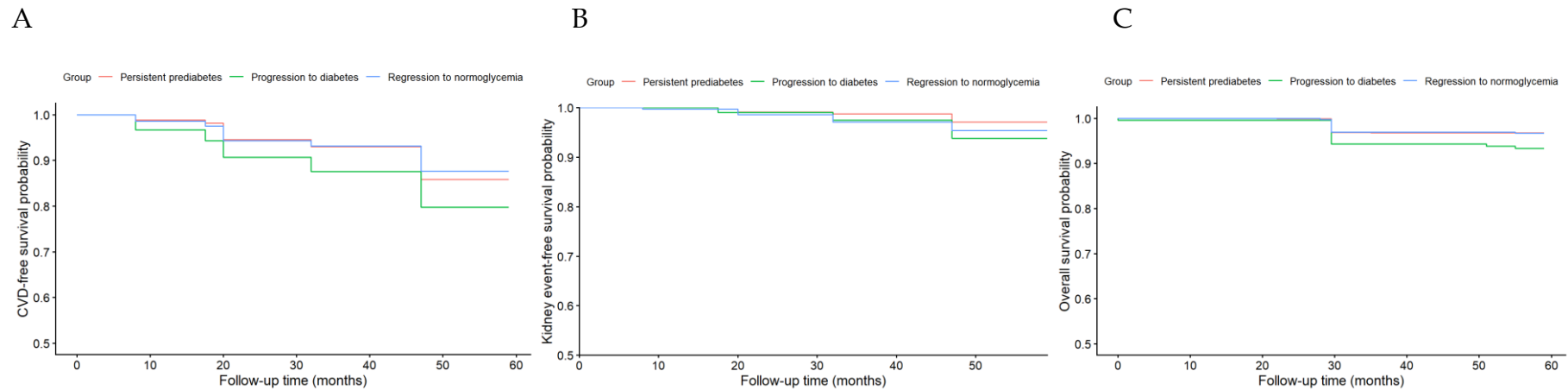




Supplementary Figure 1 Survival curves for cardiovascular disease, kidney disease, and all-cause mortality during the 2015-2020 follow-up, stratified by prediabetes transition groups. A: Cardiovascular disease; B: Kidney disease; C: All-cause mortality.

Supplementary Table 1 Proportions of regression to normoglycemia, persistent prediabetes, and progression to diabetes during a median follow-up of 4 years in various subgroups

Subgroups	<i>n</i>	Regression	Persistence	Progression
Age				
< 60	1375	24.1% (21.8-26.3)	62.0% (59.5-64.6)	13.9% (12.1-15.7)
≥ 60	1086	18.3% (16.0-20.6)	64.9% (62.1-67.8)	16.8% (14.5-19.0)

Gender				
Female	1328	18.6% (16.5-20.7)	64.2% (61.7-66.8)	17.2% (15.1-19.2)
Male	1133	25.0% (22.5-27.5)	62.2% (59.4-65.0)	12.8% (10.9-14.7)
Education level				
High school or higher	217	27.6% (21.7-33.6)	59.4% (52.9-66.0)	12.9% (8.4-17.4)
Lower high school	2244	20.9% (19.3-22.6)	63.7% (61.7-65.7)	15.4% (13.9-16.9)
Marriage status				
Married	2080	22.0% (20.2-23.8)	63.3% (61.2-65.4)	14.7% (13.2-16.2)
Others	381	19.2% (15.2-23.1)	63.3% (58.4-68.1)	17.6% (13.8-21.4)
Total household income (CNY)				
< 10000	777	22.0% (19.1-24.9)	61.5% (58.1-64.9)	16.5% (13.9-19.1)
≥ 10000	768	21.0% (18.1-23.8)	63.4% (60.0-66.8)	15.6% (13.1-18.2)
Health insurance				
No	114	28.1% (19.8-36.3)	60.5% (51.6-69.5)	11.4% (5.6-17.2)
Yes	2339	21.2% (19.6-22.9)	63.4% (61.5-65.4)	15.3% (13.9-16.8)
Smoking status				
Current smoker	678	22.4% (19.3-25.6)	63.7% (60.1-67.3)	13.9% (11.3-16.5)
Others	1754	21.4% (19.5-23.3)	63.1% (60.9-65.4)	15.5% (13.8-17.2)

