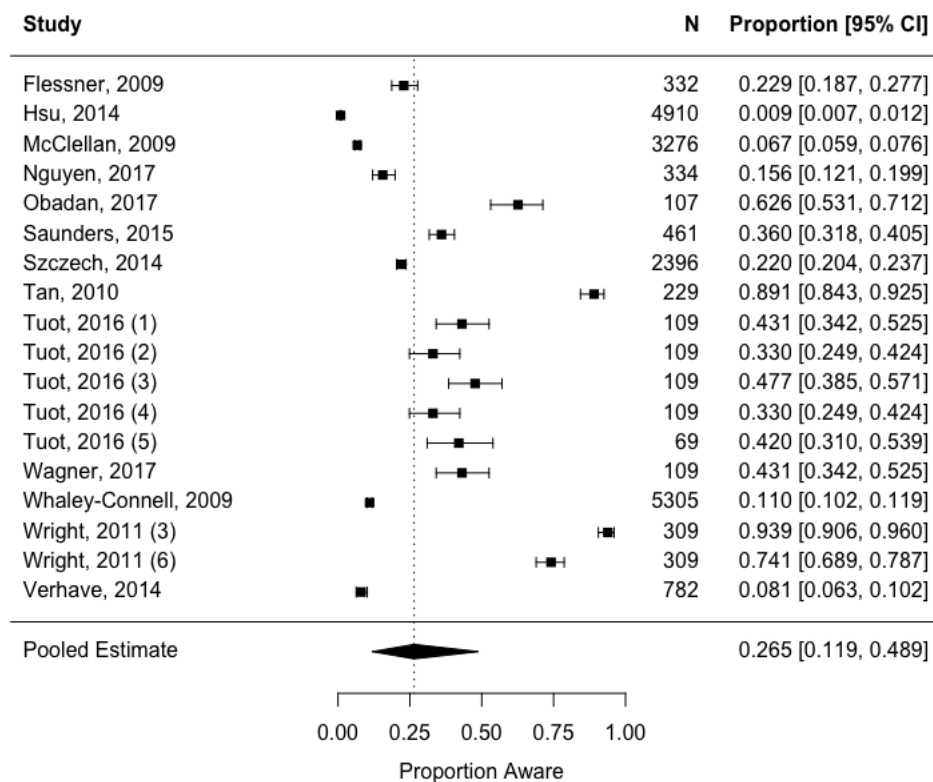
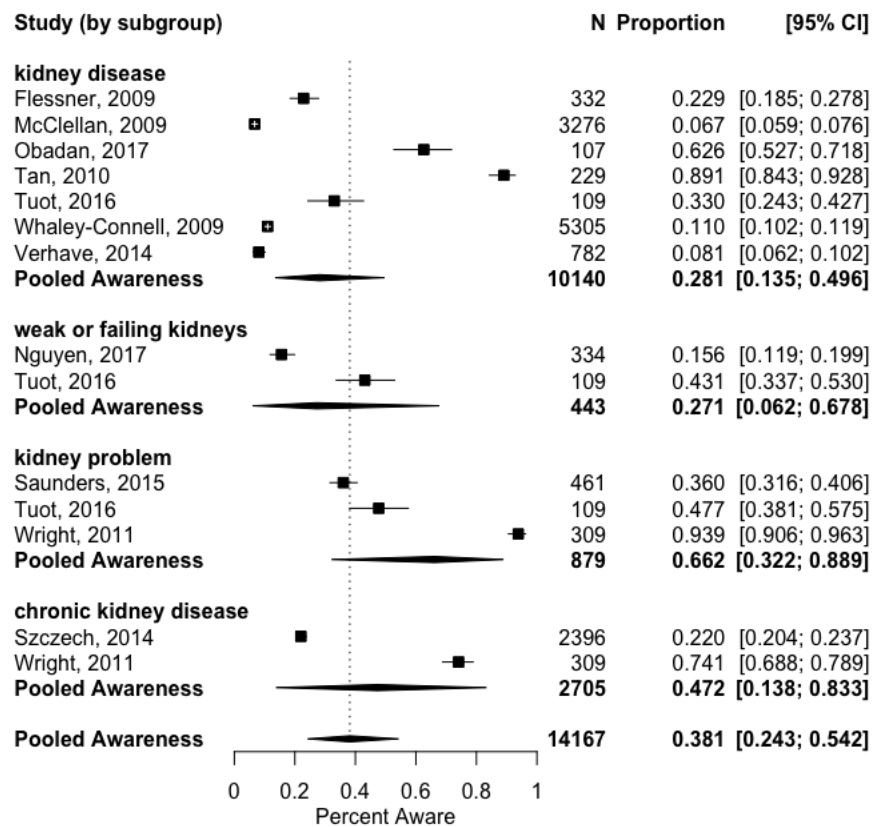


