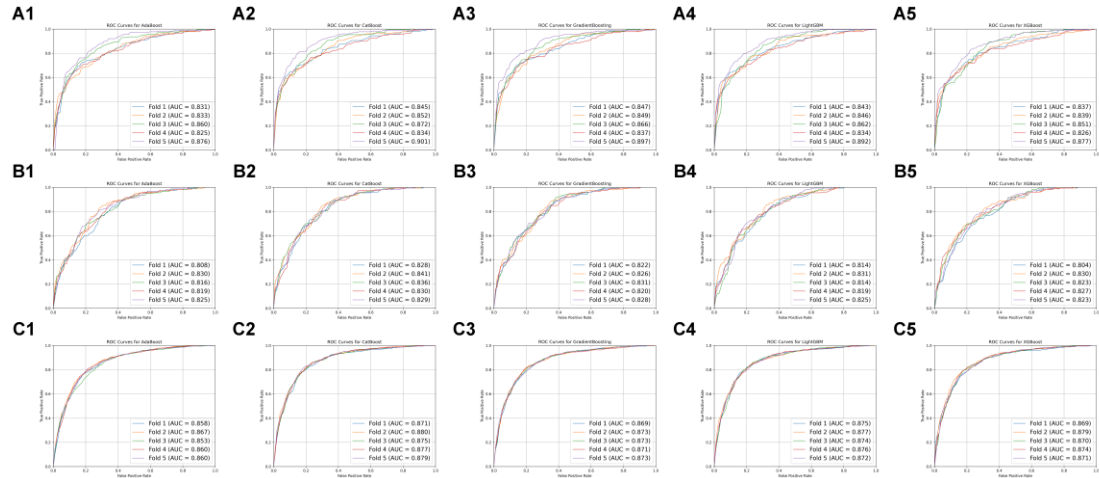
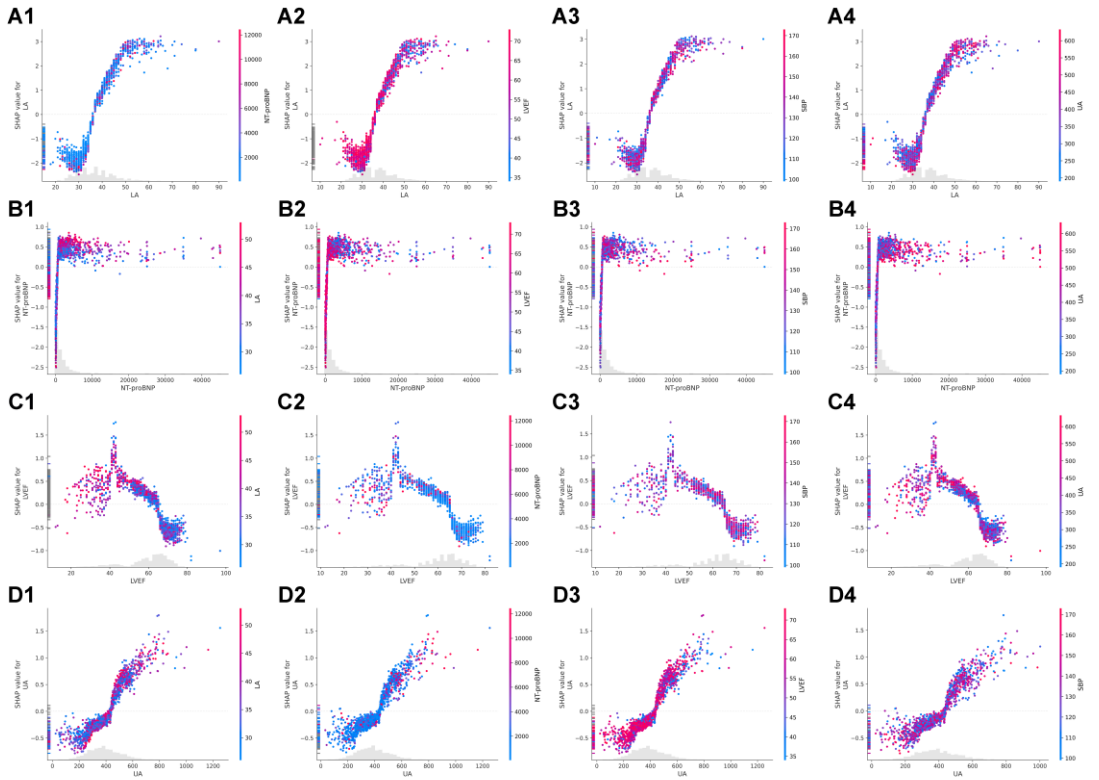


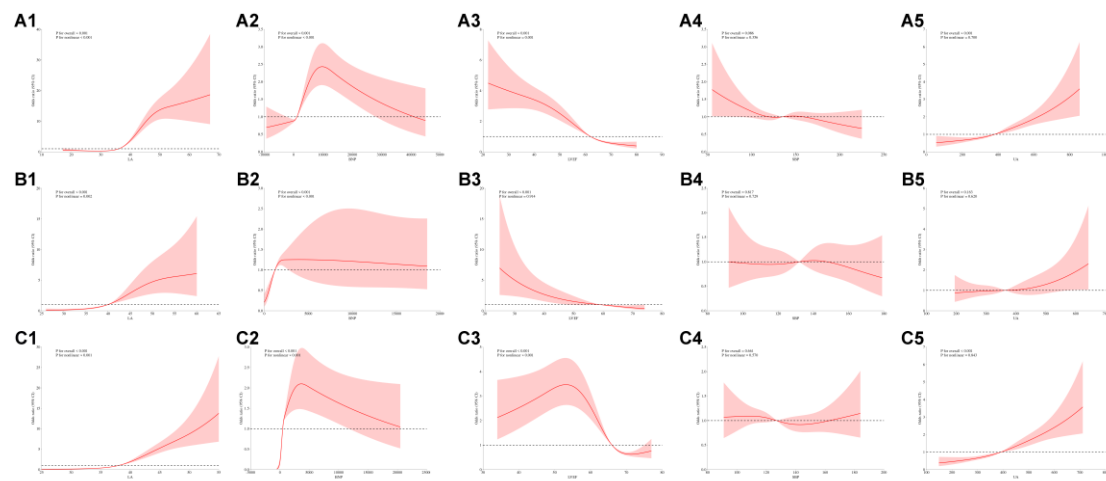
Supplementary Materials



Supplementary Figure 1. Five-fold cross validation and AUC results of every fold in three centers.

