

## **Supplemental Material**

**Supplemental table 1.** Baseline characteristics of the main study population and events during follow-up across the fifths of social deprivation in men

**Supplemental table 2.** Baseline characteristics of the main study population and events during follow-up across the fifths of social deprivation in women.

**Supplemental table 3.** Baseline characteristics of the subset participants with known baseline eGFR and events during follow-up across the fifths of individual socioeconomic deprivation.

**Supplemental table 4.** Association between socioeconomic deprivation fifths and hazard of advanced chronic kidney disease by different levels of adjustment in the subset of 1,031,377 participants with known baseline eGFR.

**Supplemental table 5.** The effect of social deprivation on the association between estimated glomerular filtration rate (eGFR) and advanced chronic kidney disease in the subset of 1,031,377 participants with known baseline eGFR.

**Supplemental table 6.** Characteristics of studies included in the meta-analysis

Supplemental figure 1. Association between fifths of social deprivation and hazard of end-stage renal disease by sex, age, smoking status, uncontrolled hypertension, diabetes, and cardiovascular disease at baseline.

**Supplemental figure 1:** Flow chart of study selection.

**Supplemental figure 2.** Kaplan-Meier curves for CKD stage 4–5 by fifths of socioeconomic deprivation during the follow-up period. Please note that the scale of the Y-axis ranges from 0.90 to 1.00.

**Supplemental figure 3.** Association between fifths of social deprivation and hazard of end-stage renal disease by sex, age, smoking status, uncontrolled hypertension, diabetes, and cardiovascular disease at baseline. Hazard ratios were all adjusted or stratified by baseline age and sex and are plotted against the fifths of social deprivation category.

**Supplemental table 1.** Baseline characteristics of the main study population and events during follow-up across the fifths of social deprivation in men

Characteristic	Overall (n=583535)	First ( <b>Least</b> ) (n=142391)	Second (n=131463)	Third (n=119150)	Fourth (n=111122)	Fifth ( <b>Most</b> ) (n=79409)
<b>Baseline</b>						
Age, years, mean (SD)	51.1 (14.7)	52.1 (14.1)	52.3 (14.4)	51.6 (14.7)	50.0 (15.1)	48.3 (15.2)
Current smoker, n (%)	121939 (20.9)	20671 (14.5)	22432 (17.1)	24115 (20.2)	28700 (25.8)	26021 (32.8)
BMI, kg/m <sup>2</sup> , mean (SD)	27.8 (4.9)	27.5 (4.5)	27.7 (4.6)	27.9 (4.9)	27.9 (5.2)	27.8 (5.5)
BMI category, kg/m <sup>2</sup> , n (%)						
<20	17222 (3.0)	3080 (2.2)	3204 (2.4)	3289 (2.8)	3882 (3.5)	3767 (4.7)
≥20, <25	153470 (26.3)	39078 (27.4)	34003 (25.9)	30441 (25.5)	28554 (25.7)	21394 (26.9)
≥25, <30	253503 (43.4)	65831 (46.2)	59424 (45.2)	51824 (43.5)	45758 (41.2)	30666 (38.6)
≥30, <35	115363 (19.8)	25983 (18.2)	25965 (19.8)	24318 (20.4)	23065 (20.8)	16032 (20.2)
≥35	43977 (7.5)	8419 (5.9)	8867 (6.7)	9278 (7.8)	9863 (8.9)	7550 (9.5)
Systolic blood pressure, mmHg, mean (SD)	138 (18.8)	138 (18.5)	138 (18.7)	138 (18.8)	137 (19.0)	137 (19.3)
Uncontrolled hypertension, yes, n (%)	223756 (46.3)	55893 (46.1)	52538 (47.7)	46201 (46.9)	41146 (45.5)	27978 (44.3)
Diabetes mellitus, yes, n (%)	55268 (9.5)	12067 (8.5)	12346 (9.4)	11798 (9.9)	11095 (10.0)	7962 (10.0)
Prior cardiovascular disease, yes, n (%)	82473 (14.1)	17942 (12.6)	18329 (13.9)	17421 (14.6)	16354 (14.7)	12427 (15.6)
<b>Follow-up</b>						
Duration, years, median (IQR)	7.3 [5.1–9.9]	7.5 [5.2–10.2]	7.5 [5.2–10.0]	7.4 [5.2–9.9]	7.2 [5.0–9.6]	7.0 [4.9–9.4]
Death, yes, n (%)	41087 (7.0)	8330 (5.9)	8837 (6.7)	8623 (7.2)	8449 (7.6)	6848 (8.6)

*Abbreviation:* bmi, body-mass index; eGFR, estimated glomerular filtration rate. *Note:* Categorical values shown as number (percentage); continuous variables, as mean (standard deviation) or median (interquartile range); Index of Multiple Deprivation (First= least deprived, Fifth= most deprived).

