# Chronic Kidney Disease & People Living with Diagnosed HIV in California 2015 - 2020

Chronic kidney disease (CKD) is a common condition among **people living with diagnosed HIV** (PLWDH). The kidneys are essential organs that constantly filter blood to remove waste, toxins, and excess fluid which are then excreted in the urine. CKD involves a gradual loss of the kidney's capacity to filter blood which can result in health complications from excess fluid and waste accumulation. This infographic provides an estimated prevalence of CKD in PLWDH in California, and characterizes the population in terms of demographics and clinical characteristics, based on **California Medical Monitoring Project** data (2015-2020).
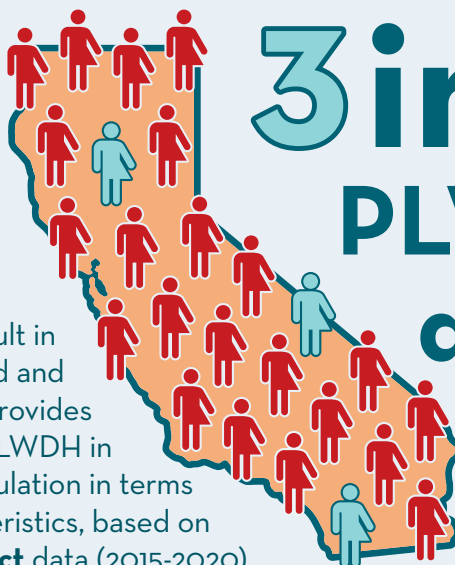
3 in 25 PLWDH had diagnosed CKD

26% of PLWDH age 60+ had diagnosed CKD

PLWDH who had their **kidney function evaluated** with a **creatinine test** in previous **2 years:** **93%**

Among **PLWDH with CKD** who got **treatment with hypertension meds:**

Only **23.5%** Received ACE-1*

Only **13.3%** Received ARBs**

These meds can improve long-term quality of life of PLWDH who have CKD.

4.4% of PLWDH *without* diagnosed CKD had an eGFR*** indicating kidney disease or kidney failure, which suggests CKD is *under* diagnosed.

*Angiotensin-Converting Enyzme Inhibitors (ACE-1); **Angiotensin II Receptor Blockers (ARBs); ***The estimated glomerular filtration rate (eGFR) is a measure of how well your kidneys are working. eGFR is calculated using the creatinine test result.

Questions?

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MEDICAL MONITORING PROJECT

CA OFFICE OF AIDS
California Department of Public Health

HIV and Chronic Kidney Disease
2015-2020 Prevalence in California

Executive Summary

The Medical Monitoring Project (MMP) is a surveillance activity funded by the Centers for Disease Control and Prevention and implemented by state and local health departments. A representative sample of PLWDH in the United States participate in a survey and medical record abstraction to collect behavioral and medical information, including co-occurring chronic medical conditions.

The purpose of this analysis was to provide an estimated prevalence of CKD in PLWDH in California and to characterize the population in terms of demographics and clinical characteristics.

Prevalence of Diagnosed CKD by Selected Factors

- Of PLWDH in California who received HIV care between 2015 and 2020:

    - 12% had diagnosed CKD.

    - 26% of PLWDH aged 60 years or older had CKD.

    - 21% of PLWDH who were hospitalized and 15% of PLWDH who had an emergency room visit in the 12 months prior to their interview also had CKD.

Prevalence of Diagnosed CKD by Other Comorbidities

- Of PLWDH in California who received HIV care between 2015 and 2020:

    - 26% of PLWDH with diagnosed diabetes had CKD.

    - 21% of PLWDH with diagnosed hypertension had CKD.

    - 15% of PLWDH with diagnosed hepatitis C at any time had CKD.

HIV and Chronic Kidney Disease
2015-2020 Prevalence in California

The Medical Monitoring Project

- MMP is a surveillance activity funded by the Centers for Disease Control and Prevention (CDC) and implemented by state and local health departments. It collects behavioral and medical data from interviews and chart abstractions for PLWDH in the United States.

