

Healthy People 2020

- In this chapter, we examine data for 10 Healthy People 2020 (HP2020) objectives spanning 19 total indicators for which the USRDS serves as the official data source. As in previous Annual Data Reports (ADR), we present data overall, and stratified by race, sex, and age groups to highlight any disparities in progress.
- In 2016, 11 of the 18 HP2020 indicators with specific targets met the established goals. Key areas where substantial improvement has been observed include mortality among dialysis patients and vascular access. Conversely, the incidence rates of end-stage renal disease (ESRD) overall, and ESRD due to diabetes, remain above HP2020 targets.
- State-level comparison maps showed marked geographic variation for HP2020 Objectives CKD-10 (Proportion of ESRD patients receiving care from a nephrologist at least 12 months before the start of renal replacement therapy; Figure 1) and CKD-13.1 (Proportion of patients receiving a kidney transplant within three years of end-stage renal disease; Figure 2). Forty-eight states achieved the HP2020 target for CKD-10, while nine achieved the target for CKD-13.1.
- For HP2020 objectives relating to vascular access, we present data from CROWNWeb examining HP2020 Objectives CKD 11-1 (Proportion of adult hemodialysis patients who use arteriovenous fistulas as the primary mode of vascular access; Table 9) and CKD 11-2 (Proportion of adult hemodialysis patients who use catheters as the only mode of vascular access; Table 10). In 2016, the overall proportion of prevalent patients using an arteriovenous fistula was 64.1%, and this appears to have plateaued since 2012.
- The all-cause mortality among prevalent dialysis patients in 2016 was 173.1 deaths per 1,000 patient-years (HP2020 objective CKD-14.1, Table 15). This rate represents a 16.8% decrease in the mortality rate since 2007. While this rate is lower than in 2015 (174.0 deaths per 1,000 patient-years), it is still higher than in 2014, when the rate was lower than it has ever been at 171.6 deaths per 1,000 patient-years.

Introduction

The Healthy People initiative, coordinated by the United States (U.S.) Department of Health and Human Services, provides a vision and strategy for improving the health of all Americans by setting priorities, identifying baseline data and 10-year targets for specific objectives, monitoring outcomes, and evaluating progress. Since 1980, the Healthy People program has released updated plans each decade to reflect emerging health priorities, and to align health promotion resources, strategies, and research.

The fourth-generation plan, Healthy People 2020 (HP2020), was launched on December 2, 2010

(HP2020, 2010). It encompasses over 1,000 health objectives organized under 42 different topic areas. HP2020's overarching goals are:

- To assist all Americans in attaining high-quality, longer lives free of preventable disease, disability, injury, and premature death
- To achieve health equity, eliminate disparities, and improve the health of all groups
- To create social and physical environments that promote good health for all
- To promote quality of life, healthy development, and healthy behaviors across all life stages (HP2020, 2010).

A key priority of the HP2020 initiative is to “reduce new cases of chronic kidney disease (CKD) and its complications, disability, death, and economic costs.” The HP2020 CKD objectives were designed to monitor and assess efforts to reduce the long-term burden of kidney disease, increase lifespan, improve quality of life, and eliminate related health care disparities. To accomplish these goals the HP2020 program is comprised of 14 CKD-related objectives, encompassing 24 individual indicators with targets (HP2020 Table A). Herein, we provide data for the 10 CKD-related objectives for which USRDS serves as the official data source.

One of the four overarching goals of HP2020 is to eliminate health care disparities. As directed by the Department of Health and Human Services, and to facilitate comparisons and gauge progress across groups, we present data overall and by racial, ethnic, sex, and age subgroups. In many cases, while the overall population may have met an objective, one or more subgroups may have fallen short. Conversely, for some objectives the overall findings may have been stable, yet with significant improvements observed in some subgroups.

HP2020 Table A. Healthy People 2020 CKD Objectives

Objective	Indicator	Target
CKD-1*	Reduce the proportion of the U.S. population with chronic kidney disease	13.3%
CKD-2*	Increase the proportion of persons with chronic kidney disease (CKD) who know they have impaired renal function	13.4%
CKD-3	Increase the proportion of hospital patients who incurred acute kidney injury who have follow-up renal evaluation in 6 months post discharge	12.3%
CKD-4 Increase the proportion of persons with diabetes and chronic kidney disease who receive recommended medical evaluation	4.1 Increase the proportion of persons with chronic kidney disease who receive medical evaluation with serum creatinine, lipids, and microalbuminuria	28.4%
	4.2 Increase the proportion of persons with type 1 or type 2 diabetes and chronic kidney disease who receive medical evaluation with serum creatinine, microalbuminuria, HbA1c, lipids, and eye examinations	25.3%
CKD-5	Increase the proportion of persons with diabetes and chronic kidney disease who receive recommended medical treatment with angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs)	74.1%
CKD-6* Improve cardiovascular care in persons with chronic kidney disease	6.1 Reduce the proportion of persons with chronic kidney disease who have elevated blood pressure	17.6%
	6.2 Increase the proportion of adults aged 50 years and over with chronic kidney disease who currently take statins to lower their blood cholesterol	25.6%
CKD-7*	Reduce the number of deaths among persons with chronic kidney disease	Not applicable
CKD-8	Reduce the number of new cases of end-stage renal disease (ESRD)	352.1 PMP
CKD-9 Reduce kidney failure due to diabetes	9.1 Reduce kidney failure due to diabetes	154.4 PMP
	9.2 Reduce kidney failure due to diabetes among persons with diabetes	2,352.7 PMP
CKD-10	Increase the proportion of chronic kidney disease patients receiving care from a nephrologist at least 12 months before the start of renal replacement therapy	30.0%
CKD-11 Improve vascular access for hemodialysis patients	11.1 Increase the proportion of adult hemodialysis patients who use arteriovenous fistulas as the primary mode of vascular access	50.6%
	11.2 Reduce the proportion of adult hemodialysis patients who use catheters as the only mode of vascular access	26.1%
	11.3 Increase the proportion of adult hemodialysis patients who use arteriovenous fistulas or have a maturing fistula as the primary mode of vascular access at the start of renal replacement therapy	34.8%
CKD-12	Increase the proportion of dialysis patients waitlisted and/or receiving a deceased donor kidney transplant within 1 year of end-stage renal disease (ESRD) start (among patients under 70 years of age)	18.7%
CKD-13 Increase the proportion of patients with treated chronic kidney failure who receive a transplant	13.1 Increase the proportion of patients receiving a kidney transplant within 3 years of end-stage renal disease (ESRD)	20.1%
	13.2 Increase the proportion of patients who receive a preemptive transplant at the start of ESRD	Not applicable
CKD-14 Reduce deaths in persons with end-stage renal disease (ESRD)	14.1 Reduce the total number of deaths for persons on dialysis	187.3 per 1,000 patient-years
	14.2 Reduce the number of deaths in dialysis patients within the first 3 months of initiation of renal replacement therapy	335.0 per 1,000 patient-years
	14.3 Reduce the number of cardiovascular deaths for persons on dialysis	81.3 per 1,000 patient-years
	14.4 Reduce the total number of deaths for persons with a functioning kidney transplant	27.8 per 1,000 patient-years
	14.5 Reduce the number of cardiovascular deaths in persons with a functioning kidney transplant	4.5 per 1,000 patient-years

Data Source: <https://www.healthypeople.gov/2020/topics-objectives/topic/chronic-kidney-disease/objectives>. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease; HbA1c, glycosylated hemoglobin; HP2020, Healthy People 2020; PMP, per million population. * These objectives use a data source other than USRDS, and are therefore not reported in this chapter.

Recommended Care

Acute kidney injury (AKI) is an important risk factor for the subsequent development, or worsening, of CKD. This association persists even for less severe stages of AKI and after apparent recovery from AKI. Follow-up renal evaluation after an episode of AKI allows for early identification of CKD development and provides an opportunity to institute nephroprotective measures early in the course of evolving disease. Objective CKD-3 aims to promote improved renal follow-up within six months after an episode of AKI.

In 2016, 17.6% of patients with AKI had follow-up renal evaluation within 6 months post-discharge, the sixth consecutive year in which the HP2020 goal of 12.3% was exceeded (see Table 1). This continued a steady increase observed over the last decade.

Men were more likely to receive post-AKI follow-up renal evaluation than women. Among racial and ethnic groups, the rates in descending order were Hispanics (24.9%), Asians (19.4%), Blacks/African Americans (17.8%), Whites (17.2%), and American Indian or Alaskan native (13.8%). The proportion of patients receiving post-AKI renal evaluation decreased with older age, falling from 21.7% in those aged 65-74 to 9.6% of those aged 85 and older.

HP2020 Table 1 CKD-3 Increase the proportion of hospital patients who incurred acute kidney injury who have follow-up renal evaluation in 6 months post discharge: Target 12.3%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	11.2	10.5	11.4	11.8	12.6	12.7	15.9	16.2	17.0	17.6
Race/Ethnicity										
American Indian or Alaska Native	12.0	15.2	6.9	11.1	17.5	9.5	9.4	10.2	16.7	13.8
Asian	15.1	11.3	16.1	15.4	15.8	14.8	22.4	20.2	20.9	19.4
Black/African American	11.1	10.3	12.1	11.3	11.9	13.1	15.7	17.0	18.6	17.8
White	11.1	10.4	11.2	11.8	12.5	12.4	15.6	15.8	16.5	17.2
Hispanic or Latino	11.8	16.0	13.1	12.9	16.6	15.9	23.0	21.9	22.1	24.9
Sex										
Male	12.5	11.9	12.4	12.7	13.8	13.8	17.4	17.5	18.6	18.5
Female	10.0	9.3	10.5	11.0	11.5	11.6	14.5	14.9	15.5	16.6
Age										
65-74	16.1	14.8	16.0	16.4	17.5	17.2	20.8	21.0	21.6	21.7
75-84	11.1	10.7	11.2	12.3	13.2	13.0	16.7	17.2	17.9	18.6
85+	5.1	5.0	6.4	5.9	6.3	6.9	8.8	8.6	9.4	9.6

Data Source: Special analyses, Medicare 5 percent sample. Medicare patients aged 65 & older with a hospitalized AKI event in a given year. Abbreviations: AKI, acute kidney injury; CKD, chronic kidney disease.

HP2020 CKD Objective 4.1 examines the proportion of patients with CKD who receive recommended medical testing, specifically serum creatinine, urine albumin, and lipids (Table 2). In 2016, in the Medicare population aged 65 and older, 34.0% of CKD patients received this recommended testing. While this represents a slight decrease from recent years, it was the seventh consecutive year of surpassing the HP2020 goal of 28.4%.

Similar to trends for other recommended measures, the proportion of patients receiving these tests declined with rising age; testing occurred in 40.2%,

35.9%, and 21.3% of individuals in the 65-74, 75-84, and 85 years and older age groups. Recommended testing was higher among males (35.5%) than among females (32.5%). When examining race and ethnicity, Hispanic or Latino patients and Asians had the highest proportion of recommended testing, both at 45.2%, followed by Black/African-Americans at 36.7%. American Indians or Alaska Natives had the lowest proportion, although this may relate to lack of data capture of services provided through the Indian Health Service (IHS), which are not reported to the Medicare system.