**Supplemental table 2.** Baseline characteristics of the main study population and events during follow-up across the fifths of social deprivation in women

Characteristic	Overall (n=814038)	First ( <b>Least</b> ) (n=198962)	Second (n=182799)	Third (n=165165)	Fourth (n=158036)	Fifth ( <b>Most</b> ) (n=109076)
<b>Baseline</b>						
Age, years, mean (SD)	46.8 (16.2)	47.4 (15.6)	47.7 (16.1)	47.3 (16.3)	45.9 (16.5)	44.5 (16.6)
Current smoker, n (%)	138311 (17.0)	22759 (11.4)	25400 (13.9)	27248 (16.5)	33657 (21.3)	29247 (26.8)
BMI, kg/m <sup>2</sup> , mean (SD)	27.1 (6.0)	26.3 (5.5)	26.8 (5.7)	27.2 (6.0)	27.6 (6.3)	28.0 (6.7)
BMI category, kg/m <sup>2</sup> , n (%)						
<20	57361 (7.1)	14919 (7.5)	12681 (6.9)	10969 (6.6)	10725 (6.8)	8067 (7.4)
≥20, <25	294395 (36.2)	82009 (41.2)	69104 (37.8)	58172 (35.2)	52185 (33.0)	32925 (30.2)
≥25, <30	249190 (30.6)	60543 (30.4)	56870 (31.1)	51626 (31.3)	47855 (30.3)	32296 (29.6)
≥30, <35	128820 (15.8)	26793 (13.5)	27614 (15.1)	26888 (16.3)	27580 (17.5)	19945 (18.3)
≥35	84271 (10.4)	14698 (7.4)	16529 (9.0)	17510 (10.6)	19691 (12.5)	15843 (14.5)
Systolic blood pressure, mmHg, mean (SD)	130 (20.3)	129 (19.9)	130 (20.3)	130 (20.5)	130 (20.4)	129 (20.5)
Uncontrolled hypertension, yes, n (%)	214196 (30.8)	51009 (29.4)	50033 (31.6)	44928 (31.9)	41173 (30.8)	27053 (30.0)
Diabetes mellitus, yes, n (%)	44789 (5.5)	8944 (4.5)	9227 (5.1)	9330 (5.7)	9854 (6.2)	7434 (6.8)
Prior cardiovascular disease, yes, n (%)	53829 (6.6)	10381 (5.2)	11281 (6.2)	11237 (6.8)	11580 (7.3)	9350 (8.6)
<b>Follow-up</b>						
Duration, years, median (IQR)	7.7 [5.3–10.4]	7.8 [5.3–10.6]	7.8 [5.3–10.5]	7.7 [5.3–10.4]	7.6 [5.2–10.2]	7.5 [5.1–10.1]
Death, yes, n (%)	33363 (4.1)	6326 (3.2)	7055 (3.9)	6925 (4.2)	7211 (4.6)	5846 (5.4)

*Abbreviation:* bmi, body-mass index; eGFR, estimated glomerular filtration rate. *Note:* Categorical values shown as number (percentage); continuous variables, as mean (standard deviation) or median (interquartile range); Index of Multiple Deprivation (First= least deprived, Fifth= most deprived).

**Supplemental table 3.** Baseline characteristics of the subset participants with known baseline eGFR and events during follow-up across the fifths of individual socioeconomic deprivation