Drinking status				
Current alcohol drinker	454	23.3% (19.5-27.2)	64.1% (59.7-68.5)	12.6% (9.5-15.6)
Others	2006	21.1% (19.3-22.9)	63.2% (61.0-65.3)	15.7% (14.1-17.3)
Physical activity				
Active	958	20.7% (18.1-23.2)	65.1% (62.1-68.2)	14.2% (12.0-16.4)
Others	1503	22.1% (20.0-24.2)	62.1% (59.7-64.6)	15.8% (13.9-17.6)
Hypertension				
No	1742	21.8% (19.9-23.8)	65.7% (63.5-68.0)	12.5% (10.9-14.0)
Yes	712	20.6% (17.7-23.6)	57.4% (53.8-61.1)	21.9% (18.9-24.9)
Cardiovascular disease				
No	2085	21.9% (20.1-23.7)	64.2% (62.2-66.3)	13.9% (12.4-15.3)
Yes	365	19.7% (15.6-23.8)	57.5% (52.5-62.6)	22.7% (18.4-27.0)
Dyslipidemia				
No	2150	22.0% (20.3-23.8)	64.2% (62.2-66.2)	13.8% (12.3-15.2)
Yes	270	17.8% (13.2-22.3)	55.6% (49.6-61.5)	26.7% (21.4-31.9)
Comorbidity				
0	1588	20.8% (18.8-22.8)	65.1% (62.7-67.4)	14.2% (12.5-15.9)
≥ 1	873	22.9% (20.1-25.7)	60.1% (56.9-63.4)	17.0% (14.5-19.4)

Body mass index(kg/m ²)				
< 24	1206	24.6% (22.2-27.1)	64.2% (61.5-66.9)	11.2% (9.4-13.0)
≥ 24	947	18.5% (16.0-21.0)	60.6% (57.5-63.7)	20.9% (18.3-23.5)
General health				
Poor/very poor	647	21.3% (18.2-24.5)	60.4% (56.7-64.2)	18.2% (15.3-21.2)
Very good/good/fair	1811	21.6% (19.7-23.5)	64.3% (62.1-66.5)	14.0% (12.4-15.6)
Baseline FPG category				
5.6-6.0 mmol/L	1310	25.8% (23.4-28.2)	63.6% (61.0-66.2)	10.6% (8.9-12.3)
6.1-6.9 mmol/L	1067	17.1% (14.8-19.3)	62.3% (59.4-65.2)	20.6% (18.2-23.0)
Baseline HbA1c category				
5.7%-5.9%	92	9.8% (3.7-15.9)	63.0% (53.2-72.9)	27.2% (18.1-36.3)
6.0%-6.4%	171	4.7% (1.5-7.8)	63.7% (56.5-70.9)	31.6% (24.6-38.5)

FPG: Fasting plasma glucose; HbA1c: Glycated hemoglobin; CNY: Chinese Yuan.

Supplementary Table 2 Comparison of baseline characteristics between included and excluded participants with prediabetes, *n* (%)

Characteristics	Included participants with prediabetes	Excluded participants with prediabetes	<i>P</i> value included <i>vs</i> excluded
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Number of participants	2461	1867	
Baseline FPG (mmol/L), mean (SD)	6.0 (0.4)	6.0 (0.4)	0.023
Baseline HbA1c (%), mean (SD)	5.2 (0.4)	5.2 (0.4)	0.392
Age (years), mean (SD)	59.0 (8.6)	59.6 (10.1)	0.022
Age category			
45-59 years	1375 (55.9)	1037 (55.5)	0.854
≥ 60 years	1086 (44.1)	830 (44.5)	
Male	1133 (46.0)	917 (49.1)	0.048
Married	2080 (84.5)	1492 (79.9)	< 0.001
Education level: high school or above	217 (8.8)	235 (12.6)	< 0.001
Total household income (CNY)			
< 10000	777 (50.3)	551 (47.4)	0.144
≥ 10000	768 (49.7)	612 (52.6)	
Health insurance			
No	114 (4.6)	114 (6.2)	0.033
Yes	2339 (95.4)	1735 (93.8)	
Current smokers	678 (27.9)	536 (29.6)	0.238
Current alcohol drinkers	454 (18.5)	341 (18.3)	0.917