HP2020 Table 2 CKD-4.1 Increase the proportion of persons with chronic kidney disease who receive medical evaluation with serum creatinine, lipids, and microalbuminuria: Target 28.4%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	25.8	26.8	28.2	29.1	30.3	31.2	33.1	33.7	35.2	34.0
Race/Ethnicity										
American Indian or Alaska Native	17.2	17.4	18.6	20.2	20.9	18.5	23.3	22.0	24.8	24.0
Asian	35.3	34.0	37.8	37.1	39.6	41.2	43.8	44.8	46.1	45.2
Black/African American	26.8	28.0	30.2	30.6	32.3	33.0	35.0	35.5	37.0	36.7
White	25.2	26.3	27.4	28.4	29.5	30.4	32.2	32.8	34.3	33.0
Hispanic or Latino	32.9	32.3	36.2	36.7	39.3	41.5	44.1	44.8	46.0	45.2
Sex										
Male	27.2	28.4	29.6	30.6	32.0	33.0	35.0	35.7	36.9	35.5
Female	24.4	25.3	26.8	27.7	28.8	29.6	31.4	32.0	33.7	32.5
Age										
65-74	34.0	35.4	37.0	37.8	39.1	39.9	41.5	42.0	43.1	40.2
75-84	26.2	27.3	28.9	30.1	31.5	32.7	34.8	35.6	36.6	35.9
85+	13.0	14.2	15.1	15.9	17.2	18.0	19.8	20.2	21.1	21.3

Data Source: Special analyses, Medicare 5 percent sample. Medicare patients aged 65 & older with CKD. Abbreviation: CKD, chronic kidney disease.

Patients with both CKD and type 1 or type 2 DM are recommended to have comprehensive laboratory monitoring to assess for the development of complications. The glycosylated hemoglobin (HbA1c) test provides an assessment of blood glucose control over prolonged periods, while regular eye examinations can detect diabetic retinopathy at treatable stages. Lipid levels can be used to estimate cardiovascular risk. In 2016, 30.7% of Medicare patients with CKD and DM received all five tests:

serum creatinine, urine albumin, HbA1c, lipid testing, and an eye examination (see Table 3). The level of testing appears to have plateaued over the last four years of available data, but has surpassed the HP2020 goal of 25.3% for seven consecutive years.

Once again, the proportion of patients tested was lowest among the patients over the age of 85; testing occurred in 32.5%, 32.7%, and 22.8% of individuals in the 65-74, 75-84, and 85 years and older age groups.

HP2020 Table 3 CKD-4.2 Increase the proportion of persons with type 1 or type 2 diabetes and chronic kidney disease who receive medical evaluation with serum creatinine, microalbuminuria, HbA1c, lipids, and eye examinations: Target 25.3%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	23.0	23.6	25.1	26.5	26.9	27.6	29.7	29.8	30.3	30.7
Race/Ethnicity										
American Indian or Alaska Native	10.4	11.5	11.7	15.1	14.1	11.5	17.1	17.2	17.4	16.8
Asian	26.6	25.3	27.1	29.6	30.8	32.6	37.0	34.4	32.4	35.5
Black/African American	19.7	21.0	22.4	23.7	25.0	25.1	27.0	26.6	27.9	27.5
White	23.5	24.1	25.6	27.0	27.1	27.8	29.8	30.1	30.4	30.9
Hispanic or Latino	22.0	21.9	24.6	24.1	27.0	25.4	29.8	30.0	31.8	32.0
Sex										
Male	23.5	23.6	25.5	26.7	27.2	27.7	30.0	30.2	30.4	30.8
Female	22.5	23.6	24.7	26.2	26.6	27.5	29.4	29.5	30.2	30.6
Age										
65-74	26.4	27.0	28.3	29.9	29.9	30.2	32.1	32.2	32.5	32.5
75-84	23.3	24.1	25.9	27.3	28.0	29.3	31.6	31.5	31.8	32.7
85+	14.1	15.0	16.6	17.6	18.7	18.9	21.4	21.7	22.0	22.8

Data Source: Special analyses, Medicare 5 percent sample. Medicare patients aged 65 & older with CKD & diabetes mellitus. Abbreviations: CKD, chronic kidney disease; HbA1c, glycosylated hemoglobin.

Angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) are a recommended part of the medical management of patients with CKD and DM. In 2016, 71.4% of Medicare patients aged 65 and older received one of these agents (Table 4). This was a slight decrease from 2015, and fell short of the HP2020 goal of 74.1%.

A slightly higher proportion of females received ACE inhibitor or ARB therapy as compared to males. Those of White race had the lowest proportion of use at 70.6%, compared to 71.5% of Blacks and 79.6% of Hispanic or Latino patients. Use of ACE inhibitors and ARBs decreased with increasing age group.

HP2020 Table 4 CKD-5 Increase the proportion of persons with diabetes and chronic kidney disease who receive recommended medical treatment with angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs): Target 74.1%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	67.4	68.2	69.1	68.9	68.6	67.8	70.3	71.9	71.8	71.4
Race/Ethnicity										
American Indian or Alaska Native	68.5	74.4	71.1	71.5	72.7	68.1	70.3	70.4	73.4	70.3
Asian	75.2	75.5	74.6	76.4	75.5	76.8	79.2	77.8	76.0	76.2
Black/African American	70.0	69.3	70.9	70.1	71.0	69.3	71.0	72.5	73.4	71.5
White	66.1	67.3	68.1	67.8	67.3	66.7	69.4	71.1	71.0	70.6
Hispanic or Latino	71.5	72.0	74.7	75.3	76.1	76.8	77.0	78.4	77.3	79.6
Sex										
Male	65.0	66.4	67.3	67.1	66.7	66.7	69.4	71.0	71.2	70.9
Female	69.0	69.5	70.4	70.2	70.0	68.9	71.1	72.6	72.3	71.8
Age										
65-74	71.4	72.0	72.6	72.5	72.2	72.0	74.2	75.3	75.3	75.2
75-84	65.9	67.3	68.1	67.6	68.2	66.4	69.6	71.7	71.2	70.7
85+	59.6	60.2	62.3	62.4	60.4	58.1	62.1	63.6	62.9	62.0

Data Source: Special analyses, Medicare 5 percent sample. Medicare patients aged 65 & older with CKD & diabetes mellitus. Abbreviation: CKD, chronic kidney disease.

Incidence of End-Stage Renal Disease

After seeing a decline in the rate of new cases of ESRD from 2006 through 2012, the rates remained somewhat stable in recent years. In 2016, the incidence of ESRD was 358.1 cases per million population (PMP), which remains above the target of 352.1, established as a 10% decrease from the 2007 value of 391.2. As shown in Table 5, there remains substantial variation in the incidence of ESRD across race and ethnicity groups. Consistent with previous years, in 2016 higher rates of incident ESRD were seen among Blacks, at 868.9 new cases PMP and Native Hawaiians and Pacific Islanders, with 2638.9 PMP, as compared to Whites with 294.70 and Asians with 326.0. The most improvement has been observed among American Indians and Alaska Natives, in whom overall ESRD incidence decreased by 29.5% from 2007 to 2016. Blacks had a 20.4% reduction in ESRD incidence in that decade. In contrast, the incidence among Whites and Asians decreased by 3.9% and 8.9% respectively over the same period.

Of note, the extraordinarily high incidence rates among Native Hawaiians and Pacific Islanders might in part result from differential race reporting between the U.S. Census Bureau and the Centers for Medicare & Medicaid ESRD Medical Evidence Report form (CMS 2728) data collections. Although in the Census, one-half of Native Hawaiians and Pacific Islanders self-identified as of multiple races, only 7% did so in the CMS 2728.

At 477.6 PMP, the rate of incident ESRD among Hispanics was 35.2% greater than for non-Hispanics, at 358.9 PMP, although this gap has decreased slightly in recent years.

There remains a significant gender gap in ESRD incidence rates. In 2016, men had a 60.4% higher rate than women (451.6 vs 281.6 new cases PMP). This has increased since 2006, when the rate in males was 54.6% higher than females.

Kidney Failure Resulting from Diabetes

In 2016, the overall rate of kidney failure due to DM was 166.3 PMP. This was the third consecutive year of increase, and rates remained above the HP2020 target of 154.4 PMP (Table 6). Males continued to have a higher rate of diabetic kidney failure than did females, at 204.3 compared with 134.2 PMP.

The degree of kidney failure due to DM varied widely by race, and was markedly higher in Blacks as compared to Whites, at 386.0 versus 142.9 PMP. American Indians and Alaska Natives have had the greatest decline in ESRD incidence from DM, falling 25.9% from 2007 to 2016; over the same period, Blacks had a 19.3% decrease while Whites experienced a 4.9% increase in ESRD incidence due to DM. As noted above, the extraordinarily high rates among Native Hawaiians and Pacific Islanders again may have been influenced by differential race reporting between the Census Bureau and the CMS 2728 data collections.

HP2020 Table 5 CKD-8 Reduce the rate of new cases of end-stage renal disease (ESRD): Target 352.1 new cases per million population

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	391.2	387.0	390.2	382.4	366.3	361.0	362.1	362.7	366.1	358.1
Race										
American Indian or Alaska Native	541.3	543.6	528.8	488.2	458.8	466.1	414.8	407.1	378.5	381.6
Asian	357.7	356.2	366.5	356.3	347.5	339.1	337.7	328.7	320.4	326.0
Native Hawaiian or Pacific Islander~	2402.3	2209.9	2437.2	2615.9	2379.3	2555.0	2615.8	2581.0	2570.9	2638.9
Black/African American	1092.2	1074.4	1074.1	1034.6	995.5	954.1	942.1	923.9	911.0	868.9
White	306.7	304.4	308.2	304.7	291.8	288.6	290.7	293.2	298.8	294.7
Two or more races	149.8	158.4	145.7	140.7	115.6	13.0	*	*	*	*
Ethnicity										
Hispanic/Latino	593.4	589.9	587.3	580.0	567.7	533.3	527.8	502.0	499.9	477.6
Non-Hispanic	376.0	372.6	377.3	370.1	354.5	354.9	358.0	361.4	365.9	358.9
Non-Hispanic Black/African American	1111.9	1094.4	1094.7	1055.4	1015.3	977.1	967.0	951.7	939.0	896.5
Non-Hispanic White	275.9	272.3	275.5	271.2	257.5	257.3	259.3	263.7	269.5	268.0
Sex										
Male	486.9	484.2	489.5	481.2	461.5	454.0	458.0	459.8	463.4	451.6
Female	314.9	309.3	310.8	303.0	288.9	285.4	284.0	283.0	286.3	281.2
Age										
<18	12.3	12.2	12.0	11.6	11.7	11.7	11.5	11.0	10.6	10.4
0-4	10.9	10.0	10.8	11.0	11.3	11.3	11.2	10.9	11.1	10.3
5-11	7.0	7.8	7.2	7.2	7.0	7.5	7.9	7.3	5.7	6.9
12-17	19.5	19.2	18.6	17.2	17.6	16.9	16.0	15.5	15.9	14.7
18-44	119.4	118.9	122.6	119.0	115.4	114.3	115.5	120.2	121.9	119.1
18-24	43.0	41.5	40.7	40.0	39.7	36.4	37.3	35.1	35.7	34.2
25-44	146.2	146.0	151.3	146.6	141.9	141.6	142.9	150.0	152.1	148.8
45-64	597.2	593.0	593.4	575.8	557.2	558.5	559.4	560.4	567.3	552.4
45-54	390.2	386.5	389.4	374.0	372.3	370.6	384.0	388.1	399.3	391.0
55-64	804.2	799.5	797.3	777.7	742.1	746.4	734.9	732.6	735.3	713.9
65+	1623.6	1600.5	1610.9	1602.2	1522.7	1464.9	1466.4	1443.4	1452.6	1419.7
65-74	1379.6	1352.9	1360.8	1353.9	1271.5	1242.0	1249.4	1241.8	1228.7	1222.1
75-84	1879.1	1855.7	1867.2	1863.0	1789.6	1703.1	1705.7	1668.1	1703.8	1646.8
85+	1510.0	1523.4	1548.7	1477.5	1365.0	1311.6	1242.2	1211.4	1179.7	1124.7