Characteristic	Overall (n=1031377)	First ( <b>Least</b> ) (n=252613)	Second (n=233711)	Third (n=210998)	Fourth (n=197145)	Fifth ( <b>Most</b> ) (n=136910)
<b>Baseline</b>						
eGFR, mL/min/1.73m <sup>2</sup> , mean (SD)	80.8 (18.4)	80.3 (17.5)	80.0 (17.9)	80.3 (18.3)	81.5 (18.9)	82.8 (19.9)
Age, years, mean (SD)	52.2 (14.5)	52.8 (13.9)	53.2 (14.2)	52.7 (14.5)	51.3 (14.9)	50.0 (15.1)
Female sex, n (%)	581980 (56.4)	140807 (55.7)	130808 (56.0)	118844 (56.3)	113285 (57.5)	78236 (57.1)
Current smoker, n (%)	174290 (16.9)	28424 (11.3)	31852 (13.6)	34443 (16.3)	42002 (21.3)	37569 (27.4)
BMI, kg/m <sup>2</sup> , mean (SD)	28.1 (5.9)	27.4 (5.4)	27.8 (5.6)	28.2 (5.9)	28.5 (6.2)	28.7 (6.5)
BMI category, kg/m <sup>2</sup> , n (%)						
<20	24017 (4.9)	5470 (4.7)	4961 (4.5)	4591 (4.6)	4839 (5.0)	4156 (5.9)
≥20, <25	137015 (27.7)	35860 (31.0)	31244 (28.6)	27132 (26.9)	25330 (25.9)	17449 (24.8)
≥25, <30	178039 (36.0)	43722 (37.8)	40855 (37.4)	36643 (36.3)	33608 (34.4)	23211 (32.9)
≥30, <35	97151 (19.7)	20489 (17.7)	21024 (19.3)	20515 (20.3)	20441 (20.9)	14682 (20.8)
≥35	57784 (11.7)	10020 (8.7)	11129 (10.2)	12125 (12.0)	13532 (13.8)	10978 (15.6)
Systolic blood pressure, † mmHg, mean (SD)	137.5 (21.4)	137.1 (21.2)	137.6 (21.2)	137.6 (21.2)	137.6 (21.2)	137.7 (21.3)
Uncontrolled hypertension, yes, n (%)	392852 (45.7)	95580 (45.4)	91938 (47.1)	82285 (46.7)	73678 (44.9)	49371 (43.5)
Diabetes mellitus, yes, n (%)	89103 (8.6)	18246 (7.2)	18895 (8.1)	18887 (9.0)	19036 (9.7)	14039 (10.3)
Prior cardiovascular disease, yes, n (%)	126653 (12.3)	25877 (10.2)	27351 (11.7)	26823 (12.7)	26118 (13.2)	20484 (15.0)
<b>Follow-up</b>						
Duration, years, median (IQR)	7.8 [5.5–10.2]	8.0 [5.6–10.4]	8.0 [5.6–10.3]	7.9 [5.5–10.2]	7.7 [5.4–10.1]	7.5 [5.3–10.0]
Death, yes, n (%)	64305 (6.2)	12691 (5.0)	13864 (5.9)	13422 (6.4)	13507 (6.9)	10821 (7.9)

*Abbreviation:* eGFR, estimated glomerular filtration rate; BMI, body-mass index. *Note:* Categorical values shown as number (percentage); continuous variables, as mean (standard deviation) or median (interquartile range); Index of Multiple Deprivation (First= least deprived, Fifth= most deprived); †, adjusted for age and sex.

**Supplemental table 4.** Association between socioeconomic deprivation fifths and hazard of advanced chronic kidney disease by different levels of adjustment in the subset of 1,031,377 participants with known baseline eGFR.

Social deprivation (fifths)	n	Model 1 (unadjusted) HR (95% CI)	Model 2 HR (95% CI)	Model 3 HR (95% CI)	Model 4 HR (95% CI)
<i>CKD stages 4 and 5</i>					
First (least)	2246	1.0 [0.96–1.04]	1.0 [0.96–1.04]	1.0 [0.94–1.07]	1.0 [0.94–1.07]
Second	2474	1.21 [1.17–1.26]	1.16 [1.11–1.21]	1.11 [1.05–1.18]	1.06 [1.0–1.13]
Third	2438	1.41 [1.35–1.47]	1.39 [1.34–1.45]	1.21 [1.14–1.28]	1.13 [1.06–1.20]
Fourth	2346	1.57 [1.51–1.63]	1.60 [1.53–1.66]	1.36 [1.28–1.45]	1.27 [1.19–1.35]
Fifth (most)	1719	1.69 [1.61–1.77]	1.87 [1.79–1.96]	1.39 [1.30–1.49]	1.23 [1.14–1.32]
<i>ESRD</i>					
First (least)	214	1.0 [0.87–1.14]	1.0 [0.87–1.14]	1.0 [0.79–1.27]	1.0 [0.79–1.27]
Second	223	1.15 [1.01–1.31]	1.14 [1.0–1.30]	1.61 [1.34–1.94]	1.57 [1.31–1.89]
Third	243	1.48 [1.30–1.68]	1.50 [1.32–1.70]	1.38 [1.12–1.70]	1.30 [1.06–1.60]
Fourth	211	1.49 [1.30–1.70]	1.55 [1.35–1.77]	1.70 [1.39–2.07]	1.60 [1.31–1.95]
Fifth (most)	160	1.66 [1.42–1.93]	1.76 [1.51–2.05]	1.46 [1.13–1.88]	1.33 [1.03–1.71]