Physical activity			
Active	958 (38.9)	665 (35.6)	0.028
Others	1503 (61.1)	1202 (64.4)	
Body mass index (kg/m ²)			
< 24	1206 (56.0)	859 (57.1)	0.546
≥ 24 (overweight/obese)	947 (44.0)	646 (42.9)	
Self-rated current health status			
Poor/very poor	647 (26.3)	504 (27.0)	0.637
Very good/good/fair	1811 (73.7)	1362 (73.0)	
Disease status			
Hypertension	712 (29.0)	494 (26.5)	0.079
Cardiovascular disease	365 (14.9)	250 (13.4)	0.190
Dyslipidemia	270 (11.2)	163 (8.9)	0.018
Number of comorbidities			
0	1588 (64.5)	1230 (65.9)	0.371
≥ 1	873 (35.5)	637 (34.1)	
High-sensitivity C-reactive protein (mg/L), mean (SD)	2.5 (6.8)	2.9 (7.5)	0.122

Baseline FPG category			
5.6-6.0 mmol/L	1310 (55.1)	954 (52.6)	0.120
6.1-6.9 mmol/L	1067 (44.9)	858 (47.4)	
Baseline HbA1c category			
5.7%-5.9%	92 (35.0)	80 (37.0)	0.711
6.0%-6.4%	171 (65.0)	136 (63.0)	

FPG: Fasting plasma glucose; HbA1c: Glycated hemoglobin; CNY: Chinese Yuan.

Supplementary Table 3 Multinomial logistic regression analysis of the factors associated with regression to normoglycemia and progression to diabetes

Factors	Regression to normoglycemia		Progression to diabetes	
	Adjusted OR (95%CI) ^a	P	Adjusted OR (95%CI) ^a	P
		value		value
Age (≥ 60 <i>vs</i> < 60)	0.67 (0.54-0.83)	<0.001	1.09 (0.85-1.39)	0.496
Male <i>vs</i> female	1.58 (1.23-2.03)	<0.001	0.76 (0.56-1.04)	0.083
High school or above <i>vs</i> middle school or below	1.29 (0.92-1.81)	0.137	0.96 (0.61-1.50)	0.861
Married <i>vs</i> others	1.03 (0.77-1.39)	0.820	0.84 (0.61-1.15)	0.278
Total household income (≥ 10000 <i>vs</i> < 10000 , CNY)	0.90 (0.69-1.16)	0.410	0.87 (0.65-1.17)	0.367

Health insurance (yes <i>vs</i> no)	0.72 (0.46-1.11)	0.139	1.21 (0.65-2.24)	0.542
Current smoker <i>vs</i> others	0.80 (0.61-1.05)	0.108	1.29 (0.93-1.80)	0.131
Current alcohol drinker <i>vs</i> others	0.93 (0.70-1.23)	0.605	0.96 (0.68-1.37)	0.833
Active physical activity <i>vs</i> others	0.89 (0.72-1.09)	0.256	0.83 (0.65-1.05)	0.124
Disease status (yes <i>vs</i> no)				
Hypertension	1.21 (0.96-1.54)	0.113	1.56 (1.21-2.02)	0.001
Cardiovascular disease	0.98 (0.72-1.33)	0.873	1.27 (0.93-1.74)	0.128
Dyslipidemia	0.94 (0.66-1.34)	0.732	1.69 (1.21-2.36)	0.002
Other comorbidities (≥ 1 <i>vs</i> 0)	1.17 (0.94-1.45)	0.155	1.25 (0.97-1.60)	0.083
Body mass index (≥ 24 <i>vs</i> < 24)	0.78 (0.62-0.98)	0.035	1.79 (1.37-2.34)	< 0.001
Self-reported general health (very good/ good/ fair <i>vs</i> poor or very poor)	0.95 (0.74-1.21)	0.684	0.90 (0.69-1.18)	0.442
High-sensitivity C-reactive protein (every 1-mg/L increase)	0.98 (0.95-1.00)	0.058	1.01 (1.00-1.02)	0.214

^aAll the factors listed in this table were adjusted for.

