

Supplemental Table 1: Primary vs sensitivity definitions for ascertainment of CKD Stage 3

Criterion	Ascertainment of CKD				
	Primary	Sensitivity			
		1	2	3	4
1. Number of eGFR < 60 ml/min per 1.73m ²	2	2	2	2	1
2. Include if died after reaching first eGFR < 60	Y	Y	Y	Need to reach 45 ml/min per 1.73m ² prior to death	NA
3. Include if participant reached eGFR <60 ml/min per 1.73m ² at the last visit	Need to reach 45 ml/min per 1.73m ² if last GFR	Y	N	Need to reach 45 ml/min per 1.73m ² if last GFR	NA
4. Include if developed ESRD regardless of baseline eGFR	Y	Y	Y	Y	Y

CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; ESRD, end stage renal disease; Y, yes; N, no; NA, not applicable

Supplemental Table 2: Characteristics of patients included vs excluded

	Total N=4560	Not included N = 672, 14.7%	Included N = 3888, 85.3%	<i>p</i>
Age (years) , mean (SD)	46.9 (7.0)	49.6 (7.1)	46.5 (6.9)	<.0001
Male, n (%)	2195 (48.1)	295 (43.9)	1900 (48.9)	0.02
Smoking status				
Never smoked	1411 (31.0)	168 (25.0)	1243 (32.0)	<.0001
Past smoker	644 (14.1)	81 (12.1)	563 (14.5)	
Current smoker	2504 (54.9)	422 (62.9)	2082 (53.6)	
Diabetes, n (%)	76 (1.7)	14 (2.1)	62 (1.6)	0.35
Hypertension, n (%)	2003 (44)	365 (55)	1638 (42)	<.0001
History of cardiovascular disease, n (%)	3 (0.1)	1 (0.2)	2 (0.1)	0.36
Proteinuria, n (%)	55 (1.3)	16 (2.6)	39 (1.1)	0.002
eGFR (mL/min/1.73m ²), mean (SD)	88.8 (13.8)	85.2 (17.0)	89.4 (13.1)	<.0001
Cholesterol (mg/dL), mean (SD)	257.4 (46.9)	265.4 (50.5)	256.0 (46.1)	<.0001
Systolic blood pressure (mmHg), mean (SD)	135.1 (18.2)	139.9 (21.3)	134.2 (17.5)	<.0001
Diastolic blood pressure (mmHg), mean (SD)	85.7 (10.4)	87.7 (11.6)	85.4 (10.1)	<.0001
Triglycerides (mg/dL), mean (SD)	88.2 (42.7)	93.7 (45.3)	87.2 (42.2)	0.001
BMI (kg/m ²), mean (SD)	25.0 (3.7)	24.9 (4.1)	25.1 (3.7)	0.34
Fasting blood sugar (mg/dL), mean (SD)	81.6 (12.3)	82.4 (12.2)	81.5 (12.3)	0.068

eGFR, estimated glomerular filtration rate; BMI, body mass index

Supplemental Table 3: Comparison of characteristics of participants identified with CKD by the different definitions

