1,222	10,110
Missing	629	28	68	192	8	280	1,205
Health Insurance Status							
Yes	40,482	1,425	2,722	10,729	640	8,333	64,331
No	7,700	473	517	1,157	67	1,492	11,406
Missing	1,597	77	122	475	32	436	2,739
Doctor Status							
Yes	43,123	1,660	2,979	11,493	690	8,829	68,774
No	5,674	270	309	585	30	1,122	7,990
Missing	982	45	73	283	19	310	1,712
All	49,779	1,975	3,361	12,361	739	10,261	78,476

*CKD Stages

Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g; Stage 3: eGFR 30–59 mL/min/1.73 m²;Stage 4: eGFR 15–29 mL/min/1.73 m²; Stage 5: eGFR <15 mL/min/1.73 m².

"." Zero values in this cell.

Table 3

Total eligible KEEP participants with self-reported diabetes*

	2000+2001	2002	2003	2004	2005	2006	2007	All
Total (answered diabetes question)	5,944	7,986	9,828	12,985	17,997	18,104	15,974	88,818
Age								
18-30	40	43	57	88	128	132	90	578
31-45	216	245	343	429	639	724	617	3,213
46-60	532	658	897	1,236	1,775	1,989	1,843	8,930
61-75	566	745	866	1,259	1,759	2,012	2,202	9,409
>75	144	249	254	380	541	568	719	2,855
Gender								
Male	536	671	742	1,124	1,568	1,795	1,836	8,272
Female	962	1,269	1,674	2,267	3,261	3,630	3,633	16,696
Missing	.	.	1	1	13	.	2	17
Race								
White	574	808	1,059	1,549	2,390	2,713	3,086	12,179
Black	563	710	775	1,042	1,362	1,622	1,484	7,558
N Am	138	201	226	270	260	186	167	1,448
Other	180	178	269	510	715	698	588	3,138
Unknown/missing	43	43	88	21	115	206	146	662
Ethnicity								
Non-Hispanic	1,326	1,765	2,152	2,938	4,186	4,755	4,849	21,971
Hispanic	172	175	265	454	656	670	622	3,014
U.S. Census Region								
Northeast	348	427	559	804	1,048	1,184	1,188	5,558
Midwest	202	289	432	715	716	841	743	3,938
South	857	1,062	1,160	1,578	2,382	2,638	2,678	12,355
West	90	160	266	295	694	760	861	3,126
Missing	1	2	.	.	2	2	1	8
U.S. Census Division								
New England	235	189	265	367	396	434	399	2,285
Middle Atlantic	113	238	294	437	652	750	789	3,273
East North Central	52	160	222	426	420	625	560	2,465
West North Central	150	129	210	289	296	216	183	1,473
South Atlantic	500	653	540	758	1,126	1,288	1,183	6,048
East South Central	134	80	281	440	649	858	1,056	3,498
West South Central	223	329	339	380	607	492	439	2,809
Mountain	28	67	144	208	459	490	504	1,900
Pacific	62	93	122	87	235	270	357	1,226
Missing	1	2	.	.	2	2	1	8
Smoking								
Yes	731	939	1,059	1,482	2,007	2,227	2,294	10,739
No	659	874	1,218	1,690	2,641	3,012	2,984	13,078
Missing	108	127	140	220	194	186	193	1,168
Education Level								
≤6 years	161	135	169	288	422	372	350	1,897
<12 years	183	272	293	399	602	658	609	3,016
12 years	408	599	672	934	1,313	1,429	1,547	6,902
>12 years	370	473	619	844	1,182	1,298	1,296	6,082
16 years	208	251	383	541	784	944	966	4,077
>16 years	140	185	257	335	469	626	600	2,612
Missing	28	25	24	51	70	98	103	399
Health Insurance Status								
Yes	1,246	1,593	1,962	2,750	3,760	4,231	4,427	19,969
No	191	248	359	525	845	971	930	4,069
Missing	61	99	96	117	237	223	114	947
Doctor Status								
Yes	1,370	1,800	2,253	3,098	4,402	4,905	4,991	22,819
No	73	77	120	199	327	419	396	1,611
Missing	55	63	44	95	113	101	84	555
All	1,498	1,940	2,417	3,392	4,842	5,425	5,471	24,985

* Self-reported diabetes: self-reported diabetes or self-reported diabetic retinopathy.
 "." Zero values in this cell.

Table 3.1

Total eligible KEEP participants with self-reported diabetes*, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	220	156	57	116	29	144	434	578
31-45	1,254	992	250	574	143	689	2,524	3,213
46-60	3,902	3,022	514	1,234	258	1,159	7,771	8,930
61-75	4,917	2,791	516	1,004	181	851	8,558	9,409
>75	1,886	597	111	210	51	171	2,684	2,855
Gender								
Male	4,540	2,012	334	1,160	226	1,039	7,233	8,272
Female	7,633	5,543	1,110	1,977	433	1,973	14,723	16,696
Missing	6	3	4	1	3	2	15	17
U.S. Census Region								
Northeast	3,040	1,428	144	790	156	616	4,942	5,558
Midwest	2,077	1,083	324	365	89	434	3,504	3,938
South	5,703	4,910	534	971	237	1,317	11,038	12,355
West	1,354	135	446	1,011	180	647	2,479	3,126
Missing	5	2	.	1	.	.	8	8
U.S. Census Division								
New England	1,247	476	58	389	115	368	1,917	2,285
Middle Atlantic	1,793	952	86	401	41	248	3,025	3,273
East North Central	1,316	783	53	251	62	306	2,159	2,465
West North Central	761	300	271	114	27	128	1,345	1,473
South Atlantic	2,737	2,834	30	368	79	395	5,653	6,048
East South Central	2,002	1,334	21	115	26	95	3,403	3,498
West South Central	964	742	483	488	132	827	1,982	2,809
Mountain	1,034	59	434	257	116	438	1,462	1,900
Pacific	320	76	12	754	64	209	1,017	1,226
Missing	5	2	.	1	.	.	8	8
Smoking								
Yes	5,425	3,164	822	1,077	251	1,129	9,610	10,739
No	6,302	3,944	577	1,900	355	1,705	11,373	13,078
Missing	452	450	49	161	56	180	988	1,168
Education Level								
≤6 years	614	379	123	618	163	802	1,095	1,897
<12 years	1,185	1,052	253	396	130	528	2,488	3,016
12 years	3,808	1,941	375	637	141	649	6,253	6,902
>12 years	3,115	1,941	401	530	95	510	5,572	6,082
16 years	2,002	1,258	183	589	45	315	3,762	4,077
>16 years	1,330	866	89	303	24	132	2,480	2,612
Missing	125	121	24	64	64	78	321	399
Health Insurance Status								
Yes	10,399	6,084	1,026	2,071	389	1,764	18,205	19,969
No	1,429	1,131	366	928	215	1,100	2,969	4,069
Missing	351	343	56	139	58	150	797	947
Doctor Status								
Yes	11,435	6,978	1,310	2,583	513	2,390	20,429	22,819
No	515	409	104	478	105	529	1,082	1,611
Missing	229	171	34	77	44	95	460	555
All	12,179	7,558	1,448	3,138	662	3,014	21,971	24,985

* Self-reported diabetes: self-reported diabetes or self-reported diabetic retinopathy.
 ". " Zero values in this cell.

Table 4

Total eligible KEEP participants with elevated blood sugar*

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	6,678	178	2.7	98.7
31-45	18,688	1,178	6.3	108.9
46-60	30,408	3,298	10.8	118.9
61-75	23,363	2,953	12.6	122.9
>75	7,623	837	11.0	120.5
Missing	6	1	16.7	130.1
Gender				
Male	27,551	3,081	11.2	118.9
Female	59,161	5,354	9.0	115.2
Missing	54	10	18.5	123.9
Race				
White	40,574	3,696	9.1	115.2
Black	28,526	2,724	9.5	116.0
N Am	3,829	565	14.8	131.1
Other	11,553	1,205	10.4	116.0
Unknown/missing	2,284	255	11.2	118.2
Ethnicity				
Non-Hispanic	75,974	7,312	9.6	116.3
Hispanic	10,792	1,133	10.5	117.3
U.S. Census Region				
Northeast	19,821	1,709	8.6	116.0
Midwest	13,425	1,243	9.3	116.0
South	42,879	4,349	10.1	116.6
West	10,609	1,142	10.8	116.6
Missing	32	2	6.3	110.8
U.S. Census Division				
New England	7,444	682	9.2	116.1
Middle Atlantic	12,377	1,027	8.3	115.9
East North Central	8,032	744	9.3	117.0
West North Central	5,393	499	9.3	114.6
South Atlantic	21,906	2,139	9.8	116.6
East South Central	11,308	1,121	9.9	115.3
West South Central	9,665	1,089	11.3	118.3
Mountain	6,470	658	10.2	117.5
Pacific	4,139	484	11.7	115.0
Missing	32	2	6.3	110.8
Smoking				
Yes	34,130	3,684	10.8	118.8
No	48,505	4,343	9.0	114.6
Missing	4,131	418	10.1	117.6
Education Level				
≤6 years	4,876	769	15.8	127.3
<12 years	8,433	1,101	13.1	123.2
12 years	22,461	2,307	10.3	118.0
>12 years	22,205	2,051	9.2	115.4
16 years	17,204	1,272	7.4	111.1
>16 years	10,466	774	7.4	111.8
Missing	1,121	171	15.3	125.0
Health Insurance Status				
Yes	67,965	6,251	9.2	115.6
No	15,694	1,828	11.6	119.1
Missing	3,107	366	11.8	120.0
Doctor Status				
Yes	73,490	7,438	10.1	117.2
No	11,213	785	7.0	110.7
Missing	2063	222	10.8	117.5
All with non-missing	86,766	8,445	9.7	116.4

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.1

Total eligible KEEP participants with elevated blood sugar*: White

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	2,460	57	2.3	97.4
31-45	6,779	384	5.7	107.1
46-60	13,431	1,297	9.7	116.2
61-75	12,769	1,433	11.2	120.2
>75	5,134	525	10.2	119.6
Missing	1	0	0.0	115.0
Gender				
Male	13,749	1,517	11.0	118.9
Female	26,807	2,174	8.1	113.3
Missing	18	5	27.8	135.7
U.S. Census Region				
Northeast	10,570	868	8.2	115.0
Midwest	6,743	614	9.1	115.3
South	18,679	1,824	9.8	116.0
West	4,570	389	8.5	112.7
Missing	12	1	8.3	95.6
U.S. Census Division				
New England	3,819	355	9.3	115.8
Middle Atlantic	6,751	513	7.6	114.5
East North Central	3,761	360	9.6	117.7
West North Central	2,982	254	8.5	112.3
South Atlantic	9,274	910	9.8	117.0
East South Central	5,913	578	9.8	115.1
West South Central	3,492	336	9.6	115.0
Mountain	3,597	275	7.6	111.8
Pacific	973	114	11.7	116.0
Missing	12	1	8.3	95.6
Smoking				
Yes	17,154	1,715	10.0	116.9
No	21,967	1,837	8.4	113.9
Missing	1,453	144	9.9	116.4
Education Level				
≤6 years	1,474	221	15.0	127.1
<12 years	3,160	408	12.9	122.9
12 years	11,672	1,161	9.9	117.5
>12 years	10,539	964	9.1	114.6
16 years	8,210	542	6.6	109.8
>16 years	5,166	348	6.7	111.3
Missing	353	52	14.7	123.4
Health Insurance Status				
Yes	34,462	2,982	8.7	114.5
No	4,963	580	11.7	119.6
Missing	1,149	134	11.7	119.5
Doctor Status				
Yes	36,271	3,393	9.4	115.7
No	3,505	224	6.4	110.0
Missing	798	79	9.9	117.3
All with non-missing glucose	40,574	3,696	9.1	115.2

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.2

Total eligible KEEP participants with elevated blood sugar*: Black

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	2,104	68	3.2	99.0
31-45	6,813	422	6.2	109.0
46-60	11,131	1,172	10.5	118.5
61-75	6,888	886	12.9	123.5
>75	1,587	175	11.0	119.8
Missing	3	1	33.3	131.7
Gender				
Male	7,979	837	10.5	117.4
Female	20,530	1,886	9.2	115.5
Missing	17	1	5.9	93.2
U.S. Census Region				
Northeast	5,392	484	9.0	116.1
Midwest	4,179	359	8.6	114.9
South	18,287	1,831	10.0	116.4
West	656	50	7.6	112.7
Missing	12	0	0.0	100.3
U.S. Census Division				
New England	1,802	150	8.3	114.8
Middle Atlantic	3,590	334	9.3	116.7
East North Central	2,900	254	8.8	116.9
West North Central	1,279	105	8.2	110.3
South Atlantic	10,760	1,067	9.9	116.7
East South Central	4,644	482	10.4	116.2
West South Central	2,883	282	9.8	115.8
Mountain	255	22	8.6	114.3
Pacific	401	28	7.0	111.7
Missing	12	0	0.0	100.3
Smoking				
Yes	10,590	1,149	10.8	119.3
No	16,268	1,400	8.6	113.6
Missing	1,668	175	10.5	119.0
Education Level				
≤6 years	950	137	14.4	124.6
<12 years	2,956	385	13.0	123.6
12 years	6,829	678	9.9	117.7
>12 years	8,014	728	9.1	115.6
16 years	5,741	450	7.8	111.3
>16 years	3,686	293	7.9	112.0
Missing	350	53	15.1	125.5
Health Insurance Status				
Yes	22,564	2,053	9.1	115.2
No	4,802	528	11.0	118.4
Missing	1,160	143	12.3	121.4
Doctor Status				
Yes	24,491	2,426	9.9	116.8
No	3,371	223	6.6	110.1
Missing	664	75	11.3	119.1
All with non-missing glucose	28,526	2,724	9.5	116.0

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.3

Total eligible KEEP participants with elevated blood sugar*: Native American

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	458	19	4.1	106.5
31-45	986	105	10.6	123.6
46-60	1,222	205	16.8	135.9
61-75	930	191	20.5	143.6
>75	232	45	19.4	135.7
missing	1	0	0.0	140.5
Gender				
Male	982	143	14.6	129.4
Female	2,843	420	14.8	131.5
missing	4	2	50.0	210.8
U.S. Census Region				
Northeast	368	35	9.5	119.6
Midwest	710	101	14.2	131.6
South	1,474	212	14.4	129.6
West	1,275	217	17.0	135.8
Missing	2	0	0.0	132.5
U.S. Census Division				
New England	161	17	10.6	117.9
Middle Atlantic	207	18	8.7	120.9
East North Central	118	12	10.2	122.2
West North Central	592	89	15.0	133.5
South Atlantic	118	9	7.6	117.5
East South Central	44	3	6.8	112.9
West South Central	1,312	200	15.2	131.3
Mountain	1,228	211	17.2	136.5
Pacific	47	6	12.8	117.4
Missing	2	0	0.0	132.5
Smoking				
Yes	2,087	287	13.8	129.5
No	1,593	259	16.3	133.1
Missing	149	19	12.8	130.8
Education Level				
≤6 years	205	60	29.3	153.1
<12 years	555	108	19.5	137.9
12 years	1,046	142	13.6	129.4
>12 years	1,185	137	11.6	125.9
16 years	526	76	14.4	130.2
>16 years	257	31	12.1	128.4
Missing	55	11	20.0	144.3
Health Insurance Status				
Yes	2,630	366	13.9	130.4
No	1,069	176	16.5	132.2
Missing	130	23	17.7	134.5
Doctor Status				
Yes	3,166	499	15.8	133.1
No	571	48	8.4	119.2
Missing	92	18	19.6	134.4
All with non-missing glucose	3,829	565	14.8	131.1

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.4

Total eligible KEEP participants with elevated blood sugar*: Other race

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	1,372	25	1.8	98.3
31-45	3,358	214	6.4	108.0
46-60	3,913	510	13.0	121.9
61-75	2,357	378	16.0	126.4
>75	552	78	14.1	123.8
Missing	1	0	0.0	120.0
Gender				
Male	4,087	492	12.0	119.2
Female	7,460	713	9.6	114.3
Missing	6	0	0.0	105.8
U.S. Census Region				
Northeast	2,913	281	9.6	119.2
Midwest	1,447	133	9.2	115.2
South	3,624	379	10.5	115.1
West	3,564	412	11.6	114.7
Missing	5	0	0.0	96.6
U.S. Census Division				
New England	1,276	136	10.7	119.4
Middle Atlantic	1,637	145	8.9	119.1
East North Central	983	90	9.2	114.6
West North Central	464	43	9.3	116.6
South Atlantic	1,478	118	8.0	112.8
East South Central	552	43	7.8	110.8
West South Central	1,594	218	13.7	118.8
Mountain	991	92	9.3	114.3
Pacific	2,573	320	12.4	114.9
Missing	5	0	0.0	96.6
Smoking				
Yes	3,521	434	12.3	119.7
No	7,345	708	9.6	114.5
Missing	687	63	9.2	113.8
Education Level				
≤6 years	1,748	281	16.1	126.7
<12 years	1,363	156	11.4	118.5
12 years	2,390	269	11.3	117.1
>12 years	2,081	187	9.0	112.9
16 years	2,519	184	7.3	110.9
>16 years	1,250	93	7.4	110.1
Missing	202	35	17.4	126.8
Health Insurance Status				
Yes	7,115	725	10.2	116.1
No	3,959	433	10.9	115.9
Missing	479	47	9.8	116.0
Doctor Status				
Yes	8,124	933	11.5	118.1
No	3,079	237	7.7	110.8
Missing	350	35	10.0	113.9
All with non-missing glucose	11,553	1,205	10.4	116.0

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.5

Total eligible KEEP participants with elevated blood sugar*: Hispanic

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	1,470	34	2.3	98.4
31-45	3,604	248	6.9	109.5
46-60	3,432	493	14.4	125.8
61-75	1,872	307	16.4	130.3
>75	413	51	12.3	122.3
Missing	1	0	0.0	120.0
Gender				
Male	3,612	448	12.4	120.7
Female	7,166	684	9.5	115.6
Missing	14	1	7.1	108.2
U.S. Census Region				
Northeast	2,140	201	9.4	118.9
Midwest	1,734	170	9.8	115.6
South	4,760	504	10.6	116.2
West	2,152	257	11.9	119.2
Missing	6	1	16.7	154.8
U.S. Census Division				
New England	1,170	117	10.0	117.8
Middle Atlantic	970	84	8.7	120.1
East North Central	1,253	117	9.3	114.8
West North Central	481	53	11.0	117.6
South Atlantic	1,673	119	7.1	110.8
East South Central	549	33	6.0	108.1
West South Central	2,538	352	13.9	121.6
Mountain	1,517	174	11.5	118.4
Pacific	635	83	13.1	121.2
Missing	6	1	16.7	154.8
Smoking				
Yes	3,649	437	12.0	120.6
No	6,449	630	9.8	115.7
Missing	694	66	9.5	114.5
Education Level				
≤6 years	2,284	347	15.2	125.4
<12 years	1,717	194	11.3	118.9
12 years	2,471	249	10.1	116.4
>12 years	2,048	177	8.6	113.4
16 years	1,419	91	6.4	110.1
>16 years	638	43	6.7	110.7
Missing	215	32	15.0	130.0
Health Insurance Status				
Yes	5,595	602	10.8	119.1
No	4,641	482	10.4	115.3
Missing	556	49	8.8	115.2
Doctor Status				
Yes	6,859	848	12.4	121.5
No	3,479	244	7.0	109.5
Missing	454	41	9.0	113.1
All with non-missing glucose	10,792	1,133	10.5	117.3

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 4.6

Total eligible KEEP participants with elevated blood sugar*: non-Hispanic

	Total N	Elevated blood sugar (N)	Elevated blood sugar (%)	Mean blood sugar
Age				
18-30	5,208	144	2.8	98.8
31-45	15,084	930	6.2	108.7
46-60	26,976	2,805	10.4	118.0
61-75	21,491	2,646	12.3	122.2
>75	7,210	786	10.9	120.4
Missing	5	1	20.0	131.8
Gender				
Male	23,939	2,633	11.0	118.6
Female	51,995	4,670	9.0	115.2
Missing	40	9	22.5	128.8
U.S. Census Region				
Northeast	17,681	1,508	8.5	115.6
Midwest	11,691	1,073	9.2	116.1
South	38,119	3,845	10.1	116.7
West	8,457	885	10.5	115.9
Missing	26	1	3.8	100.7
U.S. Census Division				
New England	6,274	565	9.0	115.8
Middle Atlantic	11,407	943	8.3	115.6
East North Central	6,779	627	9.2	117.4
West North Central	4,912	446	9.1	114.3
South Atlantic	20,233	2,020	10.0	117.1
East South Central	10,759	1,088	10.1	115.7
West South Central	7,127	737	10.3	117.2
Mountain	4,953	484	9.8	117.3
Pacific	3,504	401	11.4	113.9
Missing	26	1	3.8	100.7
Smoking				
Yes	30,481	3,247	10.7	118.6
No	42,056	3,713	8.8	114.4
Missing	3,437	352	10.2	118.3
Education Level				
≤6 years	2,592	422	16.3	129.1
<12 years	6,716	907	13.5	124.3
12 years	19,990	2,058	10.3	118.2
>12 years	20,157	1,874	9.3	115.6
16 years	15,785	1,181	7.5	111.2
>16 years	9,828	731	7.4	111.9
Missing	906	139	15.3	124.0
Health Insurance Status				
Yes	62,370	5,649	9.1	115.3
No	11,053	1,346	12.2	120.7
Missing	2,551	317	12.4	121.0
Doctor Status				
Yes	66,631	6,590	9.9	116.8
No	7,734	541	7.0	111.3
Missing	1,609	181	11.2	118.8
All with non-missing glucose	75,974	7,312	9.6	116.3

Excludes participants with missing blood sugar levels.

*Elevated blood sugar: No known Diabetes, fasting blood sugar ≥ 126 mg/dL, non-fasting blood sugar ≥ 200 mg/dL;
Known Diabetes, fasting blood sugar ≥ 130 mg/dL, non-fasting blood sugar ≥ 180 mg/dL.

Table 5

Total eligible KEEP participants with diabetes*

	Total N	Diabetes (N)	Diabetes (%)
Age			
18-30	6,938	626	9.0
31-45	19,333	3,479	18.0
46-60	31,386	9,459	30.1
61-75	24,084	9,784	40.6
>75	7,850	2,958	37.7
Missing	7	1	14.3
Gender			
Male	28,379	8,775	30.9
Female	61,149	17,513	28.6
Missing	70	19	27.1
Race			
White	41,646	12,669	30.4
Black	29,614	8,086	27.3
N Am	3,908	1,491	38.2
Other	11,922	3,347	28.1
Unknown/missing	2,508	714	28.5
Ethnicity			
Non-Hispanic	78,457	23,105	29.4
Hispanic	11,141	3,202	28.7
U.S. Census Region			
Northeast	20,516	5,815	28.3
Midwest	13,841	4,109	29.7
South	44,316	13,099	29.6
West	10,893	3,275	30.1
Missing	32	9	28.1
U.S. Census Division			
New England	7,769	2,370	30.5
Middle Atlantic	12,747	3,445	27.0
East North Central	8,300	2,570	31.0
West North Central	5,541	1,539	27.8
South Atlantic	22,691	6,418	28.3
East South Central	11,678	3,689	31.6
West South Central	9,947	2,992	30.1
Mountain	6,646	1,984	29.9
Pacific	4,247	1,291	30.4
Missing	32	9	28.1
Smoking			
Yes	35,218	11,268	32.0
No	50,008	13,791	27.6
Missing	4,372	1,248	28.5
Education Level			
≤6 years	5,037	2,002	39.7
<12 years	8,688	3,155	36.3
12 years	23,116	7,242	31.3
>12 years	22,858	6,438	28.2
16 years	17,706	4,283	24.2
>16 years	10,764	2,736	25.4
Missing	1,429	451	31.5
Health Insurance Status			
Yes	70,078	20,872	29.8
No	16,178	4,414	27.3
Missing	3,342	1,021	30.5
Doctor Status			
Yes	75,826	23,837	31.4
No	11,580	1,861	16.1
Missing	2,192	609	27.8
All	89,598	26,307	29.4

*Diabetes definition: self-reported history of diabetes or retinopathy, receiving medication for diabetes, or insulin, or blood sugar ≥ 126 mg/dl fasting, or ≥ 200 mg/dl non-fasting.

Table 5.1

Total eligible KEEP participants with diabetes*, by race/ethnicity

	White		Black		N Am		Other race		Unknown/missing	
	Total N	DM	Total N	DM	Total N	DM	Total N	DM	Total N	DM
Age										
18-30	2,559	229	2,196	183	462	58	1,424	124	297	32
31-45	6,970	1,323	7,087	1,112	1,003	260	3,473	624	800	160
46-60	13,777	4,078	11,552	3,244	1,255	535	4,021	1,327	781	275
61-75	13,082	5,086	7,132	2,925	947	524	2,432	1,056	491	193
>75	5,257	1,953	1,644	621	239	114	571	216	139	54
Missing	1	0	3	1	2	0	1	0	0	0
Gender										
Male	14,072	4,736	8,280	2,201	995	346	4,213	1,248	819	244
Female	27,551	7,926	21,313	5,881	2,909	1,141	7,701	2,098	1,675	467
Missing	23	7	21	4	4	4	8	1	14	3
U.S. Census Region										
Northeast	10,892	3,147	5,595	1,524	385	146	3,002	831	642	167
Midwest	6,898	2,145	4,351	1,145	720	327	1,498	397	374	95
South	19,141	5,973	18,972	5,268	1,510	548	3,781	1,052	912	258
West	4,703	1,399	684	147	1,291	470	3,636	1,066	579	193
Missing	12	5	12	2	2	0	5	1	1	1
U.S. Census Division										
New England	3,966	1,291	1,882	498	163	59	1,328	404	430	118
Middle Atlantic	6,926	1,856	3,713	1,026	222	87	1,674	427	212	49
East North Central	3,844	1,356	3,020	821	120	53	1,026	273	290	67
West North Central	3,054	789	1,331	324	600	274	472	124	84	28
South Atlantic	9,508	2,873	11,210	3,037	123	33	1,530	389	320	86
East South Central	6,065	2,082	4,818	1,430	47	21	574	128	174	28
West South Central	3,568	1,018	2,944	801	1,340	494	1,677	535	418	144
Mountain	3,697	1,065	265	65	1,241	457	1,017	270	426	127
Pacific	1,006	334	419	82	50	13	2,619	796	153	66
Missing	12	5	12	2	2	0	5	1	1	1
Smoking										
Yes	17,614	5,643	11,001	3,360	2,131	841	3,622	1,153	850	271
No	22,517	6,550	16,844	4,236	1,621	600	7,565	2,019	1,461	386
Missing	1,515	476	1,769	490	156	50	735	175	197	57
Education Level										
≤6 years	1,510	635	988	402	209	125	1,811	664	519	176
<12 years	3,235	1,228	3,065	1,110	569	260	1,403	419	416	138
12 years	11,975	3,951	7,061	2,063	1,069	388	2,469	691	542	149
>12 years	10,821	3,272	8,301	2,089	1,207	412	2,134	562	395	103
16 years	8,420	2,072	5,937	1,350	533	191	2,598	621	218	49
>16 years	5,302	1,377	3,802	929	262	89	1,288	317	110	24
Missing	383	134	460	143	59	26	219	73	308	75
Health Insurance Status										
Yes	35,356	10,782	23,387	6,452	2,678	1,053	7,328	2,170	1,329	415
No	5,080	1,517	4,989	1,255	1,095	378	4,068	1,026	946	238
Missing	1,210	370	1,238	379	135	60	526	151	233	61
Doctor Status										
Yes	37,217	11,846	25,396	7,394	3,233	1,343	8,364	2,707	1,616	547
No	3,597	581	3,510	495	581	114	3,177	551	715	120
Missing	832	242	708	197	94	34	381	89	177	47
All	41,646	12,669	29,614	8,086	3,908	1,491	11,922	3,347	2,508	714

*Diabetes definition: self-reported history of diabetes or retinopathy, receiving medication for diabetes, or insulin, or blood sugar ≥ 126 mg/dl fasting, or ≥ 200 mg/dl non-fasting.