- From 2015 to 2020, MMP interviewed and performed medical record abstractions for 3,275 adults living with HIV in California. Their responses reflect their experiences during the 12 months before their interview, unless otherwise noted, and medical records reflect medical care two years prior to the interview date.

- Data was collected by the California MMP, Los Angeles MMP, and San Francisco MMP project areas.

Chronic Kidney Disease Prevalence

12% of PLWDH in California receiving HIV care between 2015 and 2020 had CKD in their medical record.

The CDC estimates that:

- 15% of US adults have CKD.[1]

- As many as 9 in 10 adults with CKD do not know they have CKD.[1]

Early CKD Detection

Testing for CKD regularly can catch changes in kidney function early.

- Chronic kidney disease is often symptom free and can go undetected until kidney failure (also called end-stage kidney disease) occurs.[2]

    CKD treatment involves identifying and treating the underlying cause of CKD.

- Those with high blood pressure, diabetes, or other causes of CKD should have regular monitoring for CKD with simple blood and urine tests.[3]

- Estimated glomerular filtration rate (eGFR) is a measure of kidney function that is calculated with the blood test result and other patient information.[4]

Health Effects

Treating CKD can prevent further negative health events.[5]

- Prior to antiretroviral treatment, HIV nephropathy (kidney damage caused by HIV) was a frequent cause of kidney disease with advanced HIV but is now rare.

- Screening for kidney disease is routinely included in HIV primary care visits.

- Monitoring and managing blood pressure and blood sugar are key ways to prevent CKD.[6]

- Diagnosing and treating CKD early is critical as progressive kidney disease can lead to stroke, heart attack, or kidney failure requiring dialysis.[2]

Test Early. Treat Early. Prevent CKD.

The following tables provide the weighted[*] prevalence and 95% confidence intervals of diagnosed chronic kidney disease among PLWDH in California by demographic and clinical characteristics.

Chronic Kidney Disease Prevalence in PLWDH Stratified by Demographic Characteristics
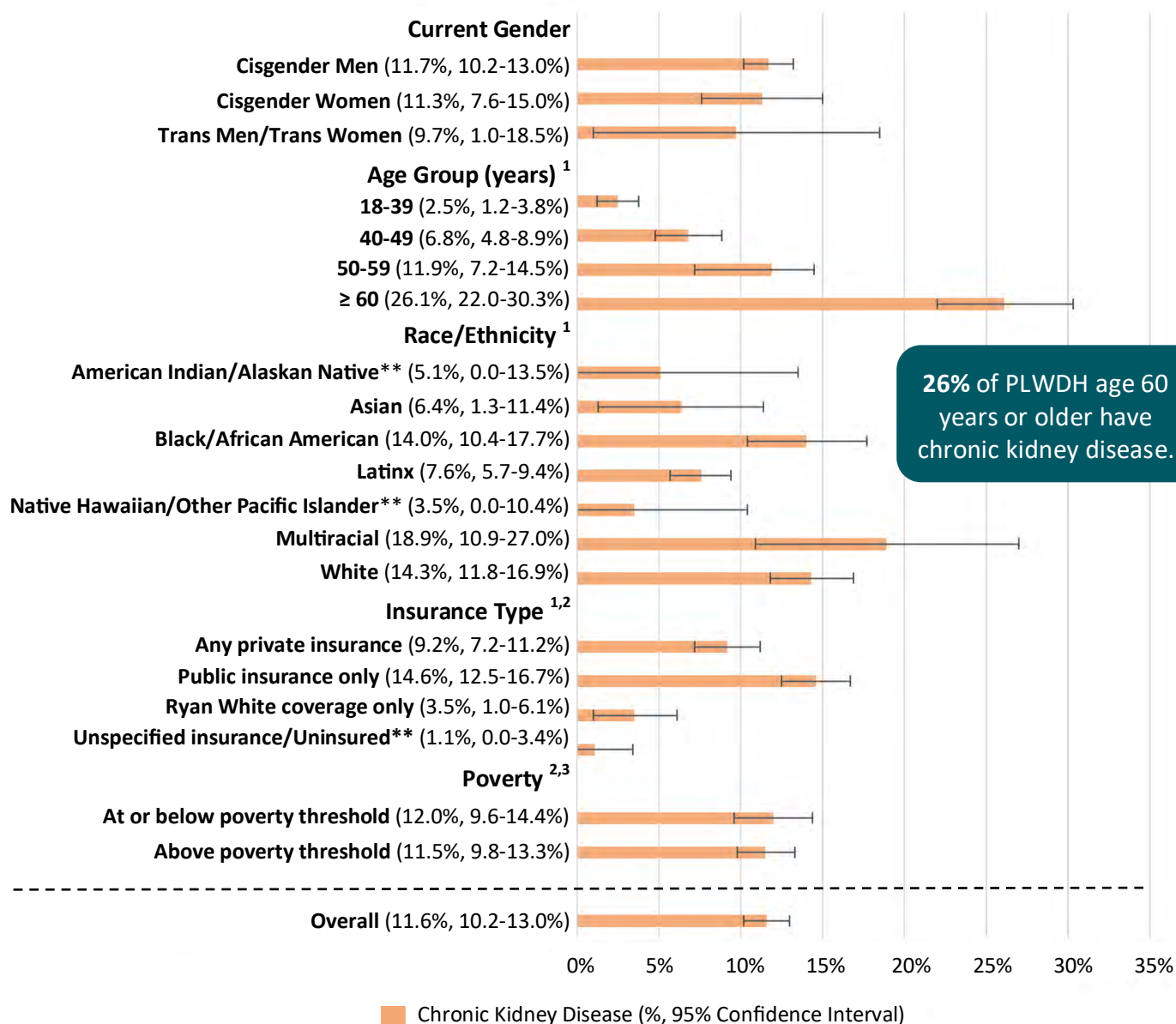
Current Gender
- Cisgender Men (11.7%, 10.2-13.0%)
- Cisgender Women (11.3%, 7.6-15.0%)
- Trans Men/Trans Women (9.7%, 1.0-18.5%)