	Primary	Sensitivity			
	(N = 727)	1 (N = 1143)	2 (N = 623)	3 (N = 548)	4 (N = 1457)
Age at first event (years), mean (SD)	69.6 (9.1)	71.9 (8.9)	68.3 (8.8)	68.6 (9.4)	69.3 (9.9)
Time to first event (years)(median, 25 th -75 th)	20 (13, 26)	25 (16, 34)	18 (12, 25)	19 (13, 26)	20 (12, 34)
Male, n (%)	257 (35.4)	431 (37.7)	216 (34.7)	174 (31.8)	523 (35.9)
Smoking status, n (%)					
Never smoked	264 (36.3)	413 (36.1)	231 (37.1)	217 (39.6)	549 (37.7)
Past smoker	121 (16.6)	188 (16.5)	101 (16.2)	93 (17.0)	236 (16.2)
Current smoker	342 (47.0)	542 (47.4)	291 (46.7)	238 (43.4)	672 (46.1)
Diabetes, n (%)	15 (2.1)	17 (1.5)	14 (2.3)	10 (1.8)	22 (1.5)
Hypertension, n (%)	376 (51.7)	534 (46.7)	336 (53.9)	274 (50.0)	690 (47.4)
History of cardiovascular disease, n (%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Proteinuria, n (%)	13 (1.9)	15 (1.4)	13 (2.2)	10 (1.9)	19 (1.4)
eGFR (mL/min/1.73m ²), mean (SD)	81.9 (12.5)	84.0 (12.8)	80.5 (11.9)	80.9 (12.6)	83.3 (12.5)
Cholesterol (mg/dL), mean (SD)	264.6 (47.1)	260.1 (46.1)	266.4 (47.4)	262.2 (46.0)	260.5 (46.2)
Systolic blood pressure (mmHg), mean (SD)	138.4 (19.4)	136.3 (18.4)	139.2 (19.5)	138.3 (20.0)	136.6 (18.9)
Diastolic blood pressure (mmHg), mean (SD)	87.7 (10.8)	86.5 (10.4)	88.1 (10.7)	87.7 (11.4)	86.6 (10.5)
Triglycerides (mg/dL), mean (SD)	91.4 (41.9)	89.0 (41.8)	90.9 (42.2)	89.4 (40.8)	88.7 (42.1)
BMI (kg/m ²), mean (SD)	25.7 (3.9)	25.4 (3.7)	25.6 (4.0)	25.7 (4.0)	25.3 (3.7)
Fasting blood sugar (mg/dL), mean (SD)	81.0 (14.3)	80.9 (13.0)	81.1 (13.9)	80.4 (15.1)	81.0 (12.4)
eGFR slope (ml/min per 1.73m ² /year), mean (SD)	0.91 (0.19)	0.87 (0.18)	0.89 (0.19)	0.92 (0.20)	0.84 (0.19)

eGFR, estimated glomerular filtration rate; BMI, body mass index

Sensitivity: 1 = requires two consecutive measurements of eGFR < 60 ml/min/1.73m² or one measurement of eGFR < 60 ml/min/1.73m² if it was at the last measurement of eGFR due to death or lack of subsequent creatinine measurement or ESRD. 2 = requires eGFR < 60 ml/min/1.73m² on two occasions or eGFR < 60 ml/min/1.73m² on the first measurement if the participant died prior to the second measurement or ESRD. 3 = requires eGFR < 60 ml/min/1.73m² on two occasions or one eGFR < 45 ml/min/1.73m² if it was at the last measurement of eGFR due to death or lack of subsequent creatinine measurement or ESRD. 4 = requires only one measurement of eGFR < 60 ml/min/1.73m² irrespective of the results of follow up measurements and was used for comparison to previous reports or ESRD.

Supplemental Table 4: Cumulative risk of incident CKD Stage 3 and higher unadjusted for death

Age (years)	Years from baseline age*				
	5-Year	10-Year	20-Year	30-Year	40-Year
Women					
45	0.8 (0.3, 1.3)	2.0 (1.3, 2.8)	8.0 (6.7, 9.3)	21.5 (19.4, 23.6)	41.4 (37.6, 45.2)
55	2.0 (1.4, 2.7)	6.1 (5.0, 7.2)	19.9 (17.9, 22.0)	40.2 (36.4, 44.1)	
65	5.4 (4.3, 6.5)	14.7 (12.8, 16.6)	36.3 (32.3, 40.4)		
75	10.3 (8.0, 12.6)	25.4 (21.0, 29.8)			
80	16.8 (12.4, 21.2)	33.3 (24.9, 41.8)			
Men					
45	0.2 (0, 0.5)	1.4 (0.8, 2.0)	4.7 (3.6, 5.8)	13.9 (11.9, 15.9)	28.0 (24.3, 31.6)
55	1.2 (0.7, 1.7)	3.3 (2.4, 4.3)	12.7 (10.8, 14.6)	27.0 (23.3, 30.6)	
65	2.8 (1.9, 3.7)	9.7 (7.9, 11.5)	24.4 (20.7, 28.2)		
75	8.5 (6.3, 10.7)	16.3 (12.6, 20.1)			
80	8.6 (5.1, 12.1)	13.7 (8.1, 19.4)			