Table 5.1 (continued)

Total eligible KEEP participants with diabetes*, by race/ethnicity

	Hispanic		non-Hispanic		All	
	Total N	DM	Total N	DM	Total N	DM
Age						
18-30	1,526	155	5,412	471	6,938	626
31-45	3,716	744	15,617	2,735	19,333	3,479
46-60	3,540	1,232	27,846	8,227	31,386	9,459
61-75	1,929	893	22,155	8,891	24,084	9,784
>75	429	178	7,421	2,780	7,850	2,958
Missing	1	0	6	1	7	1
Gender						
Male	3,727	1,104	24,652	7,671	28,379	8,775
Female	7,398	2,096	53,751	15,417	61,149	17,513
Missing	16	2	54	17	70	19
U.S. Census Region						
Northeast	2,216	642	18,300	5,173	20,516	5,815
Midwest	1,784	466	12,057	3,643	13,841	4,109
South	4,937	1,408	39,379	11,691	44,316	13,099
West	2,198	685	8,695	2,590	10,893	3,275
Missing	6	1	26	8	32	9
U.S. Census Division						
New England	1,221	377	6,548	1,993	7,769	2,370
Middle Atlantic	995	265	11,752	3,180	12,747	3,445
East North Central	1,295	331	7,005	2,239	8,300	2,570
West North Central	489	135	5,052	1,404	5,541	1,539
South Atlantic	1,724	414	20,967	6,004	22,691	6,418
East South Central	572	100	11,106	3,589	11,678	3,689
West South Central	2,641	894	7,306	2,098	9,947	2,992
Mountain	1,546	464	5,100	1,520	6,646	1,984
Pacific	652	221	3,595	1,070	4,247	1,291
Missing	6	1	26	8	32	9
Smoking						
Yes	3,758	1,197	31,460	10,071	35,218	11,268
No	6,640	1,810	43,368	11,981	50,008	13,791
Missing	743	195	3,629	1,053	4,372	1,248
Education Level						
≤6 years	2,368	855	2,669	1,147	5,037	2,002
<12 years	1,768	559	6,920	2,596	8,688	3,155
12 years	2,566	687	20,550	6,555	23,116	7,242
>12 years	2,096	540	20,762	5,898	22,858	6,438
16 years	1,459	337	16,247	3,946	17,706	4,283
>16 years	656	141	10,108	2,595	10,764	2,736
Missing	228	82	1,201	368	1,429	450
Health Insurance Status						
Yes	5,760	1,844	64,318	19,028	70,078	20,872
No	4,776	1,199	11,402	3,215	16,178	4,414
Missing	605	159	2,737	862	3,342	1,019
Doctor Status						
Yes	7,066	2,495	68,760	21,342	75,826	23,837
No	3,591	599	7,989	1,262	11,580	1,861
Missing	484	108	1,708	501	2,192	609
All	11,141	3,202	78,457	23,105	89,598	26,307

*Diabetes definition: self-reported history of diabetes or retinopathy, receiving medication for diabetes, or insulin, or blood sugar ≥ 126 mg/dl fasting, or ≥ 200 mg/dl non-fasting.

Table 6

Total eligible KEEP participants with self-reported hypertension*

	2000+2001	2002	2003	2004	2005	2006	2007	All
Total (answered hypertension question)	6,005	7,981	9,815	13,003	17,774	17,793	15,819	88,190
Age								
18-30	92	95	162	181	255	231	209	1,225
31-45	462	622	739	925	1,268	1,183	995	6,194
46-60	1,168	1,467	1,895	2,537	3,473	3,560	3,162	17,262
61-75	1,068	1,442	1,730	2,386	3,418	3,651	3,746	17,441
>75	310	551	550	810	1,191	1,305	1,347	6,064
Missing	.	.	.	2	1	.	.	3
Gender								
Male	1,007	1,359	1,546	2,175	3,202	3,167	3,125	15,581
Female	2,093	2,818	3,528	4,666	6,374	6,760	6,332	32,571
Missing	.	.	2	.	30	3	2	37
Race								
White	1,162	1,630	2,209	3,093	4,873	5,029	4,999	22,995
Black	1,403	1,876	1,914	2,464	2,981	3,364	3,096	17,098
N Am	155	279	356	343	376	207	194	1,910
Other	294	311	457	902	1,218	1,016	937	5,135
Unknown/missing	86	81	140	39	158	314	233	1,051
Ethnicity								
Non-Hispanic	2,817	3,905	4,635	6,095	8,603	8,944	8,516	43,515
Hispanic	283	272	441	746	1,003	986	943	4,674
U.S. Census Region								
Northeast	649	957	1,102	1,624	2,263	2,123	2,041	10,759
Midwest	401	662	870	1,290	1,388	1,591	1,193	7,395
South	1,848	2,169	2,627	3,356	4,662	5,048	4,890	24,600
West	196	388	477	571	1,291	1,167	1,331	5,421
Missing	6	1	.	.	2	1	4	14
U.S. Census Division								
New England	500	385	416	656	770	619	653	3,999
Middle Atlantic	149	572	686	968	1,493	1,504	1,388	6,760
East North Central	105	338	435	754	801	1,187	862	4,482
West North Central	296	324	435	536	587	404	331	2,913
South Atlantic	1,163	1,335	1,097	1,585	2,258	2,588	2,259	12,285
East South Central	293	258	788	966	1,251	1,550	1,856	6,962
West South Central	392	576	742	805	1,153	910	775	5,353
Mountain	77	161	236	392	816	774	811	3,267
Pacific	119	227	241	179	475	393	520	2,154
Missing	6	1	.	.	2	1	4	14
Smoking								
Yes	1,372	1,874	2,180	2,853	3,909	3,846	3,848	19,882
No	1,517	2,023	2,608	3,505	5,243	5,761	5,267	25,924
Missing	211	280	288	483	454	323	344	2,383
Education Level								
≤6 years	247	256	314	472	644	637	573	3,143
<12 years	373	525	550	702	1,067	1,106	1,006	5,329
12 years	836	1,218	1,411	1,962	2,635	2,673	2,690	13,425
>12 years	804	1,076	1,375	1,735	2,417	2,335	2,233	11,975
16 years	466	630	842	1,179	1,656	1,783	1,671	8,227
>16 years	320	419	537	691	1,061	1,224	1,122	5,374
Missing	54	53	47	100	126	172	164	716
Health Insurance Status								
Yes	2,568	3,452	4,149	5,561	7,721	8,030	7,665	39,146
No	396	523	741	1,043	1,454	1,499	1,598	7,254
Missing	136	202	186	237	431	401	196	1,789
Doctor Status								
Yes	2,803	3,793	4,591	6,133	8,631	8,923	8,482	43,356
No	201	264	376	485	770	789	850	3,735
Missing	96	120	109	223	205	218	127	1,098
All	3,100	4,177	5,076	6,841	9,606	9,930	9,459	48,189

Self-reported hypertension: self-reported hypertension
 ". " Zero values in this cell.

Table 6.1

Total eligible KEEP participants with self-reported hypertension*, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	461	403	93	213	55	258	967	1,225
31-45	2,209	2,589	324	881	191	998	5,196	6,194
46-60	7,207	7,048	669	1,941	397	1,755	15,507	17,262
61-75	9,134	5,682	648	1,664	313	1,344	16,097	17,441
>75	3,983	1,375	176	435	95	318	5,746	6,064
Missing	1	1	.	1	.	1	2	3
Gender								
Male	8,269	4,525	544	1,886	357	1,579	14,002	15,581
Female	14,712	12,560	1,363	3,247	689	3,091	29,480	32,571
Missing	14	13	3	2	5	4	33	37
U.S. Census Region								
Northeast	5,823	3,150	173	1,356	257	972	9,787	10,759
Midwest	3,829	2,541	364	525	136	617	6,778	7,395
South	10,752	11,050	830	1,565	403	2,140	22,460	24,600
West	2,585	353	541	1,688	254	943	4,478	5,421
Missing	6	4	2	1	1	2	12	14
U.S. Census Division								
New England	2,062	1,037	78	648	174	542	3,457	3,999
Middle Atlantic	3,761	2,113	95	708	83	430	6,330	6,760
East North Central	2,182	1,782	67	346	105	447	4,035	4,482
West North Central	1,647	759	297	179	31	170	2,743	2,913
South Atlantic	5,146	6,290	60	650	139	731	11,554	12,285
East South Central	3,656	3,015	29	191	71	192	6,770	6,962
West South Central	1,950	1,745	741	724	193	1,217	4,136	5,353
Mountain	2,041	142	523	394	167	634	2,633	3,267
Pacific	544	211	18	1,294	87	309	1,845	2,154
Missing	6	4	2	1	1	2	12	14
Smoking								
Yes	9,962	6,827	1,038	1,668	387	1,633	18,249	19,882
No	12,175	9,197	808	3,165	579	2,735	23,189	25,924
Missing	858	1,074	64	302	85	306	2,077	2,383
Education Level								
≤6 years	1,019	794	135	933	262	1,177	1,966	3,143
<12 years	2,071	2,111	342	630	175	748	4,581	5,329
12 years	7,164	4,375	547	1,120	219	1,043	12,382	13,425
>12 years	5,914	4,541	501	844	175	799	11,176	11,975
16 years	3,930	2,977	235	1,006	79	536	7,691	8,227
>16 years	2,672	2,046	117	494	45	259	5,115	5,374
Missing	225	254	33	108	96	112	604	716
Health Insurance Status								
Yes	19,912	13,796	1,362	3,455	621	2,727	36,419	39,146
No	2,423	2,535	481	1,473	342	1,711	5,543	7,254
Missing	660	767	67	207	88	236	1,553	1,789
Doctor Status								
Yes	21,335	15,492	1,697	4,050	782	3,470	39,886	43,356
No	1,215	1,205	180	942	193	1,023	2,712	3,735
Missing	445	401	33	143	76	181	917	1,098
All	22,995	17,098	1,910	5,135	1,051	4,674	43,515	48,189

Table 7

Total eligible KEEP participants with elevated blood pressure*

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	6,870	1,390	20.2	90.2
31-45	19,071	6,808	35.7	95.0
46-60	31,022	16,543	53.3	98.9
61-75	23,832	15,686	65.8	99.1
>75	7,798	5,495	70.5	97.6
Missing	7	4	57.1	101.8
Gender				
Male	28,053	15,688	55.9	99.0
Female	60,482	30,209	49.9	96.6
Missing	65	29	44.6	95.7
Race				
White	41,354	21,919	53.0	96.9
Black	29,179	16,112	55.2	99.4
N Am	3,843	1,850	48.1	94.9
Other	11,734	4,988	42.5	94.9
Unknown/missing	2,490	1,057	42.4	95.3
Ethnicity				
Non-Hispanic	77,570	41,197	53.1	97.6
Hispanic	11,030	4,729	42.9	95.1
U.S. Census Region				
Northeast	20,351	9,808	48.2	96.0
Midwest	13,686	7,334	53.6	97.8
South	43,744	23,561	53.9	98.1
West	10,787	5,209	48.3	96.1
Missing	32	14	43.8	95.3
U.S. Census Division				
New England	7,690	3,663	47.6	95.6
Middle Atlantic	12,661	6,145	48.5	96.3
East North Central	8,228	4,415	53.7	98.1
West North Central	5,458	2,919	53.5	97.4
South Atlantic	22,267	11,883	53.4	98.1
East South Central	11,629	6,342	54.5	97.9
West South Central	9,848	5,336	54.2	98.3
Mountain	6,615	3,168	47.9	95.8
Pacific	4,172	2,041	48.9	96.5
Missing	32	14	43.8	95.3
Smoking				
Yes	34,818	18,667	53.6	97.5
No	49,494	24,965	50.4	97.1
Missing	4,288	2,294	53.5	98.0
Education Level				
≤6 years	4,977	2,938	59.0	97.8
<12 years	8,589	4,970	57.9	98.1
12 years	22,874	12,834	56.1	98.2
>12 years	22,583	11,496	50.9	97.3
16 years	17,497	7,989	45.7	96.3
>16 years	10,674	4,943	46.3	96.2
Missing	1,406	756	53.8	97.9
Health Insurance Status				
Yes	69,316	36,547	52.7	97.3
No	16,003	7,652	47.8	97.4
Missing	3,281	1,724	52.6	97.3
Doctor Status				
Yes	75,000	40,149	53.5	97.4
No	11,457	4,677	40.8	96.6
Missing	2,143	1,100	51.3	97.4
All with non-missing blood pressure	88,600	45,926	51.8	97.3

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.1

Total eligible KEEP participants with elevated blood pressure*: White

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	2,539	545	21.5	90.9
31-45	6,918	2,420	35.0	94.7
46-60	13,670	6,897	50.5	97.7
61-75	12,993	8,396	64.6	98.3
>75	5,233	3,660	69.9	97.1
Missing	1	1	100.0	105.3
Gender				
Male	13,991	8,078	57.7	98.5
Female	27,342	13,830	50.6	96.0
Missing	21	11	52.4	95.9
U.S. Census Region				
Northeast	10,850	5,362	49.4	95.8
Midwest	6,861	3,907	56.9	98.0
South	18,959	10,195	53.8	97.1
West	4,672	2,447	52.4	96.7
Missing	12	8	66.7	101.3
U.S. Census Division				
New England	3,946	1,916	48.6	95.2
Middle Atlantic	6,904	3,446	49.9	96.2
East North Central	3,823	2,197	57.5	98.0
West North Central	3,038	1,710	56.3	97.9
South Atlantic	9,374	5,033	53.7	97.0
East South Central	6,036	3,226	53.4	96.7
West South Central	3,549	1,936	54.6	98.2
Mountain	3,680	1,937	52.6	96.8
Pacific	992	510	51.4	96.6
Missing	12	8	66.7	101.3
Smoking				
Yes	17,492	9,342	53.4	96.8
No	22,363	11,735	52.5	96.9
Missing	1,499	842	56.2	97.4
Education Level				
≤6 years	1,503	979	65.1	98.1
<12 years	3,221	1,942	60.3	97.7
12 years	11,890	6,902	58.0	97.9
>12 years	10,732	5,646	52.6	96.9
16 years	8,360	3,779	45.2	95.7
>16 years	5,272	2,468	46.8	95.5
Missing	376	203	54.0	96.6
Health Insurance Status				
Yes	35,116	18,695	53.2	96.8
No	5,044	2,570	51.0	97.7
Missing	1,194	654	54.8	96.7
Doctor Status				
Yes	36,960	19,907	53.9	96.9
No	3,579	1,568	43.8	97.0
Missing	815	444	54.5	97.4
All with non-missing blood pressure	41,354	21,919	53.0	96.9

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.2

Total eligible KEEP participants with elevated blood pressure*: Black

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	2,174	498	22.9	91.3
31-45	6,963	2,820	40.5	97.1
46-60	11,382	6,668	58.6	101.2
61-75	7,031	4,916	69.9	101.1
>75	1,626	1,208	74.3	100.3
Missing	3	2	66.7	105.8
Gender				
Male	8,116	4,701	57.9	101.0
Female	21,044	11,401	54.2	98.8
Missing	19	10	52.6	98.1
U.S. Census Region				
Northeast	5,520	2,858	51.8	98.0
Midwest	4,322	2,440	56.5	100.0
South	18,646	10,438	56.0	99.6
West	679	373	54.9	100.4
Missing	12	3	25.0	90.9
U.S. Census Division				
New England	1,866	950	50.9	98.0
Middle Atlantic	3,654	1,908	52.2	98.0
East North Central	3,005	1,704	56.7	100.3
West North Central	1,317	736	55.9	99.3
South Atlantic	10,951	5,971	54.5	99.4
East South Central	4,802	2,806	58.4	99.8
West South Central	2,893	1,661	57.4	100.3
Mountain	264	147	55.7	99.9
Pacific	415	226	54.5	100.7
Missing	12	3	25.0	90.9
Smoking				
Yes	10,832	6,301	58.2	100.0
No	16,621	8,796	52.9	98.9
Missing	1,726	1,015	58.8	100.4
Education Level				
≤6 years	973	697	71.6	102.1
<12 years	3,020	1,938	64.2	100.8
12 years	6,969	4,092	58.7	100.2
>12 years	8,169	4,356	53.3	99.2
16 years	5,844	2,896	49.6	98.2
>16 years	3,757	1,879	50.0	98.4
Missing	447	254	56.8	99.4
Health Insurance Status				
Yes	23,040	12,715	55.2	99.2
No	4,925	2,686	54.5	100.4
Missing	1,214	711	58.5	99.5
Doctor Status				
Yes	25,035	14,120	56.4	99.4
No	3,455	1,601	46.3	99.3
Missing	689	391	56.7	99.7
All with non-missing blood pressure	29,179	16,112	55.2	99.4

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.3

Total eligible KEEP participants with elevated blood pressure*: Native American

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	454	102	22.5	90.5
31-45	984	368	37.4	93.9
46-60	1,235	644	52.1	96.5
61-75	932	574	61.6	96.1
>75	236	162	68.6	94.4
Missing	2	0	0.0	91.2
Gender				
Male	979	542	55.4	97.8
Female	2,860	1,306	45.7	93.9
Missing	4	2	50.0	101.6
U.S. Census Region				
Northeast	385	172	44.7	94.6
Midwest	671	313	46.6	93.7
South	1,495	815	54.5	96.6
West	1,290	548	42.5	93.7
Missing	2	2	100.0	105.5
U.S. Census Division				
New England	163	82	50.3	97.0
Middle Atlantic	222	90	40.5	92.8
East North Central	120	60	50.0	95.2
West North Central	551	253	45.9	93.3
South Atlantic	122	72	59.0	99.7
East South Central	46	27	58.7	98.0
West South Central	1,327	716	54.0	96.2
Mountain	1,240	526	42.4	93.6
Pacific	50	22	44.0	95.4
Missing	2	2	100.0	105.5
Smoking				
Yes	2,081	1,009	48.5	95.0
No	1,608	769	47.8	94.8
Missing	154	72	46.8	95.2
Education Level				
≤6 years	207	126	60.9	94.8
<12 years	553	300	54.2	95.6
12 years	1,047	521	49.8	95.5
>12 years	1,189	508	42.7	94.1
16 years	528	241	45.6	95.1
>16 years	261	115	44.1	93.7
Missing	58	39	67.2	99.2
Health Insurance Status				
Yes	2,630	1,297	49.3	94.8
No	1,080	488	45.2	95.1
Missing	133	65	48.9	95.3
Doctor Status				
Yes	3,180	1,586	49.9	95.0
No	569	214	37.6	94.5
Missing	94	50	53.2	94.3
All with non-missing blood pressure	3,843	1,850	48.1	94.9

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.4

Total eligible KEEP participants with elevated blood pressure*: Other race

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	1,407	203	14.4	87.9
31-45	3,412	974	28.5	92.5
46-60	3,958	1,951	49.3	97.3
61-75	2,391	1,486	62.1	98.1
>75	565	373	66.0	96.4
Missing	1	1	100.0	107.7
Gender				
Male	4,152	1,969	47.4	97.0
Female	7,575	3,018	39.8	93.7
Missing	7	1	14.3	85.5
U.S. Census Region				
Northeast	2,959	1,175	39.7	93.7
Midwest	1,457	544	37.3	93.6
South	3,742	1,682	44.9	95.9
West	3,571	1,586	44.4	95.4
Missing	5	1	20.0	89.8
U.S. Census Division				
New England	1,289	553	42.9	93.7
Middle Atlantic	1,670	622	37.2	93.6
East North Central	989	354	35.8	93.6
West North Central	468	190	40.6	93.6
South Atlantic	1,504	654	43.5	95.1
East South Central	573	210	36.6	94.2
West South Central	1,665	818	49.1	97.2
Mountain	1,008	392	38.9	94.5
Pacific	2,563	1,194	46.6	95.7
Missing	5	1	20.0	89.8
Smoking				
Yes	3,569	1,628	45.6	95.6
No	7,450	3,072	41.2	94.6
Missing	715	288	40.3	94.8
Education Level				
≤6 years	1,778	888	49.9	96.3
<12 years	1,382	618	44.7	95.3
12 years	2,431	1,107	45.5	95.4
>12 years	2,099	829	39.5	94.5
16 years	2,548	999	39.2	94.2
>16 years	1,277	439	34.4	93.2
Missing	219	108	49.5	97.3
Health Insurance Status				
Yes	7,207	3,210	44.5	95.0
No	4,014	1,571	39.1	94.7
Missing	513	207	40.2	94.8
Doctor Status				
Yes	8,222	3,765	45.8	95.2
No	3,141	1,075	34.2	94.1
Missing	371	148	39.9	95.5
All with non-missing blood pressure	11,734	4,988	42.5	94.9

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.5

Total eligible KEEP participants with elevated blood pressure*: Hispanic

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	1,514	224	14.8	88.0
31-45	3,668	1,082	29.5	92.8
46-60	3,504	1,829	52.2	98.0
61-75	1,914	1,296	67.7	99.2
>75	429	297	69.2	98.0
Missing	1	1	100.0	107.7
Gender				
Male	3,678	1,768	48.1	97.4
Female	7,336	2,956	40.3	94.0
Missing	16	5	31.3	93.0
U.S. Census Region				
Northeast	2,207	850	38.5	93.7
Midwest	1,744	625	35.8	93.4
South	4,896	2,303	47.0	96.3
West	2,177	950	43.6	95.3
Missing	6	1	16.7	89.9
U.S. Census Division				
New England	1,214	492	40.5	93.8
Middle Atlantic	993	358	36.1	93.4
East North Central	1,257	454	36.1	93.8
West North Central	487	171	35.1	92.5
South Atlantic	1,697	772	45.5	95.4
East South Central	568	198	34.9	93.8
West South Central	2,631	1,333	50.7	97.4
Mountain	1,535	628	40.9	94.5
Pacific	642	322	50.2	97.2
Missing	6	1	16.7	89.9
Smoking				
Yes	3,725	1,667	44.8	95.3
No	6,577	2,772	42.1	95.1
Missing	728	290	39.8	94.4
Education Level				
≤6 years	2,340	1,145	48.9	96.1
<12 years	1,754	780	44.5	95.0
12 years	2,538	1,086	42.8	95.5
>12 years	2,074	811	39.1	94.8
16 years	1,445	556	38.5	94.0
>16 years	651	248	38.1	93.4
Missing	228	103	45.4	96.2
Health Insurance Status				
Yes	5,709	2,689	47.1	95.7
No	4,727	1,817	38.4	94.5
Missing	594	223	37.6	94.7
Doctor Status				
Yes	7,000	3,361	48.0	95.8
No	3,558	1,189	33.4	93.9
Missing	472	179	37.9	94.8
All with non-missing blood pressure	11,030	4,729	42.9	95.1

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 7.6

Total eligible KEEP participants with elevated blood pressure*: non-Hispanic

	Total N	Elevated blood pressure (N)	Elevated blood pressure (%)	Mean blood pressure
Age				
18-30	5,356	1,166	21.8	90.9
31-45	15,403	5,726	37.2	95.5
46-60	27,518	14,714	53.5	99.0
61-75	21,918	14,390	65.7	99.1
>75	7,369	5,198	70.5	97.6
Missing	6	3	50.0	100.8
Gender				
Male	24,375	13,920	57.1	99.2
Female	53,146	27,253	51.3	96.9
Missing	49	24	49.0	96.6
U.S. Census Region				
Northeast	18,144	8,958	49.4	96.3
Midwest	11,942	6,709	56.2	98.5
South	38,848	21,258	54.7	98.3
West	8,610	4,259	49.5	96.3
Missing	26	13	50.0	96.6
U.S. Census Division				
New England	6,476	3,171	49.0	95.9
Middle Atlantic	11,668	5,787	49.6	96.5
East North Central	6,971	3,961	56.8	98.9
West North Central	4,971	2,748	55.3	97.9
South Atlantic	20,570	11,111	54.0	98.3
East South Central	11,061	6,144	55.5	98.1
West South Central	7,217	4,003	55.5	98.7
Mountain	5,080	2,540	50.0	96.2
Pacific	3,530	1,719	48.7	96.4
Missing	26	13	50.0	96.6
Smoking				
Yes	31,093	17,000	54.7	97.8
No	42,917	22,193	51.7	97.4
Missing	3,560	2,004	56.3	98.7
Education Level				
≤6 years	2,637	1,793	68.0	99.4
<12 years	6,835	4,190	61.3	98.9
12 years	20,336	11,748	57.8	98.5
>12 years	20,509	10,685	52.1	97.6
16 years	16,052	7,433	46.3	96.5
>16 years	10,023	4,695	46.8	96.3
Missing	1,178	653	55.4	98.2
Health Insurance Status				
Yes	63,607	33,858	53.2	97.5
No	11,276	5,835	51.7	98.6
Missing	2,687	1,504	55.9	97.9
Doctor Status				
Yes	68,000	36,788	54.1	97.6
No	7,899	3,488	44.2	97.8
Missing	1,671	921	55.1	98.1
All with non-missing blood pressure	77,570	41,197	53.1	97.6

Excludes participants with missing blood pressure values.

*Elevated BP (JNC 7): DM or CKD, systolic BP ≥130 (mmHg) or diastolic BP ≥80 (mmHg);

Otherwise, systolic BP ≥140 (mmHg) or diastolic ≥90 (mmHg).

Mean BP = dia BP + (sys BP - dia BP)/3.