Age Group (years) [1]
- 18-39 (2.5%, 1.2-3.8%)
- 40-49 (6.8%, 4.8-8.9%)
- 50-59 (11.9%, 7.2-14.5%)
- ≥ 60 (26.1%, 22.0-30.3%)

Race/Ethnicity [1]
- American Indian/Alaskan Native** (5.1%, 0.0-13.5%)
- Asian (6.4%, 1.3-11.4%)
- Black/African American (14.0%, 10.4-17.7%)
- Latinx (7.6%, 5.7-9.4%)
- Native Hawaiian/Other Pacific Islander** (3.5%, 0.0-10.4%)
- Multiracial (18.9%, 10.9-27.0%)
- White (14.3%, 11.8-16.9%)

Insurance Type [1,2]
- Any private insurance (9.2%, 7.2-11.2%)
- Public insurance only (14.6%, 12.5-16.7%)
- Ryan White coverage only (3.5%, 1.0-6.1%)
- Unspecified insurance/Uninsured** (1.1%, 0.0-3.4%)

Poverty [2,3]
- At or below poverty threshold (12.0%, 9.6-14.4%)
- Above poverty threshold (11.5%, 9.8-13.3%)

- -

- Overall (11.6%, 10.2-13.0%)

X-axis: 0% 5% 10% 15% 20% 25% 30% 35%

> **26%** of PLWDH age 60 years or older have chronic kidney disease.