**Figure S1: Meta-analysis of awareness prevalence of chronic kidney disease defined by eGFR <60 ml/min/1.73m<sup>2</sup>**



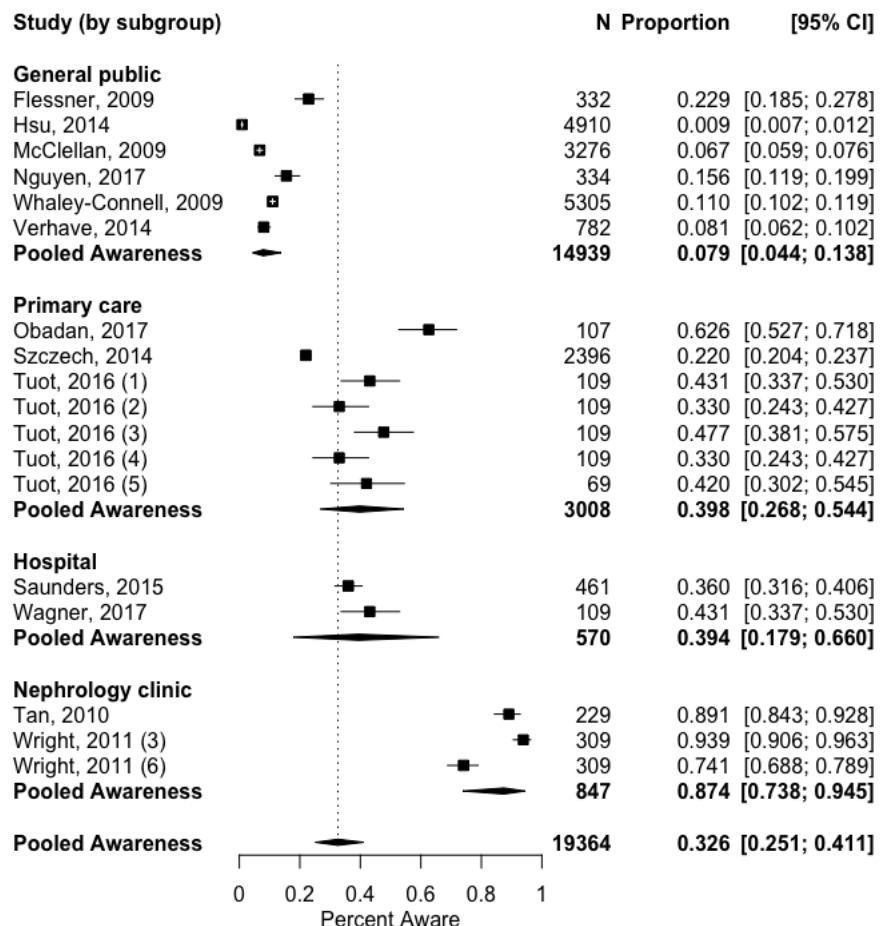
An individual study may be represented by more than one marker if it reported multiple estimates of awareness using different survey questions (numbered (1) weak or failing kidneys; (2) kidney disease; (3) kidney problem; (4) kidney damage; (5) protein in the urine; (6) chronic kidney disease).