Data Source: Special analyses, USRDS ESRD Database and CDC Bridged Race Intercensal Estimates Dataset, Incident ESRD patients. Rates adjusted for: overall, age/sex/race; rates by age adjusted for sex/race; rates by sex adjusted for age/race; rates by race/ethnicity adjusted for age/sex. Reference population: 2012 patients. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviations: CDC, Centers for Disease Control and Prevention; CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 6 CKD-9.1 Reduce kidney failure (or end-stage renal disease, ESRD) due to diabetes: Target 154.4 per million population

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	171.5	169.1	169.7	167.0	160.1	158.5	160.2	161.5	166.6	166.3
Race										
American Indian or Alaska Native	380.7	389.9	383.5	347.6	321.0	322.9	299.0	290.7	277.6	282.8
Asian	172.9	180.0	180.5	172.6	173.6	170.5	173.2	172.0	165.9	173.1
Native Hawaiian or Pacific Islander~	1504.7	1336.8	1534.8	1648.6	1449.1	1520.8	1679.5	1655.0	1643.1	1680.0
Black/African American	478.2	473.8	471.6	456.9	437.2	414.2	404.4	398.7	399.8	386.0
White	136.2	134.1	135.3	134.6	129.5	130.4	133.7	135.8	142.0	142.9
Two or more races	81.4	78.4	76.2	68.4	58.7	6.0	.	.	*	*
Ethnicity										
Hispanic/Latino	367.1	367.9	360.6	356.3	347.2	324.9	320.7	307.9	309.4	296.4
Non-Hispanic	158.6	156.3	157.8	155.2	148.6	148.4	150.4	152.9	158.3	159.4
Non-Hispanic Black/African American	486.2	482.1	480.5	465.7	445.4	423.8	414.3	409.9	411.0	397.6
Non-Hispanic White	113.0	109.4	110.5	109.3	103.8	106.2	109.2	111.9	118.2	120.3
Sex										
Male	202.3	200.8	203.3	200.7	193.8	191.9	196.1	199.8	204.7	204.3
Female	145.8	142.5	141.6	138.6	131.6	130.0	129.7	128.9	134.2	134.2
Age										
<18	*	*	*	0.1	*	0.1	*	0.1	0.1	0.1
0-4	*	.	*	*	*	*	*	0.3	0.3	0.2
5-11	.	*	.	.	.	*	.	.	.	*
12-17	*	*	*	*	*	*	*	.	*	*
18-44	37.8	37.7	39.9	39.7	39.7	38.4	39.6	42.0	43.4	43.5
18-24	2.7	2.4	2.6	2.5	2.3	2.5	2.6	1.8	2.5	2.2
25-44	50.1	50.0	53.0	52.7	52.7	51.0	52.5	56.0	57.7	57.9
45-64	309.9	308.5	307.1	295.4	282.6	285.5	283.5	284.2	291.2	286.5
45-54	179.0	178.6	180.4	175.9	173.9	176.1	183.5	184.7	193.6	194.2
55-64	440.8	438.4	433.7	414.9	391.2	394.9	383.5	383.8	388.8	378.7
65+	691.7	674.6	674.3	680.2	648.7	619.5	632.5	631.1	653.4	653.7
65-74	697.9	678.3	675.8	669.7	633.3	615.7	625.0	621.5	620.5	634.9
75-84	718.0	700.8	701.1	720.6	693.1	650.2	669.9	670.0	717.1	703.5
85+	367.2	376.7	390.4	381.6	358.5	350.1	334.6	337.8	345.6	342.9

Data Source: Special analyses, USRDS ESRD Database and CDC Bridged Race Intercensal Estimates Dataset, Incident ESRD patients. Adjusted for age/sex/race. Reference population: 2012 patients. "." Zero values in this cell. *Values for cells with 10 or fewer patients are suppressed. ~Estimate shown is imprecise due to small sample size and may be unstable over time. Abbreviations: CDC, Centers for Disease Control and Prevention; CKD, chronic kidney disease; ESRD, end-stage renal disease.

In 2016 the adjusted rate of kidney failure among persons with DM was 2,412 PMP (adjustment by age, sex, and race; see Table 7), failing to achieve the HP2020 target of 2352.7PMP. This represented a decrease from 2015, although it is still higher than it was in 2009-2014.

Rates in 2016 varied among races, and remained highest in Blacks with DM at 3462 PMP, compared to 2189 PMP in their White counterparts. Of note, rates in Whites have increased annually since 2011. In contrast, rates of kidney failure in Blacks with DM have fallen each year since 2007, an overall 22.6% decrease during that period.

Nephrologist Care

At 36.8%, the proportion of CKD patients in 2016 receiving care from a nephrologist at least 12 months before the start of renal replacement therapy exceeded

the HP2020 goal of 30.0%, which was based on a 10% increase over the 2007 proportion (Table 8). Steady improvement has been seen over the last decade, and this is the sixth consecutive year of surpassing the HP2020 goal.

Variations by race continued to be observed, with Whites (38.4%) and Asians (39.2%) having a greater proportion of care than Blacks (32.3%) and Native Hawaiians and Pacific Islanders (31.5%). Percentages by ethnicity were lowest among Hispanics and Latinos, at 30.0%. However, all race and ethnicity groups achieved the HP2020 goal.

Greater variation was observed by age, with the proportions ranging from 30.8% among those aged 18-44 to 47.9% among those under age 18. In contrast to the differences seen by race and age, percentages of pre-ESRD nephrologist care were similar by sex, at 36.7% among males and 37.0% among females.

HP2020 Table 7 CKD-9.2 Reduce kidney failure (or end-stage renal disease, ESRD) due to diabetes among persons with diabetes: Target 2,352.7 per million population

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	2614	2486	2403	2347	2280	2273	2309	2320	2414	2412
Race										
American Indian or Alaska Native	2572	2916	2925	2594	2241	2289	2034	1744	1732	1798
Asian	2067	2190	2214	2111	2088	2166	2318	2317	2288	2362
Native Hawaiian or Pacific Islander~	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Black/African American	4472	4332	4242	3979	3834	3724	3605	3595	3553	3462
White	2275	2139	2051	2028	1978	1990	2046	2068	2180	2189
Two or more races	614	553	509	481	468	46	0	0	*	*
Ethnicity										
Hispanic/Latino	3320	3184	2967	2903	2910	2814	2826	2746	2795	2714
Non-Hispanic	2513	2388	2321	2263	2186	2185	2222	2242	2335	2345
Non-Hispanic Black/African American	4676	4522	4472	4192	4075	3932	3795	3803	3784	3720
Non-Hispanic White	2045	1898	1823	1801	1734	1769	1832	1864	1989	2012
Sex										
Male	2926	2743	2624	2542	2531	2549	2622	2638	2727	2718
Female	2324	2236	2179	2143	2027	1998	1998	1997	2096	2101
Age										
<18	*	*	23	28	*	30	32	46	66	54
0-4	*	*	*	*	*	*	*	*	*	*
5-11	.	*	*	*	*	*	*	.	*	*
12-17	*	*	*	*	*	*	*	.	*	*
18-44	1610	1537	1506	1462	1556	1522	1573	1716	1738	1723
18-24	347	268	284	295	338	294	287	203	295	240
25-44	1745	1684	1641	1580	1663	1659	1726	1904	1909	1898
45-64	2374	2256	2197	2136	2079	2124	2139	2156	2250	2215
45-54	2003	1844	1857	1867	1883	1893	1971	1984	2073	2034
55-64	2639	2571	2437	2310	2191	2266	2239	2255	2351	2314
65+	3101	2938	2804	2724	2582	2518	2571	2521	2624	2629
65-74	3184	2989	2898	2774	2629	2574	2636	2583	2569	2621
75-84	3355	3158	2939	2880	2809	2732	2871	2789	3113	3004
85+	1946	2065	1981	2067	1766	1701	1515	1527	1676	1709

Data Source: Special analyses, USRDS ESRD Database and CDC Bridged Race Intercensal Estimates Dataset, Incident ESRD patients. Adjusted for age/sex/race. Reference population: 2012. National Health Interview Survey 2006–2015 used to estimate diabetes mellitus prevalence. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. "." Zero values in this cell. Abbreviations: CDC, Centers for Disease Control and Prevention; CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 8 CKD-10 Increase the proportion of chronic kidney disease patients receiving care from a nephrologist at least 12 months before the start of renal replacement therapy: Target 30.0%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	27.3	28.6	28.5	29.5	31.0	33.1	34.2	34.9	35.6	36.8
Race										
American Indian or Alaska Native	25.9	27.9	26.8	23.8	27.6	30.5	30.2	30.1	35.2	33.9
Asian	26.6	27.6	29.0	29.8	31.4	31.6	35.3	35.5	37.6	39.2
Native Hawaiian or Pacific Islander~	23.9	22.4	23.9	25.1	27.0	27.3	29.9	32.5	31.6	31.5
Black/African American	24.0	24.7	24.9	25.5	27.2	29.6	30.2	30.7	31.9	32.3
White	28.8	30.3	30.1	31.3	32.7	34.7	35.8	36.6	36.9	38.4
Two or more races	24.6	29.2	28.5	31.5	31.5	31.7	.	*	*	*
Ethnicity										
Hispanic/Latino	21.2	22.2	22.5	23.6	24.9	25.6	26.9	26.9	28.0	30.0
Non-Hispanic	28.2	29.6	29.5	30.6	32.1	34.4	35.4	36.3	36.9	38.0
Non-Hispanic Black/African American	24.1	24.8	25.0	25.6	27.2	29.7	30.3	30.7	32.0	32.3
Non-Hispanic White	30.5	32.3	32.0	33.3	34.7	37.1	38.2	39.2	39.3	40.7
Sex										
Male	27.3	28.4	28.3	29.6	30.7	33.1	34.1	34.6	35.4	36.7
Female	27.3	28.8	28.8	29.5	31.3	33.1	34.3	35.2	35.9	37.0
Age										
<18	34.4	39.6	38.6	36.9	44.1	40.6	45.9	43.3	47.4	47.9
0-4	25.0	27.0	22.3	22.6	25.1	27.4	27.9	25.0	26.7	35.8
5-11	40.4	51.9	47.6	47.9	59.1	51.7	57.8	52.9	55.5	54.2
12-17	36.0	39.6	41.5	38.3	46.4	42.0	48.8	47.9	55.5	51.1
18-44	23.5	24.4	23.9	24.2	25.6	27.8	27.7	29.3	29.2	30.8
18-24	24.6	23.7	24.4	25.2	27.4	26.7	27.2	29.9	30.5	32.8
25-44	23.4	24.5	23.8	24.1	25.4	27.9	27.7	29.2	29.1	30.6
45-64	26.6	27.3	27.4	27.9	29.4	31.1	32.1	32.3	33.5	34.3
45-54	25.5	25.3	25.7	26.3	28.4	29.5	30.6	31.2	31.9	33.4
55-64	27.4	28.6	28.4	29.0	30.1	32.1	33.1	33.0	34.5	34.8
65+	28.6	30.5	30.5	32.0	33.4	35.8	37.2	38.2	38.5	39.9
65-74	28.9	30.6	30.7	32.1	33.4	35.6	36.6	37.9	38.0	39.4
75-84	28.9	31.2	30.9	32.7	33.9	36.6	38.3	38.8	39.5	40.6
85+	26.7	27.5	28.4	29.7	31.5	34.0	36.2	37.7	37.8	40.2