*Note:* Model 1, unadjusted model; Model 2, adjusted for age and sex; Model 3, adjusted for age, sex, and potential mediators of effect including current smoking, body-mass index, diabetes, systolic blood pressure, and prior cardiovascular disease at baseline; Model 4, in addition to the variables in model 3, model 4 adjusted for baseline eGFR.

**Supplemental table 5.** The effect of social deprivation on the association between estimated glomerular filtration rate (eGFR) and advanced chronic kidney disease in the subset of 1,031,377 participants with known baseline eGFR.

Baseline eGFR (mL/min/1.73m <sup>2</sup> )	Social deprivation (fifths)				
	First (Least) HR (95% CI)	Second HR (95% CI)	Third HR (95% CI)	Fourth HR (95% CI)	Fifth (Most) HR (95% CI)
<i>CKD stages 4 and 5</i>					
≥30, <60	1.0 [0.95–1.05]	1.05 [1.0–1.10]	1.23 [1.18–1.29]	1.32 [1.25–1.38]	1.45 [1.37–1.54]
≥60, <90	1.0 [0.93–1.08]	1.21 [1.12–1.30]	1.34 [1.24–1.44]	1.75 [1.63–1.89]	2.11 [1.94–2.30]
≥90	1.0 [0.81–1.24]	1.22 [0.98–1.52]	1.77 [1.45–2.17]	1.87 [1.52–2.30]	2.42 [1.94–3.01]

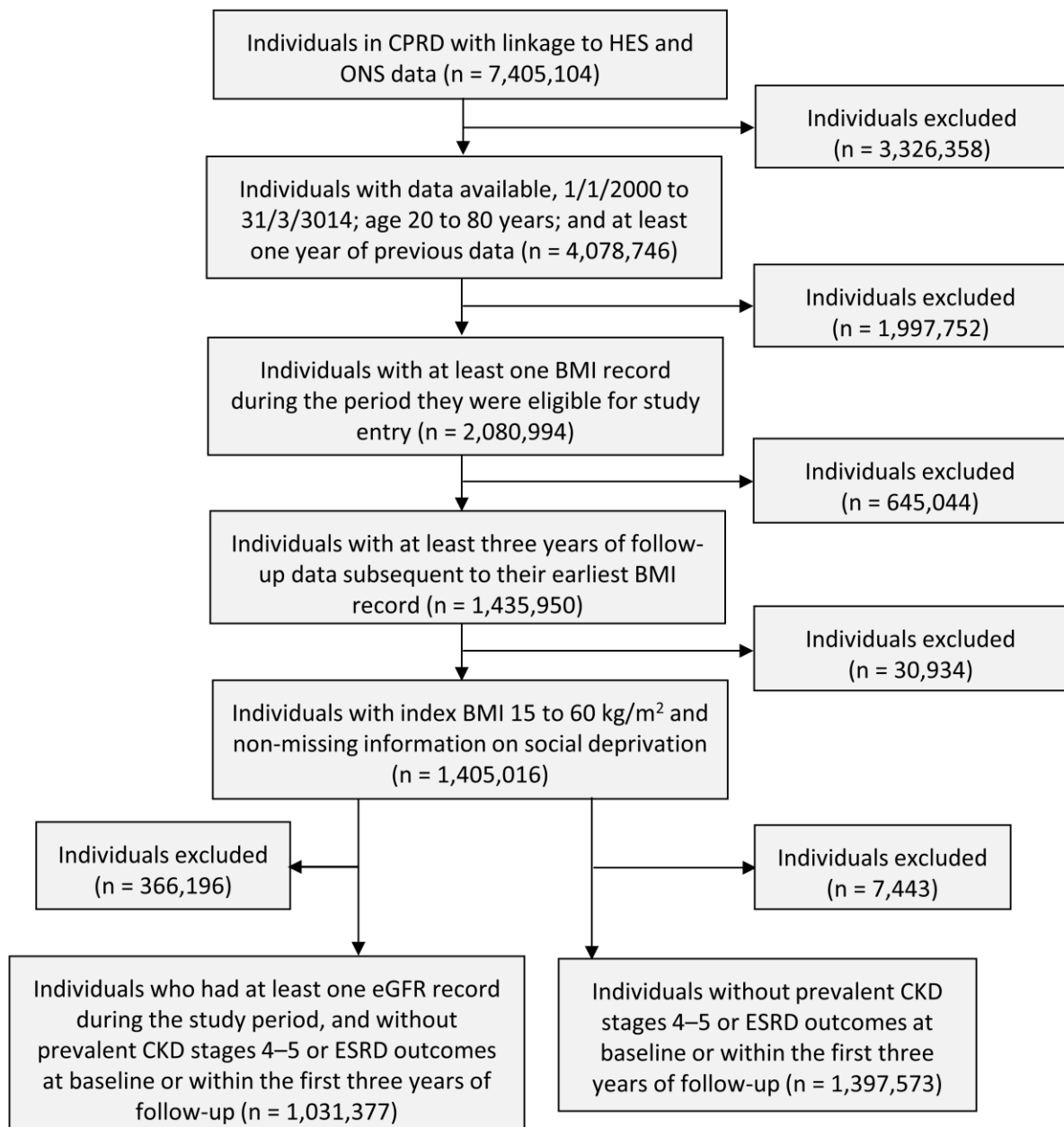
*Abbreviation:* Index of Multiple Deprivation (First= least deprived, Fifth= most deprived)