**Figure S2: Meta-analysis of awareness prevalence of chronic kidney disease defined by eGFR <60 ml/min/1.73m<sup>2</sup>, by question wording**



Heterogeneity by wording subgroup: "kidney disease" ( $p < 0.001$ ;  $I^2 = 99.1\%$ ); "weak or failing kidneys" ( $p < 0.001$ ;  $I^2 = 99.3\%$ ); "kidney problem" ( $p < 0.001$ ;  $I^2 = 99.2\%$ ); "chronic kidney disease" ( $p < 0.001$ ;  $I^2 = 99.3\%$ ). An individual study may be represented by more than one marker if it reported multiple estimates of awareness using different survey questions.

**Figure S3: Meta-analysis of awareness prevalence of chronic kidney disease defined by eGFR <60 ml/min/1.73m<sup>2</sup>, by study setting**



Heterogeneity by setting subgroup: General public ( $p < 0.001$ ;  $I^2 = 98.6\%$ ); Primary care ( $p < 0.001$ ;  $I^2 = 99.3\%$ ); Hospital ( $p < 0.001$ ;  $I^2 = 99.3\%$ ); Nephrology clinic ( $p < 0.001$ ;  $I^2 = 98.8\%$ ). An individual study may be represented by more than one marker if it reported multiple estimates of awareness using different survey questions (numbered (1) weak or failing kidneys; (2) kidney disease; (3) kidney problem; (4) kidney damage; (5) protein in the urine; (6) chronic kidney disease).

## Item S1: Detailed Search Strategies

All databases except EMBASE:

((("patient attitudes" OR patient awareness OR "awareness of disease" OR "health literacy" OR "health knowledge" OR "self-care" OR comprehension OR "patient understanding" OR "patient knowledge") AND ("Renal Insufficiency, Chronic"[Mesh] OR "kidney disease" OR ckd OR "renal disease" OR "renal insufficiency" OR "kidney damage" OR "kidney problem" OR "kidney insufficiency" OR "renal dysfunction" OR "kidney dysfunction" OR "kidney problem" OR "weak kidneys" OR "failing kidneys") AND (survey OR questionnaire OR surveys OR questionnaires OR "medical history" OR "history taking" OR self-report))

EMBASE:

('patient awareness' OR 'awareness of disease' OR 'health literacy'/exp OR 'health literacy' OR 'health knowledge'/exp OR 'health knowledge' OR 'self care'/exp OR 'self care' OR 'comprehension'/exp OR comprehension OR 'patient understanding' OR 'patient knowledge'/exp OR 'patient knowledge') AND ('kidney disease'/exp OR 'kidney disease' OR ckd OR 'renal disease'/exp OR 'renal disease' OR 'renal insufficiency'/exp OR 'renal insufficiency' OR 'kidney damage'/exp OR 'kidney damage' OR 'kidney insufficiency'/exp OR 'kidney insufficiency' OR 'renal dysfunction'/exp OR 'renal dysfunction' OR 'kidney dysfunction'/exp OR 'kidney dysfunction' OR 'kidney problem' OR 'weak kidneys' OR 'failing kidneys') AND ('survey'/exp OR survey OR 'questionnaire'/exp OR questionnaire OR 'surveys'/exp OR surveys OR 'questionnaires'/exp OR questionnaires OR 'medical history'/exp OR 'medical history' OR 'history taking'/exp OR 'history taking' OR 'self report'/exp OR 'self report' OR (asking AND (working OR phrasing)))

