Supplementary Table 1. AI model's performance relative to the gold standard in the initial image quality screening process.

		Standard		
		Qualified	Unqualified	Sum
Algorithm	Qualified	195	5	200
	Unqualified	0	200	200
	Sum	195	205	400

The concordance of each expert with the gold standard showed the following rates: 99.5% for Expert 1, 99.75% for Expert 2, and 99.75% for Expert 3. The kappa between the algorithm and gold standard was 0.975.

Supplementary Table 2. Multivariate logistic regression to analyze the demographic effects on the target variable CKD

Variable	Coefficient	Standard Error	z-Value	P-value	95% Confidence Interval
Intercept	-3.3439	0.044	-76.388	< 0.001*	(-3.430, -3.258)
C(Male)	0.4167	0.046	9.115	< 0.001*	(0.327, 0.506)
Age_z	0.225	0.026	8.547	< 0.001*	(0.173, 0.277)
Diabetes	0.3919	0.051	7.613	< 0.001*	(0.291, 0.493)
Hypertension	1.4287	0.053	27.063	< 0.001*	(1.325, 1.532)
Cerebrovascular Disease	0.4536	0.067	6.78	< 0.001*	(0.323, 0.585)
Coronary Heart Disease	-0.0784	0.072	-1.094	0.274	(-0.219, 0.062)
Dyslipidemia	-0.0111	0.056	-0.2	0.842	(-0.120, 0.098)

* indicates P < 0.05

The result showed that sex, age, diabetes, hypertension, and cerebrovascular disease have statistically significant associations with the prediction of CKD.

Supplementary Table 3. Stratified comparisons on various subgroups that might impact the overall model performance.

Subgroup	AUC	Delta	z	p
All	0.8603	/	/	/
Male	0.8523	0.0081	0.2766	0.7821
Female	0.8685	-0.0081	-0.2358	0.8136
Age < 30	0.9637	-0.1034	-1.8337	0.0667
Age >= 30	0.8288	0.0315	1.1866	0.2354
Age < 70	0.8606	-0.0003	-0.0108	0.9914
Age >= 70	0.8440	0.0163	0.3468	0.7288
Diabetes	0.7592	0.1011	3.0218	0.0025*
Without Diabetes	0.8853	-0.0249	-0.8400	0.4009
Hypertension	0.8362	0.0241	0.8077	0.4193
Without Hypertension	0.8063	0.0540	1.5411	0.1233
CVD	0.6876	0.1727	3.4315	0.0006*
Without CVD	0.8675	-0.0072	-0.2754	0.7830
CHD	0.8175	0.0428	0.6967	0.4860
Without CHD	0.8620	-0.0017	-0.0662	0.9472
Dyslipidemia	0.8587	0.0017	0.0449	0.9642
Without Dyslipidemia	0.8558	0.0046	0.1643	0.8695

AUC = Area under the receiver operating characteristic curve.

In the subgroup of diabetes and cerebrovascular disease, the model's AUC value showed a statistically significant difference ($P<0.05$) compared to the overall sample, suggesting that the two diseases may affect the model's predictive performance.

Supplementary table 4. The AUCs of UWF-CKDS trained with original unmatched dataset, age matched dataset, and PSM dataset.

	Internal test	Multi-center test
Unmatched dataset	0.86	0.81
Age Matched dataset	0.79	0.68
PSM dataset	0.81	0.70