Table 8

Total eligible KEEP participants with hypertension*

	Total N	Hypertension (N)	Hypertension (%)
Age			
18-30	6,938	2,080	30.0
31-45	19,334	9,515	49.2
46-60	31,393	22,521	71.7
61-75	24,085	20,921	86.9
>75	7,850	7,115	90.6
Missing	7	4	57.1
Gender			
Male	28,380	20,756	73.1
Female	61,157	41,350	67.6
Missing	70	50	71.4
Race			
White	41,644	29,708	71.3
Black	29,622	21,450	72.4
N Am	3,908	2,564	65.6
Other	11,920	6,971	58.5
Unknown/missing	2,513	1,463	58.2
Ethnicity			
Non-Hispanic	78,467	55,688	71.0
Hispanic	11,140	6,468	58.1
U.S. Census Region			
Northeast	20,518	13,711	66.8
Midwest	13,841	9,648	69.7
South	44,321	31,650	71.4
West	10,895	7,129	65.4
Missing	32	18	56.3
U.S. Census Division			
New England	7,771	5,132	66.0
Middle Atlantic	12,747	8,579	67.3
East North Central	8,300	5,814	70.0
West North Central	5,541	3,834	69.2
South Atlantic	22,694	15,967	70.4
East South Central	11,680	8,653	74.1
West South Central	9,947	7,030	70.7
Mountain	6,646	4,366	65.7
Pacific	4,249	2,763	65.0
Missing	32	18	56.3
Smoking			
Yes	35,217	25,367	72.0
No	50,018	33,693	67.4
Missing	4,372	3,096	70.8
Education Level			
≤6 years	5,034	3,883	77.1
<12 years	8,688	6,618	76.2
12 years	23,121	17,098	74.0
>12 years	22,857	15,522	67.9
16 years	17,705	11,043	62.4
>16 years	10,766	6,987	64.9
Missing	1,436	1,005	70.0
Health Insurance Status			
Yes	70,081	49,797	71.1
No	16,182	10,014	61.9
Missing	3,344	2,345	70.1
Doctor Status			
Yes	75,832	54,677	72.1
No	11,579	5,996	51.8
Missing	2,196	1,483	67.5
All	89,607	62,156	69.4

Excludes participants with missing blood pressure values.

*Self-reported history of high blood pressure or receiving medication for high blood pressure or elevated BP (JNC 7):

DM or CKD, systolic BP \geq 130 (mmHg) or diastolic BP \geq 80 (mmHg);

no DM or CKD, systolic BP \geq 140 (mmHg) or diastolic \geq 90 (mmHg).

Table 8.1

Total eligible KEEP participants with hypertension*, by race/ethnicity

	White		Black		N Am		Other race		Unknown/missing	
	Total N	HTN	Total N	HTN	Total N	HTN	Total N	HTN	Total N	HTN
Age										
18-30	2,559	796	2,196	702	462	151	1,424	352	297	79
31-45	6,971	3,422	7,087	3,830	1,003	515	3,472	1,420	801	328
46-60	13,776	9,579	11,558	8,888	1,255	892	4,020	2,638	784	524
61-75	13,080	11,184	7,135	6,486	947	794	2,432	2,048	491	409
>75	5,257	4,726	1,643	1,542	239	212	571	512	140	123
Missing	1	1	3	2	2	0	1	1	0	0
Gender										
Male	14,069	10,808	8,282	6,019	995	731	4,214	2,677	820	521
Female	27,552	18,882	21,319	15,413	2,909	1,829	7,698	4,292	1,679	934
Missing	23	18	21	18	4	4	8	2	14	8
U.S. Census Region										
Northeast	10,891	7,457	5,597	3,933	385	240	3,003	1,736	642	345
Midwest	6,897	5,042	4,351	3,179	720	473	1,495	768	378	186
South	19,141	13,870	18,978	13,868	1,510	1,093	3,780	2,243	912	576
West	4,703	3,331	684	465	1,291	756	3,637	2,222	580	355
Missing	12	8	12	5	2	2	5	2	1	1
U.S. Census Division										
New England	3,966	2,658	1,884	1,308	163	112	1,328	826	430	228
Middle Atlantic	6,925	4,799	3,713	2,625	222	128	1,675	910	212	117
East North Central	3,844	2,843	3,020	2,231	120	88	1,023	508	293	144
West North Central	3,053	2,199	1,331	948	600	385	472	260	85	42
South Atlantic	9,507	6,769	11,215	8,005	123	92	1,529	889	320	212
East South Central	6,066	4,546	4,819	3,685	47	37	574	290	174	95
West South Central	3,568	2,555	2,944	2,178	1,340	964	1,677	1,064	418	269
Mountain	3,697	2,652	265	186	1,241	729	1,017	557	426	242
Pacific	1,006	679	419	279	50	27	2,620	1,665	154	113
Missing	12	8	12	5	2	2	5	2	1	1
Smoking										
Yes	17,611	12,785	11,001	8,398	2,131	1,390	3,623	2,261	851	533
No	22,518	15,802	16,852	11,707	1,621	1,078	7,564	4,293	1,463	813
Missing	1,515	1,121	1,769	1,345	156	96	733	417	199	117
Education Level										
≤6 years	1,509	1,258	987	899	209	171	1,810	1,208	519	347
<12 years	3,234	2,601	3,067	2,507	569	423	1,402	849	416	238
12 years	11,976	9,155	7,064	5,402	1,069	718	2,470	1,525	542	298
>12 years	10,821	7,612	8,302	5,805	1,207	705	2,132	1,172	395	228
16 years	8,420	5,299	5,939	3,903	533	342	2,595	1,398	218	101
>16 years	5,302	3,497	3,803	2,602	262	158	1,289	669	110	61
Missing	382	286	460	332	59	47	221	150	313	190
Health Insurance Status										
Yes	35,355	25,505	23,392	17,102	2,678	1,801	7,325	4,549	1,331	840
No	5,080	3,320	4,991	3,408	1,095	671	4,069	2,125	947	490
Missing	1,209	883	1,239	940	135	92	526	297	235	133
Doctor Status										
Yes	37,215	27,148	25,403	18,964	3,233	2,215	8,362	5,305	1,619	1,045
No	3,597	1,965	3,510	1,964	581	290	3,176	1,459	715	318
Missing	832	595	709	522	94	59	382	207	179	100
All	41,644	29,708	29,622	21,450	3,908	2,564	11,920	6,971	2,513	1,463

Excludes participants with missing blood pressure values.

*Self-reported history of high blood pressure or receiving medication for high blood pressure or elevated BP (JNC 7):

DM or CKD, systolic BP \geq 130 (mmHg) or diastolic BP \geq 80 (mmHg);

otherwise, systolic BP \geq 140 (mmHg) or diastolic BP \geq 90 (mmHg).

Table 8.1 (continued)

Total eligible KEEP participants with hypertension*, by race/ethnicity

	Hispanic		non-Hispanic		All	
	Total N	HTN	Total N	HTN	Total N	HTN
Age						
18-30	1,526	405	5,412	1,675	6,938	2,080
31-45	3,713	1,589	15,621	7,926	19,334	9,515
46-60	3,541	2,403	27,852	20,118	31,393	22,521
61-75	1,929	1,681	22,156	19,240	24,085	20,921
>75	430	389	7,420	6,726	7,850	7,115
Missing	1	1	6	3	7	4
Gender						
Male	3,726	2,316	24,654	18,440	28,380	20,756
Female	7,398	4,145	53,759	37,205	61,157	41,350
Missing	16	7	54	43	70	50
U.S. Census Region						
Northeast	2,216	1,269	18,302	12,442	20,518	13,711
Midwest	1,783	886	12,058	8,762	13,841	9,648
South	4,937	3,018	39,384	28,632	44,321	31,650
West	2,198	1,293	8,697	5,836	10,895	7,129
Missing	6	2	26	16	32	18
U.S. Census Division						
New England	1,221	716	6,550	4,416	7,771	5,132
Middle Atlantic	995	553	11,752	8,026	12,747	8,579
East North Central	1,293	641	7,007	5,173	8,300	5,814
West North Central	490	245	5,051	3,589	5,541	3,834
South Atlantic	1,723	1,032	20,971	14,935	22,694	15,967
East South Central	572	276	11,108	8,377	11,680	8,653
West South Central	2,642	1,710	7,305	5,320	9,947	7,030
Mountain	1,546	882	5,100	3,484	6,646	4,366
Pacific	652	411	3,597	2,352	4,249	2,763
Missing	6	2	26	16	32	18
Smoking						
Yes	3,758	2,273	31,459	23,094	35,217	25,367
No	6,641	3,766	43,377	29,927	50,018	33,693
Missing	741	429	3,631	2,667	4,372	3,096
Education Level						
≤6 years	2,366	1,558	2,668	2,325	5,034	3,883
<12 years	1,767	1,040	6,921	5,578	8,688	6,618
12 years	2,566	1,478	20,555	15,620	23,121	17,098
>12 years	2,095	1,125	20,762	14,397	22,857	15,522
16 years	1,458	763	16,247	10,280	17,705	11,043
>16 years	656	357	10,110	6,630	10,766	6,987
Missing	232	147	1,204	858	1,436	1,005
Health Insurance Status						
Yes	5,757	3,651	64,324	46,146	70,081	49,797
No	4,777	2,484	11,405	7,530	16,182	10,014
Missing	606	333	2,738	2,012	3,344	2,345
Doctor Status						
Yes	7,066	4,575	68,766	50,102	75,832	54,677
No	3,589	1,633	7,990	4,363	11,579	5,996
Missing	485	260	1,711	1,223	2,196	1,483
All	11,140	6,468	78,467	55,688	89,607	62,156

Excludes participants with missing blood pressure values.

*Self-reported history of high blood pressure or receiving medication for high blood pressure or elevated BP (JNC 7):
 DM or CKD, systolic BP \geq 130 (mmHg) or diastolic BP \geq 80 (mmHg);
 otherwise, systolic BP \geq 140 (mmHg) or diastolic BP \geq 90 (mmHg).

Table 9

Total eligible KEEP participants, by BMI (kg/m²)

	BMI <18.5 Underweight	BMI 18.5-24.9 Normal	BMI 25-29.9 Overweight	BMI 30-39.9 Obese	BMI ≥40 Extremely obese	Missing	All
Age							
18-30	140	2,364	1,879	1,853	577	125	6,938
31-45	158	4,103	5,708	6,779	2,162	429	19,339
46-60	189	5,666	9,783	11,902	3,283	575	31,398
61-75	183	4,467	8,636	8,887	1,543	373	24,089
>75	114	2,469	3,084	1,924	143	117	7,851
Missing	.	4	.	2	1	.	7
Gender							
Male	155	5,540	11,263	9,543	1,400	487	28,388
Female	629	13,516	17,796	21,792	6,305	1,126	61,164
Missing	.	17	31	12	4	6	70
Race							
White	391	9,861	13,951	13,824	3,080	541	41,648
Black	162	4,635	9,084	11,856	3,483	404	29,624
N Am	21	530	1,089	1,745	452	71	3,908
Other	192	3,564	4,042	3,096	551	484	11,929
Unknown/missing	18	483	924	826	143	119	2,513
Ethnicity							
Non-Hispanic	686	16,866	25,145	27,553	7,029	1,197	78,476
Hispanic	98	2,207	3,945	3,794	680	422	11,146
U.S. Census Region							
Northeast	189	4,837	6,665	6,856	1,441	532	20,520
Midwest	112	2,622	4,386	5,090	1,463	174	13,847
South	329	8,804	14,497	15,968	4,084	646	44,328
West	154	2,800	3,532	3,425	720	264	10,895
Missing	.	10	10	8	1	3	32
U.S. Census Division							
New England	71	1,884	2,582	2,514	486	235	7,772
Middle Atlantic	118	2,953	4,083	4,342	955	297	12,748
East North Central	69	1,583	2,564	3,028	935	126	8,305
West North Central	43	1,039	1,822	2,062	528	48	5,542
South Atlantic	177	4,644	7,543	8,048	1,975	312	22,699
East South Central	75	2,302	3,689	4,239	1,194	181	11,680
West South Central	77	1,858	3,265	3,681	915	153	9,949
Mountain	77	1,515	2,207	2,259	413	175	6,646
Pacific	77	1,285	1,325	1,166	307	89	4,249
Missing	.	10	10	8	1	3	32
Smoking							
Yes	274	6,938	11,685	12,761	3,015	548	35,221
No	449	11,180	15,968	17,094	4,361	971	50,023
Missing	61	955	1,437	1,492	333	100	4,378
Education Level							
≤6 years	31	940	1,792	1,767	314	195	5,039
<12 years	79	1,621	2,751	3,278	791	170	8,690
12 years	207	4,559	7,466	8,451	2,067	372	23,122
>12 years	182	4,551	7,068	8,416	2,339	303	22,859
16 years	179	4,481	5,811	5,493	1,411	334	17,709
>16 years	89	2,649	3,723	3,437	678	190	10,766
Missing	17	272	479	505	109	55	1,437
Health Insurance Status							
Yes	584	14,903	22,995	24,717	5,880	1,012	70,091
No	161	3,468	5,001	5,481	1,561	513	16,185
Missing	39	702	1,094	1,149	268	94	3,346
Doctor Status							
Yes	624	15,650	24,612	27,015	6,742	1,199	75,842
No	129	2,976	3,752	3,575	796	354	11,582
Missing	31	447	726	757	171	66	2,198
All	784	19,073	29,090	31,347	7,709	1,619	89,622

“.” Zero values in this cell.

Table 9.1

Total eligible KEEP participants, by BMI (kg/m²): White

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	1,088	657	779	35	2,559
31-45	1,804	2,050	2,991	126	6,971
46-60	2,923	4,344	6,338	172	13,777
61-75	2,616	4,791	5,524	152	13,083
>75	1,820	2,109	1,272	56	5,257
Missing	1	.	.	.	1
Gender					
Male	2,713	5,738	5,459	162	14,072
Female	7,533	8,202	11,441	377	27,553
Missing	6	11	4	2	23
U.S. Census Region					
Northeast	2,795	3,639	4,288	170	10,892
Midwest	1,526	2,221	3,096	55	6,898
South	4,656	6,473	7,789	225	19,143
West	1,271	1,614	1,727	91	4,703
Missing	4	4	4	.	12
U.S. Census Division					
New England	1,020	1,366	1,499	81	3,966
Middle Atlantic	1,775	2,273	2,789	89	6,926
East North Central	862	1,206	1,744	32	3,844
West North Central	664	1,015	1,352	23	3,054
South Atlantic	2,420	3,291	3,689	109	9,509
East South Central	1,427	1,971	2,596	72	6,066
West South Central	809	1,211	1,504	44	3,568
Mountain	1,001	1,289	1,347	60	3,697
Pacific	270	325	380	31	1,006
Missing	4	4	4	.	12
Smoking					
Yes	4,047	6,059	7,299	209	17,614
No	5,777	7,396	9,036	309	22,518
Missing	428	496	569	23	1,516
Education Level					
≤6 years	266	529	674	41	1,510
<12 years	675	1,048	1,472	40	3,235
12 years	2,699	4,007	5,140	131	11,977
>12 years	2,539	3,498	4,663	121	10,821
16 years	2,452	2,831	3,020	117	8,420
>16 years	1,537	1,916	1,768	81	5,302
Missing	84	122	167	10	383
Health Insurance Status					
Yes	8,752	12,071	14,122	412	35,357
No	1,161	1,508	2,308	104	5,081
Missing	339	372	474	25	1,210
Doctor Status					
Yes	8,999	12,551	15,218	450	37,218
No	1,037	1,124	1,359	77	3,597
Missing	216	276	327	14	833
All	10,252	13,951	16,904	541	41,648

Table 9.2

Total eligible KEEP participants, by BMI (kg/m²): Black

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	662	591	914	29	2,196
31-45	1,157	1,952	3,875	104	7,088
46-60	1,552	3,463	6,389	154	11,558
61-75	1,023	2,448	3,569	95	7,135
>75	403	630	589	22	1,644
Missing	.	.	3	.	3
Gender					
Male	1,505	3,104	3,570	104	8,283
Female	3,288	5,969	11,766	297	21,320
Missing	4	11	3	3	21
U.S. Census Region					
Northeast	1,013	1,741	2,749	94	5,597
Midwest	650	1,290	2,351	60	4,351
South	3,023	5,820	9,895	242	18,980
West	107	228	341	8	684
Missing	4	5	3	.	12
U.S. Census Division					
New England	363	604	872	45	1,884
Middle Atlantic	650	1,137	1,877	49	3,713
East North Central	449	880	1,646	45	3,020
West North Central	201	410	705	15	1,331
South Atlantic	1,826	3,483	5,749	159	11,217
East South Central	706	1,431	2,629	53	4,819
West South Central	491	906	1,517	30	2,944
Mountain	43	88	130	4	265
Pacific	64	140	211	4	419
Missing	4	5	3	.	12
Smoking					
Yes	1,813	3,415	5,631	142	11,001
No	2,694	5,104	8,828	227	16,853
Missing	290	565	880	35	1,770
Education Level					
≤6 years	194	321	453	20	988
<12 years	512	890	1,616	49	3,067
12 years	1,083	2,152	3,734	95	7,064
>12 years	1,344	2,437	4,426	95	8,302
16 years	997	1,898	2,970	75	5,940
>16 years	602	1,234	1,909	58	3,803
Missing	65	152	231	12	460
Health Insurance Status					
Yes	3,670	7,247	12,178	299	23,394
No	944	1,422	2,550	75	4,991
Missing	183	415	611	30	1,239
Doctor Status					
Yes	3,905	7,781	13,382	337	25,405
No	780	1,083	1,599	48	3,510
Missing	112	220	358	19	709
All	4,797	9,084	15,339	404	29,624

“.” Zero values in this cell.

Table 9.3

Total eligible KEEP participants, by BMI (kg/m²): Native American

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	91	123	242	6	462
31-45	119	270	597	17	1,003
46-60	147	287	796	25	1,255
61-75	130	312	487	18	947
>75	62	97	75	5	239
Missing	2	.	.	.	2
Gender					
Male	148	321	513	13	995
Female	403	768	1,680	58	2,909
Missing	.	.	4	.	4
U.S. Census Region					
Northeast	50	114	215	6	385
Midwest	90	193	430	7	720
South	211	448	826	25	1,510
West	200	334	724	33	1,291
Missing	.	.	2	.	2
U.S. Census Division					
New England	21	56	86	.	163
Middle Atlantic	29	58	129	6	222
East North Central	19	31	69	1	120
West North Central	71	162	361	6	600
South Atlantic	19	31	72	1	123
East South Central	11	14	16	6	47
West South Central	181	403	738	18	1,340
Mountain	192	322	694	33	1,241
Pacific	8	12	30	.	50
Missing	.	.	2	.	2
Smoking					
Yes	271	583	1,242	35	2,131
No	252	449	887	33	1,621
Missing	28	57	68	3	156
Education Level					
≤6 years	33	72	98	6	209
<12 years	76	154	331	8	569
12 years	154	298	595	22	1,069
>12 years	161	321	708	17	1,207
16 years	79	149	294	11	533
>16 years	41	82	136	3	262
Missing	7	13	35	4	59
Health Insurance Status					
Yes	363	747	1,527	41	2,678
No	163	301	605	26	1,095
Missing	25	41	65	4	135
Doctor Status					
Yes	434	888	1,848	63	3,233
No	101	169	305	6	581
Missing	16	32	44	2	94
All	551	1,089	2,197	71	3,908

Table 9.4

Total eligible KEEP participants, by BMI (kg/m²): Other race

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	574	410	401	39	1,424
31-45	1,026	1,140	1,175	135	3,476
46-60	1,102	1,404	1,326	192	4,024
61-75	801	894	649	89	2,433
>75	252	194	96	29	571
Missing	1	.	.	.	1
Gender					
Male	1,183	1,734	1,135	166	4,218
Female	2,570	2,304	2,512	317	7,703
Missing	3	4	.	1	8
U.S. Census Region					
Northeast	1,031	941	799	233	3,004
Midwest	391	546	520	43	1,500
South	1,050	1,412	1,206	115	3,783
West	1,282	1,143	1,122	90	3,637
Missing	2	.	.	3	5
U.S. Census Division					
New England	461	423	360	85	1,329
Middle Atlantic	570	518	439	148	1,675
East North Central	264	341	384	39	1,028
West North Central	127	205	136	4	472
South Atlantic	480	620	400	30	1,530
East South Central	187	210	143	34	574
West South Central	383	582	663	51	1,679
Mountain	283	349	344	41	1,017
Pacific	999	794	778	49	2,620
Missing	2	.	.	3	5
Smoking					
Yes	927	1,299	1,273	125	3,624
No	2,597	2,491	2,150	330	7,568
Missing	232	252	224	29	737
Education Level					
≤6 years	402	676	639	96	1,813
<12 years	369	501	478	55	1,403
12 years	700	820	846	104	2,470
>12 years	609	680	794	51	2,134
16 years	1,081	841	553	123	2,598
>16 years	534	446	268	41	1,289
Missing	61	77	69	14	221
Health Insurance Status					
Yes	2,453	2,432	2,222	224	7,331
No	1,151	1,438	1,248	234	4,071
Missing	152	172	177	26	527
Doctor Status					
Yes	2,641	2,792	2,643	291	8,367
No	1,018	1,111	877	173	3,179
Missing	97	139	127	20	383
All	3,756	4,042	3,647	484	11,929

“.” Zero values in this cell.

Table 9.5

Total eligible KEEP participants, by BMI (kg/m²): Hispanic

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	512	480	478	56	1,526
31-45	780	1,263	1,521	152	3,716
46-60	562	1,296	1,557	129	3,544
61-75	330	737	795	67	1,929
>75	120	169	123	18	430
Missing	1	.	.	.	1
Gender					
Male	686	1,595	1,310	138	3,729
Female	1,614	2,344	3,160	283	7,401
Missing	5	6	4	1	16
U.S. Census Region					
Northeast	487	730	917	82	2,216
Midwest	354	662	717	55	1,788
South	1,002	1,813	1,959	164	4,938
West	461	738	880	119	2,198
Missing	1	2	1	2	6
U.S. Census Division					
New England	258	395	511	57	1,221
Middle Atlantic	229	335	406	25	995
East North Central	269	443	537	49	1,298
West North Central	85	219	180	6	490
South Atlantic	434	681	570	39	1,724
East South Central	131	210	178	53	572
West South Central	437	922	1,211	72	2,642
Mountain	315	543	597	91	1,546
Pacific	146	195	283	28	652
Missing	1	2	1	2	6
Smoking					
Yes	718	1,340	1,573	128	3,759
No	1,440	2,324	2,614	264	6,642
Missing	147	281	287	30	745
Education Level					
≤6 years	383	893	957	136	2,369
<12 years	327	664	717	60	1,768
12 years	578	853	1,051	84	2,566
>12 years	430	694	909	63	2,096
16 years	371	533	517	38	1,459
>16 years	163	239	231	23	656
Missing	53	69	92	18	232
Health Insurance Status					
Yes	1,122	2,036	2,465	137	5,760
No	1,071	1,697	1,755	256	4,779
Missing	112	212	254	29	607
Doctor Status					
Yes	1,313	2,474	3,066	215	7,068
No	896	1,293	1,223	180	3,592
Missing	96	178	185	27	486
All	2,305	3,945	4,474	422	11,146

Table 9.6

Total eligible KEEP participants, by BMI (kg/m²): non-Hispanic

	BMI <25	BMI 25-<30	BMI ≥30	Missing	All
Age					
18-30	1,992	1,399	1,952	69	5,412
31-45	3,481	4,445	7,420	277	15,623
46-60	5,293	8,487	13,628	446	27,854
61-75	4,320	7,899	9,635	306	22,160
>75	2,463	2,915	1,944	99	7,421
Missing	3	.	3	.	6
Gender					
Male	5,009	9,668	9,633	349	24,659
Female	12,531	15,452	24,937	843	53,763
Missing	12	25	12	5	54
U.S. Census Region					
Northeast	4,539	5,935	7,380	450	18,304
Midwest	2,380	3,724	5,836	119	12,059
South	8,131	12,684	18,093	482	39,390
West	2,493	2,794	3,265	145	8,697
Missing	9	8	8	1	26
U.S. Census Division					
New England	1,697	2,187	2,489	178	6,551
Middle Atlantic	2,842	3,748	4,891	272	11,753
East North Central	1,383	2,121	3,426	77	7,007
West North Central	997	1,603	2,410	42	5,052
South Atlantic	4,387	6,862	9,453	273	20,975
East South Central	2,246	3,479	5,255	128	11,108
West South Central	1,498	2,343	3,385	81	7,307
Mountain	1,277	1,664	2,075	84	5,100
Pacific	1,216	1,130	1,190	61	3,597
Missing	9	8	8	1	26
Smoking					
Yes	6,494	10,345	14,203	420	31,462
No	10,189	13,644	18,841	707	43,381
Missing	869	1,156	1,538	70	3,633
Education Level					
≤6 years	588	899	1,124	59	2,670
<12 years	1,373	2,087	3,352	110	6,922
12 years	4,188	6,613	9,467	288	20,556
>12 years	4,303	6,374	9,846	240	20,763
16 years	4,289	5,278	6,387	296	16,250
>16 years	2,575	3,484	3,884	167	10,110
Missing	236	410	522	37	1,205
Health Insurance Status					
Yes	14,365	20,959	28,132	875	64,331
No	2,558	3,304	5,287	257	11,406
Missing	629	882	1,163	65	2,739
Doctor Status					
Yes	14,961	22,138	30,691	984	68,774
No	2,209	2,459	3,148	174	7,990
Missing	382	548	743	39	1,712
All	17,552	25,145	34,582	1,197	78,476

Table 10

Total eligible KEEP participants with microalbuminuria*

	2000+2001	2002	2003	2004	2005	2006	2007	All
Age								
18-30	145	357	507	591	680	628	515	3,423
31-45	410	995	1,197	1,490	1,766	1,808	1,472	9,138
46-60	615	1,306	1,572	2,121	2,571	2,857	2,494	13,536
61-75	453	1,000	1,055	1,527	1,916	2,226	2,186	10,363
>75	156	404	371	544	720	821	851	3,867
Missing	.	.	.	5	2	.	.	7
Gender								
Male	593	1,382	1,448	2,090	2,596	2,661	2,642	13,412
Female	1,186	2,680	3,253	4,187	5,033	5,677	4,875	26,891
Missing	.	.	1	1	26	2	1	31
Race								
White	590	1,233	1,624	2,283	3,138	3,474	3,306	15,648
Black	840	2,078	2,034	2,479	2,784	3,182	2,875	16,272
N Am	100	283	352	396	367	208	171	1,877
Other	192	378	514	1,082	1,178	1,104	897	5,345
Unknown/missing	57	90	178	38	188	372	269	1,192
Ethnicity								
Non-Hispanic	1,599	3,726	4,177	5,308	6,554	7,214	6,460	35,038
Hispanic	180	336	525	970	1,101	1,126	1,058	5,296
U.S. Census Region								
Northeast	320	942	1,045	1,569	1,908	1,833	1,675	9,292
Midwest	261	617	790	1,081	1,015	1,303	943	6,010
South	1,060	2,082	2,361	3,041	3,739	4,258	4,003	20,544
West	135	417	506	587	991	941	895	4,472
Missing	3	4	.	.	2	5	2	16
U.S. Census Division								
New England	233	363	364	618	640	573	568	3,359
Middle Atlantic	87	579	681	951	1,268	1,260	1,107	5,933
East North Central	47	335	411	682	677	962	697	3,811
West North Central	214	282	379	399	338	341	246	2,199
South Atlantic	702	1,298	1,047	1,530	1,770	2,301	1,986	10,634
East South Central	176	233	728	800	934	1,131	1,317	5,319
West South Central	182	551	586	711	1,035	826	700	4,591
Mountain	53	172	283	430	598	591	498	2,625
Pacific	82	245	223	157	393	350	397	1,847
Missing	3	4	.	.	2	5	2	16
Smoking								
Yes	789	1,744	1,883	2,571	2,987	3,027	3,023	16,024
No	875	2,049	2,526	3,253	4,309	5,044	4,215	22,271
Missing	115	269	293	454	359	269	280	2,039
Education Level								
≤6 years	130	220	249	420	501	514	437	2,471
<12 years	200	472	497	635	866	894	806	4,370
12 years	467	1,159	1,250	1,673	1,963	2,035	1,998	10,545
>12 years	489	1,072	1,288	1,653	2,009	2,054	1,799	10,364
16 years	288	689	884	1,160	1,396	1,649	1,422	7,488
>16 years	186	401	486	650	802	992	917	4,434
Missing	19	49	48	87	118	202	139	662
Health Insurance Status								
Yes	1,430	3,191	3,627	4,792	5,693	6,310	5,714	30,757
No	271	687	869	1,261	1,576	1,682	1,632	7,978
Missing	78	184	206	225	386	348	172	1,599
Doctor Status								
Yes	1,544	3,467	3,968	5,186	6,364	6,970	6,254	33,753
No	172	480	613	850	1,081	1,167	1,136	5,499
Missing	63	115	121	242	210	203	128	1,082
All	1,779	4,062	4,702	6,278	7,655	8,340	7,518	40,334

*Positive, Trace or microalbuminuria value >20 mg/L.
 ". " Zero values in this cell.