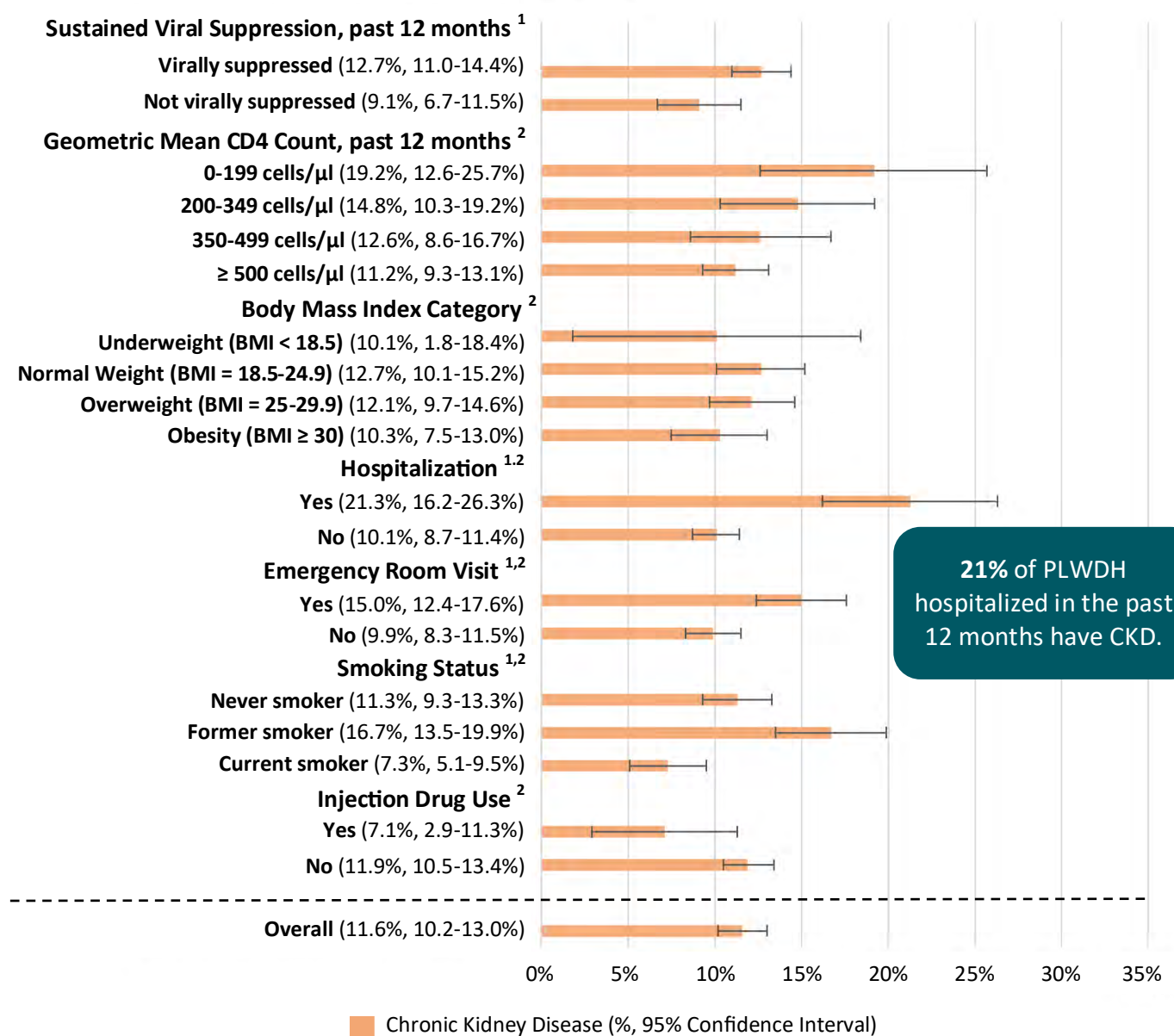Legend: Chronic Kidney Disease (%, 95% Confidence Interval)

Note: *Percentages are weighted values, non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied; Characteristic categories underwent Rao-Scott chi-square tests, which are design-adjusted and use weighted values; Chronic kidney disease status was collected through medical record abstraction data.
[1]Chi-square *p*-value < 0.05, significant difference in percentage of CKD between categories; [2]Observations were incomplete for characteristic; [3]Poverty was based on yearly income, number of household dependents, and federal poverty level for the year the survey participant was interviewed; ** = less than 5 observations for chronic kidney disease in record category.