**Supplemental table 6.** Characteristics of studies included in the meta-analysis

Author, year	Setting	Country	Baseline study, year(s)	Sample size, N	Age, years	Deprivation, categories	ESRD, n	Effect [95% CI]	Variables adjusted
Brancati, 1992 <sup>21</sup>	Cohort	U.S.	1980 to 1985	2.1 million	>18	Income, 2 Education, 2	442	*RR (low income)=1.28 [1.23, 1.33] RR (low education)=1.14 [1.03, 1.25]	*None Age, race, diabetes, hypertension, and access to health care
Perneger, 1995 <sup>11</sup>	Case-control	U.S.	1991	Case 716, Control 361	20–64	Income, 4 Education, 6	716	OR (low income white)=5.10 [2.60, 10.00] OR (low income AA)=4.30 [1.50, 12.40] *OR (low education)=7.00 [2.80, 17.22]	Gender, health insurance, and missing teeth *None
Klag, 1997 <sup>22</sup>	Cohort	U.S.	1973 to 1975	332,544	35–57	Income, continuous scale	766	RR (AA)=1.54 [1.03, 2.31] RR (White)=1.26 [1.08, 1.48]	Age, systolic blood pressure, serum cholesterol, cigarettes per day, use of medication for diabetes, and prior hospitalization for heart attack.
Fored, 2003 <sup>23</sup>	Case-control	Sweden	1996 to 1998	Case 926 Control 998	18–74	Education, 3 Occupation, 6	926	OR (low education)=1.30 [1.00, 1.70] OR (unskilled workers)=1.90 [1.30, 2.70]	Age, sex, BMI, cigarette smoking, alcohol intake, and regular aspirin and/or paracetamol use
Volkova, 2008 <sup>19</sup>	Cohort	U.S.	1998 to 2002	34,767	≥20	Area, 6	34,767	*RR (white)=2.92 [2.72, 3.13] *RR (AA)=1.99 [1.86, 2.13]	*None
Ward, 2008 <sup>20</sup>	Cohort	U.S.	1996 to 2004	747,556	≥20	Area, 4	747,556	RR (white men)=1.55 [1.53, 1.58] RR (white women)=1.92 [1.89, 1.95] RR (AA men)=1.22 [1.19, 1.24] RR (AA women)=1.40 [1.37, 1.43]	Age
Hsu, 2009 <sup>24</sup>	Cohort	U.S.	1964 to 1973	177,570	≥20	Education, 4	842	HR (low education)=1.55 [1.21, 2.00]	Age, race, BMI, proteinuria, serum creatinine, uric acid, dipstick glycosuria, dipstick hemoglobin, blood hemoglobin, hypertension Age, sex, hypertension, diabetes, multivitamin, folk remedies or over-the-counter medication, chinese herbs, regular urine testing, petrol, paint, or printing ink exposure, and intake of vitamin C, vitamin E, antibiotics, and steroids
Tsai, 2009 <sup>25</sup>	Case-control	Taiwan	2005	Case 200, Control 200	20–64	Education, 2 Income, 2	200	OR (low income)=2.86 [1.48, 5.52] OR (low education)=2.78 [1.49, 5.19]	Age, race, BMI, proteinuria, serum creatinine, uric acid, dipstick glycosuria, dipstick hemoglobin, blood hemoglobin, hypertension Age, sex, hypertension, diabetes, multivitamin, folk remedies or over-the-counter medication, chinese herbs, regular urine testing, petrol, paint, or printing ink exposure, and intake of vitamin C, vitamin E, antibiotics, and steroids