Table 10.1

Total eligible KEEP participants with an abnormal albumin/creatinine ratio*

	2002	2003	2004	2005	2006	2007	All
Age							
18-30	49	93	104	101	103	80	530
31-45	142	227	284	271	345	243	1,512
46-60	215	394	542	577	653	542	2,923
61-75	233	366	453	579	683	601	2,915
>75	119	190	232	242	299	316	1,398
Missing	.	.	.	1	.	.	1
Gender							
Male	235	404	516	612	668	666	3,101
Female	523	866	1,099	1,153	1,415	1,116	6,172
Missing	.	.	.	6	.	.	6
Race							
White	291	490	654	753	939	845	3,972
Black	309	452	575	566	676	604	3,182
N Am	79	136	119	133	74	62	603
Other	63	154	257	266	311	212	1,263
Unknown/missing	16	38	10	53	83	59	259
Ethnicity							
Non-Hispanic	716	1,139	1,407	1,524	1,815	1,561	8,162
Hispanic	42	131	208	247	268	221	1,117
U.S. Census Region							
Northeast	191	307	432	422	491	381	2,224
Midwest	141	193	323	253	333	244	1,487
South	361	626	701	824	978	892	4,382
West	65	144	159	272	281	265	1,186
Missing							
U.S. Census Division							
New England	72	111	152	130	145	114	724
Middle Atlantic	119	196	280	292	346	267	1,500
East North Central	89	98	182	183	237	171	960
West North Central	52	95	141	70	96	73	527
South Atlantic	203	260	355	384	504	417	2,123
East South Central	35	162	179	209	285	291	1,161
West South Central	123	204	167	231	189	184	1,098
Mountain	25	91	102	165	169	152	704
Pacific	40	53	57	107	112	113	482
Missing							
Smoking							
Yes	357	549	710	761	825	812	4,014
No	341	640	789	944	1,176	908	4,798
Missing	60	81	116	66	82	62	467
Education Level							
≤6 years	56	91	138	148	144	129	706
<12 years	96	160	196	245	260	218	1,175
12 years	248	367	444	500	548	510	2,617
>12 years	169	332	408	430	475	409	2,223
16 years	118	182	247	265	362	299	1,473
>16 years	62	123	150	147	234	177	893
Missing	9	15	32	36	60	40	192
Health Insurance Status							
Yes	595	969	1,243	1,304	1,584	1,359	7,054
No	110	237	312	368	407	376	1,810
Missing	53	64	60	99	92	47	415
Doctor Status							
Yes	667	1,102	1,373	1,535	1,807	1,547	8,031
No	60	139	182	186	230	204	1,001
Missing	31	29	60	50	46	31	247
All	758	1,270	1,615	1,771	2,083	1,782	9,279

*ACR ≥30 mg/g; ACR data was not available until April, 2002.
 "." Zero values in this cell.

Table 11

Total eligible KEEP participants, by hemoglobin level

	<9	9-<10	10-<11	11-<12	12+	Missing	All	Mean Hb
Age								
18-30	20	35	98	401	5,974	410	6,938	13.9
31-45	141	218	424	1,270	16,465	821	19,339	13.7
46-60	99	157	486	1,686	27,535	1,435	31,398	13.8
61-75	43	118	412	1,584	20,909	1,023	24,089	13.7
>75	24	61	251	765	6,416	334	7,851	13.4
Missing	.	.	1	1	5	.	7	13.0
Gender								
Male	29	65	174	539	26,462	1,119	28,388	14.8
Female	298	524	1,497	5,160	50,797	2,888	61,164	13.3
Missing	.	.	1	8	45	16	70	13.7
Race								
White	71	142	453	1,760	37,594	1,628	41,648	14.0
Black	200	319	947	3,078	23,468	1,612	29,624	13.2
N Am	10	42	66	215	3,321	254	3,908	14.0
Other	40	72	167	546	10,713	391	11,929	14.0
Unknown/missing	6	14	39	108	2,208	138	2,513	14.0
Ethnicity								
Non-Hispanic	276	520	1,527	5,229	67,325	3,599	78,476	13.7
Hispanic	51	69	145	478	9,979	424	11,146	14.0
U.S. Census Region								
Northeast	48	114	372	1,270	17,648	1,068	20,520	13.7
Midwest	53	104	238	857	11,949	646	13,847	13.7
South	202	317	931	3,183	37,774	1,921	44,328	13.6
West	24	54	131	396	9,902	388	10,895	14.2
Missing	.	.	.	1	31	.	32	14.3
U.S. Census Division								
New England	14	38	127	473	6,711	409	7,772	13.7
Middle Atlantic	34	76	245	797	10,937	659	12,748	13.7
East North Central	36	69	156	558	7,118	368	8,305	13.6
West North Central	17	35	82	299	4,831	278	5,542	13.8
South Atlantic	118	184	466	1,702	19,286	943	22,699	13.6
East South Central	45	61	262	809	10,062	441	11,680	13.6
West South Central	39	72	203	672	8,426	537	9,949	13.7
Mountain	11	33	66	174	6,051	311	6,646	14.4
Pacific	13	21	65	222	3,851	77	4,249	13.9
Missing	.	.	.	1	31	.	32	14.3
Smoking								
Yes	98	198	584	1,804	30,932	1,605	35,221	14.0
No	211	358	989	3,565	42,741	2,159	50,023	13.6
Missing	18	33	99	338	3,631	259	4,378	13.6
Education Level								
≤6 years	21	34	105	336	4,316	227	5,039	13.7
<12 years	33	68	207	671	7,303	408	8,690	13.7
12 years	83	163	427	1,458	19,950	1,041	23,122	13.7
>12 years	87	142	415	1,514	19,628	1,073	22,859	13.7
16 years	72	107	304	1,030	15,434	762	17,709	13.8
>16 years	25	62	179	611	9,441	448	10,766	13.8
Missing	6	13	35	87	1,232	64	1,437	13.7
Health Insurance Status								
Yes	215	438	1,327	4,682	60,325	3,104	70,091	13.7
No	98	126	287	810	14,150	714	16,185	13.9
Missing	14	25	58	215	2,829	205	3,346	13.7
Doctor Status								
Yes	252	476	1,454	5,123	65,134	3,403	75,842	13.7
No	67	96	180	454	10,289	496	11,582	14.1
Missing	8	17	38	130	1,881	124	2,198	13.7
All	327	589	1,672	5,707	77,304	4,023	89,622	13.7

Table 12

Total eligible KEEP participants with anemia (WHO* definition)

	Total N	Anemia (N)	Anemia (%)
Age			
18-30	6,526	585	9.0
31-45	18,506	2,193	11.9
46-60	29,951	2,836	9.5
61-75	23,045	2,777	12.1
>75	7,510	1,445	19.2
Missing	7	2	28.6
Gender			
Male	27,269	2,359	8.7
Female	58,276	7,479	12.8
Missing	0	0	0
Race			
White	40,003	3,110	7.8
Black	27,997	5,178	18.5
N Am	3,650	368	10.1
Other	11,532	990	8.6
Unknown/missing	2,363	192	8.1
Ethnicity			
Non-Hispanic	74,837	8,985	12.0
Hispanic	10,708	853	8.0
U.S. Census Region			
Northeast	19,435	2,218	11.4
Midwest	13,194	1,457	11.0
South	42,388	5,424	12.8
West	10,496	737	7.0
Missing	32	2	6.3
U.S. Census Division			
New England	7,355	796	10.8
Middle Atlantic	12,080	1,422	11.8
East North Central	7,931	948	12.0
West North Central	5,263	509	9.7
South Atlantic	21,743	2,895	13.3
East South Central	11,238	1,362	12.1
West South Central	9,407	1,167	12.4
Mountain	6,327	352	5.6
Pacific	4,169	385	9.2
Missing	32	2	6.3
Smoking			
Yes	33,596	3,583	10.7
No	47,839	5,707	11.9
Missing	4,110	548	13.3
Education Level			
≤6 years	4,806	620	12.9
<12 years	8,272	1,149	13.9
12 years	22,064	2,558	11.6
>12 years	21,784	2,493	11.4
16 years	16,942	1,780	10.5
>16 years	10,313	1,068	10.4
Missing	1,364	170	12.5
Health Insurance Status			
Yes	66,950	7,946	11.9
No	15,462	1,515	9.8
Missing	3,133	377	12.1
Doctor Status			
Yes	72,398	8,671	12.0
No	11,076	922	8.3
Missing	2,071	245	11.8

Excludes participants with missing hemoglobin values.

*WHO anemia: hemoglobin <13 g/dl in males; <12 g/dl in females.

Table 12.1

Total eligible KEEP participants with anemia (WHO* definition), by race/ethnicity

	White		Black		N Am		Other race		Unknown/missing	
	Total N	Anemia	Total N	Anemia	Total N	Anemia	Total N	Anemia	Total N	Anemia
Age										
18-30	2,402	114	2,046	325	434	37	1,371	88	273	21
31-45	6,692	391	6,734	1,394	945	77	3,371	278	764	53
46-60	13,222	750	10,945	1,686	1,165	92	3,886	264	733	44
61-75	12,612	1,046	6,732	1,289	883	118	2,355	272	463	52
>75	5,074	809	1,537	483	221	44	548	87	130	22
Missing	1	0	3	1	2	0	1	1	0	0
Gender										
Male	13,569	1,073	7,905	933	939	68	4,086	247	770	38
Female	26,434	2,037	20,092	4,245	2,711	300	7,446	743	1,593	154
Missing	0	0	0	0	0	0	0	0	0	0
U.S. Census Region										
Northeast	10,368	891	5,246	910	366	50	2,877	303	578	64
Midwest	6,594	490	4,082	732	707	88	1,451	119	360	28
South	18,529	1,471	18,024	3,443	1,333	167	3,647	278	855	65
West	4,500	258	633	91	1,242	63	3,552	290	569	35
Missing	12	0	12	2	2	0	5	0	1	0
U.S. Census Division										
New England	3,793	314	1,769	272	160	22	1,250	142	383	46
Middle Atlantic	6,575	577	3,477	638	206	28	1,627	161	195	18
East North Central	3,703	301	2,840	526	117	14	994	85	277	22
West North Central	2,891	189	1,242	206	590	74	457	34	83	6
South Atlantic	9,212	714	10,629	2,012	114	18	1,487	124	301	27
East South Central	5,901	476	4,583	827	44	5	551	43	159	11
West South Central	3,416	281	2,812	604	1,175	144	1,609	111	395	27
Mountain	3,518	195	231	28	1,194	57	968	56	416	16
Pacific	982	63	402	63	48	6	2,584	234	153	19
Missing	12	0	12	2	2	0	5	0	1	0
Smoking										
Yes	16,922	1,337	10,382	1,694	1,996	201	3,505	293	791	58
No	21,642	1,648	15,963	3,150	1,511	148	7,331	640	1,392	121
Missing	1,439	125	1,652	334	143	19	696	57	180	13
Education Level										
≤6 years	1,456	149	917	236	197	29	1,748	172	488	34
<12 years	3,114	332	2,887	589	526	56	1,355	138	390	34
12 years	11,502	946	6,664	1,258	985	106	2,398	205	515	43
>12 years	10,349	763	7,859	1,414	1,134	107	2,069	181	373	28
16 years	8,108	530	5,616	1,011	504	38	2,511	187	203	14
>16 years	5,104	359	3,615	582	247	25	1,244	91	103	11
Missing	370	31	439	88	57	7	207	16	291	28
Health Insurance Status										
Yes	33,974	2,740	22,116	4,152	2,506	276	7,096	660	1,258	118
No	4,892	282	4,720	809	1,023	80	3,935	283	892	61
Missing	1,137	88	1,161	217	121	12	501	47	213	13
Doctor Status										
Yes	35,754	2,868	24,012	4,576	3,015	326	8,092	759	1,525	142
No	3,452	172	3,325	479	546	33	3,076	202	677	36
Missing	797	70	660	123	89	9	364	29	161	14
All	40,003	3,110	27,997	5,178	3,650	368	11,532	990	2,363	192

Excludes participants with missing hemoglobin values.

*WHO anemia: hemoglobin <13 g/dl in males; <12 g/dl in females.

Table 12.1 (continued)

Total eligible KEEP participants with anemia (WHO* definition), by race/ethnicity

	Hispanic		non-Hispanic		All	
	Total N	Anemia	Total N	Anemia	Total N	Anemia
Age						
18-30	1,453	105	5,073	480	6,526	585
31-45	3,601	278	14,905	1,915	18,506	2,193
46-60	3,393	220	26,558	2,616	29,951	2,836
61-75	1,850	181	21,195	2,596	23,045	2,777
>75	410	68	7,100	1,377	7,510	1,445
Missing	1	1	6	1	7	2
Gender						
Male	3,584	172	23,685	2,187	27,269	2,359
Female	7,124	681	51,152	6,798	58,276	7,479
Missing	0	0	0	0	0	.
U.S. Census Region						
Northeast	2,085	206	17,350	2,012	19,435	2,218
Midwest	1,734	137	11,460	1,320	13,194	1,457
South	4,762	364	37,626	5,060	42,388	5,424
West	2,121	146	8,375	591	10,496	737
Missing	6	0	26	2	32	2
U.S. Census Division						
New England	1,135	120	6,220	676	7,355	796
Middle Atlantic	950	86	11,130	1,336	12,080	1,422
East North Central	1,256	101	6,675	847	7,931	948
West North Central	478	36	4,785	473	5,263	509
South Atlantic	1,681	142	20,062	2,753	21,743	2,895
East South Central	543	29	10,695	1,333	11,238	1,362
West South Central	2,538	193	6,869	974	9,407	1,167
Mountain	1,484	84	4,843	268	6,327	352
Pacific	637	62	3,532	323	4,169	385
Missing	6	0	26	2	32	2
Smoking						
Yes	3,605	285	29,991	3,298	33,596	3,583
No	6,400	519	41,439	5,188	47,839	5,707
Missing	703	49	3,407	499	4,110	548
Education Level						
≤6 years	2,272	178	2,534	442	4,806	620
<12 years	1,693	158	6,579	991	8,272	1,149
12 years	2,474	179	19,590	2,379	22,064	2,558
>12 years	2,018	161	19,766	2,332	21,784	2,493
16 years	1,405	104	15,537	1,676	16,942	1,780
>16 years	629	51	9,684	1,017	10,313	1,068
Missing	217	22	1,147	148	1,364	170
Health Insurance Status						
Yes	5,539	496	61,411	7,450	66,950	7,946
No	4,598	311	10,864	1,204	15,462	1,515
Missing	571	46	2,562	331	3,133	377
Doctor Status						
Yes	6,791	613	65,607	8,058	72,398	8,671
No	3,454	205	7,622	717	11,076	922
Missing	463	35	1,608	210	2,071	245
All	10,708	853	74,837	8,985	85,545	9,838

Excludes participants with missing hemoglobin values.

*WHO anemia: hemoglobin <13 g/dl in males; <12 g/dl in females.

Table 13

Total eligible KEEP participants with anemia (KDOQI* definition)

	Total N	N Anemia	% with anemia
Age			
18-30	6,526	644	9.9
31-45	18,506	2,410	13.0
46-60	29,951	3,350	11.2
61-75	23,045	3,395	14.7
>75	7,510	1,740	23.2
Missing	7	2	28.6
Gender			
Male	27,269	4,062	14.9
Female	58,276	7,479	12.8
Missing	0	0	0
Race			
White	40,003	3,828	9.6
Black	27,997	5,918	21.1
N Am	3,650	409	11.2
Other	11,532	1,159	10.1
Unknown/missing	2,363	227	9.6
Ethnicity			
Non-Hispanic	74,837	10,574	14.1
Hispanic	10,708	967	9.0
U.S. Census Region			
Northeast	19,435	2,654	13.7
Midwest	13,194	1,726	13.1
South	42,388	6,294	14.8
West	10,496	862	8.2
Missing	32	5	15.6
U.S. Census Division			
New England	7,355	945	12.8
Middle Atlantic	12,080	1,709	14.1
East North Central	7,931	1,108	14.0
West North Central	5,263	618	11.7
South Atlantic	21,743	3,377	15.5
East South Central	11,238	1,579	14.1
West South Central	9,407	1,338	14.2
Mountain	6,327	420	6.6
Pacific	4,169	442	10.6
Missing	32	5	15.6
Smoking			
Yes	33,596	4,524	13.5
No	47,839	6,390	13.4
Missing	4,110	627	15.3
Education Level			
≤6 years	4,806	747	15.5
<12 years	8,272	1,354	16.4
12 years	22,064	3,013	13.7
>12 years	21,784	2,894	13.3
16 years	16,942	2,077	12.3
>16 years	10,313	1,264	12.3
Missing	1,364	192	14.1
Health Insurance Status			
Yes	66,950	9,328	13.9
No	15,462	1,753	11.3
Missing	3,133	460	14.7
Doctor Status			
Yes	72,398	10,133	14.0
No	11,076	1,120	10.1
Missing	2,071	288	13.9
All	85,545	11,541	13.5

Excludes participants with missing hemoglobin values.

*KDOQI anemia: hemoglobin <13.5 g/dl in males, <12 g/dl in females.

Table 13.1

Total eligible KEEP participants with anemia (KDOQI* definition), by race/ethnicity

	White		Black		N Am		Other race		Unknown/missing	
	Total N	Anemia	Total N	Anemia	Total N	Anemia	Total N	Anemia	Total N	Anemia
Age										
18-30	2,402	122	2,046	365	434	40	1,371	93	273	24
31-45	6,692	431	6,734	1,535	945	83	3,371	304	764	57
46-60	13,222	904	10,945	1,974	1,165	104	3,886	309	733	59
61-75	12,612	1,348	6,732	1,512	883	137	2,355	339	463	59
>75	5,074	1,023	1,537	531	221	45	548	113	130	28
Missing	1	0	3	1	2	0	1	1	0	0
Gender										
Male	13,569	1,791	7,905	1,673	939	109	4,086	416	770	73
Female	26,434	2,037	20,092	4,245	2,711	300	7,446	743	1,593	154
Missing	0	0	0	0	0	0	0	0	0	0
U.S. Census Region										
Northeast	10,368	1,102	5,246	1,056	366	56	2,877	366	578	74
Midwest	6,594	611	4,082	846	707	95	1,451	137	360	37
South	18,529	1,789	18,024	3,911	1,333	187	3,647	331	855	76
West	4,500	324	633	103	1,242	70	3,552	325	569	40
Missing	12	2	12	2	2	1	5	0	1	0
U.S. Census Division										
New England	3,793	386	1,769	317	160	27	1,250	161	383	54
Middle Atlantic	6,575	716	3,477	739	206	29	1,627	205	195	20
East North Central	3,703	367	2,840	601	117	15	994	96	277	29
West North Central	2,891	244	1,242	245	590	80	457	41	83	8
South Atlantic	9,212	884	10,629	2,289	114	22	1,487	151	301	31
East South Central	5,901	562	4,583	949	44	5	551	49	159	14
West South Central	3,416	343	2,812	673	1,175	160	1,609	131	395	31
Mountain	3,518	243	231	34	1,194	64	968	60	416	19
Pacific	982	81	402	69	48	6	2,584	265	153	21
Missing	12	2	12	2	2	1	5	0	1	0
Smoking										
Yes	16,922	1,775	10,382	2,080	1,996	233	3,505	358	791	78
No	21,642	1,908	15,963	3,459	1,511	156	7,331	735	1,392	132
Missing	1,439	145	1,652	379	143	20	696	66	180	17
Education Level										
≤6 years	1,456	200	917	278	197	32	1,748	196	488	41
<12 years	3,114	387	2,887	707	526	66	1,355	156	390	38
12 years	11,502	1,149	6,664	1,456	985	114	2,398	243	515	51
>12 years	10,349	934	7,859	1,605	1,134	120	2,069	203	373	32
16 years	8,108	668	5,616	1,122	504	42	2,511	227	203	18
>16 years	5,104	455	3,615	648	247	28	1,244	117	103	16
Missing	370	35	439	102	57	7	207	17	291	31
Health Insurance Status										
Yes	33,974	3,385	22,116	4,710	2,506	308	7,096	785	1,258	140
No	4,892	328	4,720	947	1,023	88	3,935	320	892	70
Missing	1,137	115	1,161	261	121	13	501	54	213	17
Doctor Status										
Yes	35,754	3,546	24,012	5,164	3,015	361	8,092	892	1,525	170
No	3,452	202	3,325	606	546	38	3,076	232	677	42
Missing	797	80	660	148	89	10	364	35	161	15
All	40,003	3,828	27,997	5,918	3,650	409	11,532	1,159	2,363	227

Excludes participants with missing hemoglobin values.

*KDOQI anemia: hemoglobin <13.5 g/dl in males, <12 g/dl in females.

Table 13.1 (continued)

Total eligible KEEP participants with anemia (KDOQI* definition), by race/ethnicity

	Hispanic		non-Hispanic		All	
	Total N	Anemia	Total N	Anemia	Total N	Anemia
Age						
18-30	1,453	109	5,073	535	6,526	644
31-45	3,601	301	14,905	2,109	18,506	2,410
46-60	3,393	253	26,558	3,097	29,951	3,350
61-75	1,850	214	21,195	3,181	23,045	3,395
>75	410	89	7,100	1,651	7,510	1,740
Missing	1	1	6	1	7	2
Gender						
Male	3,584	286	23,685	3,776	27,269	4,062
Female	7,124	681	51,152	6,798	58,276	7,479
Missing	0	0	0	0	0	0
U.S. Census Region						
Northeast	2,085	228	17,350	2,426	19,435	2,654
Midwest	1,734	159	11,460	1,567	13,194	1,726
South	4,762	421	37,626	5,873	42,388	6,294
West	2,121	159	8,375	703	10,496	862
Missing	6	0	26	5	32	5
U.S. Census Division						
New England	1,135	131	6,220	814	7,355	945
Middle Atlantic	950	97	11,130	1,612	12,080	1,709
East North Central	1,256	117	6,675	991	7,931	1,108
West North Central	478	42	4,785	576	5,263	618
South Atlantic	1,681	165	20,062	3,212	21,743	3,377
East South Central	543	32	10,695	1,547	11,238	1,579
West South Central	2,538	224	6,869	1,114	9,407	1,338
Mountain	1,484	90	4,843	330	6,327	420
Pacific	637	69	3,532	373	4,169	442
Missing	6	0	26	5	32	5
Smoking						
Yes	3,605	349	29,991	4,175	33,596	4,524
No	6,400	561	41,439	5,829	47,839	6,390
Missing	703	57	3,407	570	4,110	627
Education Level						
≤6 years	2,272	207	2,534	540	4,806	747
<12 years	1,693	175	6,579	1,179	8,272	1,354
12 years	2,474	208	19,590	2,805	22,064	3,013
>12 years	2,018	178	19,766	2,716	21,784	2,894
16 years	1,405	117	15,537	1,960	16,942	2,077
>16 years	629	59	9,684	1,205	10,313	1,264
Missing	217	23	1,147	169	1,364	192
Health Insurance Status						
Yes	5,539	570	61,411	8,758	66,950	9,328
No	4,598	346	10,864	1,407	15,462	1,753
Missing	571	51	2,562	409	3,133	460
Doctor Status						
Yes	6,791	699	65,607	9,434	72,398	10,133
No	3,454	231	7,622	889	11,076	1,120
Missing	463	37	1,608	251	2,071	288
All	10,708	967	74,837	10,574	85,545	11,541

Excludes participants with missing hemoglobin values.

*KDOQI anemia: hemoglobin <13.5 g/dl in males, <12 g/dl in females.

Table 14

Total eligible KEEP participants with a risk factor for cardiovascular disease*

	2000+2001			2002			2003		
	Total N	N with a risk factor	% with a risk factor	Total N	N with a risk factor	% with a risk factor	Total N	N with a risk factor	% with a risk factor
Age									
18-30	536	371	69.2	600	425	70.8	943	621	65.9
31-45	1,345	1,102	81.9	1,825	1,512	82.8	2,232	1,809	81.0
46-60	1,931	1,724	89.3	2,422	2,145	88.6	3,181	2,798	88.0
61-75	1,345	1,265	94.1	1,839	1,732	94.2	2,206	2,069	93.8
>75	377	353	93.6	677	627	92.6	663	623	94.0
Missing	.	.	.	.	.	.	.	.	.
Gender									
Male	1,807	1,597	88.4	2,343	2,108	90.0	2,763	2,458	89.0
Female	3,727	3,218	86.3	5,020	4,333	86.3	6,462	5,462	84.5
Race									
White	2,138	1,840	86.1	2,871	2,520	87.8	4,101	3,505	85.5
Black	2,334	2,048	87.7	3,062	2,708	88.4	3,118	2,773	88.9
N Am	303	297	98.0	529	487	92.1	647	586	90.6
Other	603	498	82.6	738	589	79.8	1,079	834	77.3
Unknown/missing	156	132	84.6	163	137	84.0	280	222	79.3
Ethnicity									
Non-Hispanic	4,965	4,322	87.0	6,715	5,900	87.9	8,205	7,099	86.5
Hispanic	569	493	86.6	648	541	83.5	1,020	821	80.5
U.S. Census Region									
Northeast	1,118	994	88.9	1,722	1,512	87.8	2,123	1,830	86.2
Midwest	802	718	89.5	1,075	948	88.2	1,585	1,381	87.1
South	3,175	2,755	86.8	3,716	3,287	88.5	4,380	3,789	86.5
West	429	339	79.0	846	691	81.7	1,136	919	80.9
Missing	10	9	90.0	4	3	75.0	1	1	100.0
U.S. Census Division									
New England	882	774	87.8	726	623	85.8	738	630	85.4
Middle Atlantic	236	220	93.2	996	889	89.3	1,385	1,200	86.6
East North Central	214	190	88.8	599	529	88.3	771	666	86.4
West North Central	588	528	89.8	476	419	88.0	814	715	87.8
South Atlantic	1,946	1,679	86.3	2,293	2,016	87.9	1,896	1,612	85.0
East South Central	491	429	87.4	489	419	85.7	1,368	1,160	84.8
West South Central	738	647	87.7	934	852	91.2	1,116	1,017	91.1
Mountain	167	135	80.8	356	303	85.1	579	485	83.8
Pacific	262	204	77.9	490	388	79.2	557	434	77.9
Missing	10	9	90.0	4	3	75.0	1	1	100.0
Smoking									
Yes	2,473	2,473	100.0	3,369	3,369	100.0	3,983	3,983	100.0
No	3,061	2,342	76.5	3,994	3,072	76.9	5,242	3,937	75.1
Education Level									
≤6 years	323	309	95.7	353	320	90.7	443	412	93.0
<12 years	517	481	93.0	795	742	93.3	829	765	92.3
12 years	1,423	1,292	90.8	1,985	1,797	90.5	2,412	2,163	89.7
>12 years	1,521	1,307	85.9	1,998	1,760	88.1	2,592	2,227	85.9
16 years	1,037	837	80.7	1,350	1,092	80.9	1,809	1,421	78.6
>16 years	639	523	81.8	808	665	82.3	1,073	871	81.2
Missing	74	66	89.2	74	65	87.8	67	61	91.0
Health Insurance Status									
Yes	4,553	3,957	86.9	6,000	5,244	87.4	7,424	6,369	85.8
No	805	705	87.6	1,132	995	87.9	1,543	1,328	86.1
Missing	176	153	86.9	231	202	87.4	258	223	86.4
Doctor Status									
Yes	4,802	4,211	87.7	6,454	5,671	87.9	7,949	6,863	86.3
No	596	489	82.0	808	683	84.5	1,138	942	82.8
Missing	136	115	84.6	101	87	86.1	138	115	83.3
All	5,534	4,815	87	7,363	6,441	87.5	9,225	7,920	85.9

*Risk factors: BMI ≥ 30 (kg/m²), self-reported history of diabetes or retinopathy, history of smoking, anemia (WHO definition), and elevated blood pressure (JNC 7).