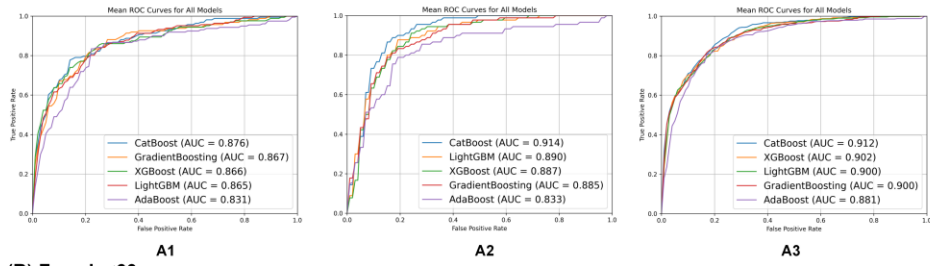


Supplementary Figure 2. Scatter plot of the correlation between the top five variables based on the SHAP method.

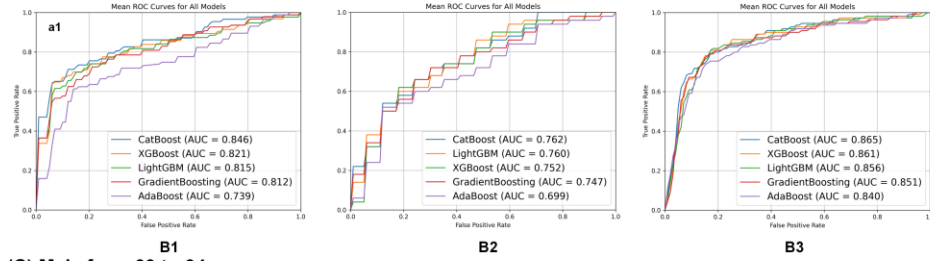


Supplementary Figure 3. Nonlinear associations between key variables and AF subtypes across centers.