Note: Analyses in this report are describing the prevalence of chronic kidney disease in PLWDH by multiple characteristics that may be highly correlated. Results presented should not be used to interpret associations between different variables.
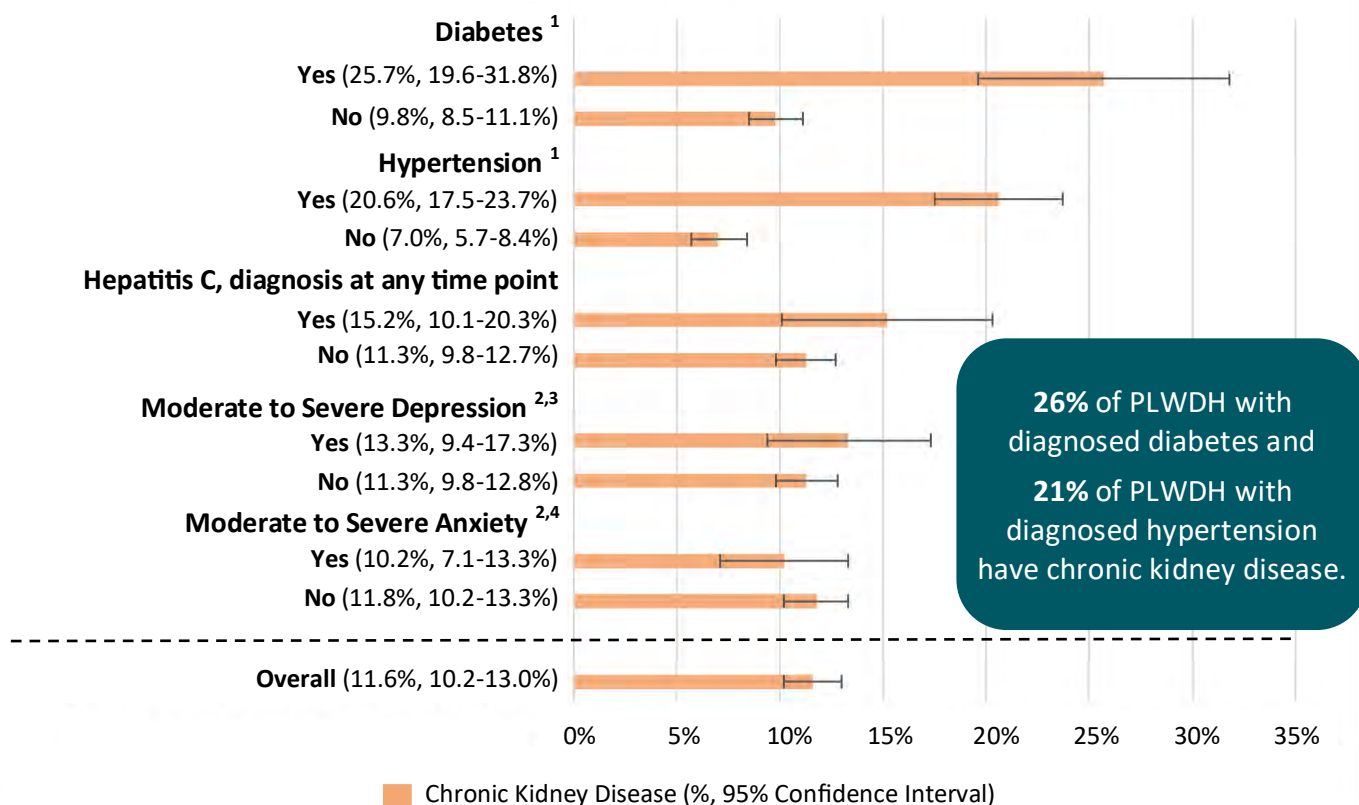
Chronic Kidney Disease Prevalence in PLWDH Stratified by Clinical Characteristics