Data Source: Special analyses, USRDS ESRD Database. Incident patients with a valid ESRD Medical Evidence CMS 2728 form; nephrologist care determined from Medical Evidence form. ~Estimate shown is imprecise due to small sample size and may be unstable over time. "." Zero values in this cell. *Values for cells with 10 or fewer patients are suppressed. Abbreviations: CMS, Centers for Medicare and Medicaid Services; CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 9 CKD-11.1: Increase the proportion of adult hemodialysis patients who use arteriovenous fistulas as the primary mode of vascular access: Previous data source target 50.6%

	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	62.8	64.2	64.6	64.3	64.1
Race					
American Indian or Alaska Native	72.5	75.7	76.2	76.4	76.3
Asian	67.7	69.4	69.9	69.2	68.4
Native Hawaiian or Pacific Islander~	66.5	69.3	69.7	69.6	69.2
Black/African American	58.5	59.7	60.2	59.9	59.3
White	65.0	66.4	66.8	66.4	66.4
Two or more races	70.1	70.2	72.0	71.0	70.0
Ethnicity					
Hispanic/Latino	68.7	69.5	69.8	69.6	70.0
Non-Hispanic	61.4	62.9	63.4	63.0	62.8
Non-Hispanic Black/African American	58.4	59.6	60.1	59.8	59.3
Non-Hispanic White	63.2	64.9	65.3	64.8	64.6
Sex					
Male	69.0	70.1	70.3	70.0	69.9
Female	54.7	56.5	57.3	56.8	56.4
Age					
18-44	66.7	67.5	68.0	67.5	67.2
18-24	66.0	67.7	68.8	67.6	67.7
25-44	66.8	67.4	67.9	67.5	67.1
45-64	64.4	65.8	66.3	66.2	66.3
45-54	66.2	67.5	68.1	67.9	68.1
55-64	63.1	64.6	65.0	64.9	65.0
65+	58.4	60.2	60.7	60.4	60.2
65-74	60.2	62.0	62.4	62.4	62.2
75-84	57.2	58.9	59.4	58.8	58.7
85+	48.0	50.0	50.4	49.8	50.0

Data Source: Special analyses, CROWNWeb. Prevalent hemodialysis patients with a valid ESRD Medical Evidence CMS 2728 form; vascular access type determined from CROWNWeb. ~Estimate shown is imprecise due to small sample size and may be unstable over time. Abbreviations: CKD, chronic kidney disease; CMS, Centers for Medicare and Medicaid Services; ESRD, end-stage renal disease.

In comparison to AV fistulas, reliance on hemodialysis catheters as primary vascular access is associated with increased morbidity and mortality. HP2020 CKD Objective 11.2 aims to reduce the proportion of hemodialysis patients that are dependent on catheters. Data for this objective were also obtained from CROWNWeb and thus interpretation of target achievement may be limited, as the former HP2020 target was derived from a different data source (ESRD CPM Project).

In 2016, 15.9% of prevalent adult hemodialysis patients were using catheters as the primary mode of access (Table 10). This represents an improvement from the most recent available data from the ESRD CPM project, which found that 27.7% of prevalent hemodialysis patients were using a catheter as their primary access in 2007.

Percentage of catheter use was highest among Whites at 16.9% compared to 15.1% in Blacks, 13.3% in Asians, 11.6% in American Indian or Alaska Natives, and 13.6% in Native Hawaiians or Pacific Islanders. The proportion of patients with catheter access

increased by age group after the age of 45, rising from 14.1% among those aged 45-54 years to 25.2% in those aged 85 years and older.

Programs such as HP2020 and the Fistula First Initiative (a U.S. national quality improvement program initiated in 2003) continue to work to increase the use of fistulas, and to promote early placement prior to initiation of ESRD therapy. In 2016, 34.9% of incident hemodialysis patients had a maturing arteriovenous fistula, or were using one as their primary vascular access (see Table 11). This was the fourth consecutive year of slight decrease in this proportion, but remains above the HP2020 goal of 34.8%.

By race, in 2016 Blacks had the lowest proportion of AV fistula at 32.8%, compared to 35.3% in Whites, 40.6% in American Indian or Alaska Natives, 38.3% in Asians, and 35.1% in Native Hawaiians or Pacific Islanders. By age group, patients aged 65-74 had the highest proportion at 36.4%, compared to just 24.6% in patients aged 18-24.

HP2020 Table 10 CKD-11.2: Reduce the proportion of adult hemodialysis patients who use catheters as the only mode of vascular access: Previous data source target 26.1%

	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	15.0	14.3	16.0	16.1	15.9
Race					
American Indian or Alaska Native	12.2	11.1	12.1	11.5	11.6
Asian	13.0	12.3	13.0	13.0	13.3
Native Hawaiian or Pacific Islander~	13.4	13.7	14.0	14.3	13.6
Black/African American	14.1	13.4	14.9	15.1	15.1
White	15.9	15.2	17.1	17.2	16.9
Two or more races	10.4	10.0	8.5	8.3	9.9
Ethnicity					
Hispanic/Latino	12.9	12.7	14.3	14.4	14.0
Non-Hispanic	15.5	14.7	16.4	16.5	16.4
Non-Hispanic Black/African American	14.1	13.4	14.9	15.1	15.1
Non-Hispanic White	17.3	16.4	18.5	18.5	18.2
Sex					
Male	13.1	12.6	14.3	14.3	14.1
Female	17.4	16.5	18.2	18.4	18.4
Age					
18-44	14.3	13.7	15.2	15.6	15.4
18-24	17.1	15.6	16.4	17.6	17.4
25-44	14.0	13.5	15.1	15.4	15.2
45-64	14.0	13.3	14.9	15.0	14.7
45-54	13.4	12.6	14.1	14.3	14.1
55-64	14.5	13.9	15.4	15.4	15.2
65+	16.7	16.0	17.9	17.8	17.7
65-74	15.3	14.6	16.7	16.4	16.5
75-84	17.4	16.8	18.4	18.6	18.3
85+	26.0	24.6	26.0	26.2	25.2

Data Source: Special analyses, CROWNWeb. Prevalent hemodialysis patients with a valid ESRD Medical Evidence CMS 2728 form; vascular access type determined from CROWNWeb. ~Estimate shown is imprecise due to small sample size and may be unstable over time. Abbreviations: CKD, chronic kidney disease; CMS, Centers for Medicare and Medicaid Services; ESRD, end-stage renal disease.

HP2020 Table 11 CKD-11.3 Increase the proportion of adult hemodialysis patients who use arteriovenous fistulas or have a maturing fistula as the primary mode of vascular access at the start of renal replacement therapy: Target 34.8%

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	31.6	31.2	32.2	33.8	35.1	36.7	37.3	35.9	35.5	34.9
Race										
American Indian or Alaska Native	37.7	41.5	41.4	41.1	40.3	40.8	42.5	40.5	43.2	40.6
Asian	35.3	35.9	35.5	37.3	37.2	38.0	41.4	38.5	38.7	38.3
Native Hawaiian or Pacific Islander~	35.2	32.6	32.4	32.6	36.2	37.3	39.8	34.9	37.9	35.1
Black/African American	29.8	29.2	30.6	32.1	33.9	35.8	35.7	34.3	33.4	32.8
White	32.2	31.7	32.7	34.3	35.3	36.8	37.5	36.2	35.9	35.3
Two or more races	33.1	28.8	36.0	37.6	38.9	43.6	.	.	*	*
Ethnicity										
Hispanic/Latino	29.9	29.7	31.0	32.8	33.4	34.0	34.7	33.1	33.0	32.6
Non-Hispanic	31.9	31.4	32.5	34.0	35.4	37.1	37.7	36.3	35.9	35.2
Non-Hispanic Black/African American	29.7	29.1	30.5	32.0	33.9	35.8	35.6	34.3	33.3	32.8
Non-Hispanic White	32.8	32.3	33.2	34.8	36.0	37.7	38.5	37.2	36.8	36.2
Sex										
Male	34.9	33.9	34.9	36.4	37.9	39.2	39.3	38.0	37.9	37.0
Female	27.5	27.6	28.8	30.4	31.4	33.3	34.5	33.0	32.1	31.9
Age										
18-44	28.2	27.4	29.2	31.1	31.8	32.5	33.0	32.2	30.9	31.0
18-24	20.8	21.1	22.6	23.4	24.9	25.8	27.3	27.4	23.3	24.6
25-44	28.9	28.1	29.8	31.8	32.5	33.2	33.5	32.6	31.6	31.5
45-64	32.7	32.5	33.2	34.4	35.9	37.9	38.0	36.6	36.2	35.8
45-54	32.4	32.2	32.8	34.1	35.9	37.3	37.6	36.2	36.4	35.4
55-64	32.9	32.6	33.4	34.5	35.9	38.3	38.2	36.7	36.1	36.0
65+	31.6	31.0	32.2	34.0	35.2	36.7	37.6	36.2	35.8	34.9
65-74	34.1	32.9	34.2	35.9	37.0	38.8	39.1	37.5	37.2	36.4
75-84	30.6	30.8	31.9	33.7	34.9	36.2	37.7	36.3	35.5	34.4
85+	25.3	24.2	25.5	26.8	28.5	29.3	30.2	29.5	29.9	29.1

Data Source: Special analyses, USRDS ESRD Database. Incident hemodialysis patients aged 18 & older. ~Estimate shown is imprecise due to small sample size and may be unstable over time. "." Zero values in this cell. *Values for cells with 10 or fewer patients are suppressed. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

Transplantation

Objective CKD-12 examines the proportion of ESRD patients younger than age 70 who were wait-listed or received a kidney transplant from a deceased donor within one year of initiating dialysis therapy. This proportion has decreased in recent years, falling from between 17.3% in 2012 to 15.8% in 2016 (Table 12). Across race categories, the HP2020 target of 18.7% was only achieved by those of Asian race (28.7%). Males (16.3%) were closer to the target than females (15.1%). Groups furthest from the target included American Indians or Alaska Natives (10.8%), those aged 65+ (10.4%), Blacks (12.3%) and Native Hawaiians and Pacific Islanders (11.5%). Gaps between groups with the highest and lowest percentages have remained stable, showing only minor decreases over time.

At 12.7%, the proportion of 2013 patients younger than age 70 who received a kidney transplant within three years of starting ESRD therapy (objective CKD-12) remained well below the HP2020 target of 20.1%, which was based on a 10% improvement over the value in 2004 (see Table 13). This continued the slow but consistent decrease observed since 2004, when 18.3% of patients received a transplant within three years of initiating ESRD therapy.

Rates were lowest among Blacks (6.8%), and American Indians and Alaska Natives (6.5%), and were highest among Whites (15.5%) and Asians (18.0%). At 13.0%, males were slightly more likely to receive a transplant than females, at 12.3%. The percentage of patients receiving transplants decreased with age, from 77.2% in pediatric patients to 7.6% among those aged 65-69.