**Table S1: Full Data Abstraction Table**

Authors	Country	Survey years	Study population	Question wording	Overall awareness	Overall CKD definition	Awareness by CKD G and A category	Characteristics associated with higher awareness
<sup>31</sup> Agrawal, V.; Jaar, B.G. et al, 2012	US	2000-2010	KEEP	Have you ever been told by a doctor or a health care professional that you have kidney disease? Have you ever been told by a doctor or a health care professional that you have protein or blood in your urine? Not explicitly indicated whether yes to one or either or both defined awareness	6611/27927 (23.7%)	All KDIGO CKD	G1/2: 2240/10082 (22.2%) G3: 3759/16684 (22.5%) G4/5: 612/1161 (52.7%)	Age <65, comorbid diabetes, hypertension, or cardiovascular disease
<sup>41</sup> Coresh, J.; Byrd-Holt, D. et al, 2005	US	1988-1994, 1999-2000	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	24% (n = 4101); 1999-2000	eGFR 15-59 with UACR >30mg/g	G1A1: 1.1% G1A2-3: 5.5% G2A1: 1.6% G2A2-3: 3.9% G3A1: 2.4% G3A2-3: 18.6% G3A1-3: 8% (n = 3.7% of 4101)	Lower eGFR, higher albuminuria, male sex
<sup>23</sup> Dharmarajan, S.H.; Bragg-Gresham, J.L. et al, 2017	US	2011-2012	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	9.1% (n = 5055 among whom 14.5% had CKD)	CKD defined as eGFR 15-59 or UACR >30.		Diabetes, hypertension
<sup>36</sup> Flessner, M.F.; Wyatt, S.B. et al, 2009	US	2000-2004	Jackson Heart Study	Have you ever been told by a doctor or health care professional that you have kidney disease?	107/685	All KDIGO CKD	G1: 4/148 G2: 15/186 G3: 51/291 G4/5: 27/41	More severe CKD
<sup>16</sup> Gaffney H.; Blakeman T. et al, 2014	UK	2012	Primary care patients with CKD G3	Please tell us if you have any of the following long-term medical conditions; "kidney problems" as an option If patient asked clarification: "Has your GP or other health professional told you that you have problems with your kidneys?"	209/436	CKD G3	G3a: 139/330 = 42% G3b: 70/106 = 66% No proteinuria: 179/388 = 46% Yes proteinuria: 30/48 = 63%	Female sex, more severe CKD, proteinuria, higher levels of general anxiety
<sup>40</sup> Hsu, C.; Hwang, S. et al, 2006	Taiwan	2001-2002	Taiwan National Health Interview Survey	Have you ever been told by a doctor or health care professional of weak or failing kidneys?	31/389	CKD G3	G3a: 18/305 (5.9%) G3b: 13/84 (15.5%)	More severe CKD, male sex, greater number of hospitalizations
<sup>28</sup> Hsu, Y.; Lee, P. et al, 2014	Taiwan	2002 or later	National survey	Do you have physician-diagnosed renal disease or renal failure?	0.9% (n = 4910)		G3: 0.9% G4-5: 9.6%	Male sex
<sup>37</sup> McClellan, W.M.; Newsome, B.B. et al, 2008	US	2003-2007	REGARDS	Has a doctor or other health professional ever told you that you had kidney disease?	220/3276 (6.7%)	eGFR <60	G3: 149/3039 (4.9%) G4/5: 71/237 (30.0%)	Lower eGFR, coronary heart disease
<sup>42</sup> Nickolas, T.L.; Frisch, G.D. et al, 2004	US	1999-2000	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	110/384 (pooled CKD)	Defined early CKD = eGFR ≥60 with UACR ≥300 (men) or ≥355 (women), or if	G1: 40.5% (n = 263) G2: 29.3% (n = 48) G3: 22% (n = 66) G4: 44.5% (n = 7) G5: 100% (n = 19) Early: 93/311	Younger age, female sex, non-Hispanic black race, hypertension, diabetes, cardiovascular disease, higher systolic blood pressure, higher UACR,