Sustained Viral Suppression, past 12 months [1]
Virally suppressed (12.7%, 11.0-14.4%)
Not virally suppressed (9.1%, 6.7-11.5%)
Geometric Mean CD4 Count, past 12 months [2]
0-199 cells/µl (19.2%, 12.6-25.7%)
200-349 cells/µl (14.8%, 10.3-19.2%)
350-499 cells/µl (12.6%, 8.6-16.7%)
≥ 500 cells/µl (11.2%, 9.3-13.1%)
Body Mass Index Category [2]
Underweight (BMI < 18.5) (10.1%, 1.8-18.4%)
Normal Weight (BMI = 18.5-24.9) (12.7%, 10.1-15.2%)
Overweight (BMI = 25-29.9) (12.1%, 9.7-14.6%)
Obesity (BMI ≥ 30) (10.3%, 7.5-13.0%)
Hospitalization [1,2]
Yes (21.3%, 16.2-26.3%)
No (10.1%, 8.7-11.4%)
Emergency Room Visit [1,2]
Yes (15.0%, 12.4-17.6%)
No (9.9%, 8.3-11.5%)
Smoking Status [1,2]
Never smoker (11.3%, 9.3-13.3%)
Former smoker (16.7%, 13.5-19.9%)
Current smoker (7.3%, 5.1-9.5%)
Injection Drug Use [2]
Yes (7.1%, 2.9-11.3%)
No (11.9%, 10.5-13.4%)

Overall (11.6%, 10.2-13.0%)

0% 5% 10% 15% 20% 25% 30% 35%

■ Chronic Kidney Disease (%, 95% Confidence Interval)

21% of PLWDH hospitalized in the past 12 months have CKD.

Note: Percentages are weighted values, non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied; Characteristic categories underwent Rao-Scott chi-square tests, which are design-adjusted and use weighted values; Chronic kidney disease status was collected through medical record abstraction data.
[1]Chi-square p-value < 0.05, significant difference in percentage of CKD between categories; [2]Observations were incomplete for characteristic.

Chronic Kidney Disease Prevalence in PLWDH Stratified by Comorbidities

Diabetes [1]
Yes (25.7%, 19.6-31.8%)
No (9.8%, 8.5-11.1%)

Hypertension [1]
Yes (20.6%, 17.5-23.7%)
No (7.0%, 5.7-8.4%)

Hepatitis C, diagnosis at any time point
Yes (15.2%, 10.1-20.3%)
No (11.3%, 9.8-12.7%)

Moderate to Severe Depression [2,3]
Yes (13.3%, 9.4-17.3%)
No (11.3%, 9.8-12.8%)

Moderate to Severe Anxiety [2,4]
Yes (10.2%, 7.1-13.3%)
No (11.8%, 10.2-13.3%)

Overall (11.6%, 10.2-13.0%)

0% 5% 10% 15% 20% 25% 30% 35%

■ Chronic Kidney Disease (%, 95% Confidence Interval)

> **26%** of PLWDH with diagnosed diabetes and
>
> **21%** of PLWDH with diagnosed hypertension have chronic kidney disease.

Note: Percentages are weighted values, non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied; Characteristic categories underwent Rao-Scott chi-square tests, which are design-adjusted and use weighted values; Chronic kidney disease, diabetes, hypertension and hepatitis C statuses were collected through medical record abstraction data. [1]Chi-square p-value < 0.05, significant difference in percentage of CKD between categories; [2]Observations were incomplete for characteristic; [3]Depression was determined using responses to the Patient Health Questionnaire 8-item scale (PHQ-8), a score ≥10 = moderate/severe depression; [4]Anxiety was determined using responses to the Generalized Anxiety Disorder 7-item scale (GAD-7), a score ≥10 = moderate/severe anxiety.

Hypertension Medication

Once CKD has developed, treatments cannot reverse the kidney damage but can slow the progression of disease.

- High blood pressure frequently occurs with CKD and keeping the blood pressure in a normal range is the most important step that patients can take to prevent CKD progression and reduce long-term mortality.

- Many people with CKD also lose a significant amount of protein in their urine (called proteinuria) and people with proteinuria benefit from blood pressure treatment with angiotensin-converting enzyme inhibitors (ACE-Is) or angiotensin receptor blockers (ARBs) in particular.

- Among PLWDH and CKD in California, only 23.5% and 13.3% were receiving treatment with an ACE-I or ARB, respectively, and 50% were not receiving any hypertension medication. Improving the utilization of ACE-Is, ARBs, and other anti-hypertensive treatments can improve the long-term quality of life of PLWDH who have CKD.