“.” Zero values in this cell.

Table 14 (continued)

Total eligible KEEP participants with a risk factor for cardiovascular disease*

	2004			2005			2006		
	Total N	N with a risk factor	% with a risk factor	Total N	N with a risk factor	% with a risk factor	Total N	N with a risk factor	% with a risk factor
Age									
18-30	995	712	71.6	1,290	893	69.2	1,180	803	68.1
31-45	2,694	2,191	81.3	3,603	2,816	78.2	3,428	2,641	77.0
46-60	4,324	3,745	86.6	5,842	5,046	86.4	6,188	5,254	84.9
61-75	3,028	2,801	92.5	4,345	3,939	90.7	4,838	4,342	89.7
>75	952	892	93.7	1,400	1,282	91.6	1,562	1,403	89.8
Missing	4	4	100.0	2	2	100.0	.	.	.
Gender									
Male	3,816	3,396	89.0	5,426	4,737	87.3	5,434	4,711	86.7
Female	8,181	6,949	84.9	11,056	9,241	83.6	11,762	9,732	82.7
Race									
White	5,420	4,655	85.9	8,487	7,181	84.6	8,645	7,296	84.4
Black	3,866	3,461	89.5	4,696	4,157	88.5	5,257	4,626	88.0
N Am	767	713	93.0	620	547	88.2	419	378	90.2
Other	1,868	1,460	78.2	2,308	1,787	77.4	2,183	1,601	73.3
Unknown/missing	76	56	73.7	371	306	82.5	692	542	78.3
Ethnicity									
Non-Hispanic	10,369	9,042	87.2	14,381	12,273	85.3	15,117	12,812	84.8
Hispanic	1,628	1,303	80.0	2,101	1,705	81.2	2,079	1,631	78.5
U.S. Census Region									
Northeast	2,808	2,440	86.9	4,076	3,328	81.6	3,798	3,108	81.8
Midwest	2,269	1,980	87.3	2,338	2,038	87.2	2,868	2,454	85.6
South	5,722	4,969	86.8	7,838	6,771	86.4	8,390	7,166	85.4
West	1,198	956	79.8	2,226	1,838	82.6	2,134	1,709	80.1
Missing	.	.	.	4	3	75.0	6	6	100.0
U.S. Census Division									
New England	1,163	1,022	87.9	1,283	1,079	84.1	1,119	930	83.1
Middle Atlantic	1,645	1,418	86.2	2,793	2,249	80.5	2,679	2,178	81.3
East North Central	1,293	1,125	87.0	1,368	1,172	85.7	2,082	1,783	85.6
West North Central	976	855	87.6	970	866	89.3	786	671	85.4
South Atlantic	2,747	2,357	85.8	3,717	3,197	86.0	4,468	3,790	84.8
East South Central	1,615	1,414	87.6	2,023	1,743	86.2	2,305	2,021	87.7
West South Central	1,360	1,198	88.1	2,098	1,831	87.3	1,617	1,355	83.8
Mountain	863	689	79.8	1,489	1,217	81.7	1,400	1,127	80.5
Pacific	335	267	79.7	737	621	84.3	734	582	79.3
Missing	.	.	.	4	3	75.0	6	6	100.0
Smoking									
Yes	5,247	5,247	100.0	6,608	6,608	100.0	6,554	6,554	100.0
No	6,750	5,098	75.5	9,874	7,370	74.6	10,642	7,889	74.1
Education Level									
≤6 years	703	618	87.9	887	800	90.2	902	794	88.0
<12 years	1,057	985	93.2	1,589	1,443	90.8	1,643	1,493	90.9
12 years	3,183	2,825	88.8	4,201	3,686	87.7	4,195	3,626	86.4
>12 years	3,224	2,817	87.4	4,286	3,688	86.0	4,164	3,573	85.8
16 years	2,342	1,896	81.0	3,333	2,651	79.5	3,583	2,825	78.8
>16 years	1,370	1,104	80.6	1,980	1,532	77.4	2,317	1,803	77.8
Missing	118	100	84.7	206	178	86.4	392	329	83.9
Health Insurance Status									
Yes	9,463	8,194	86.6	12,925	10,942	84.7	13,527	11,379	84.1
No	2,257	1,909	84.6	2,904	2,464	84.8	3,048	2,532	83.1
Missing	277	242	87.4	653	572	87.6	621	532	85.7
Doctor Status									
Yes	10,189	8,879	87.1	14,052	12,034	85.6	14,675	12,488	85.1
No	1,545	1,243	80.5	2,150	1,705	79.3	2,212	1,700	76.9
Missing	263	223	84.8	280	239	85.4	309	255	82.5
All	11,997	10,345	86.2	16,482	13,978	84.8	17,196	14,443	84.0

*Risk factors: BMI ≥ 30 (kg/m²), self-reported history of diabetes or retinopathy, history of smoking, anemia (WHO definition), and elevated blood pressure (JNC 7).

"." Zero values in this cell.

Table 14 (continued)

Total eligible KEEP participants with a risk factor for cardiovascular disease*, by race/ethnicity

	2007			All		
	Total N	N with a risk factor	% with a risk factor	Total N	N with a risk factor	% with a risk factor
Age						
18-30	925	601	65.0	6,469	4,426	68.4
31-45	2,669	2,133	79.9	17,796	14,204	79.8
46-60	5,228	4,548	87.0	29,116	25,260	86.8
61-75	4,680	4,259	91.0	22,281	20,407	91.6
>75	1,564	1,413	90.3	7,195	6,593	91.6
Missing	.	.	.	6	6	100.0
Gender						
Male	4,959	4,383	88.4	26,548	23,390	88.1
Female	10,107	8,571	84.8	56,315	47,506	84.4
Race						
White	7,705	6,726	87.3	39,367	33,723	85.7
Black	4,775	4,232	88.6	27,108	24,005	88.6
N Am	334	305	91.3	3,619	3,313	91.5
Other	1,809	1,340	74.1	10,588	8,109	76.6
Unknown/missing	443	351	79.2	2,181	1,746	80.1
Ethnicity						
Non-Hispanic	13,193	11,467	86.9	72,945	62,915	86.2
Hispanic	1,873	1,487	79.4	9,918	7,981	80.5
U.S. Census Region						
Northeast	3,302	2,822	85.5	18,947	16,034	84.6
Midwest	1,902	1,697	89.2	12,839	11,216	87.4
South	7,755	6,664	85.9	40,976	35,401	86.4
West	2,104	1,768	84.0	10,073	8,220	81.6
Missing	3	3	100.0	28	25	89.3
U.S. Census Division						
New England	1,085	907	83.6	6,996	5,965	85.3
Middle Atlantic	2,217	1,915	86.4	11,951	10,069	84.3
East North Central	1,365	1,230	90.1	7,692	6,695	87.0
West North Central	537	467	87.0	5,147	4,521	87.8
South Atlantic	3,722	3,195	85.8	20,789	17,846	85.8
East South Central	2,690	2,342	87.1	10,981	9,528	86.8
West South Central	1,343	1,127	83.9	9,206	8,027	87.2
Mountain	1,261	1,058	83.9	6,115	5,014	82.0
Pacific	843	710	84.2	3,958	3,206	81.0
Missing	3	3	100.0	28	25	89.3
Smoking						
Yes	6,063	6,063	100.0	34,297	34,297	100.0
No	9,003	6,891	76.5	48,566	36,599	75.4
Education Level						
≤6 years	805	707	87.8	4,416	3,960	89.7
<12 years	1,492	1,354	90.8	7,922	7,263	91.7
12 years	3,961	3,523	88.9	21,360	18,912	88.5
>12 years	3,616	3,149	87.1	21,401	18,521	86.5
16 years	3,024	2,465	81.5	16,478	13,187	80.0
>16 years	1,898	1,520	80.1	10,085	8,018	79.5
Missing	270	236	87.4	1,201	1,035	86.2
Health Insurance Status						
Yes	11,727	10,142	86.5	65,619	56,227	85.7
No	3,067	2,575	84.0	14,756	12,508	84.8
Missing	271	237	87.3	2,488	2,161	86.9
Doctor Status						
Yes	12,686	11,034	87.0	70,807	61,180	86.4
No	2,175	1,745	80.2	10,624	8,507	80.1
Missing	205.0	175.0	85.4	1,432	1,209	84.4
All	15,066	12,954	86.0	82,863	70,896	85.6

*Risk factors: BMI ≥ 30 (kg/m²), self-reported history of diabetes or retinopathy, history of smoking, anemia (WHO definition), and elevated blood pressure (JNC 7).

"." Zero values in this cell.

Table 14.1

Total eligible KEEP participants with a risk factor for cardiovascular disease*, by race/ethnicity

	White		Black		N Am		Other race		Unknown/missing	
	Total N	N with a risk factor	Total N	N with a risk factor	Total N	N with a risk factor	Total N	N with a risk factor	Total N	N with a risk factor
Age										
18-30	2,439	1,655	2,058	1,476	430	360	1,285	765	257	170
31-45	6,597	5,232	6,510	5,470	939	844	3,063	2,153	687	505
46-60	13,091	11,121	10,624	9,629	1,159	1,081	3,554	2,851	688	578
61-75	12,330	11,232	6,464	6,069	874	827	2,184	1,892	429	387
>75	4,909	4,482	1,449	1,358	216	200	501	447	120	106
Missing	1	1	3	3	1	1	1	1	.	.
Gender										
Male	13,463	11,999	7,609	6,782	933	880	3,820	3,123	723	606
Female	25,904	21,724	19,499	17,223	2,686	2,433	6,768	4,986	1,458	1,140
U.S. Census Region										
Northeast	10,321	8,751	5,136	4,542	364	342	2,575	1,945	551	454
Midwest	6,551	5,774	4,024	3,594	647	620	1,295	978	322	250
South	18,107	15,573	17,296	15,290	1,398	1,306	3,364	2,584	811	648
West	4,376	3,613	641	570	1,208	1,043	3,352	2,601	496	393
Missing	12	12	11	9	2	2	2	1	1	1
U.S. Census Division										
New England	3,676	3,132	1,700	1,494	159	148	1,103	885	358	306
Middle Atlantic	6,645	5,619	3,436	3,048	205	194	1,472	1,060	193	148
East North Central	3,677	3,243	2,795	2,500	117	105	857	657	246	190
West North Central	2,874	2,531	1,229	1,094	530	515	438	321	76	60
South Atlantic	8,949	7,660	10,096	8,855	114	105	1,348	1,009	282	217
East South Central	5,786	4,989	4,503	4,032	39	35	502	351	151	121
West South Central	3,372	2,924	2,697	2,403	1,245	1,166	1,514	1,224	378	310
Mountain	3,446	2,839	245	215	1,161	999	908	691	355	270
Pacific	930	774	396	355	47	44	2,444	1,910	141	123
Missing	12	12	11	9	2	2	2	1	1	1
Smoking										
Yes	17,302	17,302	10,698	10,698	2,045	2,045	3,450	3,450	802	802
No	22,065	16,421	16,410	13,307	1,574	1,268	7,138	4,659	1,379	944
Education Level										
≤6 years	1,377	1,276	862	830	187	173	1,544	1,306	446	375
<12 years	3,046	2,849	2,763	2,603	525	501	1,218	1,007	370	303
12 years	11,293	10,042	6,404	5,859	980	912	2,204	1,733	479	366
>12 years	10,291	8,911	7,672	6,777	1,131	1,017	1,958	1,528	349	288
16 years	7,988	6,367	5,486	4,609	493	440	2,317	1,635	194	136
>16 years	5,029	3,973	3,535	2,989	250	220	1,176	761	95	75
Missing	343	305	386	338	53	50	171	139	248	203
Health Insurance Status										
Yes	33,645	28,757	21,580	19,024	2,497	2,293	6,689	5,158	1,208	995
No	4,794	4,177	4,614	4,148	1,022	929	3,522	2,639	804	615
Missing	928	789	914	833	100	91	377	311	169	136
Doctor Status										
Yes	35,403	30,488	23,400	20,779	3,002	2,760	7,558	5,949	1,444	1,204
No	3,402	2,759	3,275	2,838	552	496	2,779	1,970	616	444
Missing	562	476	433	388	65	57	251	190	121	98
All	39,367	33,723	27,108	24,005	3,619	3,313	10,588	8,109	2,181	1,746

*Risk factors: BMI ≥ 30 (kg/m²), self-reported history of diabetes or retinopathy, history of smoking, anemia (WHO definition), and elevated blood pressure (JNC 7).

“.” Zero values in this cell.

Table 14.1 (continued)

Total eligible KEEP participants with a risk factor for cardiovascular disease*, by race/ethnicity

	Hispanic		Non-Hispanic		All	
	Total N	N with a risk factor	Total N	N with a risk factor	Total N	N with a risk factor
Age						
18-30	1,366	877	5,103	3,549	6,469	4,426
31-45	3,280	2,463	14,516	11,741	17,796	14,204
46-60	3,160	2,709	25,956	22,551	29,116	25,260
61-75	1,732	1,586	20,549	18,821	22,281	20,407
>75	379	345	6,816	6,248	7,195	6,593
Missing	1	1	5	5	6	6
Gender						
Male	3,352	2,833	23,196	20,557	26,548	23,390
Female	6,566	5,148	49,749	42,358	56,315	47,506
U.S. Census Region						
Northeast	1,997	1,625	16,950	14,409	18,947	16,034
Midwest	1,536	1,202	11,303	10,014	12,839	11,216
South	4,431	3,593	36,545	31,808	40,976	35,401
West	1,950	1,558	8,123	6,662	10,073	8,220
Missing	4	3	24	22	28	25
U.S. Census Division						
New England	1,065	899	5,931	5,066	6,996	5,965
Middle Atlantic	932	726	11,019	9,343	11,951	10,069
East North Central	1,083	852	6,609	5,843	7,692	6,695
West North Central	453	350	4,694	4,171	5,147	4,521
South Atlantic	1,524	1,192	19,265	16,654	20,789	17,846
East South Central	485	352	10,496	9,176	10,981	9,528
West South Central	2,422	2,049	6,784	5,978	9,206	8,027
Mountain	1,361	1,063	4,754	3,951	6,115	5,014
Pacific	589	495	3,369	2,711	3,958	3,206
Missing	4	3	24	22	28	25
Smoking						
Yes	3,598	3,598	30,699	30,699	34,297	34,297
No	6,320	4,383	42,246	32,216	48,566	36,599
Education Level						
≤6 years	2,027	1,724	2,389	2,236	4,416	3,960
<12 years	1,572	1,308	6,350	5,955	7,922	7,263
12 years	2,312	1,838	19,048	17,074	21,360	18,912
>12 years	1,915	1,532	19,486	16,989	21,401	18,521
16 years	1,326	996	15,152	12,191	16,478	13,187
>16 years	587	433	9,498	7,585	10,085	8,018
Missing	179	150	1,022	885	1,201	1,034
Health Insurance Status						
Yes	5,296	4,381	60,323	51,846	65,619	56,227
No	4,175	3,228	10,581	9,280	14,756	12,508
Missing	447	372	2,041	1,789	2,488	2,161
Doctor Status						
Yes	6,429	5,401	64,378	55,779	70,807	61,180
No	3,156	2,321	7,468	6,186	10,624	8,507
Missing	333	259	1,099	950	1,432	1,209
All	9,918	7,981	72,945	62,915	82,863	70,896

*Risk factors: BMI ≥ 30 (kg/m²), self-reported history of diabetes or retinopathy, history of smoking, anemia (WHO definition), and elevated blood pressure (JNC 7).

Table 15

Total eligible KEEP participants with self-reported kidney disease or stones

	2000+2001	2002	2003	2004	2005	2006	2007	All
Total (answered kidney question)	6,081	8,044	9,921	13,123	17,987	18,047	15,928	89,131
Age								
18-30	26	33	43	79	92	104	85	462
31-45	107	119	174	241	440	447	374	1,902
46-60	219	239	329	474	837	907	860	3,865
61-75	181	202	263	383	728	882	910	3,549
>75	43	77	89	133	269	269	345	1,225
Gender								
Male	225	266	348	524	929	985	997	4,274
Female	351	404	549	786	1,427	1,624	1,576	6,717
Missing	.	.	1	.	10	.	1	12
Race								
White	317	373	521	764	1,478	1,583	1,667	6,703
Black	151	152	176	225	391	516	456	2,067
N Am	33	57	65	68	97	56	49	425
Other	56	76	107	248	341	329	300	1,457
Unknown/missing	19	12	29	5	59	125	102	351
Ethnicity								
Non-Hispanic	514	597	774	1,088	1,988	2,229	2,201	9,391
Hispanic	62	73	124	222	378	380	373	1,612
U.S. Census Region								
Northeast	107	121	217	280	561	559	592	2,437
Midwest	62	88	154	215	301	371	319	1,510
South	362	383	421	655	1,143	1,282	1,229	5,475
West	44	78	106	160	361	396	434	1,579
Missing	1	.	.	.	.	1	.	2
U.S. Census Division								
New England	84	71	72	105	208	163	178	881
Middle Atlantic	23	50	145	175	353	396	414	1,556
East North Central	14	55	76	137	177	274	239	972
West North Central	48	33	78	78	124	97	80	538
South Atlantic	220	244	183	313	545	627	520	2,652
East South Central	54	54	110	179	321	414	488	1,620
West South Central	88	85	128	163	277	241	221	1,203
Mountain	22	32	53	109	259	287	277	1,039
Pacific	22	46	53	51	102	109	157	540
Missing	1	.	.	.	.	1	.	2
Smoking								
Yes	267	334	418	573	980	1,027	1,119	4,718
No	279	309	449	678	1,304	1,499	1,368	5,886
Missing	30	27	31	59	82	83	87	399
Education Level								
≤6 years	54	50	60	102	154	192	184	796
<12 years	60	74	87	128	263	274	276	1,162
12 years	135	204	234	363	640	714	720	3,010
>12 years	152	174	252	331	596	591	586	2,682
16 years	106	99	165	230	414	487	462	1,963
>16 years	63	64	97	144	277	312	305	1,262
Missing	6	5	3	12	22	39	41	128
Health Insurance Status								
Yes	479	536	725	989	1,826	2,000	1,980	8,535
No	77	113	149	277	426	512	534	2,088
Missing	20	21	24	44	114	97	60	380
Doctor Status								
Yes	510	594	786	1,113	2,036	2,236	2,205	9,480
No	49	63	97	159	264	321	334	1,287
Missing	17	13	15	38	66	52	35	236
All	576	670	898	1,310	2,366	2,609	2,574	11,003

Table 15.1

Total eligible KEEP participants with self-reported kidney disease or stones, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	242	70	18	98	34	133	329	462
31-45	941	359	87	403	112	533	1,369	1,902
46-60	2,252	819	150	530	114	548	3,317	3,865
61-75	2,353	652	132	343	69	318	3,231	3,549
>75	915	167	38	83	22	80	1,145	1,225
Gender								
Male	2,804	646	120	601	103	566	3,708	4,274
Female	3,893	1,419	304	855	246	1,043	5,674	6,717
Missing	6	2	1	1	2	3	9	12
U.S. Census Region								
Northeast	1,571	359	49	382	76	319	2,118	2,437
Midwest	938	297	78	149	48	205	1,305	1,510
South	3,354	1,359	170	470	122	743	4,732	5,475
West	839	52	128	455	105	345	1,234	1,579
Missing	1	.	.	1	.	.	2	2
U.S. Census Division								
New England	517	134	22	158	50	161	720	881
Middle Atlantic	1,054	225	27	224	26	158	1,398	1,556
East North Central	583	227	17	104	41	155	817	972
West North Central	355	70	61	45	7	50	488	538
South Atlantic	1,638	778	16	177	43	267	2,385	2,652
East South Central	1,151	356	11	84	18	91	1,529	1,620
West South Central	565	225	143	209	61	385	818	1,203
Mountain	652	27	120	166	74	269	770	1,039
Pacific	187	25	8	289	31	76	464	540
Missing	1	.	.	1	.	.	2	2
Smoking								
Yes	2,993	894	234	473	124	552	4,166	4,718
No	3,518	1,086	175	902	205	971	4,915	5,886
Missing	192	87	16	82	22	89	310	399
Education Level								
≤6 years	290	120	46	255	85	370	426	796
<12 years	569	272	71	182	68	260	902	1,162
12 years	1,981	531	121	298	79	368	2,642	3,010
>12 years	1,731	545	113	237	56	270	2,412	2,682
16 years	1,242	331	51	308	31	214	1,749	1,963
>16 years	839	244	17	152	10	97	1,165	1,262
Missing	51	24	6	25	22	33	95	128
Health Insurance Status								
Yes	5,615	1,618	301	836	165	768	7,767	8,535
No	907	354	109	561	157	762	1,326	2,088
Missing	181	95	15	60	29	82	298	380
Doctor Status								
Yes	6,058	1,825	372	1,005	220	1,022	8,458	9,480
No	530	200	41	414	102	523	764	1,287
Missing	115	42	12	38	29	67	169	236
All	6,703	2,067	425	1,457	351	1,612	9,391	11,003

“.” Zero values in this cell.

Table 16

Total eligible KEEP participants with elevated PTH*

	2005	2006	2007	All
Total (eGFR<60 and CLS only, non-missing PTH)	438	2,218	2,118	4,774
Age				
18-30	1	3	4	8
31-45	1	36	30	67
46-60	30	203	216	449
61-75	100	450	481	1,031
>75	86	318	367	771
Gender				
Male	87	323	356	766
Female	131	687	742	1,560
Missing				
Race				
White	180	590	710	1,480
Black	25	296	267	588
N Am	5	29	21	55
Other	8	83	86	177
Unknown/missing	.	12	14	26
Ethnicity				
Non-Hispanic	208	941	1,026	2,175
Hispanic	10	69	72	151
U.S. Census Region				
Northeast	39	217	246	502
Midwest	35	161	134	330
South	96	488	523	1,107
West	48	144	195	387
Missing				
U.S. Census Division				
New England	7	46	62	115
Middle Atlantic	32	171	184	387
East North Central	9	114	97	220
West North Central	26	47	37	110
South Atlantic	65	235	232	532
East South Central	28	175	224	427
West South Central	3	78	67	148
Mountain	43	111	141	295
Pacific	5	33	54	92
Missing				
Smoking				
Yes	96	398	470	964
No	117	576	585	1,278
Missing	5	36	43	84
Education Level				
≤6 years	10	81	91	182
<12 years	19	137	137	293
12 years	74	304	341	719
>12 years	54	208	242	504
16 years	30	122	147	299
>16 years	29	133	122	284
Missing	2	25	18	45
Health Insurance Status				
Yes	196	871	951	2,018
No	8	88	121	217
Missing	14	51	26	91
Doctor Status				
Yes	204	948	1,026	2,178
No	9	38	53	100
Missing	5	24	19	48
All	218	1,010	1,098	2,326

Excludes participants with missing eGFR values, or eGFR \geq 60, or missing PTH values;

*CLS lab only, Elevated PTH: >70 for CKD stage 3, >110 for stage 4, and >300 for stage 5, all in pg/ml.

“.” Zero values in this cell.

Table 16.1

Total eligible KEEP participants with elevated PTH*, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	3	5	.	.	.	.	8	8
31-45	28	25	2	9	3	13	54	67
46-60	241	154	9	42	3	32	417	449
61-75	629	269	31	89	13	73	958	1,031
>75	579	135	13	37	7	33	738	771
Gender								
Male	526	143	12	75	10	54	712	766
Female	954	445	43	102	16	97	1,463	1,560
Missing								
U.S. Census Region								
Northeast	356	81	7	52	6	17	485	502
Midwest	186	105	24	13	2	15	315	330
South	656	391	4	51	5	76	1,031	1,107
West	282	11	20	61	13	43	344	387
Missing								
U.S. Census Division								
New England	53	32	2	26	2	7	108	115
Middle Atlantic	303	49	5	26	4	10	377	387
East North Central	103	95	7	13	2	12	208	220
West North Central	83	10	17	.	.	3	107	110
South Atlantic	278	230	4	17	3	30	502	532
East South Central	308	111	.	8	.	5	422	427
West South Central	70	50	.	26	2	41	107	148
Mountain	241	6	20	17	11	30	265	295
Pacific	41	5	.	44	2	13	79	92
Missing								
Smoking								
Yes	627	241	32	53	11	62	902	964
No	802	322	23	118	13	80	1,198	1,278
Missing	51	25	.	6	2	9	75	84
Education Level								
≤6 years	92	38	4	43	5	44	138	182
<12 years	158	104	11	15	5	20	273	293
12 years	495	168	14	37	5	37	682	719
>12 years	325	129	20	25	5	25	479	504
16 years	196	68	2	32	1	14	285	299
>16 years	188	69	4	23	.	9	275	284
Missing	26	12	.	2	5	2	43	45
Health Insurance Status								
Yes	1,340	490	45	121	22	103	1,915	2,018
No	89	72	10	44	2	35	182	217
Missing	51	26	.	12	2	13	78	91
Doctor Status								
Yes	1,403	557	48	147	23	123	2,055	2,178
No	42	23	7	26	2	24	76	100
Missing	35	8	.	4	1	4	44	48
All	1,480	588	55	177	26	151	2,175	2,326

Excludes participants with missing eGFR values, or eGFR ≥ 60 , or missing PTH values;

*CLS lab only, Elevated PTH: >70 for CKD stage 3, >110 for stage 4, and >300 for stage 5, all in pg/ml.

“.” Zero values in this cell.