HP2020 Table 12 CKD-12 Increase the proportion of dialysis patients waitlisted and/or receiving a kidney transplant from a deceased donor within 1 year of end-stage renal disease (ESRD) start (among patients under 70 years of age): Target 18.7% of dialysis patients

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	17.0	16.8	17.1	16.8	17.4	17.3	17.1	16.4	15.9	15.8
Race										
American Indian or Alaska Native	11.4	10.6	11.4	11.4	11.1	12.4	11.7	8.7	10.2	10.8
Asian	30.9	31.0	31.8	31.5	32.6	31.5	32.4	29.8	29.3	29.1
Native Hawaiian or Pacific Islander~	14.9	14.3	14.6	15.0	14.5	16.5	17.7	14.2	13.9	11.5
Black/African American	13.3	13.2	13.8	13.8	14.3	14.6	14.5	13.9	13.4	12.3
White	18.5	18.2	18.2	17.7	18.3	18.0	17.9	17.2	16.5	16.2
Two or more races	13.9	23.8	24.1	22.3	18.5	*	.	.	*	*
Ethnicity										
Hispanic/Latino	17.8	17.5	18.1	17.4	18.3	17.5	17.2	15.8	16.4	15.8
Non-Hispanic	16.7	16.5	16.8	16.6	17.0	17.0	17.0	16.4	15.6	15.5
Non-Hispanic Black/African American	13.2	13.2	13.8	13.7	14.3	14.6	14.5	13.9	13.3	12.2
Non-Hispanic White	18.8	18.3	18.1	17.8	18.1	18.1	18.1	17.7	16.6	16.4
Sex										
Male	17.9	17.6	18.0	17.6	18.2	18.1	17.7	17.4	16.6	16.3
Female	15.8	15.7	15.9	15.7	16.1	16.1	16.3	15.0	15.0	15.1
Age										
<18	57.2	61.0	58.7	57.0	55.6	57.6	59.4	62.7	54.7	54.4
0-4	36.7	42.5	46.6	41.1	37.7	35.9	38.5	35.8	33.2	28.0
5-11	66.5	69.1	65.0	61.1	63.1	63.2	68.3	74.3	61.8	62.5
12-17	60.8	64.3	60.7	62.0	59.9	64.9	64.0	69.0	64.0	64.9
18-44	25.8	25.3	25.7	24.9	26.7	25.2	25.2	24.4	23.6	24.2
18-24	32.3	29.6	32.3	31.9	32.1	32.6	34.2	33.3	33.2	34.6
25-44	25.2	25.0	25.2	24.3	26.1	24.5	24.4	23.6	22.8	23.3
45-64	15.8	15.5	15.8	15.6	16.1	16.4	16.0	15.2	14.9	14.8
45-54	18.6	17.3	18.2	17.8	18.3	18.5	18.2	17.4	17.3	17.2
55-64	14.0	14.3	14.1	14.2	14.7	15.1	14.6	13.8	13.5	13.3
65+	9.4	9.9	10.9	10.9	10.8	10.8	11.5	11.4	10.8	10.4

Data Source: Special analyses, USRDS ESRD Database. Incident ESRD patients younger than age 70. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. "." Zero values in this cell. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 13 CKD-13.1 Increase the proportion of patients receiving a kidney transplant within 3 years of end-stage renal disease (ESRD): Target 20.1%

	2004 (%)	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)
All	18.3	17.8	17.2	16.6	15.6	14.7	14.1	13.7	13.2	12.7
Race										
American Indian or Alaska Native	9.3	8.8	10.0	10.1	7.0	7.2	7.2	6.4	7.2	6.5
Asian	20.6	18.6	19.1	17.6	18.0	16.9	17.5	16.9	16.2	18.0
Native Hawaiian or Pacific Islander~	12.7	9.8	9.6	10.5	11.2	8.3	7.5	8.0	8.3	6.7
Black/African American	10.0	9.6	9.1	9.0	8.7	7.8	7.7	7.3	7.0	6.8
White	22.7	22.2	21.4	20.7	19.3	18.1	17.2	16.9	16.2	15.5
Two or more races	.	17.1	16.6	14.7	17.9	18.3	14.8	17.6	18.3	.
Ethnicity										
Hispanic/Latino	14.9	15.1	14.7	14.0	12.8	11.8	11.3	11.4	11.0	10.8
Non-Hispanic	18.6	18.0	17.3	16.8	15.9	14.9	14.3	13.9	13.2	12.7
Non-Hispanic Black/African	9.9	9.5	8.9	8.9	8.6	7.7	7.6	7.2	6.9	6.6
Non-Hispanic White	25.1	24.5	23.7	23.0	21.7	20.4	19.4	19.0	18.1	17.3
Sex										
Male	19.6	19.2	18.5	17.5	16.2	15.3	14.5	14.3	13.5	13.0
Female	16.5	15.9	15.4	15.3	14.8	13.8	13.5	12.9	12.7	12.3
Age										
<18	76.3	76.7	78.1	78.3	76.8	78.2	74.6	75.0	74.4	77.2
0-4	78.0	75.5	77.3	75.9	68.7	77.0	71.2	68.8	62.7	73.3
5-11	84.1	82.1	83.0	86.9	85.6	83.0	81.0	85.6	84.0	83.6
12-17	72.6	75.1	76.8	76.0	76.3	76.9	73.2	73.4	75.6	76.0
18-44	29.3	27.7	26.7	25.4	23.9	22.6	21.8	21.4	21.2	21.0
18-24	42.0	40.3	37.1	35.1	33.1	34.0	33.8	30.5	31.9	35.0
25-44	27.8	26.3	25.5	24.2	22.8	21.4	20.5	20.3	20.1	19.5
45-64	15.2	15.0	14.5	14.0	13.2	12.3	11.8	11.5	11.0	10.2
45-54	18.5	17.6	17.1	16.9	15.6	14.8	13.8	13.4	12.8	11.8
55-64	12.6	13.1	12.6	12.0	11.6	10.7	10.5	10.3	9.9	9.2
65+	8.1	7.9	8.4	8.3	8.3	7.9	8.0	7.9	7.0	7.6

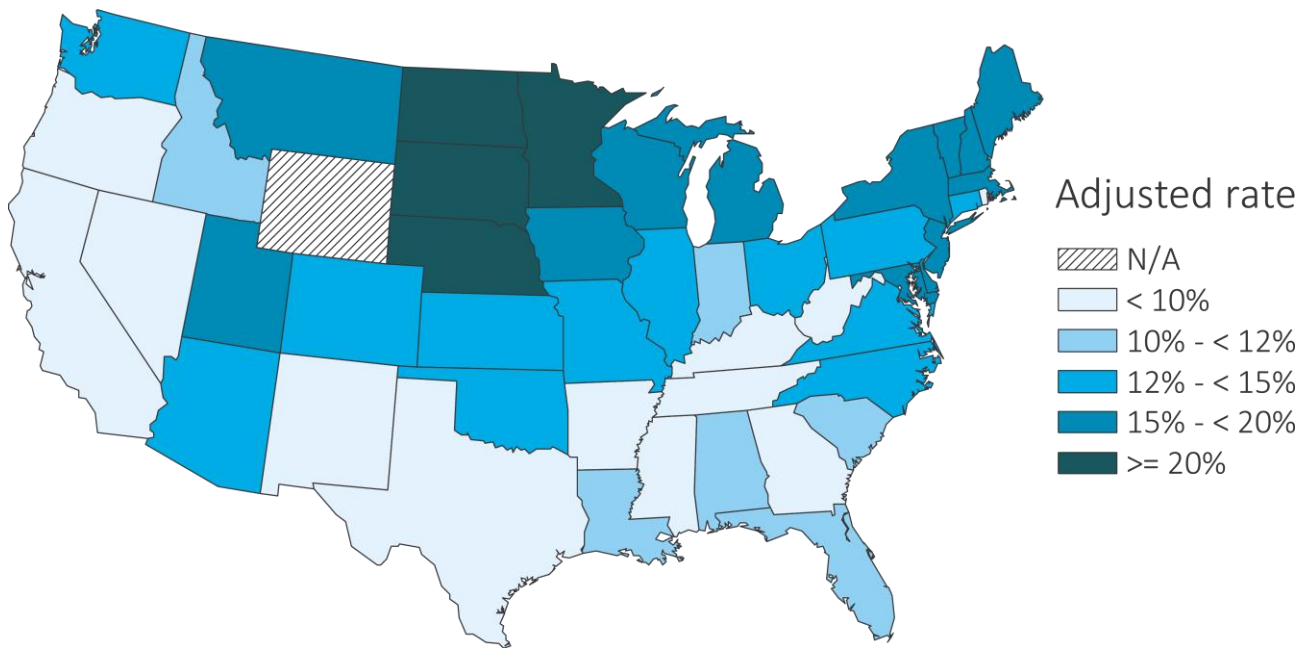
Data Source: Special analyses, USRDS ESRD Database. Incident ESRD patients younger than age 70. ~Estimate shown is imprecise due to small sample size and may be unstable over time. "." Zero values in this cell. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

Geographic variation in the proportion of patients receiving a kidney transplant within three years of ESRD was also observed (Figure 2). In 2013, nine of the U.S. states met or exceeded the HP2020 target of 20.1%; these were almost exclusively located in the North Atlantic and Northern Plains regions. States with the lowest percentages were generally observed throughout the South and in the West.

In 2016, the percentage of patients receiving a preemptive transplant at the start of ESRD remained

stable at 4.0%, consistent with the previous four years (see Table 14). Not surprisingly, preemptive transplants were most common in pediatric patients, reaching 30.3% among those aged 5 to 11. Proportions were equivalent between females at 4.1% and males at 3.9%. Broad variation was observed by race, however, ranging from 0.9% among Blacks and to 3.6% among Whites and 3.4% for Asians.

HP2020 Figure 2 HP2020 CKD-13.1 Geographic distribution of the adjusted proportion of patients receiving a kidney transplant within 3 years of end-stage renal disease (ESRD), by state, in the U.S. population, 2012: Target 20.1%



Data Source: Special analyses, USRDS ESRD Database. Incident ESRD patients younger than age 70. Adjusted for age, sex, and race. Alaska, Hawaii, and Wyoming are not reported due to small sample size. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 14 CKD-13.2 Increase the proportion of patients who receive a preemptive transplant at the start of end-stage renal disease (ESRD): No applicable target