						diabetics, UACR $\geq$ 17 (men) or 25 (women); late CKD = eGFR <60 (MDRD). Pooled CKD = early + late.	Late: 17/73	higher creatinine. In multivariable analysis: female, non-Hispanic black race, hypertension.
<sup>14</sup> Nguyen H.A., Anderson C.A.M. et al, 2017	US	2011-2012	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	52/334	eGFR <60		
<sup>13</sup> Obadan N.O., Walker R.J. et al, 2017	US		Primary care patients with diabetes	Has a doctor, nurse, or other health professional ever told you that you have kidney disease? Do not include kidney stones, bladder infection or incontinence. Have you ever had kidney failure that required dialysis or a kidney transplant? (awareness defined as yes to either question)	67/107	eGFR <60		Non-Hispanic black race, having a college education, history of myocardial infarction, hypertension, having Medicare, VA insurance, or other insurance.
<sup>21</sup> Plantinga L.C.; Boulware L.E. et al, 2008	US	1999-2004	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	205/2992	CKD G1-4 by KDIGO	Overall: 205/2992 (6.0% weighted) G1: 24/675 (3.7%); G2 36/926 (3.5%); G3 111/1314 (7.8%); G4 34/77 (41.8%)	Non-Hispanic black or Mexican American, male sex, proteinuria, hypertension, diabetes, obesity, more advanced CKD
<sup>33</sup> Plantinga L.; Grubbs, V. et al, 2011	US	1999-2004	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	7.5% (n = 2461)	All KDIGO CKD	G1-2: 4.4% (n = 1137) G3-4: 10.2% (n = 1324)	
<sup>38</sup> Saab, G.; Whaley-Connell, A.T. et al, 2008	US	2000-2005	KEEP	Have you ever been told by a doctor or healthcare professional you have kidney disease (do not include kidney stones, bladder infections or incontinence)?	815/12907 (6.3%)	All KDIGO CKD	G1: 60/1377 (4.4%) G2: 105/2159 (4.9%) G3: 478/8866 (5.4%) G4: 137/427 (32.1%) G5: 35/78 (44.9%)	More recent years, more severe CKD
<sup>39</sup> Sarafidis, P.A.; Li, S. et al, 2008	US	2000-2005	KEEP	Have you ever been told by a doctor or healthcare professional you have kidney disease (do not include kidney stones, bladder infections or incontinence)?	705/10813	All KDIGO CKD		
<sup>15</sup> Saunders M.R.; Kim S.D. et al, 2015	US	2012-2013	Adults with CKD diagnosis code, discharged from hospital	Patient self-report of "kidney problems" within a list of chronic medical conditions	191/590	All KDIGO CKD	G1-2: 20/115 G3: 83/300 G4: 54/112 G5: 31/49	Younger age, more severe CKD, higher Mini-Mental State Exam score
<sup>43</sup> Shah, A.; Fried, L.F. et al, 2012	US	2000-2010	KEEP	Have you ever been told by a health care professional that you have kidney disease? Have you ever been told by a doctor or a health care professional that you have protein or blood in your urine?	6751/29144 (either question) 3022/28923 (yes to kidney disease)	All KDIGO CKD	Either question: G1: 965/4590 G2: 1275/5453 G3a: 2448/12941 G3b: 1415/4892 G4: 541/1105 G5: 107/163 "Kidney disease": G1: 234/4565 G2: 365/5402 G3a: 1021/12849 G3b: 862/4849	Diabetes, reported difficult access to care