Table 17

Total eligible KEEP participants with abnormal calcium*

	2005	2006	2007	All
Total (eGFR<60 and CLS only, non-missing calcium)	444	2,306	2,199	4,949
Age				
18-30				
31-45	.	2	4	6
46-60	2	48	49	99
61-75	13	90	106	209
>75	8	43	63	114
Gender				
Male	10	35	53	98
Female	13	148	169	330
Missing				
Race				
White	22	116	148	286
Black	.	42	54	96
N Am	1	2	1	4
Other	.	20	17	37
Unknown/missing	.	3	2	5
Ethnicity				
Non-Hispanic	22	173	209	404
Hispanic	1	10	13	24
U.S. Census Region				
Northeast	4	44	44	92
Midwest	4	26	26	56
South	5	88	114	207
West	10	25	38	73
Missing				
U.S. Census Division				
New England	.	14	16	30
Middle Atlantic	4	30	28	62
East North Central	.	17	15	32
West North Central	4	9	11	24
South Atlantic	5	48	44	97
East South Central	.	30	58	88
West South Central	.	10	12	22
Mountain	10	14	29	53
Pacific	.	11	9	20
Missing				
Smoking				
Yes	11	74	96	181
No	12	106	120	238
Missing	.	3	6	9
Education Level				
≤6 years	1	10	13	24
<12 years	1	25	27	53
12 years	9	51	69	129
>12 years	7	40	54	101
16 years	2	23	29	54
>16 years	2	25	26	53
Missing	1	9	4	14
Health Insurance Status				
Yes	20	151	196	367
No	1	22	21	44
Missing	2	10	5	17
Doctor Status				
Yes	21	169	212	402
No	2	11	9	22
Missing	.	3	1	4
All	23	183	222	428

Excludes participants with missing values for eGFR, or eGFR ≥60, or missing value for calcium; *CLS lab only, abnormal calcium (<8.4 or >10.2, in mg/dl).

“.” Zero values in this cell.

Table 17.1

Total eligible KEEP participants with elevated calcium*, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	5	1	.	.	.	2	4	6
31-45	60	25	.	11	3	8	91	99
46-60	133	52	4	18	2	7	202	209
61-75	88	18	.	8	.	7	107	114
>75								
Gender								
Male	69	17	.	11	1	7	91	98
Female	217	79	4	26	4	17	313	330
Missing								
U.S. Census Region								
Northeast	61	19	.	9	3	7	85	92
Midwest	36	19	1	.	.	1	55	56
South	140	57	.	8	2	11	196	207
West	49	1	3	20	.	5	68	73
Missing								
U.S. Census Division								
New England	12	8	.	8	2	6	24	30
Middle Atlantic	49	11	.	1	1	1	61	62
East North Central	17	15	.	.	.	1	31	32
West North Central	19	4	1	.	.	.	24	24
South Atlantic	63	29	.	4	1	7	90	97
East South Central	66	20	.	1	1	1	87	88
West South Central	11	8	.	3	.	3	19	22
Mountain	44	1	3	5	.	3	50	53
Pacific	5	.	.	15	.	2	18	20
Missing								
Smoking								
Yes	124	47	1	9	.	4	177	181
No	155	47	3	28	5	19	219	238
Missing	7	2	.	.	.	1	8	9
Education Level								
≤6 years	11	5	1	5	2	8	16	24
<12 years	30	16	2	5	.	4	49	53
12 years	92	27	1	9	.	5	124	129
>12 years	71	23	.	5	2	4	97	101
16 years	41	7	.	6	.	2	52	54
>16 years	34	13	.	6	.	.	53	53
Missing	7	5	.	1	1	1	13	14
Health Insurance Status								
Yes	253	78	3	29	4	15	352	367
No	22	13	1	7	1	7	37	44
Missing	11	5	.	1	.	2	15	17
Doctor Status								
Yes	271	93	3	30	5	17	385	402
No	13	3	1	5	.	6	16	22
Missing	2	.	.	2	.	1	3	4
All	286	96	4	37	5	24	404	428

Excludes participants with missing values for eGFR, or eGFR ≥ 60 , or missing value for calcium;

*CLS lab only, abnormal calcium (< 8.4 or > 10.2 , in mg/dl).

“.” Zero values in this cell.

Table 18

Total eligible KEEP participants with abnormal phosphorus*

	2005	2006	2007	All
Total (eGFR<60 and CLS only, non-missing phosphorus)	444	2,307	2,200	4,951
Age				
18-30	1	2	2	5
31-45	.	14	8	22
46-60	5	62	54	121
61-75	11	91	88	190
>75	6	48	55	109
Gender				
Male	16	65	55	136
Female	7	152	152	311
Missing				
Race				
White	21	143	133	297
Black	2	44	45	91
N Am	.	8	5	13
Other	.	17	20	37
Unknown/missing	.	5	4	9
Ethnicity				
Non-Hispanic	22	207	191	420
Hispanic	1	10	16	27
U.S. Census Region				
Northeast	6	45	54	105
Midwest	4	33	25	62
South	10	106	87	203
West	3	32	41	76
Missing	.	1	.	1
U.S. Census Division				
New England	.	16	18	34
Middle Atlantic	6	29	36	71
East North Central	.	15	11	26
West North Central	4	18	14	36
South Atlantic	7	49	40	96
East South Central	3	47	37	87
West South Central	.	10	10	20
Mountain	3	22	34	59
Pacific	.	10	7	17
Missing	.	1	.	1
Smoking				
Yes	12	82	78	172
No	11	133	124	268
Missing	.	2	5	7
Education Level				
≤6 years	1	20	11	32
<12 years	2	33	28	63
12 years	8	61	63	132
>12 years	6	45	46	97
16 years	2	25	28	55
>16 years	4	27	28	59
Missing	.	6	3	9
Health Insurance Status				
Yes	20	177	177	374
No	1	29	25	55
Missing	2	11	5	18
Doctor Status				
Yes	22	201	188	411
No	1	10	18	29
Missing	.	6	1	7
All	23	217	207	447

Excludes participants with missing values for eGFR, or eGFR ≥60, or missing value for phosphorus;

*CLS lab only, abnormal phosphorus (<2.7 or >4.6 stage 3 and 4, and <3.5 or >5.5 stage 5, all in mg/dl).

“.” Zero values in this cell.

Table 18.1

Total eligible KEEP participants with abnormal phosphorus*, by race/ethnicity

	White	Black	N Am	Other race	Unknown/missing	Hispanic	non-Hispanic	All
Age								
18-30	4	1	.	.	.	.	5	5
31-45	14	4	2	2	.	4	18	22
46-60	69	34	3	10	5	11	110	121
61-75	125	37	6	18	4	8	182	190
>75	85	15	2	7	.	4	105	109
Gender								
Male	97	26	2	9	2	9	127	136
Female	200	65	11	28	7	18	293	311
Missing								
U.S. Census Region								
Northeast	68	18	2	14	3	4	101	105
Midwest	38	14	7	2	1	1	61	62
South	138	55	1	7	2	14	189	203
West	53	3	3	14	3	8	68	76
Missing	.	1	.	.	.	.	1	1
U.S. Census Division								
New England	15	7	1	9	2	3	31	34
Middle Atlantic	53	11	1	5	1	1	70	71
East North Central	17	7	1	.	1	1	25	26
West North Central	21	7	6	2	.	.	36	36
South Atlantic	65	26	1	3	1	6	90	96
East South Central	63	22	.	1	1	2	85	87
West South Central	10	7	.	3	.	6	14	20
Mountain	48	1	3	4	3	6	53	59
Pacific	5	2	.	10	.	2	15	17
Missing	.	1	.	.	.	.	1	1
Smoking								
Yes	118	35	9	9	1	9	163	172
No	175	53	4	28	8	18	250	268
Missing	4	3	.	.	.	.	7	7
Education Level								
≤6 years	15	5	1	9	2	8	24	32
<12 years	33	19	4	4	3	8	55	63
12 years	92	31	3	6	.	4	128	132
>12 years	71	15	3	6	2	5	92	97
16 years	39	11	1	4	.	1	54	55
>16 years	44	6	1	8	.	1	58	59
Missing	3	4	.	.	2	.	9	9
Health Insurance Status								
Yes	254	73	12	29	6	16	358	374
No	31	13	1	8	2	10	45	55
Missing	12	5	.	.	1	1	17	18
Doctor Status								
Yes	280	84	11	30	6	19	392	411
No	14	4	2	6	3	8	21	29
Missing	3	3	.	1	.	.	7	7
All	297	91	13	37	9	27	420	447

Excludes participants with missing values for eGFR, or eGFR ≥ 60 , or missing value for phosphorus;

*CLS lab only, abnormal phosphorus (<2.7 or >4.6 stage 3 and 4, and <3.5 or >5.5 stage 5, all in mg/dl).

“.” Zero values in this cell.

Table 19

Total eligible KEEP participants with high cholesterol*

	SR			cholesterol level > 200 mg/				SR or cholesterol level > 200 mg/dL			
	2006	2007	All	2005	2006	2007	All	2005	2006	2007	All
Total (non-missing)	7,542	14,147	21,689	11,341	17,906	15,582	44,829	11,341	18,035	15,940	45,316
Age											
18-30	38	118	156	238	319	270	827	238	341	314	893
31-45	390	723	1,113	1,063	1,535	1,224	3,822	1,063	1,684	1,500	4,247
46-60	1,300	2,385	3,686	2,070	3,478	2,774	8,322	2,071	4,013	3,809	9,893
61-75	1,400	2,950	4,350	1,493	2,322	2,122	5,937	1,493	3,071	3,793	8,357
>75	467	1,018	1,485	397	631	587	1,615	397	915	1,253	2,565
Gender											
Male	1,042	2,281	3,323	1,455	2,136	1,861	5,452	1,455	2,772	3,312	7,539
Female	2,552	4,912	7,465	3,784	6,148	5,116	15,048	3,785	7,251	7,356	18,392
Missing	1	1	2	23	1	.	24	23	1	1	25
Race											
White	1,884	4,159	6,044	2,748	4,102	3,473	10,323	2,749	5,043	5,769	13,561
Black	1,138	2,047	3,185	1,457	2,536	2,210	6,203	1,457	3,056	3,139	7,652
N Am	129	119	248	173	151	122	446	173	229	192	594
Other	354	700	1,054	670	1,118	928	2,716	670	1,279	1,249	3,198
Unknown/missing	90	169	259	214	378	244	836	214	417	320	951
Ethnicity											
Non-Hispanic	3,289	6,482	9,772	4,487	7,207	5,963	17,657	4,488	8,810	9,359	22,657
Hispanic	306	712	1,018	775	1,078	1,014	2,867	775	1,214	1,310	3,299
U.S. Census Region											
Northeast	935	1,647	2,582	1,364	1,828	1,543	4,735	1,364	2,272	2,388	6,024
Midwest	542	883	1,425	698	1,393	868	2,959	698	1,663	1,339	3,700
South	1,866	3,713	5,579	2,441	4,073	3,589	10,103	2,441	4,961	5,479	12,881
West	250	950	1,201	756	988	975	2,719	757	1,125	1,461	3,343
Missing	2	1	3	3	3	2	8	3	3	2	8
U.S. Census Division											
New England	258	525	783	478	537	556	1,571	478	650	811	1,939
Middle Atlantic	677	1,122	1,799	886	1,291	987	3,164	886	1,622	1,577	4,085
East North Central	411	677	1,088	451	1,047	631	2,129	451	1,241	981	2,673
West North Central	131	206	337	247	346	237	830	247	422	358	1,027
South Atlantic	966	1,663	2,629	1,209	2,220	1,743	5,172	1,209	2,638	2,544	6,391
East South Central	583	1,538	2,121	605	1,097	1,195	2,897	605	1,402	2,031	4,038
West South Central	317	512	829	627	756	651	2,034	627	921	904	2,452
Mountain	156	536	693	622	661	591	1,874	623	747	870	2,240
Pacific	94	414	508	134	327	384	845	134	378	591	1,103
Missing	2	1	3	3	3	2	8	3	3	2	8
Smoking											
Yes	1,451	2,953	4,404	1,988	2,981	2,606	7,575	1,988	3,729	4,211	9,928
No	2,047	3,980	6,028	3,116	5,056	4,102	12,274	3,117	5,997	6,057	15,171
Missing	97	261	358	158	248	269	675	158	298	401	857
Education Level											
≤6 years	229	388	617	308	477	408	1,193	308	587	622	1,517
<12 years	408	705	1,113	534	808	671	2,013	534	1,005	1,035	2,574
12 years	984	2,019	3,003	1,398	2,081	1,829	5,308	1,398	2,568	2,886	6,852
>12 years	805	1,744	2,549	1,347	1,954	1,670	4,971	1,347	2,332	2,572	6,251
16 years	646	1,312	1,958	968	1,658	1,422	4,048	968	1,962	2,058	4,988
>16 years	435	900	1,335	602	1,095	847	2,544	602	1,323	1,303	3,228
Missing	88	126	215	105	212	129	446	106	247	192	545
Health Insurance Status											
Yes	2,985	6,020	9,006	3,954	6,296	5,209	15,459	3,955	7,804	8,466	20,225
No	496	1,049	1,545	1,030	1,662	1,627	4,319	1,030	1,843	1,997	4,870
Missing	114	123	237	278	327	140	745	278	377	204	859
Doctor Status											
Yes	3,304	6,523	9,828	4,386	6,890	5,707	16,983	4,387	8,542	9,195	22,124
No	223	571	794	758	1,186	1,155	3,099	758	1,247	1,314	3,319
Missing	68	100	168	118	209	115	442	118	235	160	513
All	3,595	7,194	10,790	5,262	8,285	6,977	20,524	5,263	10,024	10,669	25,956

Excludes participants with missing SR cholesterol data, or missing cholesterol values.

*CLS only, high cholesterol (self-reported HC or cholesterol > 200 mg/dl).

“.” Zero values in this cell.

Table 19.1

Total eligible KEEP participants with high cholesterol*, by race/ethnicity

	SR				Unknown/ missing	Hispanic	non-Hispanic	All
	White	Black	N Am	Other race				
Age								
18-30	69	50	9	18	10	29	127	156
31-45	477	384	30	163	59	218	895	1,113
46-60	1,833	1,269	92	404	88	378	3,308	3,686
61-75	2,576	1,210	98	388	78	316	4,034	4,350
>75	1,089	272	19	81	24	77	1,408	1,485
Gender								
Male	1,978	813	57	395	80	320	3,003	3,323
Female	4,065	2,372	191	659	178	698	6,767	7,465
Missing	1	.	.	.	1	.	2	2
U.S. Census Region								
Northeast	1,471	575	40	403	93	299	2,283	2,582
Midwest	872	351	120	59	23	87	1,338	1,425
South	2,997	2,174	16	327	65	416	5,163	5,579
West	703	84	72	264	78	216	985	1,201
Missing	1	1	.	1	.	.	3	3
U.S. Census Division								
New England	369	198	8	149	59	144	639	783
Middle Atlantic	1,102	377	32	254	34	155	1,644	1,799
East North Central	658	334	26	49	21	76	1,012	1,088
West North Central	214	17	94	10	2	11	326	337
South Atlantic	1,238	1,249	8	116	18	144	2,485	2,629
East South Central	1,430	624	7	52	8	33	2,088	2,121
West South Central	329	301	1	159	39	239	590	829
Mountain	520	18	68	64	23	89	604	693
Pacific	183	66	4	200	55	127	381	508
Missing	1	1	.	1	.	.	3	3
Smoking								
Yes	2,635	1,246	151	288	84	331	4,073	4,404
No	3,216	1,827	93	729	163	643	5,385	6,028
Missing	193	112	4	37	12	44	314	358
Education Level								
≤6 years	268	125	11	159	54	219	398	617
<12 years	547	381	38	100	47	155	958	1,113
12 years	1,904	796	59	200	44	219	2,784	3,003
>12 years	1,457	810	79	157	46	178	2,371	2,549
16 years	1,044	583	40	269	22	164	1,794	1,958
>16 years	741	422	16	145	11	55	1,280	1,335
Missing	83	68	5	24	35	28	187	215
Health Insurance Status								
Yes	5,251	2,648	190	748	169	655	8,351	9,006
No	691	451	48	282	73	340	1,205	1,545
Missing	101	85	10	24	17	23	214	237
Doctor Status								
Yes	5,619	2,910	227	864	208	791	9,037	9,828
No	340	222	20	172	40	205	589	794
Missing	85	53	1	18	11	22	146	168
All	6,044	3,185	248	1,054	259	1,018	9,772	10,790

Excludes participants with missing SR cholesterol data, or missing cholesterol values.

*CLS only, high cholesterol (self-reported HC or cholesterol > 200 mg/dl).

“.” Zero values in this cell.

Table 19.1 (continued)

Total eligible KEEP participants with high cholesterol*, by race/ethnicity

	cholesterol level > 200 mg/dL				Unknown missing	Hispanic	non-Hispanic	All
	White	Black	N Am	Other race				
Age								
18-30	354	213	37	166	57	209	618	827
31-45	1,568	1,197	88	708	261	905	2,917	3,822
46-60	3,960	2,742	171	1,146	303	1,107	7,215	8,322
61-75	3,376	1,667	131	590	173	558	5,379	5,937
>75	1,065	383	19	106	42	88	1,527	1,615
Gender								
Male	2,684	1,499	99	920	250	927	4,525	5,452
Female	7,632	4,695	346	1,794	581	1,934	13,114	15,048
Missing	7	9	1	2	5	6	18	24
U.S. Census Region								
Northeast	2,584	1,153	56	759	183	550	4,185	4,735
Midwest	1,592	832	105	285	145	397	2,562	2,959
South	4,682	4,100	81	962	278	1,318	8,785	10,103
West	1,461	117	203	708	230	602	2,117	2,719
Missing	4	1	1	2	.	.	8	8
U.S. Census Division								
New England	746	391	23	297	114	262	1,309	1,571
Middle Atlantic	1,838	762	33	462	69	288	2,876	3,164
East North Central	1,029	723	28	224	125	326	1,803	2,129
West North Central	563	109	77	61	20	71	759	830
South Atlantic	2,254	2,485	25	314	94	411	4,761	5,172
East South Central	1,609	1,077	13	147	51	152	2,745	2,897
West South Central	819	538	43	501	133	755	1,279	2,034
Mountain	1,186	52	198	265	173	441	1,433	1,874
Pacific	275	65	5	443	57	161	684	845
Missing	4	1	1	2	.	.	8	8
Smoking								
Yes	4,181	2,193	226	713	262	859	6,716	7,575
No	5,860	3,780	214	1,902	518	1,878	10,396	12,274
Missing	282	230	6	101	56	130	545	675
Education Level								
≤6 years	378	200	14	418	183	635	558	1,193
<12 years	813	698	57	311	134	435	1,578	2,013
12 years	3,038	1,466	110	537	157	645	4,663	5,308
>12 years	2,606	1,681	140	404	140	503	4,468	4,971
16 years	2,033	1,205	82	662	66	403	3,645	4,048
>16 years	1,327	819	37	329	32	180	2,364	2,544
Missing	128	134	6	54	124	65	381	446
Health Insurance Status								
Yes	8,410	4,822	295	1,531	401	1,339	14,120	15,459
No	1,639	1,129	139	1,083	329	1,373	2,946	4,319
Missing	274	251	12	102	106	155	590	745
Doctor Status								
Yes	8,984	5,334	369	1,800	496	1,658	15,325	16,983
No	1,181	747	68	841	262	1,065	2,034	3,099
Missing	158	122	9	75	78	144	298	442
All	10,323	6,203	446	2,716	836	2,867	17,657	20,524

Excludes participants with missing SR cholesterol data, or missing cholesterol values.

*CLS only, high cholesterol (self-reported HC or cholesterol > 200 mg/dl).

“.” Zero values in this cell.

Table 19.1 (continued)

Total eligible KEEP participants with high cholesterol*, by race/ethnicity

	SR or cholesterol level > 200 mg/dL				Unknown missing	Hispanic	non-Hispanic	All
	White	Black	N Am	Other race				
Age								
18-30	383	236	41	174	59	220	673	893
31-45	1,747	1,346	107	765	282	986	3,261	4,247
46-60	4,790	3,246	218	1,300	339	1,242	8,651	9,893
61-75	4,857	2,293	194	803	210	713	7,644	8,357
>75	1,784	530	34	156	61	138	2,427	2,565
Gender								
Male	4,040	1,939	136	1,133	291	1,085	6,454	7,539
Female	9,513	5,704	457	2,063	655	2,208	16,184	18,392
Missing	8	9	1	2	5	6	19	25
U.S. Census Region								
Northeast	3,384	1,406	81	929	224	675	5,349	6,024
Midwest	2,070	991	177	310	152	433	3,267	3,700
South	6,270	5,100	89	1,115	307	1,488	11,393	12,881
West	1,833	154	246	842	268	703	2,640	3,343
Missing	4	1	1	2	.	.	8	8
U.S. Census Division								
New England	937	478	28	357	139	317	1,622	1,939
Middle Atlantic	2,447	928	53	572	85	358	3,727	4,085
East North Central	1,381	875	43	242	132	355	2,318	2,673
West North Central	689	116	134	68	20	78	949	1,027
South Atlantic	2,864	3,035	29	362	101	454	5,937	6,391
East South Central	2,421	1,375	16	173	53	166	3,872	4,038
West South Central	985	690	44	580	153	868	1,584	2,452
Mountain	1,463	59	239	295	184	479	1,761	2,240
Pacific	370	95	7	547	84	224	879	1,103
Missing	4	1	1	2	.	.	8	8
Smoking								
Yes	5,665	2,794	319	847	303	1,014	8,914	9,928
No	7,512	4,570	266	2,234	589	2,141	13,030	15,171
Missing	384	288	9	117	59	144	713	857
Education Level								
≤6 years	521	274	20	492	210	737	780	1,517
<12 years	1,105	876	87	356	150	498	2,076	2,574
12 years	4,059	1,838	146	628	181	741	6,111	6,852
>12 years	3,387	2,039	182	480	163	576	5,675	6,251
16 years	2,576	1,457	105	773	77	468	4,520	4,988
>16 years	1,742	1,001	45	404	36	204	3,024	3,228
Missing	171	167	9	64	134	74	471	545
Health Insurance Status								
Yes	11,337	6,075	414	1,910	489	1,657	18,568	20,225
No	1,898	1,286	162	1,175	349	1,475	3,395	4,870
Missing	325	290	18	113	113	167	692	859
Doctor Status								
Yes	12,084	6,700	509	2,232	599	2,044	20,080	22,124
No	1,273	813	76	886	271	1,104	2,215	3,319
Missing	204	139	9	80	81	151	362	513
All	13,561	7,652	594	3,198	951	3,299	22,657	25,956

Excludes participants with missing SR cholesterol data, or missing cholesterol values.

*CLS only, high cholesterol (self-reported HC or cholesterol > 200 mg/dl).

"." Zero values in this cell.

Table 20

Counts of KEEP participants, by affiliate

	2000+2001	2002	2003	2004	2005	2006	2007	All
Alabama	.	.	55	99	127	190	135	606
Arizona	138	261	108	486	611	620	223	2,447
Arkansas	.	.	.	28	193	.	.	221
Northern California	33	33	164	45	200	239	565	1,279
Southern California	90	.	.	.	.	.	66	156
National Capital Area	.	.	1	.	87	838	1,211	2,137
Colorado/Idaho/Montana/Wyoming	.	.	.	.	29	176	193	398
Connecticut	265	272	296	447	548	340	585	2,753
Delaware Valley	105	37	264	231	384	197	117	1,335
Florida	679	1,158	752	766	517	619	601	5,092
Georgia	681	443	97	237	308	715	444	2,925
Hawaii	200	463	396	258	602	537	270	2,726
Illinois	60	233	176	485	437	718	.	2,109
Indiana	35	388	465	573	737	728	740	3,666
Iowa	183	56	42	161	186	224	.	852
Kansas/Western MO	.	.	.	28	125	.	.	153
Kentucky	198	76	.	352	688	829	891	3,034
Louisiana	184	361	496	561	552	476	485	3,115
Maine	234	181	100	77	174	83	174	1,023
Mass./Rhode Isl./N. Hampshire/Vermont	475	329	429	766	762	796	501	4,058
Michigan	35	.	.	.	.	.	90	125
Minnesota/Dakotas	41	57	260	344	186	263	349	1,500
Mississippi	164	99	368	338	291	505	407	2,172
Eastern MO/Metro-East MO	445	336	473	365	354	176	.	2,149
Nebraska	19	140	187	275	263	212	233	1,329
Central New York	.	373	708	368	279	155	271	2,154
Greater New York	.	.	.	405	804	1,083	692	2,984
Northeast New York	17	.	170	110	599	377	274	1,547
Upstate New York	125	138	129	123	189	211	131	1,046
Western New York	.	530	79	196	296	205	386	1,692
North Carolina	285	290	459	815	467	180	224	2,720
Ohio	.	.	103	228	237	471	466	1,505
Oklahoma	370	550	364	400	422	31	.	2,137
Oregon/Washington	.	.	.	45	56	.	.	101
Alleghenic	.	.	123	323	867	1,079	853	3,245
South Carolina	326	266	497	621	1,101	1,086	846	4,743
East Tennessee	.	123	613	597	671	633	768	3,405
Middle Tennessee	61	151	136	206	235	267	414	1,470
West Tennessee	81	69	298	114	185	93	202	1,042
North Texas	1	.	150	288	459	729	436	2,063
South and Central Texas	160	12	140	172	379	358	236	1,457
Southeast Texas	.	.	.	.	83	.	165	248
West Texas	65	58	.	.	195	128	121	567
Utah	40	25	51	277	656	558	848	2,455
Virginia	287	386	263	673	1,240	847	233	3,929
Wisconsin	.	.	.	.	25	144	90	259
New Mexico	.	150	510	240	325	185	83	1,493
All	6,082	8,044	9,922	13,123	18,131	18,301	16,019	89,622

Table 20.1
eGFR <60ml/min/1.73 m², by affiliate

	Total N	N with eGFR	% with eGFR	Odds ratio	Lower limit	Upper limit
Alabama	589	122	20.7	1.13	0.91	1.39
Arizona	2,153	567	26.3	1.54	1.37	1.74
Arkansas	218	60	27.5	1.64	1.21	2.23
Northern California	1,207	158	13.1	0.65	0.54	0.78
Southern California	143	11	7.7	0.36	0.19	0.67
National Capital Area	2,103	146	6.9	0.32	0.27	0.39
Colorado/Idaho/Montana/Wyoming	371	75	20.22	1.09	0.84	1.42
Connecticut	2,534	326	12.9	0.64	0.56	0.73
Delaware Valley	1,262	263	20.8	1.14	0.97	1.33
Florida (reference group)	4,791	901	18.8	1.00		
Georgia	2,767	361	13.1	0.65	0.57	0.74
Hawaii	2,694	409	15.2	0.77	0.68	0.88
Illinois	1,930	284	14.7	0.75	0.64	0.86
Indiana	3,529	577	16.4	0.84	0.75	0.95
Iowa	827	136	16.4	0.85	0.70	1.04
Kansas/Western MO	145	19	13.1	0.65	0.40	1.06
Kentucky	2,964	577	19.5	1.04	0.93	1.17
Louisiana	3,038	395	13.0	0.65	0.57	0.73
Maine	995	228	22.9	1.28	1.09	1.51
Mass./Rhode Isl./N. Hampshire/Vermont	3,701	800	21.62	1.19	1.07	1.33
Michigan	102	18	17.7	0.93	0.55	1.55
Minnesota/Dakotas	1,473	304	20.6	1.12	0.97	1.30
Mississippi	2,124	293	13.8	0.69	0.60	0.80
Eastern MO/Metro-East MO	2,047	447	21.8	1.21	1.06	1.37
Nebraska	1,244	173	13.9	0.70	0.59	0.83
Central New York	1,925	265	13.8	0.69	0.59	0.80
Greater New York	2,908	328	11.3	0.55	0.48	0.63
Northeast New York	1,459	153	10.5	0.51	0.42	0.61
Upstate New York	1,001	189	18.9	1.01	0.84	1.20
Western New York	1,636	374	22.9	1.28	1.12	1.47
North Carolina	2,616	380	14.5	0.73	0.64	0.84
Ohio	1,425	211	14.8	0.75	0.64	0.88
Oklahoma	1,960	333	17.0	0.88	0.77	1.02
Oregon/Washington	98	24	24.5	1.40	0.88	2.23
Alleghenic	3,160	686	21.7	1.20	1.07	1.34
South Carolina	4,510	825	18.3	0.97	0.87	1.07
East Tennessee	3,218	458	14.2	0.72	0.63	0.81
Middle Tennessee	1,376	290	21.1	1.15	0.99	1.34
West Tennessee	951	82	8.6	0.41	0.32	0.52
North Texas	1,850	246	13.3	0.66	0.57	0.77
South and Central Texas	1,348	192	14.2	0.72	0.61	0.85
Southeast Texas	226	28	12.4	0.61	0.41	0.91
West Texas	519	94	18.1	0.96	0.76	1.21
Utah	2,350	490	20.9	1.14	1.01	1.29
Virginia	3,786	663	17.5	0.92	0.82	1.02
Wisconsin	219	42	19.2	1.02	0.73	1.45
New Mexico	1,380	117	8.5	0.40	0.33	0.49
All	84,872	14,120	16.6			

Excludes participants with missing values for eGFR.

Table 20.2

Microalbuminuria*, by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	606	269	44.4	0.87	0.73	1.03
Arizona	2,447	868	35.5	0.60	0.54	0.66
Arkansas	221	87	39.4	0.71	0.54	0.93
Northern California	1,279	516	40.3	0.74	0.65	0.83
Southern California	156	82	52.6	1.21	0.88	1.66
National Capital Area	2,137	1,079	50.5	1.11	1.00	1.23
Colorado/Idaho/Montana/Wyoming	398	141	35.4	0.60	0.48	0.74
Connecticut	2,753	1,360	49.4	1.06	0.97	1.17
Delaware Valley	1,335	663	49.7	1.08	0.95	1.21
Florida	5,092	2,437	47.9	1.00		
Georgia	2,925	1,552	53.1	1.23	1.12	1.35
Hawaii	2,726	1,239	45.5	0.91	0.83	1.00
Illinois	2,109	1,020	48.4	1.02	0.92	1.13
Indiana	3,666	1,720	46.9	0.96	0.88	1.05
Iowa	852	350	41.1	0.76	0.66	0.88
Kansas/Western MO	153	63	41.2	0.76	0.55	1.06
Kentucky	3,034	1,295	42.7	0.81	0.74	0.89
Louisiana	3,115	1,618	51.9	1.18	1.08	1.29
Maine	1,023	333	32.6	0.53	0.46	0.61
Mass./Rhode Isl./N. Hampshire/Vermont	4,058	1,676	41.3	0.77	0.71	0.83
Michigan	125	44	35.2	0.59	0.41	0.86
Minnesota/Dakotas	1,500	514	34.3	0.57	0.50	0.64
Mississippi	2,172	1,093	50.3	1.10	1.00	1.22
Eastern MO/Metro-East MO	2,149	859	40.0	0.73	0.66	0.80
Nebraska	1,329	561	42.2	0.80	0.70	0.90
Central New York	2,154	1,140	52.9	1.23	1.11	1.36
Greater New York	2,984	1,346	45.1	0.90	0.82	0.98
Northeast New York	1,547	599	38.7	0.69	0.61	0.77
Upstate New York	1,046	472	45.1	0.90	0.78	1.02
Western New York	1,692	813	48.0	1.01	0.90	1.13
North Carolina	2,720	1,163	42.8	0.81	0.74	0.89
Ohio	1,505	678	45.0	0.89	0.80	1.00
Oklahoma	2,137	879	41.1	0.76	0.69	0.84
Oregon/Washington	101	27	26.7	0.40	0.26	0.62
Alleghenic	3,245	1,436	44.3	0.87	0.79	0.95
South Carolina	4,743	2,237	47.2	0.97	0.90	1.05
East Tennessee	3,405	1,429	42.0	0.79	0.72	0.86
Middle Tennessee	1,470	737	50.1	1.10	0.98	1.23
West Tennessee	1,042	523	50.2	1.10	0.96	1.25
North Texas	2,063	1,036	50.2	1.10	0.99	1.22
South and Central Texas	1,457	584	40.1	0.73	0.65	0.82
Southeast Texas	248	89	35.9	0.61	0.47	0.80
West Texas	567	226	39.9	0.72	0.61	0.86
Utah	2,455	903	36.8	0.63	0.57	0.70
Virginia	3,929	1,679	42.7	0.81	0.75	0.88
Wisconsin	259	109	42.1	0.79	0.62	1.02
New Mexico	1,493	790	52.9	1.22	1.09	1.37
All	89,622	40,334	45.0			

*Positive, trace, or microalbuminuria value >20 mg/L

Table 20.3
ACR \geq 30, by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	600	83	13.8	1.09	0.85	1.41
Arizona	2,069	211	10.2	0.77	0.65	0.92
Arkansas	219	20	9.1	0.69	0.43	1.10
Northern California	1,098	143	13.0	1.02	0.84	1.25
Southern California	65	12	18.5	1.54	0.82	2.91
National Capital Area	2,088	177	8.5	0.63	0.53	0.76
Colorado/Idaho/Montana/Wyoming	393	44	11.2	0.86	0.62	1.19
Connecticut	2,385	266	11.2	0.86	0.73	1.00
Delaware Valley	1,216	187	15.4	1.00		
Florida (reference group)	3,891	498	12.8	1.24	1.03	1.49
Georgia	2,115	278	13.1	1.03	0.88	1.21
Hawaii	2,282	318	13.9	1.10	0.95	1.28
Illinois	1,992	248	12.5	0.97	0.82	1.14
Indiana	3,545	417	11.8	0.91	0.79	1.04
Iowa	667	53	8.0	0.59	0.44	0.79
Kansas/Western MO	152	15	9.9	0.75	0.43	1.28
Kentucky	2,745	259	9.4	0.71	0.61	0.83
Louisiana	2,826	341	12.1	0.94	0.81	1.08
Maine	723	54	7.5	0.55	0.41	0.74
Mass./Rhode Isl./N. Hampshire/Vermont	3,412	407	11.93	0.92	0.80	1.06
Michigan	90	13	14.4	1.15	0.63	2.09
Minnesota/Dakotas	1,444	165	11.4	0.88	0.73	1.06
Mississippi	1,921	261	13.6	1.07	0.91	1.26
Eastern MO/Metro-East MO	1,608	190	11.8	0.91	0.76	1.09
Nebraska	1,114	153	13.7	1.09	0.89	1.32
Central New York	1,944	203	10.4	0.79	0.67	0.95
Greater New York	2,946	338	11.5	0.88	0.76	1.02
Northeast New York	1,496	144	9.6	0.73	0.60	0.88
Upstate New York	824	128	15.5	1.25	1.02	1.55
Western New York	1,613	199	12.3	0.96	0.80	1.14
North Carolina	2,224	231	10.4	0.79	0.67	0.93
Ohio	1,489	186	12.5	0.97	0.81	1.17
Oklahoma	1,659	254	15.3	1.23	1.05	1.45
Oregon/Washington	88	5	5.7	0.41	0.17	1.02
Alleghenic	3,204	479	15.0	1.20	1.05	1.37
South Carolina	4,224	476	11.3	0.87	0.76	0.99
East Tennessee	3,344	308	9.2	0.69	0.60	0.80
Middle Tennessee	1,320	156	11.8	0.91	0.75	1.11
West Tennessee	944	100	10.6	0.81	0.64	1.01
North Texas	2,004	209	10.4	0.79	0.67	0.94
South and Central Texas	1,153	161	14.0	1.11	0.91	1.34
Southeast Texas	244	35	14.3	1.14	0.79	1.65
West Texas	439	65	14.8	1.18	0.90	1.57
Utah	2,386	181	7.6	0.56	0.47	0.67
Virginia	3,385	294	8.7	0.65	0.56	0.76
Wisconsin	242	29	12.0	0.93	0.62	1.38
New Mexico	1,472	285	19.4	1.64	1.39	1.92
All	79,304	9,279	11.7			

Excludes participants with missing values for clinitek Albumin/Creatinine ratio.

Table 20.4

Diabetes*, by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	606	230	38.0	1.47	1.23	1.75
Arizona	2,447	608	24.9	0.79	0.71	0.89
Arkansas	221	55	24.9	0.80	0.58	1.08
Northern California	1,278	451	35.3	1.31	1.15	1.49
Southern California	155	45	29.0	0.98	0.69	1.40
National Capital Area	2,137	455	21.3	0.65	0.58	0.73
Colorado/Idaho/Montana/Wyoming	398	177	44.47	1.92	1.56	2.36
Connecticut	2,753	784	28.5	0.96	0.86	1.06
Delaware Valley	1,335	454	34.0	1.24	1.09	1.41
Florida	5,091	1,498	29.4	1.00		
Georgia	2,922	767	26.3	0.85	0.77	0.95
Hawaii	2,725	771	28.3	0.95	0.85	1.05
Illinois	2,104	569	27.0	0.89	0.79	1.00
Indiana	3,666	1,035	28.2	0.94	0.86	1.04
Iowa	852	236	27.7	0.92	0.78	1.08
Kansas/Western MO	153	39	25.5	0.82	0.57	1.19
Kentucky	3,034	1,349	44.5	1.92	1.75	2.11
Louisiana	3,115	886	28.4	0.95	0.86	1.05
Maine	1,023	268	26.2	0.85	0.73	0.99
Mass./Rhode Isl./N. Hampshire/Vermont	4,055	1,329	32.77	1.17	1.07	1.28
Michigan	125	55	44.0	1.89	1.32	2.70
Minnesota/Dakotas	1,500	502	33.5	1.21	1.07	1.36
Mississippi	2,172	686	31.6	1.11	0.99	1.23
Eastern MO/Metro-East MO	2,149	638	29.7	1.01	0.91	1.13
Nebraska	1,328	344	25.9	0.84	0.73	0.96
Central New York	2,153	457	21.2	0.65	0.57	0.73
Greater New York	2,984	814	27.3	0.90	0.81	1.00
Northeast New York	1,547	319	20.6	0.62	0.54	0.72
Upstate New York	1,046	301	28.8	0.97	0.84	1.12
Western New York	1,692	478	28.3	0.94	0.84	1.07
North Carolina	2,720	663	24.4	0.77	0.70	0.86
Ohio	1,505	541	36.0	1.35	1.19	1.52
Oklahoma	2,137	629	29.4	1.00	0.90	1.12
Oregon/Washington	101	13	12.9	0.35	0.20	0.64
Alleghenic	3,245	1,097	33.8	1.23	1.12	1.35
South Carolina	4,741	1,578	33.3	1.20	1.10	1.30
East Tennessee	3,403	851	25.0	0.80	0.73	0.88
Middle Tennessee	1,470	416	28.3	0.95	0.83	1.08
West Tennessee	1,042	194	18.6	0.55	0.46	0.65
North Texas	2,061	482	23.4	0.73	0.65	0.82
South and Central Texas	1,457	601	41.3	1.68	1.49	1.90
Southeast Texas	248	101	40.7	1.65	1.27	2.14
West Texas	567	186	32.8	1.17	0.97	1.41
Utah	2,455	760	31.0	1.08	0.97	1.19
Virginia	3,928	1,006	25.6	0.83	0.75	0.91
Wisconsin	259	88	34.0	1.23	0.95	1.61
New Mexico	1,493	501	33.6	1.21	1.07	1.37
All	89,598	26,307	29.4			

Excludes participants with missing values for blood sugar.

*Self-reported history of diabetes or retinopathy, receiving medication for diabetes or insulin, or, blood sugar ≥ 126 mg/dl fasting or ≥ 200 mg/dl non-fasting.

Table 20.5
Hypertension*, by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	606	491	81.0	1.91	1.54	2.36
Arizona	2,447	1,628	66.5	0.89	0.80	0.98
Arkansas	221	149	67.4	0.92	0.69	1.23
Northern California	1,279	904	70.7	1.08	0.94	1.23
Southern California	156	108	69.2	1.01	0.71	1.42
National Capital Area	2,137	1,319	61.7	0.72	0.65	0.80
Colorado/Idaho/Montana/Wyoming	398	309	77.64	1.55	1.22	1.98
Connecticut	2,753	1,843	67.0	0.91	0.82	1.00
Delaware Valley	1,335	952	71.3	1.11	0.97	1.27
Florida	5,091	3,519	69.1	1.04	0.94	1.14
Georgia	2,925	2,043	69.9	0.73	0.66	0.81
Hawaii	2,726	1,692	62.1	0.82	0.73	0.91
Illinois	2,104	1,359	64.6	1.00	0.91	1.10
Indiana	3,666	2,533	69.1	0.97	0.83	1.14
Iowa	852	584	68.5	0.92	0.65	1.30
Kansas/Western MO	153	103	67.3	1.65	1.48	1.83
Kentucky	3,034	2,386	78.6	1.31	1.18	1.44
Louisiana	3,115	2,321	74.5	0.94	0.82	1.09
Maine	1,023	694	67.8	0.82	0.75	0.90
Mass./Rhode Isl./N. Hampshire/Vermont	4,057	2,628	64.78	2.21	1.38	3.55
Michigan	125	104	83.2	0.90	0.79	1.01
Minnesota/Dakotas	1,499	1,000	66.7	1.51	1.34	1.70
Mississippi	2,172	1,676	77.2	1.28	1.15	1.44
Eastern MO/Metro-East MO	2,149	1,594	74.2	1.00	0.88	1.14
Nebraska	1,329	918	69.1	0.92	0.83	1.03
Central New York	2,154	1,451	67.4	0.78	0.71	0.85
Greater New York	2,984	1,893	63.4	0.62	0.55	0.69
Northeast New York	1,546	897	58.0	1.08	0.93	1.24
Upstate New York	1,046	739	70.7	1.05	0.93	1.19
Western New York	1,692	1,188	70.2	0.93	0.84	1.02
North Carolina	2,718	1,833	67.4	1.33	1.17	1.52
Ohio	1,505	1,127	74.9	1.03	0.92	1.15
Oklahoma	2,137	1,489	69.7	0.65	0.44	0.98
Oregon/Washington	101	60	59.4	1.32	1.20	1.46
Alleghenic	3,245	2,425	74.7	1.29	1.18	1.41
South Carolina	4,743	3,524	74.3	1.19	1.08	1.31
East Tennessee	3,405	2,473	72.6	0.92	0.82	1.05
Middle Tennessee	1,470	991	67.4	0.83	0.72	0.95
West Tennessee	1,042	676	64.9	0.80	0.72	0.89
North Texas	2,061	1,324	64.2	1.11	0.97	1.26
South and Central Texas	1,457	1,038	71.2	1.64	1.21	2.24
Southeast Texas	248	195	78.6	1.28	1.05	1.55
West Texas	567	420	74.1	0.93	0.84	1.03
Utah	2,455	1,659	67.6	1.17	1.07	1.28
Virginia	3,927	2,840	72.3	1.26	0.95	1.67
Wisconsin	259	191	73.8	0.62	0.55	0.70
New Mexico	1,493	866	58.0			
All	89,607	62,156	69.4			

Excludes participants with missing values for blood pressure.

*Self-reported hypertension or elevated blood pressure, or receiving medication for high blood pressure.

Table 20.6

Diabetes & hypertension*, by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	606	213	35.2	1.58	1.32	1.88
Arizona	2,447	523	21.4	0.79	0.70	0.89
Arkansas	221	48	21.7	0.81	0.58	1.12
Northern California	1,278	399	31.2	1.32	1.15	1.51
Southern California	155	40	25.8	1.01	0.70	1.46
National Capital Area	2,137	382	17.9	0.63	0.56	0.72
Colorado/Idaho/Montana/Wyoming	398	160	40.2	1.95	1.58	2.41
Connecticut	2,753	672	24.4	0.94	0.84	1.05
Delaware Valley	1,335	405	30.3	1.27	1.11	1.45
Florida	5,090	1,303	25.6	1.00		
Georgia	2,922	679	23.2	0.88	0.79	0.98
Hawaii	2,725	642	23.6	0.90	0.80	1.00
Illinois	2,099	492	23.4	0.89	0.79	1.00
Indiana	3,666	914	24.9	0.97	0.88	1.06
Iowa	852	211	24.8	0.96	0.81	1.13
Kansas/Western MO	153	32	20.9	0.77	0.52	1.14
Kentucky	3,034	1,225	40.4	1.97	1.79	2.17
Louisiana	3,115	811	26.0	1.02	0.92	1.13
Maine	1,023	233	22.8	0.86	0.73	1.01
Mass./Rhode Isl./N. Hampshire/Vermont	4,054	1,098	27.08	1.08	0.98	1.19
Michigan	125	50	40.0	1.94	1.35	2.79
Minnesota/Dakotas	1,499	427	28.5	1.16	1.02	1.32
Mississippi	2,172	626	28.8	1.18	1.05	1.32
Eastern MO/Metro-East MO	2,149	583	27.1	1.08	0.97	1.21
Nebraska	1,328	300	22.6	0.85	0.74	0.98
Central New York	2,153	401	18.6	0.67	0.59	0.75
Greater New York	2,984	662	22.2	0.83	0.75	0.92
Northeast New York	1,546	267	17.3	0.61	0.52	0.70
Upstate New York	1,046	268	25.6	1.00	0.86	1.17
Western New York	1,692	413	24.4	0.94	0.83	1.07
North Carolina	2,718	581	21.4	0.79	0.71	0.88
Ohio	1,505	489	32.5	1.40	1.24	1.59
Oklahoma	2,137	577	27.0	1.08	0.96	1.21
Oregon/Washington	101	10	9.9	0.32	0.17	0.62
Alleghenic	3,245	967	29.8	1.23	1.12	1.36
South Carolina	4,741	1,443	30.4	1.27	1.16	1.39
East Tennessee	3,403	773	22.7	0.85	0.77	0.95
Middle Tennessee	1,470	362	24.6	0.95	0.83	1.09
West Tennessee	1,042	177	17.0	0.60	0.50	0.71
North Texas	2,059	405	19.7	0.71	0.63	0.81
South and Central Texas	1,457	520	35.7	1.61	1.42	1.83
Southeast Texas	248	97	39.1	1.87	1.44	2.43
West Texas	567	165	29.1	1.19	0.99	1.45
Utah	2,455	643	26.2	1.03	0.92	1.15
Virginia	3,926	910	23.2	0.88	0.80	0.97
Wisconsin	259	77	29.7	1.23	0.94	1.62
New Mexico	1,493	410	27.5	1.10	0.97	1.25
All	89,583	23,085	25.8			

Excludes participants with missing values for blood sugar & blood pressure.

*Diabetes: self-reported history of diabetes or retinopathy, receiving medication for diabetes or insulin, or blood sugar ≥ 126 mg/dl fasting or ≥ 200 mg/dl non-fasting
hypertension: self-reported hypertension or elevated blood pressure or receiving medication for high blood pressure.

Table 20.7

Obesity*, by affiliate

	Total N	N with obesity	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	593	270	45.5	1.23	1.04	1.46
Arizona	2,360	900	38.1	0.91	0.82	1.01
Arkansas	221	87	39.4	0.96	0.73	1.26
Northern California	1,236	519	42.0	1.07	0.94	1.21
Southern California	150	65	43.3	1.13	0.81	1.57
National Capital Area	2,107	791	37.5	0.89	0.80	0.99
Colorado/Idaho/Montana/Wyoming	391	176	45.01	1.21	0.98	1.49
Connecticut	2,630	1,135	43.2	1.12	1.02	1.23
Delaware Valley	1,308	620	47.4	1.33	1.18	1.50
Florida	5,032	2,032	40.4	1.00		
Georgia	2,860	1,324	46.3	1.27	1.16	1.40
Hawaii	2,688	844	31.4	0.68	0.61	0.75
Illinois	2,045	873	42.7	1.10	0.99	1.22
Indiana	3,630	1,793	49.4	1.44	1.32	1.57
Iowa	847	437	51.6	1.57	1.36	1.82
Kansas/Western MO	144	76	52.8	1.65	1.18	2.30
Kentucky	3,007	1,584	52.7	1.64	1.50	1.80
Louisiana	3,092	1,484	48.0	1.36	1.25	1.49
Maine	1,016	406	40.0	0.98	0.86	1.13
Mass./Rhode Isl./N. Hampshire/Vermont	3,943	1,467	37.21	0.88	0.80	0.95
Michigan	125	80	64.0	2.63	1.81	3.80
Minnesota/Dakotas	1,489	728	48.9	1.41	1.26	1.59
Mississippi	2,147	1,097	51.1	1.54	1.39	1.71
Eastern MO/Metro-East MO	2,138	1,001	46.8	1.30	1.17	1.44
Nebraska	1,317	580	44.0	1.16	1.03	1.31
Central New York	2,121	974	45.9	1.25	1.13	1.39
Greater New York	2,830	983	34.7	0.79	0.71	0.87
Northeast New York	1,522	570	37.5	0.88	0.79	1.00
Upstate New York	1,030	523	50.8	1.52	1.33	1.74
Western New York	1,668	725	43.5	1.14	1.02	1.27
North Carolina	2,692	1,240	46.1	1.26	1.15	1.39
Ohio	1,488	761	51.1	1.55	1.38	1.74
Oklahoma	2,102	1,051	50.0	1.48	1.33	1.64
Oregon/Washington	101	46	45.5	1.24	0.83	1.83
Alleghenic	3,220	1,463	45.4	1.23	1.12	1.34
South Carolina	4,673	2,325	49.8	1.46	1.35	1.58
East Tennessee	3,311	1,353	40.9	1.02	0.93	1.12
Middle Tennessee	1,455	650	44.7	1.19	1.06	1.34
West Tennessee	1,034	504	48.7	1.40	1.23	1.61
North Texas	2,019	806	39.9	0.98	0.88	1.09
South and Central Texas	1,423	699	49.1	1.43	1.27	1.60
Southeast Texas	242	127	52.5	1.63	1.26	2.11
West Texas	557	263	47.2	1.32	1.11	1.57
Utah	2,425	912	37.6	0.89	0.81	0.98
Virginia	3,878	1,811	46.7	1.29	1.19	1.41
Wisconsin	254	138	54.3	1.76	1.36	2.26
New Mexico	1,442	763	52.9	1.66	1.48	1.87
All	88,003	39,056	44.4			

Excludes participants with missing values for BMI.

*Body mass index = 30+ kg/m².

Table 20.8

Glycemic control*, by affiliate

	Total N	N with gly. control	% with gly. control	Odds ratio	Lower limit	Upper limit
Alabama	601	512	85.2	0.66	0.51	0.84
Arizona	2,342	2,125	90.7	1.12	0.94	1.32
Arkansas	216	197	91.2	1.18	0.73	1.91
Northern California	1,218	1,083	88.9	0.91	0.75	1.12
Southern California	144	129	89.6	0.98	0.57	1.69
National Capital Area	2,106	1,983	94.2	1.84	1.50	2.25
Colorado/Idaho/Montana/Wyoming	388	309	79.64	0.45	0.34	0.58
Connecticut	2,699	2,437	90.3	1.06	0.91	1.24
Delaware Valley	1,294	1,142	88.3	0.86	0.71	1.04
Florida	4,911	4,409	89.8	1.00		
Georgia	2,745	2,497	91.0	1.15	0.98	1.35
Hawaii	2,685	2,361	87.9	0.83	0.72	0.96
Illinois	2,012	1,827	90.8	1.12	0.94	1.34
Indiana	3,577	3,325	93.0	1.50	1.28	1.76
Iowa	841	764	90.8	1.13	0.88	1.45
Kansas/Western MO	150	140	93.3	1.59	0.83	3.05
Kentucky	2,964	2,632	88.8	0.90	0.78	1.05
Louisiana	3,070	2,767	90.1	1.04	0.90	1.21
Maine	958	904	94.4	1.91	1.43	2.55
Mass./Rhode Isl./N. Hampshire/Vermont	3,850	3,484	90.49	1.08	0.94	1.25
Michigan	119	98	82.4	0.53	0.33	0.86
Minnesota/Dakotas	1,479	1,338	90.5	1.08	0.89	1.32
Mississippi	2,136	1,844	86.3	0.72	0.62	0.84
Eastern MO/Metro-East MO	2,064	1,829	88.6	0.89	0.75	1.04
Nebraska	1,286	1,168	90.8	1.13	0.91	1.39
Central New York	2,079	1,976	95.1	2.18	1.76	2.72
Greater New York	2,931	2,652	90.5	1.08	0.93	1.26
Northeast New York	1,477	1,392	94.3	1.87	1.47	2.37
Upstate New York	1,005	919	91.4	1.22	0.96	1.55
Western New York	1,658	1,510	91.1	1.16	0.96	1.41
North Carolina	2,642	2,403	91.0	1.15	0.97	1.35
Ohio	1,463	1,298	88.7	0.90	0.74	1.08
Oklahoma	2,098	1,862	88.8	0.90	0.76	1.06
Oregon/Washington	98	96	98.0	5.46	1.34	22.23
Alleghenic	3,159	2,848	90.2	1.04	0.90	1.21
South Carolina	4,584	4,026	87.8	0.82	0.72	0.93
East Tennessee	3,256	3,061	94.0	1.79	1.51	2.12
Middle Tennessee	1,402	1,254	89.4	0.97	0.80	1.17
West Tennessee	1,006	942	93.6	1.68	1.28	2.19
North Texas	1,948	1,767	90.7	1.11	0.93	1.33
South and Central Texas	1,399	1,162	83.1	0.56	0.47	0.66
Southeast Texas	241	218	90.5	1.08	0.70	1.68
West Texas	549	477	86.9	0.75	0.58	0.98
Utah	2,406	2,246	93.4	1.60	1.33	1.92
Virginia	3,788	3,436	90.7	1.11	0.96	1.28
Wisconsin	243	219	90.1	1.04	0.68	1.60
New Mexico	1,479	1,253	84.7	0.63	0.53	0.75
All	86,766	78,321	90.3			

Excludes participants with missing values for blood sugar.

*Elevated blood sugar: No known Diabetes, fasting blood sugar \geq 126 mg/dL, non-fasting blood sugar \geq 200 mg/dL;
Known Diabetes, fasting blood sugar \geq 130 mg/dL, non-fasting blood sugar \geq 180 mg/dL.

Table 20.9
Blood pressure control*, by affiliate

	Total N	N with BP control	% with BP control	Odds ratio	Lower limit	Upper limit
Alabama	606	288	47.5	0.91	0.77	1.08
Arizona	2,427	1,319	54.4	1.20	1.09	1.32
Arkansas	221	106	48.0	0.93	0.71	1.21
Northern California	1,275	617	48.4	0.94	0.83	1.07
Southern California	155	75	48.4	0.94	0.68	1.30
National Capital Area	2,133	1,062	49.8	1.00	0.90	1.10
Colorado/Idaho/Montana/Wyoming	394	216	54.82	1.22	0.99	1.50
Connecticut	2,740	1,416	51.7	1.07	0.98	1.18
Delaware Valley	1,327	711	53.6	1.16	1.03	1.31
Florida	5,011	2,500	49.9	1.00		
Georgia	2,826	1,307	46.3	0.86	0.79	0.95
Hawaii	2,653	1,515	57.1	1.34	1.22	1.47
Illinois	2,053	1,052	51.2	1.06	0.95	1.17
Indiana	3,650	1,837	50.3	1.02	0.93	1.11
Iowa	847	416	49.1	0.97	0.84	1.12
Kansas/Western MO	152	77	50.7	1.03	0.75	1.42
Kentucky	3,028	1,711	56.5	1.31	1.19	1.43
Louisiana	3,071	1,464	47.7	0.92	0.84	1.00
Maine	1,017	538	52.9	1.13	0.99	1.29
Mass./Rhode Isl./N. Hampshire/Vermont	3,987	2,460	61.7	1.62	1.49	1.76
Michigan	125	63	50.4	1.02	0.72	1.46
Minnesota/Dakotas	1,444	813	56.3	1.29	1.15	1.46
Mississippi	2,168	983	45.3	0.83	0.75	0.92
Eastern MO/Metro-East MO	2,143	1,091	50.9	1.04	0.94	1.15
Nebraska	1,309	709	54.2	1.19	1.05	1.34
Central New York	2,144	1,135	52.9	1.13	1.02	1.25
Greater New York	2,927	1,690	57.7	1.37	1.25	1.50
Northeast New York	1,542	892	57.9	1.38	1.23	1.55
Upstate New York	1,041	515	49.5	0.98	0.86	1.12
Western New York	1,683	1,001	59.5	1.47	1.32	1.65
North Carolina	2,668	1,459	54.7	1.21	1.10	1.33
Ohio	1,497	719	48.0	0.93	0.83	1.04
Oklahoma	2,110	1,157	54.8	1.22	1.10	1.35
Oregon/Washington	99	48	48.5	0.95	0.64	1.41
Alleghenic	3,231	1,689	52.3	1.10	1.01	1.20
South Carolina	4,615	2,204	47.8	0.92	0.85	1.00
East Tennessee	3,373	1,696	50.3	1.02	0.93	1.11
Middle Tennessee	1,464	822	56.2	1.29	1.14	1.45
West Tennessee	1,041	492	47.3	0.90	0.79	1.03
North Texas	2,034	965	47.4	0.91	0.82	1.01
South and Central Texas	1,454	758	52.1	1.09	0.97	1.23
Southeast Texas	244	129	52.9	1.13	0.87	1.46
West Texas	564	317	56.2	1.29	1.08	1.54
Utah	2,445	1,376	56.3	1.29	1.17	1.43
Virginia	3,844	1,913	49.8	1.00	0.92	1.08
Wisconsin	258	156	60.5	1.54	1.19	1.98
New Mexico	1,489	865	58.1	1.39	1.24	1.57
All	88,529	46,344	52.4			

Excludes participants with missing values for blood pressure.

*Within JNC 7 standards: systolic <120 mmHg, diastolic <80 mmHg.

Table 20.10

Anemia (WHO definition*), by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	583	98	16.8	1.56	1.23	1.97
Arizona	2,292	161	7.0	0.58	0.49	0.70
Arkansas	215	18	8.4	0.71	0.43	1.15
Northern California	1,232	123	10.0	0.86	0.70	1.05
Southern California	144	28	19.4	1.86	1.22	2.84
National Capital Area	2,100	270	12.9	1.14	0.97	1.33
Colorado/Idaho/Montana/Wyoming	388	14	3.61	0.29	0.17	0.50
Connecticut	2,625	302	11.5	1.00	0.86	1.16
Delaware Valley	1,277	184	14.4	1.30	1.09	1.55
Florida	4,896	562	11.5	1.00		
Georgia	2,768	377	13.6	1.22	1.06	1.40
Hawaii	2,700	236	8.7	0.74	0.63	0.87
Illinois	2,019	242	12.0	1.05	0.89	1.23
Indiana	3,582	438	12.2	1.07	0.94	1.23
Iowa	734	70	9.5	0.81	0.63	1.06
Kansas/Western MO	151	15	9.9	0.85	0.50	1.46
Kentucky	2,965	355	12.0	1.05	0.91	1.21
Louisiana	3,033	551	18.2	1.71	1.51	1.95
Maine	990	77	7.8	0.65	0.51	0.83
Mass./Rhode Isl./N. Hampshire/Vermont	3,804	425	11.17	0.97	0.85	1.11
Michigan	99	13	13.1	1.17	0.65	2.10
Minnesota/Dakotas	1,476	120	8.1	0.68	0.56	0.84
Mississippi	2,118	362	17.1	1.59	1.38	1.84
Eastern MO/Metro-East MO	2,062	242	11.7	1.03	0.87	1.20
Nebraska	1,273	111	8.7	0.74	0.60	0.91
Central New York	1,910	206	10.8	0.93	0.79	1.10
Greater New York	2,930	369	12.6	1.11	0.97	1.28
Northeast New York	1,449	113	7.8	0.65	0.53	0.81
Upstate New York	1,002	150	15.0	1.36	1.12	1.65
Western New York	1,626	212	13.0	1.16	0.98	1.37
North Carolina	2,635	355	13.5	1.20	1.04	1.38
Ohio	1,399	138	9.9	0.84	0.69	1.03
Oklahoma	1,881	210	11.2	0.97	0.82	1.15
Oregon/Washington	98	5	5.1	0.42	0.17	1.02
Alleghenic	3,114	299	9.6	0.82	0.71	0.95
South Carolina	4,473	748	16.7	1.55	1.38	1.74
East Tennessee	3,236	275	8.5	0.72	0.62	0.83
Middle Tennessee	1,409	153	10.9	0.94	0.78	1.14
West Tennessee	969	147	15.2	1.38	1.13	1.68
North Texas	1,938	196	10.1	0.87	0.73	1.03
South and Central Texas	1,424	119	8.4	0.70	0.57	0.87
Southeast Texas	232	29	12.5	1.10	0.74	1.64
West Texas	550	34	6.2	0.51	0.36	0.73
Utah	2,357	114	4.8	0.39	0.32	0.48
Virginia	3,742	462	12.4	1.09	0.95	1.24
Wisconsin	216	41	19.0	1.81	1.27	2.57
New Mexico	1,429	69	4.8	0.39	0.30	0.51
All	85,545	9,838	11.5			

Excludes participants with missing values for hemoglobin.

*Hemoglobin <13g/dl men, <12 g/dl women.

Table 20.11
Anemia (KDOQI definition*), by affiliate

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Alabama	583	108	18.5	1.31	1.05	1.64
Arizona	2,292	208	9.1	0.58	0.49	0.68
Arkansas	215	21	9.8	0.63	0.40	0.99
Northern California	1,232	142	11.5	0.75	0.62	0.91
Southern California	144	30	20.8	1.52	1.01	2.29
National Capital Area	2,100	315	15.0	1.02	0.88	1.18
Colorado/Idaho/Montana/Wyoming	388	15	3.87	0.23	0.14	0.39
Connecticut	2,625	350	13.3	0.89	0.77	1.02
Delaware Valley	1,277	228	17.9	1.25	1.07	1.48
Florida	4,896	723	14.8	1.00		
Georgia	2,768	423	15.3	1.04	0.91	1.19
Hawaii	2,700	272	10.1	0.65	0.56	0.75
Illinois	2,019	289	14.3	0.96	0.83	1.12
Indiana	3,582	515	14.4	0.97	0.86	1.10
Iowa	734	86	11.7	0.77	0.60	0.97
Kansas/Western MO	151	20	13.3	0.88	0.55	1.42
Kentucky	2,965	410	13.8	0.93	0.81	1.06
Louisiana	3,033	611	20.2	1.46	1.29	1.64
Maine	990	97	9.8	0.63	0.50	0.78
Mass./Rhode Isl./N. Hampshire/Vermont	3,804	507	13.33	0.89	0.79	1.00
Michigan	99	15	15.2	1.03	0.59	1.80
Minnesota/Dakotas	1,476	145	9.8	0.63	0.52	0.76
Mississippi	2,118	416	19.6	1.41	1.24	1.61
Eastern MO/Metro-East MO	2,062	293	14.2	0.96	0.83	1.11
Nebraska	1,273	135	10.6	0.69	0.56	0.83
Central New York	1,910	245	12.8	0.85	0.73	0.99
Greater New York	2,930	458	15.6	1.07	0.94	1.21
Northeast New York	1,449	137	9.5	0.60	0.50	0.73
Upstate New York	1,002	180	18.0	1.26	1.06	1.51
Western New York	1,626	243	14.9	1.01	0.87	1.19
North Carolina	2,635	414	15.7	1.08	0.94	1.23
Ohio	1,399	157	11.2	0.73	0.61	0.88
Oklahoma	1,881	244	13.0	0.86	0.74	1.01
Oregon/Washington	98	5	5.1	0.31	0.13	0.77
Alleghenic	3,114	357	11.5	0.75	0.65	0.86
South Carolina	4,473	851	19.0	1.36	1.22	1.51
East Tennessee	3,236	328	10.1	0.65	0.57	0.75
Middle Tennessee	1,409	171	12.1	0.80	0.67	0.95
West Tennessee	969	170	17.5	1.23	1.02	1.48
North Texas	1,938	232	12.0	0.79	0.67	0.92
South and Central Texas	1,424	141	9.9	0.63	0.52	0.77
Southeast Texas	232	34	14.7	0.99	0.68	1.44
West Texas	550	43	7.8	0.49	0.36	0.68
Utah	2,357	130	5.5	0.34	0.28	0.41
Virginia	3,742	506	13.5	0.90	0.80	1.02
Wisconsin	216	47	21.8	1.61	1.15	2.24
New Mexico	1,429	74	5.2	0.32	0.25	0.40
All	85,545	11,541	13.5			

Excludes participants with missing values for hemoglobin.
*Hemoglobin <13.5g/dl men, <12g/dl women.

Table 20.12

Elevated PTH*, by region/census division

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Region						
Midwest	754	330	43.8	0.79	0.67	0.93
Northeast	1,011	502	49.7	1.00	0.86	1.16
South	2,226	1,107	49.7	1.00		
West	781	387	49.6	0.99	0.84	1.17
Census division						
East North Central	462	220	47.6	0.97	0.78	1.20
East South Central	857	427	49.8	1.06	0.89	1.27
Middle Atlantic	776	387	49.9	1.06	0.88	1.27
Mountain	582	295	50.7	1.10	0.90	1.34
New England	235	115	48.9	1.02	0.77	1.35
Pacific	199	92	46.2	0.92	0.68	1.24
South Atlantic	1,099	532	48.4	1.00		
West North Central	292	110	37.7	0.64	0.49	0.84
West South Central	270	148	54.8	1.29	0.99	1.69
All	4,772	2,326	48.7			

Excludes participants with missing values for eGFR, or eGFR \leq 60, or missing value for PTH;
 *CLS lab only, Elevated PTH: >70 for CKD stage 3, >110 for stage 4, and >300 for stage 5, all in pg/ml.

Table 20.13
Abnormal Calcium*, by region/census division

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Region						
Midwest	742	56	7.6	0.80	0.59	1.08
Northeast	1,010	92	9.1	0.98	0.76	1.26
South	2,225	207	9.3	1.00		
West	780	73	9.4	1.01	0.76	1.33
Census division						
East North Central	450	32	7.1	0.79	0.52	1.20
East South Central	856	88	10.3	1.18	0.87	1.60
Middle Atlantic	775	62	8.0	0.90	0.64	1.25
Mountain	581	53	9.1	1.04	0.73	1.47
New England	235	30	12.8	1.51	0.98	2.34
Pacific	199	20	10.1	1.15	0.70	1.92
South Atlantic	1,099	97	8.8	1.00		
West North Central	292	24	8.2	0.93	0.58	1.48
West South Central	270	22	8.2	0.92	0.57	1.49
All	4,757	428	9.0			

Excludes participants with missing values for eGFR, or eGFR ≥ 60 , or missing value for calcium;
*CLS lab only, abnormal calcium (<8.4 or >10.2, in mg/dl.)

Table 20.14

Abnormal Phosphorus*, by region/census division

	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Region						
Midwest	742	62	8.4	0.91	0.68	1.22
Northeast	1,011	105	10.4	1.15	0.90	1.48
South	2,225	203	9.1	1.00		
West	781	76	9.7	1.07	0.81	1.42
Census division						
East North Central	450	26	5.8	0.64	0.41	1.00
East South Central	856	87	10.2	1.18	0.87	1.60
Middle Atlantic	776	71	9.2	1.05	0.76	1.45
Mountain	582	59	10.1	1.18	0.84	1.66
New England	235	34	14.5	1.77	1.16	2.69
Pacific	199	17	8.5	0.98	0.57	1.67
South Atlantic	1,099	96	8.7	1.00		
West North Central	292	36	12.3	1.47	0.98	2.21
West South Central	270	20	7.4	0.84	0.51	1.38
All	4,759	446	9.4			

Excludes participants with missing values for eGFR, or eGFR ≥ 60 , or missing value for phosphorus;
 *CLS lab only, abnormal phosphorus (<2.7 or >4.6 stage 3 and 4, and <3.5 or >5.5 stage 5, all in mg/dl)

Table 20.15

High cholesterol*, by region/census division

	SR high cholesterol (without msising SR-HC)					
	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Region						
Midwest	2,774	1,425	51.37	1.12	1.03	1.22
Northeast	5,057	2,582	51.06	1.11	1.04	1.18
South	11,503	5,579	48.5	1.00		
West	2,349	1,201	51.13	1.11	1.02	1.21
Census division						
East North Central	2,163	1,088	50.3	1.27	1.15	1.41
East South Central	3,776	2,121	56.17	1.61	1.48	1.75
Middle Atlantic	3,445	1,799	52.22	1.37	1.26	1.50
Mountain	1,401	693	49.46	1.23	1.10	1.38
New England	1,612	783	48.57	1.19	1.06	1.33
Pacific	948	508	53.59	1.45	1.27	1.67
South Atlantic	5,935	2,629	44.3	1.00		
West North Central	611	337	55.16	1.55	1.31	1.83
West South Central	1,792	829	46.26	1.08	0.97	1.20
All	21,683	10,787	49.75			

Excludes participants with missing SR cholesterol data, or missing cholesterol values.
 *CLS only, high cholesterol (self-reported HC or cholesterol > 200).

Table 20.15 (continued)

High cholesterol*, by region/census division

	cholesterol level > 200 mg/dL					
	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Region						
Midwest	6,400	2,959	46.23	1.00	0.94	1.05
Northeast	10,397	4,735	45.54	0.97	0.92	1.01
South	21,794	10,103	46.36	1.00		
West	6,223	2,719	43.69	0.90	0.85	0.95
Census division						
East North Central	4,487	2,129	47.45	0.99	0.92	1.06
East South Central	6,559	2,897	44.17	0.87	0.81	0.92
Middle Atlantic	7,045	3,164	44.91	0.89	0.84	0.95
Mountain	4,243	1,874	44.17	0.87	0.81	0.93
New England	3,352	1,571	46.87	0.96	0.89	1.04
Pacific	1,980	845	42.68	0.81	0.74	0.90
South Atlantic	10,826	5,172	47.77	1.00		
West North Central	1,913	830	43.39	0.84	0.76	0.92
West South Central	4,409	2,034	46.13	0.94	0.87	1.00
All	44,814	20,516	45.78			

Excludes participants with missing SR cholesterol data, or missing cholesterol values.
 *CLS only, high cholesterol (self-reported HC or cholesterol > 200).

Table 20.15 (continued)

High cholesterol*, by region/census division

Region	SR high cholesterol or cholesterol level > 200 mg/dL					
	Total N	N with disease	% with disease	Odds ratio	Lower limit	Upper limit
Midwest	6,495	3,700	56.97	0.94	0.89	1.00
Northeast	10,517	6,024	57.28	0.95	0.91	1.00
South	22,036	12,881	58.45	1.00		
West	6,253	3,343	53.46	0.82	0.77	0.86
Census division						
East North Central	4,578	2,673	58.39	1.01	0.94	1.08
East South Central	6,611	4,038	61.08	1.13	1.06	1.20
Middle Atlantic	7,114	4,085	57.42	0.97	0.91	1.03
Mountain	4,252	2,240	52.68	0.80	0.74	0.86
New England	3,403	1,939	56.98	0.95	0.88	1.03
Pacific	2,001	1,103	55.12	0.88	0.80	0.97
South Atlantic	10,973	6,391	58.24	1.00		
West North Central	1,917	1,027	53.57	0.83	0.75	0.91
West South Central	4,452	2,452	55.08	0.88	0.82	0.94
All	45,301	25,948	57.28			

Excludes participants with missing SR cholesterol data, or missing cholesterol values.
 *CLS only, high cholesterol (self-reported HC or cholesterol > 200).

KEEP 2008

Analytical Methods

The Kidney Early Evaluation program (KEEP) is a free, community-based health screening program that targets populations at high risk for kidney disease. A pilot program conducted in 1997 screened almost 900 individuals and showed that targeted populations aged 18 years and older, with history of diabetes or hypertension, or with a first-order relative with diabetes, hypertension, or kidney disease, were highly likely to show evidence of kidney damage, microalbuminuria, and reduced kidney function. In August 2000, the National Kidney Foundation (NKF) officially launched KEEP nationwide. Now in its eighth year, the program has screened more than 115,000 participants from 49 states and the District of Colombia.

Criteria for Inclusion in KEEP Data Analysis

In this Annual Data Report, we report only eligible participants as defined by Jurkowitz et al in their description of program design and demographic characteristics of the KEEP population.¹ Most analyses are descriptive. Due to missing responses by KEEP survey participants, we used the following inclusion criteria:

- In the overall analysis, we include all eligible participants.
- In analyses by any participant characteristic, we exclude participants with missing values for that characteristic. For example, when we report participant distribution by race or by self-reported disease, we exclude participants with missing values for race or self-reported disease. We describe the specific exclusions under each figure.
- For all percent distribution analyses, denominators include only eligible participants without missing data for the specific characteristics.
- In the race/ethnicity categories, racial groups are white, African American, Native American, or other in most analyses, and participants with missing values for race were excluded. Ethnicity groups are Hispanic and non-Hispanic, and participants with missing values for ethnicity were treated as non-Hispanic.
- In the age category, participants are grouped as follows: 18-30, 31-45, 46-60, 61-75, and 75-110 years.
- When calculating the means of biochemical measures such as blood pressure (BP), blood glucose, estimated glomerular filtration rate (eGFR), hemoglobin, and so on, participants with missing values for these measures were excluded.

- In any analyses involving multiple participant characteristics or biochemical measures, participants with any missing values for those characteristics or measures were excluded.

Definitions

Chronic Kidney Disease (CKD)

eGFR <60 mL/min/1.73 m² or eGFR ≥ 60 mL/min/1.73 m² and albumin-creatinine ratio (ACR) ≥30 mg/g. GFR estimated using the IDMS-traceable 4-variable Modification of Diet in Renal Disease (MDRD) Study equation for calibrated serum creatinine (Scr) values: $GFR = 175 \times \text{standardized Scr}^{-1.154} \times \text{age}^{-0.203} \times 1.212$ [African Americans] $\times 0.742$ [women]. Detailed information is available in a prior AJKD KEEP supplement.²

CKD Stages

- Stage 1: eGFR ≥90 mL/min/1.73 m² and ACR ≥30 mg/g.
- Stage 2: eGFR 60–89 mL/min/1.73 m² and ACR ≥30 mg/g.
- Stage 3: eGFR 30–59 mL/min/1.73 m².
- Stage 4: eGFR 15–29 mL/min/1.73 m².
- Stage 5: eGFR <15 mL/min/1.73 m².

History of Diabetes

- Self-reported diabetes or
- retinopathy.

Elevated Blood Sugar

- No known diabetes: fasting blood sugar ≥126 mg/dL, non-fasting blood sugar ≥200 mg/dL.
- known diabetes: fasting blood sugar ≥130 mg/dL, non-fasting blood sugar ≥180 mg/dL.

Diabetes

- Self-reported history of diabetes or retinopathy,
- receiving medication for diabetes or insulin, or
- elevated blood sugar defined by glucose ≥ 126 mg/dL fasting or ≥ 200 mg/dL non-fasting.

Elevated Measured Blood Pressure

- Diabetes or CKD: systolic ≥130 mmHg or diastolic ≥80 mmHg.

- No diabetes or CKD: systolic ≥ 140 mmHg or diastolic ≥ 90 mmHg.

Hypertension

- Self-reported history of high BP,
- receiving medication for high BP, or
- elevated BP (JNC 7) defined by systolic BP ≥ 130 mmHg or diastolic BP ≥ 80 mmHg for persons with history of diabetes or CKD and systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg for persons without history of diabetes or CKD.

Body Mass Index Groups

- Underweight: body mass index (BMI) < 18.5 kg/m².
- Normal weight: BMI 18.5–24.9 kg/m².
- Overweight: BMI 25–29.9 kg/m².
- Obese: BMI 30–39.9 kg/m².
- Extremely obese: BMI ≥ 40 kg/m².

Microalbuminuria

- Positive, trace, or microalbuminuria value >20 mg/L.

WHO Anemia

- Men: hemoglobin <13 g/dL.
- Women: hemoglobin <12 g/dL.

KDOQI Anemia

- Men: hemoglobin <13.5 g/dL.
- Women: hemoglobin <12 g/dL.

Mean blood pressure

- Diastolic BP + (systolic BP – diastolic BP) / 3.

Risk Factors for Cardiovascular Disease

- BMI ≥ 30 kg/m².
- Self-reported diabetes or retinopathy.
- History of smoking.
- WHO anemia.
- Elevated BP (JNC 7).

Cardiovascular Disease

- Self-reported heart attack.
- Heart bypass surgery.
- Heart angioplasty.
- Stroke.

- Heart failure.
- Abnormal heart rhythm.
- Peripheral vascular disease (only for KEEP version 2).

High Cholesterol

- Self-reported high cholesterol or cholesterol >200 mg/dL.

Glycemic Control

- No known diabetes: fasting blood sugar <126 mg/dL, non-fasting blood sugar <200 mg/dL.
- Known diabetes: fasting blood sugar <130 mg/dL, non-fasting blood sugar <180 mg/dL.

Blood pressure control

- JNC 7 standards: systolic <120 mmHg, diastolic <80 mmHg

Abnormal mineral metabolism values

Values were determined for calcium and phosphorus using the Architect c8000 (Abbott Laboratories, Abbott Park, Illinois), with Arsenazo-III dye for calcium and ammonium molybdate for phosphorus. The intact-parathyroid hormone (PTH) assay was performed using Immulite 2000 (Siemens Medical Solutions Diagnostics, Los Angeles, California), a two-site chemiluminescent enzyme-labeled immunometric assay. All lab tests were performed at Consolidated Laboratory Services (CLS), Van Nuys, California.

- Elevated PTH: >70 pg/mL for CKD stage 3, >110 pg/mL for stage 4, and >300 pg/mL for stage 5.
- Abnormal phosphorus: <2.7 mg/dL or >4.6 mg/dL, stage 3 and 4; <3.5 mg/dL or >5.5 mg/dL stage 5.
- Abnormal calcium: <8.4 mg/dL or >10.2 mg/dL.

Laboratory Analysis

Data collected at KEEP screening events included height, weight, blood pressure, age, family history, and plasma glucose. Urine was checked for presence of pyuria, hematuria, and microalbuminuria, and albumin-to-creatinine ratio. Venous blood specimens were collected and sent to a central laboratory, where hemoglobin, creatinine, cholesterol, intact PTH, calcium, and phosphorus testing was conducted.

Clinitek Microalbumin Reagent Strips (Siemens Healthcare Diagnostics Inc., Tarrytown, New York) for urinalysis were used

to obtain the microalbumin and albumin-to-creatinine ratio results. Siemens' Multistix PRO Reagent Strip for Urinalysis was used for the blood and leukocyte measures. Urinalysis testing was performed using Siemens' Clinitek 50 Analyzer.

Plasma glucose testing on venous blood specimens was performed using SureStep Pro test strips and SureStep meters (Lifescan, Milpitas, California).

Through October 2005, hemoglobin and serum creatinine testing was performed by Satellite Laboratory Services, (Redwood City, California), hemoglobin using the Sysmex SE2100 (Sysmex America Inc., Mundelein Illinois), and creatinine using the Olympus 5431 (Olympus Optical, Tokyo, Japan).

Beginning November 2005, laboratory testing was performed by Consolidated Laboratory Services, Van Nuys, California. Hemoglobin testing was conducted using whole blood on the Abbott Cell-Dyn 3200 (Abbott Laboratories, Abbott Park, Illinois), and PTH testing was conducted on plasma using Siemens Immulite 2000 (Siemens Healthcare Diagnostics, Deerfield, Illinois). The Abbott Architect c8000 (Abbott Laboratories, Abbott Park, Illinois) was used to conduct serum creatinine, calcium, phosphorus, and cholesterol tests.

Reference Tables

Tables 1–15 present total counts of eligible KEEP participants, and show the prevalence of CKD, diabetes, hypertension, obesity, microalbuminuria, anemia, risk factors for cardiovascular disease, and self-reported kidney disease or stones, overall and by age, sex, race/ethnicity, region, smoking status, education, insurance status, and whether a participant has a physician.

Tables 16–19 report counts of eligible KEEP participants with elevated PTH, abnormal calcium, abnormal phosphorus, and high cholesterol overall and by age, sex, race/ethnicity, region, smoking status, education, insurance status, and whether a participant has a physician.

Table 20 reports counts of eligible KEEP participants by NKF affiliate.

Tables 20.1–20.11 present total counts, prevalence, and odds ratios for KEEP participants with eGFR <60 mL/min/1.73 m²,

microalbuminuria, ACR ≥30 mg/g, diabetes, hypertension, diabetes and hypertension, obesity, glycemic control, BP control, WHO anemia, and KDOQI anemia. To calculate odds ratios, we used a set of logistic regressions with all affiliates as independent variables and Florida as the reference.

Tables 20.12–20.15 report total counts, prevalence, and odds ratios for KEEP participants with elevated PTH, abnormal calcium, abnormal phosphorus, and high cholesterol level by division or region. To calculate odds ratios, we used a set of logistic regressions with all divisions as independent variables and the South Atlantic as the reference, or with all regions as independent variables and the South as the reference.

References

1. Jurkovitz CT, Qiu Y, Brown WW: The Kidney Early Evaluation Program (KEEP): Program Design and Demographic Characteristics of the Population. *Am J Kidney Dis* 51:S3–S12, 2008 (suppl 2).
2. Stevens LA, Stoycheff N: Standardization of Serum Creatinine and Estimated Glomerular Filtration Rate in the Kidney Early Evaluation Program (KEEP). *Am J Kidney Dis* 51:S77–S82, 2008 (suppl 2).
3. Chobanian AV, Bakris GL, Black HR, et al: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA* 289:2560–2572, 2003.