	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)	2013 (%)	2014 (%)	2015 (%)	2016 (%)
All	4.0	3.9	3.8	3.8	3.9	3.7	3.7	3.7	3.6	4.0
Race										
American Indian or Alaska Native	1.2	*	1.6	*	1.6	1.3	1.2	1.3	1.4	*
Asian	3.1	3.6	3.2	3.5	3.8	3.3	4.5	3.9	4.1	3.4
Native Hawaiian or Pacific Islander~	1.9	2.8	1.9	1.3	*	*	*	1.2	*	*
Black/African American	1.1	1.2	1.1	1.2	1.3	1.0	1.2	1.0	0.9	0.9
White	5.3	5.1	4.7	4.8	4.8	4.5	4.4	4.3	3.9	3.6
Two or more races	*	*	4.0	*	*	*	.	.	*	*
Ethnicity										
Hispanic/Latino	2.2	2.1	2.2	2.2	2.4	2.2	2.2	2.0	2.3	2.2
Non-Hispanic	4.1	3.9	3.7	3.8	3.9	3.5	3.6	3.5	3.3	3.5
Non-Hispanic Black/African American	1.1	1.1	1.1	1.2	1.2	1.0	1.1	1.0	0.9	0.9
Non-Hispanic White	6.3	6.0	5.5	5.7	5.7	5.3	5.3	5.1	4.5	4.2
Sex										
Male	4.2	3.9	3.8	3.8	3.9	3.6	3.5	3.6	3.7	3.9
Female	3.8	4.0	3.8	3.9	3.9	3.8	3.9	3.9	3.6	4.1
Age										
<18	21.3	20.9	25.0	22.5	24.0	24.2	24.2	22.9	26.4	25.1
0-4	19.7	10.6	19.2	15.0	18.3	17.4	18.5	14.6	15.8	15.0
5-11	31.0	30.7	33.0	31.1	28.3	30.0	32.1	31.5	37.0	30.3
12-17	18.1	20.9	24.1	21.9	24.9	24.8	23.0	22.7	27.8	27.7
18-44	6.0	6.0	5.7	5.5	5.9	5.5	5.4	5.8	5.7	6.4
18-24	8.1	8.6	8.9	8.9	9.2	9.1	8.0	10.3	9.3	9.6
25-44	5.8	5.8	5.4	5.2	5.5	5.1	5.1	5.4	5.4	6.1
45-64	3.6	3.5	3.3	3.5	3.3	3.1	3.2	3.2	3.2	3.4
45-54	4.6	4.3	4.0	4.4	4.0	3.8	3.7	3.8	3.9	4.3
55-64	3.0	3.0	2.8	2.9	2.9	2.7	2.8	2.9	2.7	2.9
65+	1.8	2.0	1.9	2.2	2.3	2.2	2.4	2.3	2.0	2.5

Data Source: Special analyses, USRDS ESRD Database. Incident ESRD patients younger than age 70. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. "." Zero values in this cell. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

Mortality

Table 15 reports the mortality rate of prevalent patients on dialysis. In the past decade, this rate has fallen by nearly 17%, from 208.1 deaths per 1,000 patient-years in 2007 to 173.1 in 2016, although rates appear to have stabilized in the past few years. Nonetheless, this is the sixth consecutive year that rates were below the HP2020 target of 187.3. In 2016, mortality was slightly lower among males at 170.7 deaths per 1,000 patient-years, compared to females, at 176.2 deaths.

Since 2007, reductions in mortality rates have been observed across all age, race and ethnic groups. Among race groups, mortality was highest among Whites and continued to exceed the target at 202.8 deaths per 1,000 patient-years. Rates were lowest among Native Hawaiians and Pacific Islanders (118.5

deaths per 1,000 patient-years), Asians (123.6 deaths per 1,000), and Hispanics (127.1 per 1,000).

Since 2007, the rate of mortality among dialysis patients in the first three months after initiation has fallen by 21.7%, from 372.2 deaths per 1,000 patient-years to 291.3 in 2016. For the fifth year in a row, the rate was below the HP2020 target of 335.0 deaths per 1,000 patient-years (see Table 16). Whites remained the only racial group who exceeded the target rate at 340.6 deaths per 1,000 patient-years. Rates were lowest among American Indians and Alaska Natives, with 149.5 deaths. Native Hawaiians and Pacific Islanders showed a rate of 164.4 deaths per 1,000 patient-years at risk, and those with Hispanic or Latino ethnicity, with 178.6 deaths. Males had slightly lower mortality rates than females, at 289.7 deaths per 1,000 patient-years compared to 293.5. Mortality rates were highest among those aged 85 years or older, at 790.1 deaths per 1,000 patient-years.

HP2020 Table 15 CKD-14.1 Reduce the total number of deaths for persons on dialysis: Target 187.3 deaths per 1,000 patient-years

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	208.1	200.8	195.5	188.6	184.6	177.2	173.4	171.6	174.0	173.1
Race										
American Indian or Alaska Native	163.2	167.5	170.0	152.1	146.0	145.5	143.4	150.1	152.4	153.1
Asian	151.0	137.6	138.1	130.6	131.9	127.3	122.0	123.4	125.7	123.6
Native Hawaiian or Pacific Islander~	157.5	146.2	152.2	148.3	135.2	132.2	119.3	124.1	115.2	118.5
Black/African American	164.2	157.8	153.3	145.6	140.9	135.9	133.5	131.9	135.4	137.9
White	246.6	238.5	231.6	225.3	221.8	212.3	207.7	204.7	206.5	202.8
Two or more races	144.6	148.7	144.4	133.3	127.0	120.3	120.8	134.9	119.6	124.0
Ethnicity										
Hispanic/Latino	146.8	140.3	139.8	131.5	129.9	129.8	125.0	124.4	127.7	127.1
Non-Hispanic	219.5	212.4	206.5	200.1	195.9	187.3	184.0	182.0	184.3	183.3
Non-Hispanic Black/African American	164.7	158.2	153.9	146.1	141.3	135.7	133.6	132.2	135.7	138.1
Non-Hispanic White	278.5	271.6	264.2	259.8	257.2	246.3	242.0	238.6	240.0	234.8
Sex										
Male	204.8	198.4	194.8	187.1	183.6	176.5	171.4	169.8	172.2	170.7
Female	212.1	203.7	196.4	190.4	185.8	178.0	176.0	173.9	176.3	176.2
Age										
<18	36.8	35.8	41.6	36.6	30.0	31.5	29.9	33.0	26.0	33.1
0-4	85.4	94.8	100.7	77.4	60.2	60.1	67.4	65.1	55.7	61.6
5-11	34.8	40.6	49.3	42.7	38.9	34.8	32.4	40.9	28.0	32.4
12-17	24.8	16.9	19.3	20.4	15.7	18.8	12.6	15.4	*	17.0
18-44	75.6	70.6	69.8	63.1	61.2	59.3	57.5	57.0	58.7	61.2
18-24	48.0	43.6	39.2	36.7	37.4	33.1	32.8	32.2	32.0	35.8
25-44	77.8	72.8	72.4	65.2	63.1	61.4	59.4	58.9	60.6	62.9
45-64	151.2	144.8	141.1	135.5	132.4	127.0	122.5	122.0	123.3	123.5
45-54	125.4	117.2	113.6	106.9	105.5	98.1	96.2	94.9	95.5	97.9
55-64	170.5	165.2	160.9	155.7	150.8	146.4	139.9	139.8	141.5	140.1
65+	315.2	305.8	296.6	287.4	281.3	268.4	262.9	257.4	259.4	253.9
65-74	247.4	242.1	236.7	227.5	221.4	212.3	209.9	206.7	208.1	207.4
75-84	361.0	348.9	335.5	325.8	319.0	303.2	296.8	290.4	295.4	286.0
85+	514.1	488.0	468.7	457.4	452.4	434.6	423.0	414.8	420.7	404.5

Data Source: Special analyses, USRDS ESRD Database. Period prevalent dialysis patients. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 16 CKD-14.2 Reduce the number of deaths in dialysis patients within the first 3 months of initiation of renal replacement therapy: Target 335.0 deaths per 1,000 patient-years at risk

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	372.2	369.4	362.4	362.6	343.2	325.6	321.3	322.0	311.2	291.3
Race										
American Indian or Alaska Native	179.0	248.1	174.2	163.5	164.7	228.2	206.1	148.0	134.5	149.5
Asian	246.9	197.0	217.5	217.5	178.8	192.4	187.3	197.7	169.9	173.0
Native Hawaiian or Pacific Islander~	169.9	160.4	200.0	167.4	183.2	117.7	156.7	139.3	138.4	164.4
Black/African American	257.7	258.8	251.1	247.6	231.2	213.4	222.1	226.4	218.2	203.4
White	438.9	436.0	429.6	431.2	411.5	390.4	379.5	378.2	366.2	340.6
Two or more races	312.6	321.9	219.8	278.7	283.2	253.4	*	*	*	449.3
Ethnicity										
Hispanic/Latino	222.7	214.2	205.6	208.8	207.2	195.1	183.4	177.9	189.7	178.6
Non-Hispanic	391.8	389.9	383.0	384.7	364.1	344.0	343.4	344.5	330.1	308.7
Non-Hispanic Black/African American	256.8	254.6	247.4	246.9	231.1	210.0	221.4	225.9	218.0	202.2
Non-Hispanic White	486.7	488.9	482.1	485.8	465.7	439.4	431.2	430.3	410.5	381.5
Sex										
Male	373.2	370.3	366.5	359.8	343.0	321.5	319.5	314.9	309.2	289.7
Female	370.8	368.2	357.1	366.4	343.5	331.2	323.8	331.8	313.9	293.5
Age										
<18	37.8	42.7	68.7	34.0	29.2	29.7	36.3	19.1	32.6	51.9
0-4	143.8	*	194.7	91.4	*	*	94.9	70.7	114.2	112.8
5-11	*	*	*	*	*	*	*	*	*	*
12-17	*	46.5	*	*	34.3	*	*	*	*	*
18-44	102.9	103.0	108.1	96.2	92.4	73.5	78.7	72.1	81.4	65.7
18-24	70.3	60.1	45.7	64.6	55.6	29.7	51.8	40.8	47.1	15.3
25-44	106.5	107.5	114.4	99.4	96.4	77.9	81.5	75.0	84.6	70.2
45-64	204.3	214.1	209.8	212.7	198.5	189.7	190.5	187.4	182.0	168.9
45-54	157.6	175.8	161.7	166.6	156.8	144.5	142.6	141.2	138.1	123.3
55-64	236.2	239.7	241.4	241.8	225.1	217.6	220.5	215.9	208.7	196.1
65+	587.9	573.6	561.7	558.0	535.0	512.0	498.0	502.8	479.7	448.0
65-74	422.1	423.5	416.8	408.9	389.1	378.7	371.7	376.9	355.1	330.2
75-84	680.8	640.5	637.1	649.0	616.4	591.4	572.4	591.1	565.6	543.8
85+	999.4	1003.6	940.8	911.8	914.8	867.4	879.1	860.1	861.8	790.1

Data Source: Special analyses, USRDS ESRD Database. Incident dialysis patients, unadjusted. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviation: CKD, chronic kidney disease; ESRD, end-stage renal disease.

Since 2007, the overall rate of cardiovascular death among those on dialysis has fallen by over 25%. In 2016, with a rate of 67.2, the HP2020 goal of 81.3 cardiovascular deaths per 1,000 patient-years at risk was met for the seventh year in a row (see Table 17). Though both exceeded the target, 2016 rates were lower among females (66.0 deaths per 1,000) as compared with males (68.0 deaths). Rates were lowest among Blacks with 56.7 deaths per 1,000, and Asians, with 52.2 deaths. Cardiovascular death continued to be highest among Whites, at 76.0 deaths per 1,000 patient-years. Since 2006, large reductions in rates by age have been observed. The largest reduction—approximately 31% fewer deaths—was seen for patients older than 65 years in 2016, with 92.1 deaths per 1,000 patient-years, compared to the 2007 rate of 134.1 deaths.

The total death rate for patients with a functioning transplant has not improved since 2007, and in 2016, at 33.2 deaths per 1,000 patient-years at risk, still remained above the HP2020 target of 27.7 (Table 18). Consistent with previous trends, in 2016 males experienced higher rates of 34.9 deaths per 1,000 patient-years, as compared with females at 30.5 deaths per 1,000. Rates were lowest among Asians (21.9 per 1,000) and highest among Whites (34.8 per 1,000), and American Indians and Alaska Natives (50.2 per 1,000). Death rates for patients with a functioning transplant were highest among those aged 65 and older, at 74.7 deaths per 1,000 patient-years compared with those aged 45-64, at 23.9, and those aged 18-44, at 6.6 deaths.