							G4: 443/1096 G5: 97/162	
<sup>24</sup> Shirazian, S.; Diep, R. et al, 2016	US	2005-2010	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	6.4% (n = 2500)	eGFR 15-60 or UACR ≥30		Higher levels of depressive symptoms
<sup>25</sup> Szczzech, L.A.; Stewart, R.C. et al, 2014	US	2011-2012	Adults in primary care with type 2 diabetes ≥1 year	Have you ever been told by a doctor or other health care professional that you have a chronic kidney disease (a decreased GFR, or elevated serum creatinine, or weak and/or failing kidneys)?	607/5036 (12.1%)	All KDIGO CKD	G1: 11/1038 (1.1%) G2: 79/1602 (4.9%) G3: 389/2156 (18.0%) G4: 118/223 (52.9%) G5: 10/17 (58.8%)	Being correctly diagnosed with CKD by primary care providers
<sup>20</sup> Tan A.U.; Hoffman B. et al, 2010	US	2007-2008	CKD G3-4, seen in nephrology clinic	Do you have kidney disease (or have you ever had kidney disease)?	204/229	CKD G3-4		
<sup>34</sup> Tuot, D.S.; Plantinga, L.C. et al, 2011	US	1999-2008	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	9% (weighted; n = 1852)	eGFR 15-59		Albuminuria and hyperkalemia. Independent of GFR, only albuminuria was associated with increased awareness.
<sup>32</sup> Tuot, D.S.; Plantinga, L.C. et al, 2012	US	2003-2008	NHANES	Has a doctor, nurse, or other health professional ever told you have weak or failing kidneys? Do NOT include kidney stones, bladder infection, or incontinence.	191/2404 (weighted = 7.4%)	All KDIGO CKD		
<sup>8</sup> Tuot D.S.; Zhu Y. et al, 2016	US	2011-2014	Saw PCP at least once in the previous 2 years, and had CKD, hypertension, diabetes, or hyperlipidemia	Have you ever been told by a doctor or health care professional that you have (multiple choice): 'kidney damage', 'kidney problem', 'protein in the urine' (only among those w proteinuria), 'weak or failing kidneys' (NHANES), 'kidney disease'	0.332 (weak or failing kidneys) 0.277 (kidney disease) 0.401 (kidney problem) 0.264 (kidney damage) 0.398 (protein in the urine) N = 176 for all except n = 83 for "protein..."	eGFR <60 or proteinuria (≥1+ UA or >30mg/g), at least 3 months apart	G1-2: 0.192 (weak or failing kidneys) 0.173 (kidney disease) 0.250 (kidney problem) 0.135 (kidney damage) 0.308 (protein in the urine) G3-4: 0.431 (weak or failing kidneys) 0.333 (kidney disease) 0.482 (kidney problem) 0.330 (kidney damage) 0.417 (protein in the urine)	More severe CKD
<sup>27</sup> Verhave, J.C.; Troyanov, S. et al, 2014	Canada	2009-2010	Biobank (CARTaGENE) cohort of adults	Has a doctor ever told you that you had kidney disease, such as renal failure, renal infection, or kidney stones? What kind of kidney disease was it: renal failure, renal infection, kidney stones, or other? Do you or did you have dialysis treatment? Have you had a kidney transplant? CKD awareness included participants who acknowledged renal failure, dialysis, or transplant or mentioned a condition associated with CKD in the other category; excluding reported renal infections or stones.	8% (n = 782)	CKD defined as eGFR <60. No UACR or UPCR available.	CKD3a: 4% (n = 662) CKD3b: 22% (n = 103) CKD4: 9/12 (75%) CKD5: 5/5 (100%)	Younger age, male sex, self-reported hypertension, hyperlipidemia, diabetes
<sup>22</sup> Wagner, M.; Wanner, G.	Germany	2012-2013	EUROASPIRE IV survey, patients discharged	Have you ever been told by a doctor/health care provider that your kidney function is impaired, e.g. not as good as it would be expected?	54/158	All KDIGO CKD	G1A3 (0/1) G2A2-3 (7/47) G3a (33/83) G3b (7/18)	Lower eGFR, heart failure history, obesity, CKD mentioned in discharge letter