Hypertension Medication Used by PLWDH with Diagnosed Chronic Kidney Disease

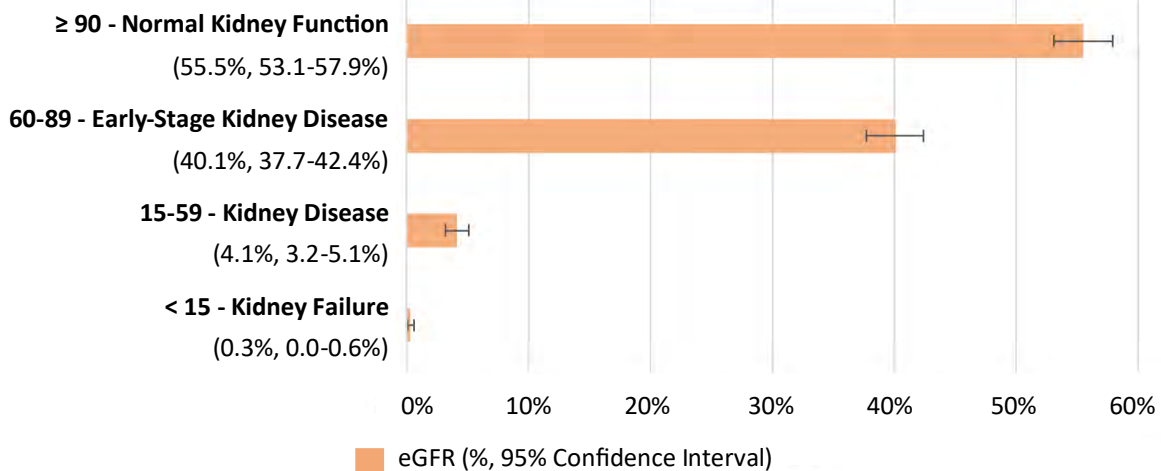| Hypertension Medication Group[1]	Row %[2]	95% Confidence Interval[2]
Angiotensin-Converting Enzyme Inhibitors (ACE-I) *Benazepril, Captopril, Enalapril, Fosinopril, Lisinopril, Quinapril, Ramipril*	23.5	(18.3-28.6)
Beta Blockers (BBs) *Atenolol, Bisoprolol, Carvedilol, Labetalol, Metoprolol tartrate, Metoprolol succinate*	20.6	(16.0-25.1)
Calcium Channel Blockers (CCBs) *Amlodipine, Felodipine, Nifedipine, Diltiazem, Verapamil*	14.9	(10.7-19.1)
Angiotensin II Receptor Blockers (ARBs) *Candesartan, Irbesartan, Losartan, Olmesartan, Telmisartan, Valsartan*	13.3	(8.5-18.2)
Thiazide-type/like Diuretics *Chlorthalidone, Indapamide, Hydrochlorothiazide*	7.0	(3.9-10.1)

Note: Percentages are weighted values, non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied. [1]Medication information was abstracted from medical records; [2]Weighted value.

Estimated Glomerular Filtration Rate (eGFR)

Estimated Glomerular Filtration Rate (eGFR) in PLWDH with CKD Diagnosis

≥ 90 - Normal Kidney Function
(6.4%, 3.6-9.1%)

60-89 - Early-Stage Kidney Disease
(48.5%, 41.9-55.1%)

15-59 - Kidney Disease
(42.9%, 36.4-49.4%)

< 15 - Kidney Failure
(2.2%, 0.7-3.7%)

0%   10%   20%   30%   40%   50%   60%

■ eGFR (%, 95% Confidence Interval)
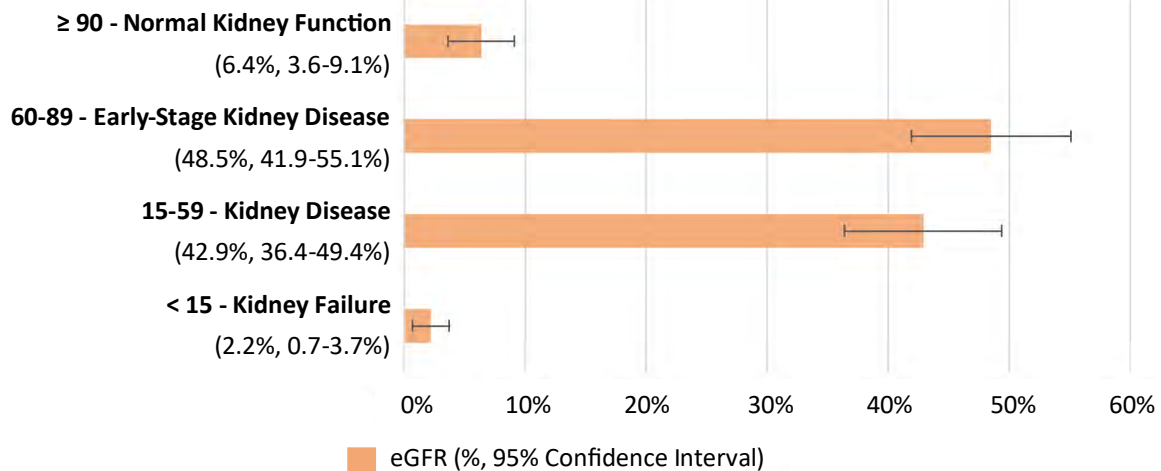
Estimated Glomerular Filtration Rate (eGFR) in PLWDH without CKD Diagnosis

≥ 90 - Normal Kidney Function
(55.5%, 53.1-57.9%)

60-89 - Early-Stage Kidney Disease
(40.1%, 37.7-42.4%)

15-59 - Kidney Disease
(4.1%, 3.2-5.1%)

< 15 - Kidney Failure
(0.3%, 0.0-0.6%)

0%   10%   20%   30%   40%   50%   60%

■ eGFR (%, 95% Confidence Interval)

93% of PLWDH had a creatinine test in the past 2 years, from which the eGFR values were calculated.

45% of PLWDH with diagnosed chronic kidney disease had an eGFR value indicating kidney disease or kidney failure.

40% of PLWDH without diagnosed chronic kidney disease had an eGFR indicating early-stage kidney disease.

Note: Percentages are weighted values, non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied; Chronic kidney disease status and creatinine value, which was used to produce eGFR values, were collected through medical record abstraction data.

Chronic Kidney Disease Diagnosis

- An individual was considered to be diagnosed with chronic kidney disease if their medical or hospitalization records included a diagnosis of chronic kidney disease.

Estimated Glomerular Filtration Rate

- The eGFR values were calculated using blood creatinine levels abstracted from the medical record.
- The most recent creatinine value was used to calculate the eGFR.
- The CKD-EPI Creatinine Equation found on the National Kidney Foundation website was used to convert creatinine values to eGFR (CKD-EPI Creatinine Equation (2021) | National Kidney Foundation).

Statistical Analysis

- Documentation of MMP methods can be found here: MMP 2018-2020 Protocol.
- SAS 9.4 survey procedure were used to find weighted percentages and 95% confidence intervals and Rao-Scott modified chi-square test statistics, which provided a design-based goodness-of-fit test and used weighted data.
- Non-response weights and post-stratification weights for sex at birth, age at interview, and race/ethnicity were applied to data.
- Survey participants were included if they had both an interview and medical record abstraction.
- 95% confidence interval means the likelihood of the true prevalence falling within the interval is 95%.

References

1. Centers for Disease Control and Prevention. *Chronic Kidney Disease in the United States, 2021*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2021.
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3. Centers for Disease Control and Prevention. *Testing and Treatment: Find it Early, Treat it Early*. 2022. Testing and Treatment: Find it Early, Treat it Early (cdc.gov)
4. National Kidney Foundation. *Estimated Glomerular Filtration Rate (eGFR)*. Estimated Glomerular Filtration Rate (eGFR) | National Kidney Foundation
5. Centers for Disease Control and Prevention. *CKD Related Health Problems*. 2022. CKD Related Health Problems (cdc.gov)
6. Centers for Disease Control and Prevention. *People with CKD Can Lower Their Risk for Kidney Failure*. 2022. People with CKD Can Lower Their Risk for Kidney Failure (cdc.gov)