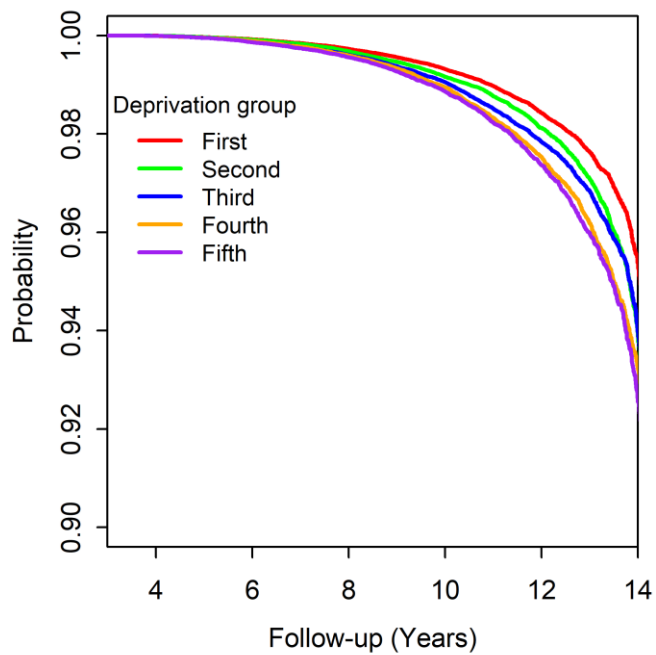
Secrest, 2011 <sup>26</sup>	Cohort	U.S.	1986 to 1988	317	24–32	Education, 2 Income, 3 Occupation, 2	31	HR (low education)=2.10 [0.80, 5.90] HR (low income)=3.80 [0.80, 17.60] HR (non-professionals)=1.40 [0.60, 3.30]	Sex, diabetes duration, HbA <sub>1c</sub> , non-HDL cholesterol, hypertension status, prevalent overt nephropathy, and smoking status
Lipworth, 2012 <sup>27</sup>	Cohort	U.S.	2002 to 2009	79,943	40–79	Income, 2 Education, 3	687	OR (low income white)=1.60 [0.97, 2.80] OR (low income AA)=1.40 [1.20, 1.70] OR (low education white)=0.90 [0.50, 1.7] OR (low education AA)=1.13 [1.01, 1.34]	Age, sex, education, income, smoking, and history of hypertension, diabetes and other medical conditions
Weldegiorgis, 2018	Cohort	U.K.	2000 to 2014	1.4 million	20–79	Area, 5	1068	HR (most deprived)=1.45 [1.23–1.71]	Age, sex, and current smoking, body-mass index, diabetes, systolic blood pressure, and prior cardiovascular disease at baseline

*Abbreviation:* RR, relative risk; OR, odds ratio; HR, hazard ratio; AA, African-American; BMI, body-mass index. *Note:* \*indicate unadjusted model; Effect indicate the risk for ESRD comparing the most deprived category versus to the least deprived one.