C. et al, 2017			from hospitalization for coronary heart disease				G4 (6/7) G5 (1/1)	
<sup>26</sup> Wang, F.; Zhang, L. et al, 2014	China		National survey	Have you ever been told by a doctor that you have kidney disease (excluding frank [sic] pain, or diagnosis of renal weakness by Chinese traditional medicine)?'	446/4443 (10.04%)	CKD defined as eGFR < 60 or UACR > 30	G1A2-3: 7.7% G2A2-3: 9.6% G3A1: 11.7% G3A2-3: 16.7% G4/5A1: 15.6% G4/5A2: 61.8%	More severe CKD, albuminuria, higher education, having free medical insurance, receiving a health examination during previous 2 years, family history of kidney disease, self-reported concern about kidney disease, hypertension
<sup>35</sup> Whaley-Connell, A.; Sowers, J.R. et al, 2009	US	2000-2007	KEEP	Have you ever been told by a doctor or healthcare professional you have kidney disease (do not include kidney stones, bladder infections or incontinence)?	736/7853 (9.4%)	All KDIGO CKD	G1-2: 154/2548 (6.0%) G3-5: 582/5305 (11.0%)	Self-reported cardiovascular disease, dyslipidemia, more severe CKD
<sup>30</sup> Whaley-Connell, A.; Shlipak, M.G. , 2012	US	2000-2009	KEEP	Have you ever been told by a doctor or healthcare professional you have kidney disease (do not include kidney stones, bladder infections or incontinence)?	2660/28244	UACR ≥30mg/g or eGFR <60 (MDRD)	G1: 4.9% G2: 6.4% G3: 9.2% G4/5: 43.6%	Lower GFR, albuminuria, diabetes, cardiovascular disease, cancer
<sup>18</sup> Wright Nunes J.A.; Wallston K.A. et al, 2011	US	2009	CKD G1-5, seen in nephrology clinic	Do you have a kidney problem? Do you have chronic kidney disease? (KIKS questionnaire)	373/399 (kidney problem) 277/399 (CKD)	All KDIGO CKD		More severe CKD
<sup>19</sup> Wright J.A.; Wallston K.A. et al, 2011	US	2009	CKD G1-5, seen in nephrology clinic	Do you have a kidney problem? Do you have chronic kidney disease? (KIKS questionnaire)	375/401 (kidney problem) 278/401 (CKD)	All KDIGO CKD	83/90 (kidney problem, CKD G1-2) 181/195 (kidney problem, CKD G3) 111/114 (kidney problem, CKD G4-5) 50/92 (CKD, CKD G1-2) 130/195 (CKD, CKD G3) 98/114 (CKD, CKD G4-5)	More severe CKD
<sup>28</sup> Wright-Nunes, J.A.; Luther, J.M. et al, 2012	US		CKD G1-5, seen in nephrology clinic	Do you have chronic kidney disease?	133/338	All KDIGO CKD		
<sup>17</sup> Wright Nunes J.; Greene J.H. et al, 2013	US	2009-2010	CKD G1-5, seen in nephrology clinic	Do you have a kidney problem? Do you have chronic kidney disease? (KIKS questionnaire)	375/401 (kidney problem) 278/401 (CKD)	All KDIGO CKD		



**Table S2: Risk of Bias Assessment**

Study	1. Was the sample frame appropriate to address the target population?	2. Were study participants sampled in an appropriate way?	3. Was the sample size adequate?	4. Were the study subjects and the setting described in detail?	5. Was the data analysis conducted with sufficient coverage of the identified sample?	6. Were valid methods used for the identification of the condition?	7. Was the condition measured in a standard, reliable way for all participants?	8. Was there appropriate statistical analysis?	9. Was the response rate adequate, and if not, was the low response rate managed appropriately?
Agrawal, 2012	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Coresh, 2005	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dharmarajan, 2017	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Flessner, M.F., 2009	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Gaffney, 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Hsu, C, 2006	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Hsu, Y, 2014	Yes	Unclear	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
McClellan, 2008	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nickolas, 2004	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Nguyen, 2017	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Obadan, 2017	Yes	No	Yes	No	No	Yes	Yes	Yes	Unclear
Plantinga, 2008	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Plantinga, 2011	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Saab, 2008	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Sarafidis, 2008	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Saunders, 2015	Yes	Yes	Yes	No	Unclear	Yes	Yes	Yes	Unclear
Shah, 2012	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Shirazian, 2016	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Szzech, 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tan, 2010	Yes	Unclear	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Tuot, 2011	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tuot, 2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tuot, 2016	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Verhave, 2014	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Wagner, 2017	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Wang, 2014	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Whaley-Connell, 2009	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Whaley-Connell, 2012	Yes	No	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Wright Nunes, 2011	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Wright, 2011	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Wright-Nunes, 2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Wright Nunes, 2013	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear