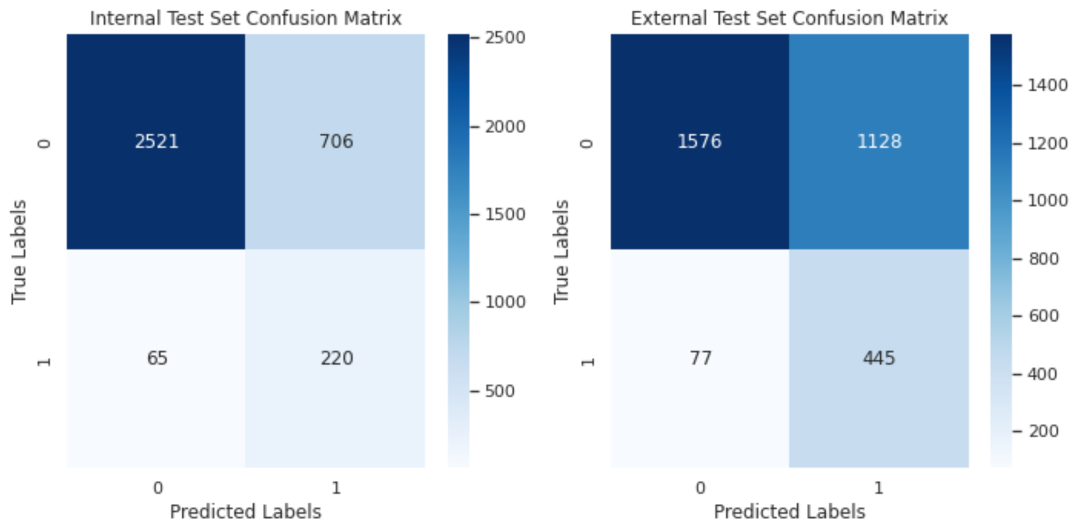
AUC = Area under the receiver operating characteristic curve. PSM = Propensity score matching.

Supplementary Table 5. Performance comparison between different AI algorithms for training UWF-CKDS.

Architectures	Internal precision	Internal recall	Internal F1	Internal AUC	Multi center precision	Multi center recall	Multi center F1	Multi center AUC
Efficientnet--B3	0.235	0.771	0.360	0.860	0.217	0.860	0.347	0.818
Resnet50	0.187	0.786	0.303	0.810	0.186	0.850	0.305	0.776
Vit	0.186	0.836	0.304	0.816	0.173	0.879	0.290	0.761

AUC = Area under the receiver operating characteristic curve.

Supplementary Figure 1. Confusion matrix for both the internal test set and external test set.



Based on the analysis of the confusion matrix, the classification model demonstrated a higher sensitivity and a relatively lower specificity. Given the objectives of early and large-scale screening and detection of CKD, reducing false negatives, sensitivity is deemed to be of greater importance than specificity within the context of our study.

Supplementary Note 1. List of 23 participated hospitals across China

1. Peking Union Medical College Hospital (PUMCH), Beijing
2. Beijing Tsinghua Changgung Hospital, Beijing
3. Beijing Tiantan Hospital, Beijing
4. Eye Hospital of Shandong First Medical University, Shandong Province
5. Tonghua Eye Hospital of Jilin Province, Jilin Province
6. Guangdong Provincial People's Hospital, Guangdong Province
7. Guizhou Provincial People's Hospital, Guizhou Province
8. Hunan Provincial People's Hospital, Hunan Province
9. The Fourth People's Hospital of Shenyang, Liaoning Province
10. The Affiliated Hospital of Chengde Medical University, Hebei Province
11. The Second Affiliated Hospital of Hebei North University, Hebei Province
12. Xi'an NO. 1 Hospital, Shanxi Province

13. The First Affiliated Hospital of Kunming Medical University, Yunnan Province
14. Renmin Hospital of Wuhan University, Hubei Province
15. The First Hospital of China Medical University, Liaoning Province
16. Bayinguoleng people's Hospital, Xinjiang Province
17. The Affiliated Hospital of Inner Mongolia Medical University, Inner Mongolia Autonomous Region
18. Hainan Hospital of PLA General Hospital, Hainan Province
19. The Second Affiliated Hospital of Harbin Medical University, Heilongjiang Province
20. The First Affiliated Hospital of Zhengzhou University, Henan Province
21. Fujian Medical University Union Hospital, Fujian Province
22. The First Affiliated Hospital of Shanxi Medical University, Shanxi Province
23. The Affiliated Hospital of Southwest Medical University, Sichuan Province