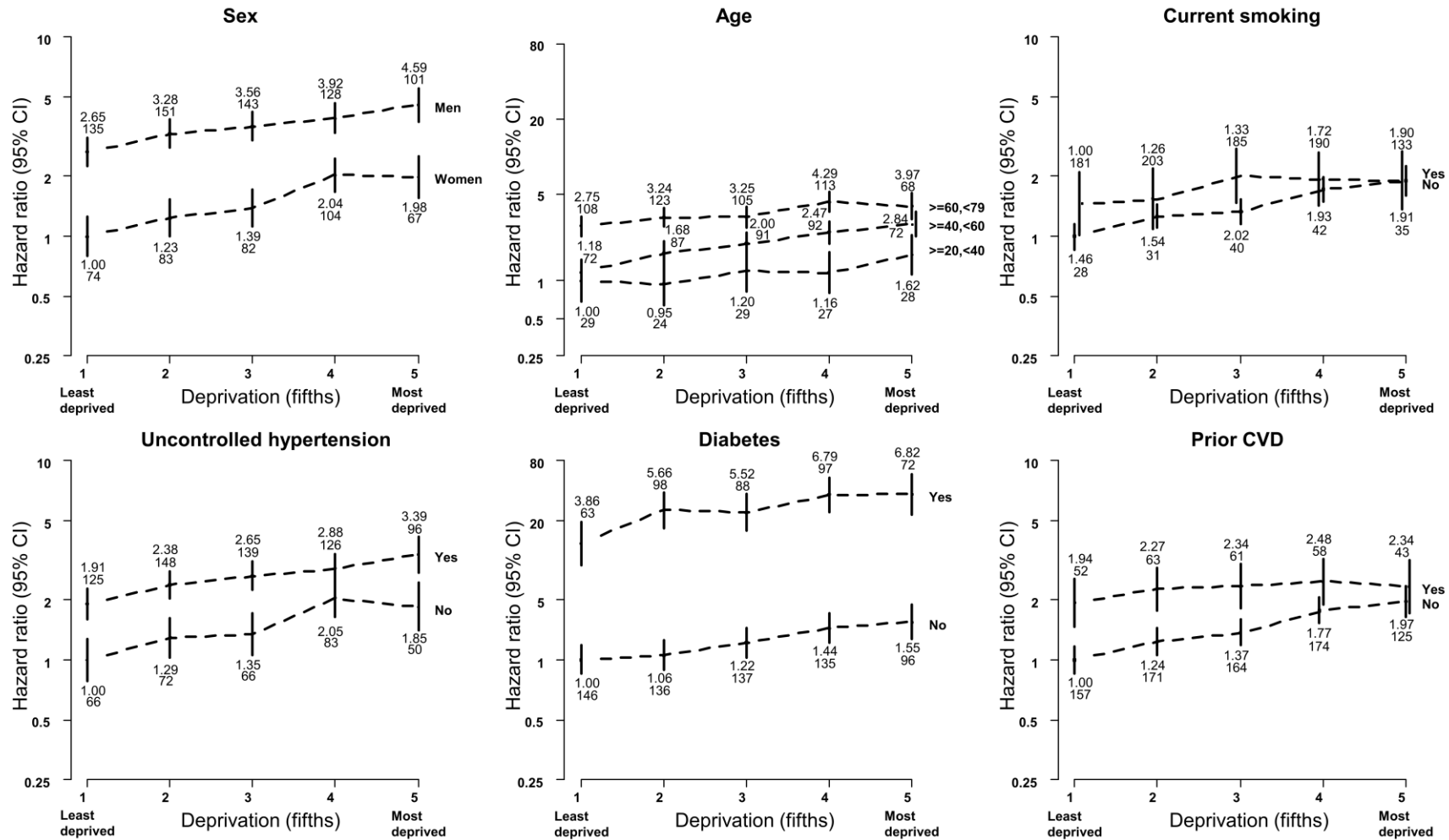


**Supplemental figure 1:** Flow chart of study selection.

*Abbreviation:* CPRD, Clinical Practice Research Datalink; HES, Health Episode Statistics; ONS, Office of National Statistics; BMI, body-mass index; eGFR, estimated glomerular filtration rate; CKD, chronic kidney disease; ESRD, end-stage renal disease



**Supplemental figure 2.** Kaplan-Meier curves for CKD stage 4–5 by fifths of socioeconomic deprivation during the follow-up period. Please note that the scale of the Y-axis ranges from 0.90 to 1.00.



**Supplemental figure 3.** Association between fifths of social deprivation and hazard of end-stage renal disease by sex, age, smoking status, uncontrolled hypertension, diabetes, and cardiovascular disease at baseline. Hazard ratios were all adjusted or stratified by baseline age and sex and are plotted against the fifths of social deprivation category.