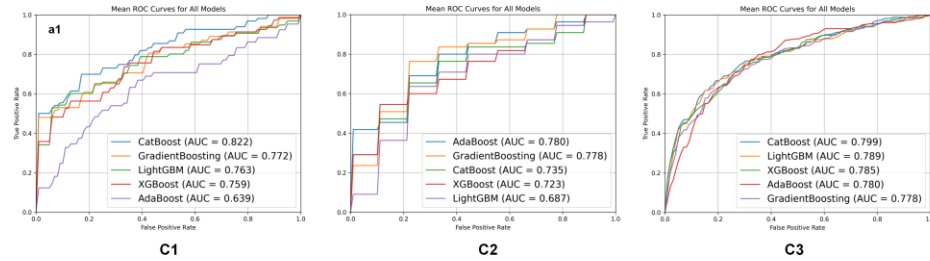
(A) Male<60



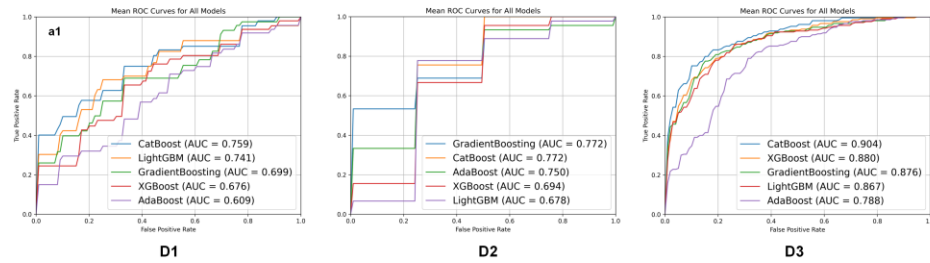
(B) Female<60



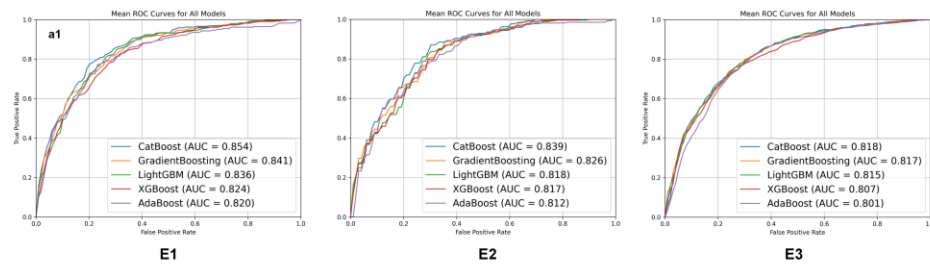
(C) Male from 60 to 64



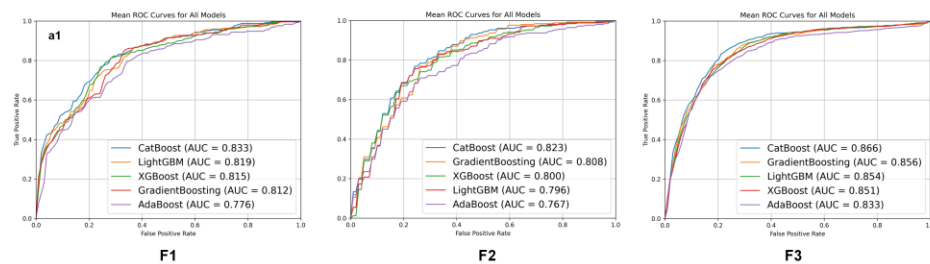
(D) Female from 60 to 64



(E) Male≥65

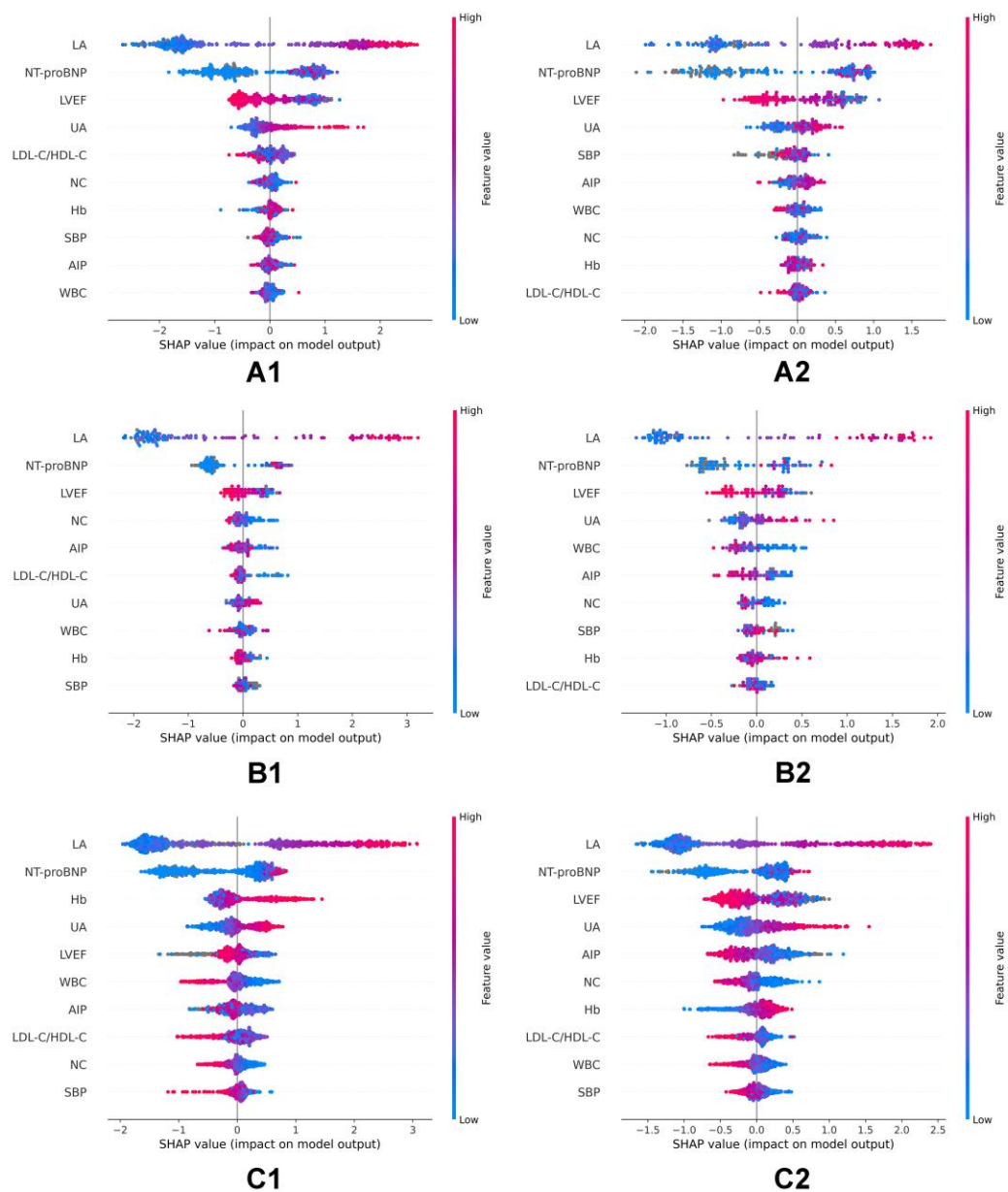


(F) Female≥65



Supplementary Figure 4. Model prediction performance by AUC in different age subgroups.

Figure 4 shows the AUC results in different age subgroups. The order of Figure 5A-5F are the male and female under 60 years old, aged 60 to 64 years old, and aged 65 and above. As for A-F, 1-3 are the results of DH, SSH, and SYSMH centers respectively.



Supplementary Figure 5. Interpretability of variables within different subgroups based on the SHAP method.

Supplementary Table 1. Recorded variables

Name of Variables			
Age	Anticoagulant	ApoE	hCRP
Gender	ACEI/ARB	WBC	SOD
Diagnose	beta-Blocker	NC	HbA1c
Height	Amiodarone	PLT	AOR
Weight	AIP	Hb	AAO
SBP	RC	AST	LA
DBP	LDL-C/HDL-C	ALT	RVDd
Smoking status	TC	eGFR	IVSd
Drinking status	TG	Cr	LVDd
HTN	HDL-C	UA	LVPWd
DM	LDL-C	CK	AV
Statins	ApoA1	CK-MB	LVEF
Antiplatelet	ApoB	NT-proBNP	Diagnose (paroxysmal or persistent AF)

Bolded variables are those that are ultimately included in the model. AAO, ascending aorta; ACEI/ARB, used ACEI/ARB drugs ever; AIP, atherogenic index of plasma; ALT, glutamic-pyruvic transaminase; Amiodarone, used amiodarone drugs ever; Anticoagulant, used anticoagulant drugs ever; Antiplatelet, used antiplatelet drugs ever; AOR, aortic root; ApoA1, apolipoprotein a1; ApoB, apolipoprotein b; ApoE, apolipoprotein e; AST, glutamic-oxalacetic transaminase; AF, atrial fibrillation; AV, aortic opening flow velocity; beta-Blocker, used beta-blocker drugs ever; CK, Creatine kinase; CK-MB, Creatine kinase-MB; Cr, Creatinine; DM, diabetes mellitus history; Drinking status, drinking alcohols ever; DBP, diastolic blood pressure; Diagnose, paroxysmal or persistent AF diagnose at discharge ; eGFR, estimated glomerular filtration rate; Hb, hemoglobin; HbA1c, hemoglobin A1c; hCRP, hypersensitive c-reactive protein; HDL-C, high density lipoprotein cholesterol; HTN, hypertension history; IVSd, Interventricular septum at end-diastole; LA, left atrial diameter; LDL-C, low density lipoprotein cholesterol; LVDd, left ventricular end-diastolic diameter; LVEF, left ventricular ejection fraction; LVPWd, left ventricular posterior wall diameter; NC, Neutrophil; NT-proBNP, N-terminal brain natriuretic peptide precursor; PLT, platelet; RC, remnant cholesterol; RVDd, Right ventricular end-diastolic; SBP, systolic blood pressure; Smoking status, smoking ever; SOD, Superoxide dismutase; Statins, used statins drugs ever; TC, total cholesterol; TG, triglyceride; UA, uric acid; WBC, white blood cell.

Supplementary Table 2. Results of model output indicators in subgroups in DH

Model	ACC	Precision	Recall	AUC	F1 Score	SEN	SPE
Male < 60							
CatBoost	0.814 (0.763-0.850)	0.775 (0.676-0.867)	0.751 (0.682-0.824)	0.876 (0.828-0.904)	0.760 (0.703-0.799)	0.751 (0.682-0.824)	0.856 (0.783-0.933)
GradientBoost	0.799 (0.774-0.824)	0.754 (0.688-0.828)	0.732 (0.650-0.821)	0.867 (0.829-0.916)	0.738 (0.722-0.758)	0.732 (0.650-0.821)	0.845 (0.788-0.913)
XGBoost	0.807 (0.765-0.835)	0.758 (0.704-0.863)	0.757 (0.682-0.859)	0.866 (0.816-0.892)	0.753 (0.733-0.775)	0.757 (0.682-0.859)	0.839 (0.781-0.931)
LightGBM	0.787 (0.753-0.811)	0.738 (0.669-0.831)	0.711 (0.623-0.799)	0.865 (0.827-0.890)	0.719 (0.651-0.746)	0.711 (0.623-0.799)	0.837 (0.782-0.913)
AdaBoost	0.787 (0.776-0.799)	0.723 (0.668-0.788)	0.741 (0.624-0.828)	0.831 (0.765-0.885)	0.728 (0.693-0.765)	0.741 (0.624-0.828)	0.815 (0.762-0.892)
Female < 60							
CatBoost	0.774 (0.708-0.815)	0.796 (0.680-0.883)	0.741 (0.671-0.853)	0.846 (0.785-0.892)	0.766 (0.690-0.842)	0.741 (0.671-0.853)	0.802 (0.703-0.879)
XGBoost	0.747 (0.703-0.789)	0.767 (0.669-0.856)	0.720 (0.649-0.813)	0.821 (0.777-0.859)	0.740 (0.669-0.800)	0.720 (0.649-0.813)	0.767 (0.670-0.888)
LightGBM	0.768 (0.705-0.836)	0.790 (0.679-0.855)	0.738 (0.571-0.863)	0.815 (0.745-0.863)	0.757 (0.669-0.854)	0.738 (0.571-0.863)	0.787 (0.670-0.890)
GradientBoost	0.752 (0.708-0.786)	0.768 (0.691-0.810)	0.731 (0.653-0.806)	0.812 (0.784-0.830)	0.748 (0.703-0.808)	0.731 (0.653-0.806)	0.766 (0.689-0.845)
AdaBoost	0.715 (0.678-0.760)	0.732 (0.652-0.797)	0.696 (0.488-0.806)	0.739 (0.608-0.796)	0.705 (0.598-0.787)	0.696 (0.488-0.806)	0.718 (0.608-0.881)
Male from 60 to 64							
CatBoost	0.702 (0.630-0.766)	0.711 (0.506-0.983)	0.549 (0.344-0.791)	0.822 (0.780-0.851)	0.572 (0.503-0.624)	0.549 (0.344-0.791)	0.829 (0.555-0.994)
GradientBoost	0.687 (0.600-0.773)	0.692 (0.465-1.000)	0.500 (0.340-0.703)	0.772 (0.701-0.810)	0.541 (0.412-0.621)	0.500 (0.340-0.703)	0.832 (0.603-1.000)
LightGBM	0.702 (0.604-0.773)	0.662 (0.506-0.855)	0.610 (0.355-0.881)	0.763 (0.651-0.831)	0.596 (0.484-0.690)	0.610 (0.355-0.881)	0.791 (0.603-0.935)
XGBoost	0.687 (0.630-0.766)	0.641 (0.536-0.838)	0.567 (0.367-0.791)	0.759 (0.643-0.817)	0.569 (0.478-0.624)	0.567 (0.367-0.791)	0.789 (0.555-0.912)
AdaBoost	0.620 (0.522-0.736)	0.568 (0.417-0.795)	0.576 (0.295-0.791)	0.639 (0.479-0.834)	0.523 (0.408-0.624)	0.576 (0.295-0.791)	0.688 (0.379-0.912)
Female from 60 to 64							
CatBoost	0.710 (0.555-0.850)	0.669 (0.448-0.878)	0.637 (0.431-0.808)	0.759 (0.558-0.961)	0.649 (0.438-0.840)	0.637 (0.431-0.868)	0.768 (0.669-0.893)
LightGBM	0.690 (0.505-0.895)	0.638 (0.356-0.888)	0.657 (0.431-0.897)	0.741 (0.576-0.952)	0.643 (0.390-0.892)	0.657 (0.431-0.897)	0.721 (0.551-0.893)
GradientBoost	0.690 (0.600-0.795)	0.626 (0.423-0.787)	0.626 (0.312-0.868)	0.699 (0.522-0.910)	0.619 (0.360-0.794)	0.626 (0.312-0.868)	0.731 (0.667-0.797)

XGBoost	0.690 (0.600-0.840)	0.634 (0.500-0.773)	0.630 (0.436-0.868)	0.676 (0.508-0.906)	0.629 (0.465-0.817)	0.630 (0.436-0.868)	0.727 (0.667-0.827)
AdaBoost	0.600 (0.500-0.740)	0.540 (0.230-0.829)	0.471 (0.165-0.735)	0.609 (0.496-0.766)	0.490 (0.194-0.695)	0.471 (0.165-0.735)	0.702 (0.517-0.885)

Male $\geq$ 65

CatBoost	0.792 (0.777-0.809)	0.724 (0.667-0.792)	0.692 (0.561-0.795)	0.854 (0.815-0.875)	0.705 (0.613-0.768)	0.692 (0.561-0.795)	0.846 (0.817-0.881)
GradientBoost	0.770 (0.754-0.794)	0.697 (0.621-0.787)	0.650 (0.541-0.769)	0.841 (0.791-0.877)	0.671 (0.578-0.752)	0.650 (0.541-0.769)	0.837 (0.808-0.878)
LightGBM	0.764 (0.737-0.782)	0.682 (0.590-0.762)	0.658 (0.524-0.728)	0.836 (0.793-0.865)	0.668 (0.557-0.712)	0.658 (0.524-0.728)	0.822 (0.787-0.856)
XGBoost	0.760 (0.718-0.794)	0.679 (0.555-0.776)	0.646 (0.505-0.744)	0.824 (0.768-0.859)	0.660 (0.531-0.726)	0.646 (0.505-0.704)	0.822 (0.767-0.874)
AdaBoost	0.765 (0.741-0.811)	0.685 (0.598-0.766)	0.649 (0.520-0.758)	0.820 (0.760-0.870)	0.666 (0.556-0.751)	0.649 (0.520-0.758)	0.828 (0.779-0.858)

Female $\geq$ 65

CatBoost	0.755 (0.718-0.774)	0.711 (0.667-0.761)	0.628 (0.536-0.690)	0.833 (0.781-0.865)	0.665 (0.601-0.713)	0.628 (0.536-0.690)	0.837 (0.804-0.882)
LightGBM	0.748 (0.728-0.760)	0.684 (0.684-0.703)	0.657 (0.628-0.687)	0.819 (0.790-0.831)	0.669 (0.654-0.680)	0.657 (0.628-0.687)	0.806 (0.783-0.835)
XGBoost	0.751 (0.727-0.779)	0.695 (0.649-0.724)	0.643 (0.593-0.701)	0.815 (0.776-0.829)	0.667 (0.626-0.701)	0.643 (0.593-0.701)	0.818 (0.770-0.860)
GradientBoost	0.721 (0.692-0.776)	0.660 (0.595-0.762)	0.602 (0.535-0.674)	0.812 (0.775-0.850)	0.627 (0.578-0.677)	0.602 (0.535-0.674)	0.799 (0.733-0.880)
AdaBoost	0.713 (0.688-0.736)	0.642 (0.610-0.665)	0.602 (0.517-0.658)	0.776 (0.729-0.831)	0.619 (0.570-0.645)	0.602 (0.517-0.658)	0.786 (0.754-0.812)

ACC, accuracy; AUC, area under curve; CI, confidence interval; SEN, sensitivity; SPE, specificity.

Supplementary Table 3. Results of model output indicators in subgroups in SSH

Model	ACC	Precision	Recall	AUC	F1 Score	SEN	SPE
Male < 60							
CatBoost	0.834 (0.817-0.846)	0.642 (0.610-0.665)	0.911 (0.889-0.944)	0.914 (0.902-0.924)	0.752 (0.740-0.772)	0.911 (0.889-0.944)	0.804 (0.770-0.828)
LightGBM	0.806 (0.769-0.845)	0.606 (0.552-0.664)	0.878 (0.839-0.889)	0.890 (0.870-0.905)	0.716 (0.668-0.760)	0.878 (0.839-0.889)	0.779 (0.726-0.828)
XGBoost	0.794 (0.771-0.815)	0.583 (0.550-0.615)	0.911 (0.889-0.944)	0.887 (0.855-0.925)	0.710 (0.694-0.742)	0.911 (0.889-0.944)	0.749 (0.704-0.787)
GradientBoost	0.785 (0.714-0.829)	0.582 (0.492-0.638)	0.844 (0.778-0.889)	0.885 (0.846-0.921)	0.687 (0.630-0.742)	0.844 (0.778-0.889)	0.762 (0.651-0.809)
AdaBoost	0.769 (0.694-0.829)	0.565 (0.470-0.649)	0.800 (0.683-0.833)	0.833 (0.717-0.879)	0.660 (0.562-0.630)	0.800 (0.683-0.833)	0.757 (0.647-0.828)
Female < 60							
CatBoost	0.652 (0.596-0.704)	0.522 (0.470-0.571)	0.780 (0.710-0.800)	0.762 (0.715-0.794)	0.625 (0.566-0.667)	0.780 (0.710-0.800)	0.576 (0.529-0.647)
LightGBM	0.644 (0.630-0.696)	0.514 (0.500-0.564)	0.760 (0.700-0.800)	0.760 (0.742-0.791)	0.613 (0.583-0.662)	0.760 (0.700-0.800)	0.576 (0.529-0.641)
XGBoost	0.637 (0.593-0.733)	0.511 (0.467-0.607)	0.760 (0.700-0.800)	0.752 (0.725-0.786)	0.610 (0.560-0.690)	0.760 (0.700-0.800)	0.565 (0.476-0.694)
GradientBoost	0.637 (0.596-0.667)	0.507 (0.470-0.533)	0.780 (0.710-0.800)	0.747 (0.658-0.788)	0.614 (0.566-0.640)	0.780 (0.710-0.800)	0.553 (0.529-0.588)
AdaBoost	0.585 (0.519-0.663)	0.457 (0.386-0.530)	0.680 (0.510-0.800)	0.699 (0.595-0.758)	0.546 (0.439-0.638)	0.680 (0.510-0.800)	0.529 (0.476-0.582)
Male from 60 to 64							
AdaBoost	0.720 (0.565-0.845)	0.712 (0.584-0.827)	0.836 (0.736-0.909)	0.780 (0.664-0.921)	0.769 (0.651-0.866)	0.836 (0.736-0.909)	0.578 (0.356-0.767)
GradientBoost	0.740 (0.655-0.845)	0.762 (0.703-0.828)	0.764 (0.634-0.909)	0.778 (0.666-0.866)	0.759 (0.670-0.866)	0.764 (0.636-0.909)	0.711 (0.667-0.778)
CatBoost	0.740 (0.655-0.800)	0.756 (0.693-0.818)	0.782 (0.655-0.818)	0.735 (0.670-0.787)	0.767 (0.675-0.818)	0.782 (0.655-0.818)	0.689 (0.567-0.778)
XGBoost	0.650 (0.600-0.740)	0.663 (0.645-0.742)	0.745 (0.727-0.809)	0.723 (0.649-0.828)	0.701 (0.667-0.774)	0.745 (0.727-0.809)	0.533 (0.444-0.656)
LightGBM	0.660 (0.560-0.745)	0.669 (0.581-0.744)	0.764 (0.727-0.818)	0.687 (0.594-0.782)	0.713 (0.646-0.779)	0.764 (0.727-0.818)	0.533 (0.356-0.656)
Female from 60 to 64							
GradientBoost	0.692 (0.615-0.769)	0.791 (0.750-0.851)	0.756 (0.667-0.889)	0.772 (0.650-0.883)	0.769 (0.706-0.842)	0.756 (0.677-0.889)	0.550 (0.500-0.725)
CatBoost	0.723 (0.692-0.769)	0.817 (0.778-0.875)	0.778 (0.778-0.778)	0.772 (0.675-0.856)	0.796 (0.778-0.824)	0.778 (0.778-0.778)	0.600 (0.500-0.750)
AdaBoost	0.708 (0.623-0.769)	0.813 (0.755-0.857)	0.756 (0.667-0.889)	0.750 (0.672-0.875)	0.778 (0.710-0.842)	0.756 (0.667-0.889)	0.600 (0.500-0.750)

XGBoost	0.738 (0.623-0.846)	0.792 (0.730-0.882)	0.844 (0.678-0.989)	0.694 (0.567-0.800)	0.815 (0.713-0.899)	0.844 (0.678-0.989)	0.500 (0.275-0.725)
LightGBM	0.738 (0.623-0.838)	0.804 (0.753-0.869)	0.822 (0.678-0.989)	0.678 (0.567-0.747)	0.810 (0.713-0.894)	0.822 (0.678-0.989)	0.550 (0.500-0.725)
Male $\geq$ 65							
CatBoost	0.762 (0.751-0.774)	0.702 (0.694-0.713)	0.819 (0.798-0.833)	0.839 (0.830-0.847)	0.756 (0.742-0.769)	0.819 (0.798-0.833)	0.715 (0.712-0.726)
GradientBoost	0.743 (0.727-0.750)	0.689 (0.679-0.695)	0.781 (0.743-0.813)	0.826 (0.817-0.845)	0.732 (0.710-0.745)	0.781 (0.743-0.813)	0.712 (0.698-0.726)
LightGBM	0.753 (0.733-0.796)	0.704 (0.683-0.753)	0.781 (0.743-0.783)	0.818 (0.794-0.859)	0.740 (0.715-0.782)	0.781 (0.743-0.813)	0.730 (0.698-0.782)
XGBoost	0.730 (0.718-0.748)	0.677 (0.611-0.699)	0.767 (0.709-0.796)	0.817 (0.795-0.837)	0.718 (0.698-0.736)	0.767 (0.709-0.796)	0.700 (0.668-0.741)
AdaBoost	0.745 (0.727-0.772)	0.689 (0.663-0.733)	0.793 (0.761-0.830)	0.812 (0.795-0.829)	0.737 (0.723-0.755)	0.793 (0.761-0.830)	0.706 (0.667-0.768)
Female $\geq$ 65							
CatBoost	0.757 (0.743-0.773)	0.762 (0.750-0.786)	0.812 (0.769-0.841)	0.823 (0.811-0.836)	0.785 (0.767-0.796)	0.812 (0.769-0.841)	0.690 (0.667-0.736)
GradientBoost	0.755 (0.702-0.795)	0.755 (0.711-0.785)	0.820 (0.769-0.861)	0.808 (0.788-0.830)	0.786 (0.739-0.821)	0.820 (0.769-0.861)	0.676 (0.619-0.714)
XGBoost	0.738 (0.702-0.753)	0.745 (0.717-0.778)	0.796 (0.747-0.841)	0.800 (0.780-0.821)	0.769 (0.735-0.785)	0.796 (0.747-0.841)	0.667 (0.600-0.733)
LightGBM	0.731 (0.683-0.753)	0.743 (0.689-0.788)	0.784 (0.747-0.822)	0.796 (0.770-0.826)	0.762 (0.726-0.781)	0.784 (0.747-0.822)	0.667 (0.579-0.755)
AdaBoost	0.705 (0.649-0.731)	0.736 (0.678-0.792)	0.725 (0.686-0.798)	0.767 (0.746-0.784)	0.730 (0.683-0.765)	0.725 (0.686-0.798)	0.681 (0.600-0.779)

ACC, accuracy; AUC, area under curve; CI, confidence interval; SEN, sensitivity; SPE, specificity.

Supplementary Table 4. Results of model output indicators in subgroups in SYSMH

Model	ACC	Precision	Recall	AUC	F1 Score	SEN	SPE
Male < 60							
CatBoost	0.829 (0.822-0.838)	0.745 (0.726-0.766)	0.773 (0.727-0.819)	0.912 (0.908-0.918)	0.758 (0.746-0.778)	0.773 (0.727-0.819)	0.859 (0.844-0.882)
XGBoost	0.825 (0.811-0.842)	0.741 (0.698-0.798)	0.768 (0.717-0.820)	0.902 (0.894-0.910)	0.753 (0.738-0.769)	0.768 (0.717-0.820)	0.855 (0.812-0.903)
LightGBM	0.815 (0.803-0.824)	0.737 (0.698-0.777)	0.728 (0.655-0.788)	0.900 (0.888-0.910)	0.731 (0.699-0.754)	0.728 (0.655-0.788)	0.860 (0.819-0.898)
GradientBoosting	0.828 (0.821-0.835)	0.749 (0.719-0.793)	0.762 (0.706-0.809)	0.900 (0.891-0.911)	0.754 (0.736-0.769)	0.762 (0.706-0.809)	0.863 (0.834-0.902)
AdaBoost	0.823 (0.814-0.835)	0.718 (0.687-0.734)	0.808 (0.731-0.863)	0.881 (0.873-0.894)	0.759 (0.732-0.783)	0.808 (0.731-0.863)	0.830 (0.791-0.859)
Female < 60							
CatBoost	0.774 (0.708-0.815)	0.607 (0.539-0.665)	0.718 (0.682-0.768)	0.846 (0.785-0.892)	0.766 (0.690-0.842)	0.741 (0.671-0.853)	0.802 (0.703-0.879)
XGBoost	0.747 (0.703-0.789)	0.556 (0.530-0.583)	0.745 (0.645-0.818)	0.821 (0.777-0.859)	0.740 (0.669-0.800)	0.720 (0.649-0.813)	0.767 (0.670-0.888)
LightGBM	0.768 (0.705-0.836)	0.542 (0.504-0.564)	0.727 (0.600-0.859)	0.815 (0.745-0.863)	0.757 (0.669-0.854)	0.738 (0.571-0.863)	0.787 (0.670-0.890)
GradientBoosting	0.752 (0.708-0.786)	0.586 (0.522-0.624)	0.745 (0.686-0.814)	0.812 (0.784-0.830)	0.748 (0.703-0.808)	0.731 (0.653-0.806)	0.766 (0.689-0.845)
AdaBoost	0.715 (0.678-0.760)	0.530 (0.475-0.588)	0.727 (0.645-0.773)	0.739 (0.608-0.796)	0.705 (0.598-0.787)	0.696 (0.488-0.806)	0.718 (0.608-0.881)
Male from 60 to 64							
CatBoost	0.741 (0.718-0.763)	0.747 (0.679-0.821)	0.621 (0.576-0.665)	0.799 (0.782-0.840)	0.675 (0.661-0.697)	0.621 (0.576-0.665)	0.833 (0.759-0.903)
LightGBM	0.738 (0.688-0.782)	0.737 (0.682-0.808)	0.618 (0.526-0.652)	0.789 (0.751-0.839)	0.672 (0.594-0.721)	0.618 (0.526-0.652)	0.830 (0.792-0.881)
XGBoost	0.726 (0.697-0.772)	0.706 (0.662-0.771)	0.636 (0.608-0.679)	0.785 (0.745-0.829)	0.669 (0.635-0.720)	0.636 (0.608-0.679)	0.795 (0.757-0.847)
AdaBoost	0.725 (0.680-0.774)	0.722 (0.631-0.807)	0.615 (0.533-0.705)	0.780 (0.737-0.841)	0.660 (0.606-0.710)	0.615 (0.533-0.705)	0.809 (0.712-0.894)
GradientBoosting	0.717 (0.698-0.753)	0.730 (0.672-0.816)	0.564 (0.517-0.618)	0.778 (0.747-0.833)	0.634 (0.604-0.665)	0.564 (0.517-0.618)	0.835 (0.769-0.903)
Female from 60 to 64							
CatBoost	0.826 (0.794-0.867)	0.769 (0.688-0.813)	0.752 (0.626-0.831)	0.904 (0.876-0.917)	0.756 (0.698-0.819)	0.752 (0.626-0.831)	0.868 (0.791-0.905)
XGBoost	0.802 (0.763-0.826)	0.715 (0.642-0.749)	0.762 (0.693-0.810)	0.880 (0.871-0.897)	0.736 (0.704-0.771)	0.762 (0.693-0.810)	0.824 (0.750-0.865)
GradientBoosting	0.812 (0.771-0.835)	0.744 (0.652-0.802)	0.748 (0.690-0.807)	0.876 (0.861-0.899)	0.743 (0.716-0.775)	0.748 (0.690-0.807)	0.849 (0.755-0.901)

LightGBM	0.798 (0.785-0.809)	0.723 (0.692-0.757)	0.729 (0.600-0.852)	0.867 (0.845-0.889)	0.720 (0.669-0.764)	0.729 (0.600-0.852)	0.838 (0.785-0.891)
AdaBoost	0.729 (0.698-0.802)	0.613 (0.560-0.736)	0.738 (0.650-0.807)	0.788 (0.747-0.866)	0.665 (0.629-0.726)	0.738 (0.650-0.807)	0.724 (0.650-0.855)
Male $\geq$ 65							
CatBoost	0.742 (0.737-0.750)	0.642 (0.631-0.653)	0.777 (0.764-0.805)	0.818 (0.809-0.823)	0.703 (0.697-0.710)	0.777 (0.764-0.805)	0.720 (0.696-0.735)
GradientBoosting	0.741 (0.724-0.764)	0.639 (0.620-0.664)	0.781 (0.755-0.812)	0.817 (0.806-0.828)	0.703 (0.686-0.729)	0.781 (0.755-0.812)	0.715 (0.696-0.737)
LightGBM	0.740 (0.714-0.756)	0.641 (0.614-0.664)	0.768 (0.728-0.798)	0.815 (0.803-0.829)	0.699 (0.667-0.715)	0.768 (0.728-0.798)	0.721 (0.692-0.750)
XGBoost	0.732 (0.720-0.746)	0.631 (0.618-0.641)	0.767 (0.744-0.805)	0.807 (0.794-0.819)	0.692 (0.677-0.713)	0.767 (0.744-0.805)	0.710 (0.701-0.725)
AdaBoost	0.730 (0.722-0.738)	0.626 (0.617-0.634)	0.771 (0.746-0.792)	0.801 (0.791-0.807)	0.691 (0.683-0.704)	0.771 (0.746-0.792)	0.703 (0.692-0.718)
Female $\geq$ 65							
CatBoost	0.803 (0.790-0.811)	0.691 (0.671-0.712)	0.803 (0.777-0.828)	0.866 (0.863-0.872)	0.743 (0.725-0.754)	0.803 (0.777-0.828)	0.803 (0.782-0.825)
GradientBoosting	0.780 (0.764-0.788)	0.656 (0.630-0.672)	0.803 (0.772-0.822)	0.856 (0.843-0.867)	0.722 (0.708-0.732)	0.803 (0.772-0.822)	0.768 (0.739-0.793)
LightGBM	0.778 (0.761-0.794)	0.652 (0.628-0.666)	0.801 (0.757-0.848)	0.854 (0.842-0.870)	0.719 (0.701-0.744)	0.801 (0.757-0.848)	0.765 (0.739-0.783)
XGBoost	0.778 (0.764-0.792)	0.651 (0.628-0.668)	0.807 (0.779-0.822)	0.851 (0.840-0.869)	0.720 (0.709-0.736)	0.807 (0.779-0.822)	0.762 (0.735-0.786)
AdaBoost	0.769 (0.757-0.776)	0.643 (0.623-0.656)	0.784 (0.758-0.803)	0.833 (0.827-0.838)	0.706 (0.696-0.717)	0.784 (0.758-0.803)	0.760 (0.738-0.782)

ACC, accuracy; AUC, area under curve; CI, confidence interval; SEN, sensitivity; SPE, specificity.

Supplementary Table 5. Comparison of CatBoost with other models

Model	ACC	Precision	Recall	AUC	F1 Score	SEN	SPE
DH							
CatBoost	0.789 (0.766-0.825)	0.755 (0.700-0.812)	0.694 (0.656-0.727)	0.861 (0.835-0.898)	0.722 (0.701-0.764)	0.694 (0.656-0.727)	0.852 (0.798-0.892)
LogisticRegres sion	0.766 (0.744-0.796)	0.744 (0.706-0.790)	0.624 (0.560-0.676)	0.814 (0.785-0.852)	0.678 (0.636-0.717)	0.624 (0.560-0.676)	0.860 (0.827-0.888)
DecisionTree	0.725 (0.725-0.731)	0.647 (0.634-0.658)	0.665 (0.627-0.695)	0.714 (0.697-0.724)	0.656 (0.636-0.670)	0.665 (0.627-0.695)	0.763 (0.754-0.769)
SSH							
CatBoost	0.748 (0.735-0.762)	0.681 (0.669-0.690)	0.834 (0.817-0.867)	0.833 (0.828-0.840)	0.750 (0.736-0.767)	0.834 (0.817-0.867)	0.677 (0.665-0.696)
LogisticRegres sion	0.761 (0.754-0.769)	0.712 (0.706-0.716)	0.792 (0.767-0.816)	0.819 (0.815-0.825)	0.750 (0.739-0.761)	0.792 (0.767-0.816)	0.735 (0.730-0.745)
DecisionTree	0.698 (0.654-0.734)	0.642 (0.599-0.683)	0.752 (0.715-0.783)	0.702 (0.660-0.737)	0.693 (0.652-0.725)	0.752 (0.715-0.783)	0.653 (0.603-0.705)
SYSMH							
CatBoost	0.808 (0.803-0.816)	0.707 (0.698-0.719)	0.802 (0.788-0.812)	0.876 (0.871-0.880)	0.752 (0.747-0.761)	0.802 (0.788-0.812)	0.811 (0.802-0.820)
LogisticRegres sion	0.763 (0.756-0.767)	0.689 (0.676-0.705)	0.631 (0.595-0.662)	0.812 (0.809-0.815)	0.659 (0.639-0.669)	0.631 (0.595-0.662)	0.838 (0.820-0.855)
DecisionTree	0.736 (0.731-0.740)	0.616 (0.609-0.622)	0.720 (0.658-0.753)	0.732 (0.715-0.741)	0.664 (0.639-0.675)	0.720 (0.658-0.753)	0.744 (0.725-0.773)

DH, Donghua Hospital of Sun Yat-sen University; SYSMH, Sun Yat-sen Memorial Hospital of Sun Yat-sen University; SSH, Dongguan Songshan Lake Donghua Hospital; ACC, accuracy; AUC, area under curve; CI, confidence interval; SEN, sensitivity; SPE, specificity.