*Cumulative risk shown as percentage (95% CI)

Cumulative risk not determined for missing cells due to the small number of events

Supplemental Table 5: Lifetime risk for incident CKD Stage 3 and higher by subgroups of eGFR

Age(years)	Years from baseline age*				
	5-Year	10-Year	20-Year	30-Year	40-Year
Women					
eGFR < 75 (ml/min per 1.73m²)					
45	4.5 (0.9, 8.1)	8.0 (3.9, 12.2)	22.7 (17.8, 27.7)	41.7 (36.3, 47.1)	55.7 (49.7, 61.6)
55	5.5 (3.0, 8.1)	16.3 (12.3, 20.2)	37.3 (32.0, 42.7)	52.8 (46.5, 59.1)	
65	13.1 (9.2, 17.1)	25.6 (20.2, 30.9)	44.3 (37.3, 51.3)		
75	16.3 (9.8, 22.8)	27.4 (18.9, 35.9)			
80	14.8 (6.5, 23.1)	24.6 (13.5, 35.7)			
eGFR 75-90 (ml/min per 1.73m²)					
45	0.7 (0, 1.5)	1.7 (0.6, 2.8)	7.0 (5.1, 8.8)	20.5 (17.6, 23.5)	34.4 (30.1, 38.6)
55	2.1 (1.1, 3.1)	5.4 (3.8, 7.0)	19.3 (16.4, 22.3)	33.5 (29.2, 37.9)	
65	5.4 (3.7, 7.1)	15.3 (12.5, 18.2)	30.9 (26.3, 35.5)		
75	7.0 (4.4, 9.7)	20.2 (15.0, 25.3)			
80	15.2 (9.9, 20.5)	26.8 (18.2, 35.4)			
eGFR > 90 (ml/min per 1.73m²)					
45	0 (0, 0)	0.5 (0, 1.0)	1.6 (0.6, 2.5)	7.5 (5.2, 9.9)	25.4 (19.0, 31.8)
55	0.2 (0, 0.4)	1.1 (0.3, 1.9)	7.2 (4.8, 9.5)	25.3 (18.8, 31.8)	
65	1.3 (0.3, 2.2)	6.3 (4.0, 8.6)	25.1 (18.4, 31.8)		
75	11.1 (6.8, 15.4)	21.9 (14.4, 29.4)			
80	14.0 (5.6, 22.5)	21.1 (9.0, 33.2)			
Men					
eGFR < 75 (ml/min per 1.73m²)					
45	0 (0, 0)	10.0 (4.6, 15.4)	19.1 (12.6, 25.7)	26.9 (19.7, 34.1)	37.7 (29.2, 46.3)
55	4.4 (0.9, 7.9)	10.4 (5.3, 15.4)	19.3 (12.6, 25.9)	31.6 (22.8, 40.5)	
65	2.6 (0, 5.4)	10.5 (4.9, 16.1)	25.1 (15.9, 34.4)		
75	12.2 (4.6, 19.8)	19.6 (9.0, 30.2)			
80	10.5 (0, 21.7)	10.5 (0, 21.7)			
eGFR 75-90 (ml/min per 1.73m²)					
45	0.5 (0, 1.2)	1.2 (0.2, 2.2)	5.7 (3.8, 7.6)	16.6 (13.4, 19.8)	24.9 (20.8, 29)
55	1.7 (0.7, 2.7)	4.7 (2.9, 6.4)	16.1 (12.9, 19.4)	24.8 (20.6, 29.0)	
65	4.5 (2.6, 6.4)	13.2 (9.9, 16.5)	23.1 (18.5, 27.7)		
75	9.1 (5.4, 12.8)	13.5 (8.6, 18.3)			
80	6.2 (1.6, 10.8)	9.9 (3.1, 16.7)			
eGFR > 90 (ml/min per 1.73m²)					
45	0.1 (0, 0.4)	0.3 (0, 0.6)	1.3 (0.5, 2.0)	6.2 (4.4, 8.1)	15.6 (12.2, 19.0)
55	0.3 (0, 0.7)	1.0 (0.4, 1.7)	6.1 (4.3, 7.9)	15.7 (12.2, 19.2)	
65	1.6 (0.7, 2.5)	5.7 (3.8, 7.6)	16.4 (12.6, 20.2)		
75	6.7 (4.0, 9.4)	13.1 (8.9, 17.2)			
80	7.6 (3.6, 11.6)	10.7 (5.5, 15.9)			

eGFR, estimated glomerular rate* Risk shown as percentage (95% CI). Cumulative risk not determined for missing cells due to the small number of events

Lifetime risk estimates are adjusted for competing risk of death

Supplemental Table 6: Lifetime risk for Incident CKD Stage 3 and higher by subgroups of Hypertension

Age (years)	Years from baseline age*				
	5-Year	10-Year	20-Year	30-Year	40-Year
Women					
No Hypertension					
45	0.9 (0.2, 1.5)	1.7 (0.9, 2.6)	6.5 (5.0, 8.0)	16.9 (14.5, 19.4)	32.3 (28.1, 36.5)
55	1.9 (1.1, 2.8)	4.9 (3.6, 6.2)	15.7 (13.2, 18.1)	31.5 (27.2, 35.8)	
65	3.6 (2.4, 4.8)	11.6 (9.3, 13.9)	28.7 (24.1, 33.3)		
75	9.8 (6.9, 12.8)	20.9 (15.8, 26.0)			
80	13.3 (8.0, 18.7)	21.2 (13.3, 29)			
Hypertension					
45	0.7 (0, 1.7)	2.5 (1.1, 4.0)	9.9 (7.5, 12.2)	25.2 (21.9, 28.6)	40.3 (35.9, 44.7)
55	2.1 (1.0, 3.2)	7.6 (5.6, 9.5)	23.4 (20.2, 26.7)	39 (34.5, 43.5)	
65	7.9 (5.7, 10.0)	17.8 (14.6, 20.9)	35.2 (30.3, 40.0)		
75	10.2 (6.8, 13.7)	23.5 (17.9, 29.1)			
80	16.7 (10.8, 22.6)	28.0 (19.7, 36.4)			
Men					
No Hypertension					
45	0.3 (0, 0.7)	1.2 (0.5, 2)	3.6 (2.4, 4.9)	9.2 (7.2, 11.2)	18.9 (15.4, 22.3)
55	0.4 (0, 0.9)	2.5 (1.5, 3.5)	8.2 (6.3, 10.2)	18.3 (14.8, 21.8)	
65	1.9 (0.9, 2.9)	6.4 (4.5, 8.3)	17.5 (13.7, 21.2)		
75	6.6 (4.1, 9.1)	13.4 (9.4, 17.5)			
80	8.4 (4.3, 12.5)	11.6 (6.2, 16.9)			
Hypertension					
45	0.2 (0, 0.6)	1.6 (0.6, 2.6)	5.6 (3.9, 7.3)	15.7 (12.8, 18.6)	24.3 (20.6, 28.1)
55	2.2 (1.1, 3.3)	4.2 (2.7, 5.7)	14.8 (11.9, 17.7)	23.9 (20.0, 27.7)	
65	3.9 (2.3, 5.6)	12.4 (9.4, 15.4)	23.1 (18.8, 27.3)		
75	10.5 (6.7, 14.3)	14.8 (10.1, 19.5)			
80	6 (1.9, 10.1)	8.5 (3.2, 13.8)			

*Risk shown as percentage (95% CI). Risk not determined for missing cells due to the small number of events

Lifetime risk estimates are adjusted for competing risk of death

Supplemental Table 7: Lifetime risk for Incident CKD Stage 3 and higher by subgroups of BMI*

Age (years)	Years from baseline age*				
	5-Year	10-Year	20-Year	30-Year	40-Year
Women					
BMI < 25 (kg/m²)					
45	0.9 (0.2, 1.6)	1.8 (0.9, 2.7)	6.3 (4.8, 7.8)	17.9 (15.4, 20.3)	32.5 (28.6, 36.4)
55	1.8 (1, 2.6)	4.6 (3.4, 5.8)	16.5 (14.1, 18.9)	31.6 (27.6, 35.6)	
65	4.8 (3.5, 6.2)	12.9 (10.6, 15.1)	29.1 (24.9, 33.3)		
75	9 (6.2, 11.7)	20.4 (15.6, 25.2)			
80	13.9 (8.9, 18.9)	17.0 (11.0, 23.0)			
BMI 25-<30 (kg/m²)					
45	0.7 (0, 1.7)	2.3 (0.8, 3.8)	10.1 (7.5, 12.8)	22.8 (19.1, 26.6)	37.6 (32.3, 42.8)
55	2.2 (0.9, 3.5)	8.1 (5.8, 10.5)	21.3 (17.6, 25.0)	36.6 (31.2, 42.0)	
65	5.6 (3.5, 7.8)	14.8 (11.3, 18.2)	31.9 (26.1, 37.6)		
75	10.4 (6.4, 14.5)	21.8 (15.4, 28.2)			
80	13.8 (7.4, 20.2)	31.9 (21.3, 42.4)			
BMI ≥ 30 (kg/m²)					
45	0 (0, 0)	2.5 (0, 5.3)	10.8 (5.6, 16)	30.1 (22.1, 38.1)	53.8 (42.2, 65.3)
55	2.2 (0, 4.7)	8.5 (3.9, 13.2)	28.3 (20.3, 36.3)	52.6 (40.7, 64.5)	
65	8.4 (3.4, 13.5)	22.3 (14.2, 30.5)	49.7 (36.6, 62.9)		
75	16.9 (6.6, 27.2)	38.3 (21.6, 55.0)			
80	30.6 (10.0, 51.1)	39.4 (15.9, 63.0)			
Men					
BMI < 25 (kg/m²)					
45	0 (0, 0)	0.6 (0, 1.2)	3.4 (2.0, 4.8)	9.7 (7.3, 12.1)	19.4 (15.4, 23.4)
55	1.0 (0.3, 1.8)	2.9 (1.6, 4.1)	9.3 (6.9, 11.7)	19.3 (15.2, 23.4)	
65	2.5 (1.2, 3.8)	7.2 (4.8, 9.5)	18.3 (13.9, 22.7)		
75	6.9 (3.8, 9.9)	14.2 (9.2, 19.1)			
80	9.2 (4.0, 14.4)	15.0 (7.6, 22.4)			
BMI 25-<30 (kg/m²)					
45	0.3 (0, 0.8)	1.8 (0.8, 2.8)	4.8 (3.3, 6.3)	13.1 (10.6, 15.6)	20.6 (17.2, 24.0)
55	0.9 (0.2, 1.5)	3.1 (1.9, 4.3)	11.8 (9.3, 14.3)	19.7 (16.2, 23.1)	
65	2.9 (1.6, 4.3)	9.9 (7.4, 12.5)	18.9 (15.1, 22.7)		
75	8.2 (5.1, 11.2)	11.4 (7.6, 15.2)			
80	4.2 (1.1, 7.3)	5.2 (1.6, 8.8)			
BMI ≥ 30 (kg/m²)					
45	0.9 (0, 2.7)	2.5 (0, 5.2)	7.9 (3.4, 12.4)	17.5 (11.0, 24.0)	31.8 (22.9, 40.7)
55	3.5 (0.5, 6.5)	5.7 (1.8, 9.6)	15.8 (9.3, 22.2)	30.8 (21.6, 39.9)	
65	2.9 (0, 6.1)	12.3 (5.8, 18.9)	30.8 (20.4, 41.2)		
75	14.2 (5.3, 23.1)	25.4 (12.8, 38.0)			
80	15.7 (2.0, 29.4)	15.7 (2.0, 29.4)			

BMI, body mass index

*Risk shown as percentage (95% CI). Risk not determined for missing cells due to the small number of events

Lifetime risk estimates are adjusted for competing risk of death

Supplemental Table 8: Lifetime risk for Incident CKD Stage 3 and higher by subgroups of smoking

	Age (years)		Years from baseline age*		
	5-Year	10-Year	20-Year	30-Year	40-Year
Women					
Never smoked					
	5-year	10-year	20-year	30-year	40-year
45	1.0 (0.1, 1.9)	2.6 (1.3, 3.9)	8.0 (6.1, 10.0)	22.2 (19.1, 25.2)	36.4 (31.7, 41.1)
55	2.1 (1.1, 3.1)	5.6 (4.0, 7.2)	20.1 (17.2, 23.1)	34.8 (30.0, 39.6)	
65	5.9 (4.2, 7.7)	15.7 (12.9, 18.6)	31.5 (26.5, 36.6)		
75	8.1 (5.1, 11.1)	19.9 (14.2, 25.5)			
80	14.0 (8.1, 19.9)	27.3 (17.9, 36.7)			
Past Smoker					
45	0 (0, 0)	0.5 (0, 1.5)	9.3 (5.4, 13.2)	17.6 (12.3, 22.8)	33.2 (25.0, 41.4)
55	2.0 (0, 3.8)	8.9 (5.1, 12.7)	17.4 (12.1, 22.6)	33.2 (24.9, 41.5)	
65	3.2 (0.7, 5.7)	9.4 (4.9, 13.8)	27 (18.3, 35.6)		
75	11.2 (4.8, 17.6)	21.0 (11.5, 30.5)			
80	11.4 (2.7, 20.2)	25.6 (11.0, 40.2)			
Current smoker					
45	0.8 (0, 1.6)	1.8 (0.7, 2.8)	7.2 (5.3, 9.1)	19.2 (16.2, 22.2)	35.8 (31.2, 40.4)
55	1.9 (1.0, 2.9)	5.7 (4.0, 7.3)	18.1 (15.1, 21.0)	35.2 (30.5, 40.0)	
65	5.3 (3.6, 7.0)	13.7 (10.9, 16.6)	32.8 (27.7, 37.9)		
75	11.7 (7.9, 15.4)	25 (19.0, 31.0)			
80	17.4 (10.8, 24.0)	21.1 (13.5, 28.7)			
Men					
Never smoked					
45	0.9 (0, 2.2)	2.4 (0.5, 4.2)	6.4 (3.6, 9.2)	11.9 (8.1, 15.7)	18.2 (12.7, 23.7)
55	1.3 (0, 2.5)	4.2 (2.0, 6.4)	9.9 (6.4, 13.5)	16.5 (11.1, 21.9)	
65	2.8 (0.7, 4.8)	6.5 (3.3, 9.7)	13.8 (8.1, 19.6)		
75	2.8 (0.1, 5.4)	8.8 (2.9, 14.6)			
80	7 (0.9, 13.1)	13.5 (4.4, 22.5)			
Past smoker					
45	0.5 (0, 1.5)	1.7 (0, 3.4)	5.5 (2.8, 8.2)	15.1 (10.7, 19.5)	29.2 (22.8, 35.6)
55	1.1 (0, 2.4)	3.9 (1.6, 6.2)	13.9 (9.5, 18.2)	28.5 (22.0, 35.0)	
65	2.9 (0.8, 5.1)	11.2 (7.0, 15.5)	27.7 (20.7, 34.7)		
75	12.2 (6.6, 17.8)	20.7 (12.9, 28.5)			
80	11.1 (3.6, 18.5)	11.1 (3.6, 18.5)			
Current smoker					
45	0 (0, 0)	1.0 (0.4, 1.7)	3.6 (2.5, 4.8)	11.3 (9.1, 13.4)	19.7 (16.6, 22.9)
55	1.2 (0.5, 1.8)	2.7 (1.7, 3.7)	10.6 (8.5, 12.8)	19.5 (16.2, 22.7)	
65	2.7 (1.5, 3.8)	9.0 (6.9, 11.2)	19.1 (15.6, 22.6)		
75	8.7 (5.8, 11.6)	13.3 (9.4, 17.1)			
80	6.1 (2.5, 9.8)	8.7 (3.6, 13.7)			

*Risk shown as percentage (95% CI). Risk not determined for missing cells due to the small number of events

Lifetime risk estimates are adjusted for competing risk of death

Supplemental Figure 1: Lifetime risk for incident CKD Stage 3 and higher for men and women starting at age 45 for the four sensitivity methods for ascertainment of CKD. The methods are described in Supplement Table 1.