HP2020 Table 17 CKD-14.3 Reduce the number of cardiovascular deaths for persons on dialysis: Target 81.3 deaths per 1,000 patient-years at risk

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	90.3	85.5	82.8	79.9	76.6	74.3	71.6	68.0	67.7	67.2
Race										
American Indian or Alaska Native	68.8	61.0	68.9	63.0	58.2	57.3	56.6	58.4	63.6	58.4
Asian	69.7	66.4	66.1	61.1	61.3	58.2	56.5	55.1	57.3	52.2
Native Hawaiian or Pacific Islander~	79.2	71.5	79.8	78.4	66.5	66.0	62.3	60.4	59.7	58.3
Black/African American	72.4	69.5	66.7	63.0	59.6	59.2	57.2	54.7	55.1	56.7
White only	105.7	99.5	96.0	93.7	90.5	87.0	83.6	78.7	77.5	76.0
Two or more races	65.8	69.1	63.6	65.7	58.0	51.1	48.4	58.0	51.5	49.1
Ethnicity										
Hispanic/Latino	67.3	64.5	64.9	61.2	59.5	59.0	58.1	57.5	56.2	56.9
Non-Hispanic	94.8	89.9	86.6	84.0	80.5	77.9	74.8	70.6	70.5	69.8
Non-Hispanic Black/African American	72.7	69.7	67.0	63.4	60.0	59.4	57.5	55.0	55.3	56.9
Non-Hispanic White	118.3	111.6	107.4	105.9	102.7	98.8	94.3	87.8	86.7	84.2
Sex										
Male	91.1	87.3	85.0	81.6	78.4	76.3	73.3	69.2	68.7	68.0
Female	89.3	83.5	80.1	77.8	74.4	71.8	69.4	66.4	66.3	66.0
Age										
<18	10.0	10.2	18.2	8.4	7.5	10.5	7.5	12.8	*	13.9
0-4	33.2	*	50.4	*	*	30.0	*	31.0	*	24.1
5-11	*	*	*	*	*	*	*	*	*	*
12-17	*	*	10.3	*	*	*	*	*	*	*
18-44	32.8	30.8	31.1	29.2	26.8	27.1	26.2	25.3	26.5	27.0
18-24	18.5	15.8	18.1	19.2	18.6	13.5	14.6	12.3	12.4	14.6
25-44	33.9	32.1	32.1	30.0	27.5	28.2	27.1	26.2	27.5	27.8
45-64	68.3	65.3	63.5	60.8	58.9	57.2	55.4	53.7	52.9	53.6
45-54	56.6	53.3	51.7	47.5	48.0	45.0	44.0	43.1	42.4	43.1
55-64	77.1	74.2	72.0	70.2	66.3	65.4	63.0	60.8	59.8	60.4
65+	134.1	126.4	121.3	117.5	112.3	107.8	102.9	95.9	95.0	92.1
65-74	108.9	104.8	101.7	96.9	93.2	89.9	87.1	81.5	82.1	79.8
75-84	152.2	140.3	132.6	131.0	124.3	117.7	113.5	106.2	103.2	101.2
85+	204.0	191.3	182.8	174.8	166.6	164.5	149.1	137.7	137.8	130.3

Data Source: Special analyses, USRDS ESRD Database. Period prevalent dialysis patients; unadjusted. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviations: CKD, chronic kidney disease; ESRD, end-stage renal disease.

HP2020 Table 18 CKD-14.4 Reduce the total number of deaths for persons with a functioning kidney transplant: Target 27.8 deaths per 1,000 patient-years at risk

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	30.8	29.6	30.9	30.7	30.9	31.3	31.1	32.1	32.7	33.2
Race										
American Indian or Alaska Native	37.1	37.4	54.1	46.0	44.0	43.1	35.1	34.3	33.3	50.2
Asian	23.6	18.6	16.9	17.4	21.7	22.4	19.0	21.7	23.7	21.9
Native Hawaiian or Pacific Islander~	16.5	15.7	26.9	17.4	17.7	21.2	26.5	23.9	23.2	28.7
Black/African American	29.9	30.9	30.0	30.0	30.2	30.2	30.3	30.3	30.3	30.4
White	31.9	30.1	32.0	31.9	31.8	32.3	32.2	33.6	34.2	34.8
Two or more races	15.8	22.0	21.8	21.8	23.7	25.8	29.9	24.6	28.9	24.8
Ethnicity										
Hispanic/Latino	21.4	22.0	22.4	22.6	22.3	22.3	23.8	22.6	23.4	24.7
Non-Hispanic	29.7	28.6	29.9	30.6	31.3	32.3	32.4	33.8	34.6	35.2
Non-Hispanic Black/African American	27.9	28.6	27.6	29.3	30.1	30.0	30.1	30.6	30.5	30.7
Non-Hispanic White	30.9	29.4	31.4	32.0	32.5	33.9	34.3	36.3	37.1	38.0
Sex										
Male	32.7	31.2	32.4	32.8	32.9	33.3	32.8	34.2	34.8	34.9
Female	28.2	27.1	28.6	27.6	28.0	28.2	28.7	29.0	29.5	30.5
Age										
<18	*	3.0	3.5	6.4	3.0	2.7	*	2.6	4.3	3.8
0-4	*	*	*	*	*	*	*	*	*	*
5-11	*	*	*	*	*	*	*	*	*	*
12-17	*	*	*	6.2	*	*	*	*	*	*
18-44	10.4	9.5	9.8	8.9	8.0	7.7	7.4	7.5	6.8	6.6
18-24	5.6	5.8	6.3	6.2	4.2	4.5	4.7	3.6	5.4	4.0
25-44	10.9	9.9	10.2	9.2	8.5	8.1	7.7	8.0	7.0	6.9
45-64	29.7	28.2	27.9	27.0	27.5	25.5	25.1	24.6	24.8	23.9
45-54	21.8	21.3	21.4	18.9	18.6	16.6	16.6	15.9	16.5	15.4
55-64	38.1	35.1	34.2	34.5	35.5	33.3	32.4	31.9	31.6	30.8
65+	78.8	72.3	75.4	73.9	71.8	75.0	71.8	73.7	73.0	74.7
65-74	70.1	62.7	65.3	64.3	61.2	63.0	59.7	62.2	59.4	60.7
75-84	119.8	116.4	119.0	111.7	112.1	117.6	115.1	111.2	117.6	120.3
85+	212.8	134.6	149.6	163.4	157.5	194.3	166.1	186.2	184.9	176.2

Data Source: Special analyses, USRDS ESRD Database. Period prevalent transplant patients, unadjusted. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviation: CKD, chronic kidney disease; ESRD, end-stage renal disease.

In 2016, for the ninth consecutive year, the HP2020 target of 4.5 cardiovascular deaths per 1,000 patient-years was met among transplant recipients. The rate of cardiovascular mortality among transplant recipients has fallen by 48.0% since 2007, to the observed 2.6 deaths per 1,000 patient-years in 2016 (see Table 19). Rates were lowest among Hispanics or

Latinos at 1.8 per 1,000 patient-years. Blacks and Whites had higher rates, at 3.2 and 2.6 deaths per 1,000 patient-years. Also consistent with prior trends, rates were lower among females at 2.2 deaths per 1,000 patient-years, compared with males at 2.9 per 1,000 patient-years, although both remained below the HP2020 target.

HP2020 Table 19 CKD-14.5 Reduce the number of cardiovascular deaths in persons with a functioning kidney transplant: Target 4.5 deaths per 1,000 patient-years at risk

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
All	5.0	4.0	4.1	4.2	3.4	3.3	3.0	2.8	3.0	2.6
Race										
American Indian or Alaska Native	*	*	*	*	*	*	6.3	*	*	*
Asian	4.0	1.8	*	1.9	2.0	2.5	1.3	1.5	2.4	1.3
Native Hawaiian or Pacific Islander~	*	*	*	*	*	*	*	*	*	*
Black/African American	5.4	4.9	4.9	4.9	4.1	4.0	3.4	3.1	2.9	3.2
White	5.0	3.9	4.0	4.2	3.4	3.3	2.9	2.8	3.0	2.6
Two or more races	*	*	3.7	*	*	*	*	*	*	*
Ethnicity										
Hispanic/Latino	3.2	3.3	3.2	2.7	2.9	2.1	2.3	1.9	2.0	1.8
Non-Hispanic	5.1	4.1	4.2	4.5	3.5	3.7	3.2	3.0	3.3	2.9
Non-Hispanic Black/African American	5.2	4.8	4.8	4.8	4.0	4.0	3.4	3.3	3.1	3.3
Non-Hispanic White	5.2	4.1	4.2	4.6	3.5	3.6	3.2	3.0	3.4	2.9
Sex										
Male	5.7	4.5	4.1	4.7	3.8	3.4	3.3	3.1	3.1	2.9
Female	4.1	3.3	4.0	3.5	2.8	3.2	2.5	2.3	2.7	2.2
Age										
<18	*	*	*	*	*	*	*	*	*	*
0-4	*	*	*	*	*	*	*	*	*	*
5-11	*	*	*	*	*	*	*	*	*	*
12-17	*	*	*	*	*	*	*	*	*	*
18-44	1.9	1.7	1.3	1.3	1.0	1.1	1.2	0.9	0.6	0.6
18-24	*	*	*	*	*	*	*	*	*	*
25-44	2.0	1.8	1.4	1.4	1.0	1.2	1.3	1.0	0.6	0.7
45-64	5.1	4.1	3.8	4.0	3.3	2.9	2.6	2.3	2.6	2.2
45-54	4.3	3.2	3.1	2.8	2.1	1.9	1.9	1.4	2.0	1.7
55-64	5.9	5.1	4.5	5.1	4.4	3.7	3.3	3.1	3.0	2.6
65+	11.6	8.4	9.4	9.1	7.1	7.3	5.8	5.7	5.9	5.3
65-74	10.2	7.7	8.1	8.6	6.7	6.2	5.1	4.9	5.2	4.7
75-84	18.0	11.6	15.4	10.8	8.6	11.6	8.5	8.9	7.7	7.0
85+	*	*	*	*	*	*	*	*	19.2	*

Data Source: Special analyses, USRDS ESRD Database. Period prevalent transplant patients, unadjusted. ~Estimate shown is imprecise due to small sample size and may be unstable over time. *Values for cells with 10 or fewer patients are suppressed. Abbreviation: CKD, chronic kidney disease; ESRD, end-stage renal disease.

Methods

The findings presented in this chapter were drawn from multiple data sources, including the Centers for Medicare & Medicaid Services (CMS), the Organ Procurement and Transplantation Network (OPTN), the Centers for Disease Control and Prevention (CDC), the Consolidated Renal Operations in a Web-Enabled Network (CROWNWeb) and the United States Census.

This section describes the analytical methods used to generate the study cohorts, figures, and tables in this chapter. Downloadable Microsoft Excel and PowerPoint files containing the data and graphics for these figures and tables are available on the <https://www.usrds.org/2018/view/Default.aspx>.

In most cases, HP2020 targets are based on percentage changes from an index value or year, e.g. a 10% reduction in the number of new cases of ESRD per million population from the 2007 value (CKD-8). These targets are updated annually to reflect any changes in the index values that may have resulted from recent data, change in the reference population year for adjusted analyses, and improved methodology.

All comparisons within this chapter are presented without statistical testing for differences, as many of these comparisons involve complete census counts instead of statistical samples.

OBJECTIVE CKD-3: INCREASE THE PROPORTION OF HOSPITAL PATIENTS WHO INCURRED ACUTE KIDNEY INJURY WHO HAVE FOLLOW-UP RENAL EVALUATION IN 6 MONTHS POST-DISCHARGE

Data for this objective include all patients in the Medicare 5% sample who are aged 65 and older and who have hospitalized acute kidney injury (AKI) events in the given year (2007–2016). Hospitalized AKI is defined by the presence of ICD-9-CM diagnosis code 584 or by the presence of ICD-10-CM diagnosis code N17 in any field of the inpatient claims, and renal evaluation is identified by a urine albumin test. Patients are followed from the discharge date to the earliest date of death, ESRD, end of Medicare coverage, or six months after the discharge date. CPT codes for urinary albumin measurement are identified

from HEDIS 2008 specifications (HEDIS 2008, an NCQA program, is used to monitor the performance of managed health care plans), and include 82042, 82043, 82044, and 84156.

OBJECTIVE CKD-4.1: INCREASE THE PROPORTION OF PERSONS WITH CHRONIC KIDNEY DISEASE WHO RECEIVE MEDICAL EVALUATION WITH SERUM CREATININE, LIPIDS, AND URINE ALBUMIN

The cohort here is similar to that used for Objective D-12, but includes all CKD patients. Testing is tracked during each year. Patients are excluded if they are enrolled in a managed care program (HMO), acquire Medicare as secondary payer, are diagnosed with ESRD during the year, have a missing date of birth, or do not live in the 50 states, the District of Columbia, Puerto Rico, or the U.S. territories. Racial and ethnic categories are mutually exclusive. Methods of defining CKD are described in the [CKD Analytical Methods](#) chapter of Volume 1: Chronic Kidney Disease (CKD) in the United States. Serum creatinine is identified through CPT codes 80047–80050, 80053–80054, 80069, and 82565, while lipid testing is identified through CPT codes 80061, 82465, 82470, 83695, 83705, 83715–83721, 84478, 83700, 83701, and 83704. CPT codes for urinary albumin measurement are the same as those used for Objective CKD-3 above.

OBJECTIVE CKD-4.2: INCREASE THE PROPORTION OF PERSONS WITH TYPE 1 OR TYPE 2 DIABETES AND CHRONIC KIDNEY DISEASE WHO RECEIVE MEDICAL EVALUATION WITH SERUM CREATININE, URINE ALBUMIN, HbA1c, LIPIDS, AND EYE EXAMINATIONS

Methods and codes used to determine rates of HbA1c testing and eye examinations are taken from HEDIS 2008 specifications. CPT codes 83036 and 83037 are used to identify HbA1c testing. Codes used to identify diabetic eye examinations are as follows: CPT codes, 92002, 92004, 92012, 92014, 92018, 92019, 92225, 92226, 92230, 92235, 92240, 92250, 92260, 67101, 67105, 67107, 67108, 67110, 67112, 67141, 67145, 67208, 67210, 67218, 67227, 67228, 67028, 67030, 67031, 67036, 67038, 67039, 67041, 67042, 67043, 67113, 67121, 67221, 67228, S0625, S0620, S0621, and S3000; ICD-9-CM procedure codes, 14.1–14.5, 14.9, 95.02, 95.03, 95.04, 95.11, 95.12, and 95.16; and ICD-9-CM diagnosis code V72.0. The cohort is similar to that used for Objective

CKD-4.1, but includes all diabetic CKD patients. Methods of defining DM are described in the [CKD Analytical Methods](#) chapter of Volume 1: Chronic Kidney Disease (CKD) in the United States.

OBJECTIVE CKD-5: INCREASE THE PROPORTION OF PERSONS WITH DIABETES AND CHRONIC KIDNEY DISEASE WHO RECEIVE RECOMMENDED MEDICAL TREATMENT WITH ANGIOTENSIN-CONVERTING ENZYME (ACE) INHIBITORS OR ANGIOTENSIN II RECEPTOR BLOCKERS (ARBs)

The cohort includes general Medicare patients diagnosed with both diabetes and chronic kidney disease (CKD) in each year, continuously enrolled in the Medicare inpatient/outpatient and physician/supplier program during the entire year, age 65 or older at the beginning of the year, and enrolled in Medicare Part D during the entire year. Use of angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin II receptor blockers (ARBs) is defined by at least one prescription fill from either drug class during the year.

OBJECTIVE CKD-8: REDUCE THE RATE OF NEW CASES OF END-STAGE RENAL DISEASE

Incident rates are calculated using the methods described for [Chapter 1](#) of Volume 2: End-stage Renal Disease (ESRD) in the United States. Overall rates are adjusted by age, sex, and race; rates by age are adjusted for sex and race; rates by sex are adjusted for age and race; and rates by race and ethnicity are adjusted by age and sex.

OBJECTIVE CKD-9.1: REDUCE KIDNEY FAILURE DUE TO DIABETES

Rates of kidney failure due to DM are also calculated using the methods described for [Chapter 1](#) of Volume 2: End-stage Renal Disease (ESRD) in the United States, and adjustments are the same as those described for Objective CKD-8, above.

OBJECTIVE CKD-9.2: REDUCE KIDNEY FAILURE DUE TO DIABETES AMONG PERSONS WITH DIABETES

This table uses data from the National Health Interview Survey; all ages are included. Three-year data are used to estimate the prevalence of DM in the middle year, and the size of the population with DM is based on U.S. Census data. The incident rate per

million of ESRD caused by DM is calculated as the number of incident ESRD patients with a primary cause of ESRD of DM, divided by the size of the population with DM in that group.

OBJECTIVES CKD-10: INCREASE THE PROPORTION OF CHRONIC KIDNEY DISEASE PATIENTS RECEIVING CARE FROM A NEPHROLOGIST AT LEAST 12 MONTHS BEFORE THE START OF RENAL REPLACEMENT THERAPY & CKD-11.3: INCREASE THE PROPORTION OF ADULT HEMODIALYSIS PATIENTS WHO USE ARTERIOVENOUS FISTULAS OR HAVE A MATURING FISTULA AS THE PRIMARY MODE OF VASCULAR ACCESS AT THE START OF RENAL REPLACEMENT THERAPY

These tables and figure use data from the newest version of the Center for Medicare and Medicaid Services (CMS) Medical Evidence form (CMS 2728). The cohorts include incident HD patients, with CKD-11.3 limited to those aged 18 and older at initiation who have a known vascular access at that time. CKD-10 includes only patients for whom it is known whether they saw a nephrologist prior to initiation.

OBJECTIVES CKD-11.1: INCREASE THE PROPORTION OF ADULT HEMODIALYSIS PATIENTS WHO USE AN ARTERIOVENOUS FISTULA AS THE PRIMARY MODE OF VASCULAR ACCESS & CKD-11.2: DECREASE THE PROPORTION OF ADULT HEMODIALYSIS PATIENTS WHO USE CATHETERS AS THE ONLY MODE OF VASCULAR ACCESS

These tables use data from CROWNWeb. The cohort includes prevalent HD patients from 2012 to 2016, who are aged 18 and older. Access type represents the last access type used in the year, according to CROWNWeb data.

OBJECTIVE CKD-12: INCREASE THE PROPORTION OF DIALYSIS PATIENTS WAIT-LISTED AND/OR RECEIVING A DECEASED DONOR KIDNEY TRANSPLANT WITHIN 1 YEAR OF END-STAGE RENAL DISEASE START (AMONG PATIENTS UNDER 70 YEARS OF AGE)

The cohort includes patients from 2007-2016 who are younger than 70 at the initiation of ESRD. Percentages are calculated as the number of patients placed on the deceased donor organ waiting list or receiving a deceased donor transplant within one year of initiation, divided by the number of patients without a living donor available (i.e., patients receiving a living donor transplant are excluded), and are estimated using the Kaplan-Meier methodology.

OBJECTIVE CKD-13.1: INCREASE THE PROPORTION OF PATIENTS RECEIVING A KIDNEY TRANSPLANT WITHIN 3 YEARS OF END-STAGE RENAL DISEASE

The cohort in Table 14 and Figure 2 includes patients from 2004–2013 who are younger than 70 at the initiation of ESRD. Patients are followed from ESRD certification to transplant, censoring at death or three years after the initiation of ESRD. Percentages are calculated using the Kaplan-Meier methodology.

OBJECTIVE CKD-13.2: INCREASE THE PROPORTION OF PATIENTS WHO RECEIVE A PRE-EMPTIVE TRANSPLANT AT THE START OF END-STAGE RENAL DISEASE

The cohort includes patients from 2007–2016 who are younger than 70 at the initiation of ESRD. Pre-emptive transplants are those in which ESRD initiation date is the date of transplant. Percentages are calculated as $100 (N/D)$, where N=the number of preemptive transplants in the year and D=the number of ESRD patients in the year.

OBJECTIVES CKD-14.1: REDUCE THE TOTAL DEATH RATE FOR PERSONS ON DIALYSIS & CKD-14.3: REDUCE THE CARDIOVASCULAR DEATH RATE FOR PERSONS ON DIALYSIS

Cohorts for these tables include period prevalent dialysis patients in each calendar year, 2007–2016, whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment during the year (incident patients). We exclude patients with unknown age or sex and those with an age calculated to be less than zero, as well as patients who are not residents of the 50 states, the District of Columbia, Puerto Rico, or the U.S. territories. Age is calculated on January 1, and race is defined from the Medical Evidence form. Cardiovascular mortality is defined using codes from past and current Death Notification forms: 01, 02, 03, 04, 1, 2, 3, 4, 23, 25, 26, 27, 28, 29, 30, 31, 32, 36, and 37. Patients are followed

from January 1 (for point prevalent dialysis patients) or day 91 of ESRD (for incident dialysis patients) until death, transplant, or December 31 of the year. Rates are estimated as the number of patients who die from any cause (Objective 14.1) and who die from cardiovascular disease (Objective 14.3) in each year, per 1,000 patient-years at risk.

OBJECTIVE CKD-14.2: REDUCE THE DEATH RATE IN DIALYSIS PATIENTS WITHIN THE FIRST 3 MONTHS OF INITIATION OF RENAL REPLACEMENT THERAPY

Cohorts here include incident dialysis patients in each calendar year, 2007–2016. In addition to applying the same exclusion criteria described for Objectives 14.1 and 14.3, we further exclude patients with recovered kidney function. Age is calculated on the first ESRD service date. Patients are followed from the first service date until death, transplant, or 90 days after ESRD. Rates are estimated as the number of patients who die from any cause per 1,000 patient-years at risk.

OBJECTIVES CKD-14.4: REDUCE THE TOTAL DEATH RATE FOR PERSONS WITH A FUNCTIONING KIDNEY TRANSPLANT & CKD-14.5: REDUCE THE CARDIOVASCULAR DEATH RATE IN PERSONS WITH A FUNCTIONING TRANSPLANT

Patient cohorts here include period prevalent transplant patients, 2007–2016, whose first ESRD service date is at least 90 days prior to the beginning of the year (point prevalent patients on January 1) or who reach day 91 of ESRD treatment (incident patients). Exclusion criteria are the same as those described for Objectives 14.1 and 14.3. Patients are followed from January 1 (for point prevalent dialysis patients) or day 91 of ESRD (for incident dialysis patients) until death or December 31 of the year. Rates are estimated as the number of patients who die from any cause (Objective 14.4) and who die from cardiovascular disease (Objective 14.5) in each year, per 1,000 patient-years at risk.

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