OR: Odds ratio; CNY: Chinese Yuan.

Supplementary Table 4 Binary logistic regression analysis of the factors associated with regression to normoglycemia and

progression to diabetes in fasting plasma glucose-defined prediabetes cohort

Outcome/variables	Regression to normoglycemia		Progression to diabetes	
	OR (95%CI) ^a	P value	OR (95%CI) ^a	P value
Age (≥ 60 <i>vs</i> < 60)	0.66 (0.53-0.82)	< 0.001	1.12 (0.87-1.44)	0.383
Male <i>vs</i> female	1.61 (1.25-2.08)	< 0.001	0.75 (0.54-1.03)	0.081
High school or above <i>vs</i> middle school or below	1.29 (0.92-1.81)	0.137	0.96 (0.60-1.50)	0.877
Married <i>vs</i> others	1.05 (0.78-1.42)	0.749	0.81 (0.59-1.13)	0.210
Total household income (≥ 10000 <i>vs</i> < 10000 , CNY)	0.90 (0.70-1.18)	0.455	0.82 (0.61-1.11)	0.205
Health insurance (yes <i>vs</i> no)	0.74 (0.48-1.17)	0.187	1.41 (0.75-2.87)	0.314
Current smoker <i>vs</i> others	0.78 (0.59-1.02)	0.075	1.30 (0.92-1.82)	0.134
Current alcohol drinker <i>vs</i> others	0.94 (0.71-1.24)	0.654	0.99 (0.69-1.41)	0.953
Active physical activity <i>vs</i> others	0.87 (0.70-1.07)	0.191	0.82 (0.64-1.05)	0.122
Disease status (yes <i>vs</i> no)				
Hypertension	1.17 (0.92-1.48)	0.203	1.52 (1.17-1.97)	0.002
Cardiovascular disease	0.99 (0.72-1.35)	0.948	1.26 (0.91-1.73)	0.161
Dyslipidemia	0.96 (0.66-1.36)	0.811	1.79 (1.27-2.50)	0.001
Other comorbidities (≥ 1 <i>vs</i> 0)	1.18 (0.95-1.47)	0.142	1.24 (0.96-1.60)	0.095
Body mass index (≥ 24 kg/m ² <i>vs</i> < 24 kg/m ²)	0.78 (0.61-0.99)	0.039	1.77 (1.35-2.32)	< 0.001

Self-reported general health (very good/good/fair <i>vs</i> poor or very poor)	0.91 (0.71-1.17)	0.462	0.92 (0.69-1.21)	0.534
High-sensitivity C-reactive protein (every 1-mg/L increase)	0.98 (0.95-1.00)	0.073	1.01 (0.99-1.02)	0.282

^aAll the factors listed in this table were adjusted for.

OR: Odds ratio; CNY: Chinese Yuan.

Supplementary Table 5 Sensitivity analysis of factors associated with regression to normoglycemia and progression to diabetes from prediabetes using multiple imputation for missing covariates

Factors	Regression to normoglycemia			Progression to diabetes		
	Adjusted (95%CI) ^a	OR	P value	Adjusted (95%CI) ^a	OR	P value
Age (≥ 60 <i>vs</i> < 60)	0.68 (0.54-0.84)		< 0.001	1.11 (0.86-1.41)		0.426
Male <i>vs</i> female	1.55 (1.21-2.00)		< 0.001	0.78 (0.58-1.07)		0.119
High school or above <i>vs</i> middle school or below	1.28 (0.91-1.80)		0.150	0.93 (0.59-1.46)		0.754
Married <i>vs</i> others	1.05 (0.78-1.41)		0.733	0.83 (0.60-1.13)		0.235
Total household income (≥ 10000 <i>vs</i> < 10000 , CNY)	0.90 (0.70-1.17)		0.433	0.86 (0.64-1.16)		0.334
Health insurance (yes <i>vs</i> no)	0.72 (0.46-1.12)		0.146	1.21 (0.65-2.26)		0.543
Current smoker <i>vs</i> others	0.79 (0.60-1.03)		0.082	1.31 (0.94-1.82)		0.108
Current alcohol drinker <i>vs</i> others	0.95 (0.72-1.25)		0.716	0.97 (0.68-1.38)		0.865

Active physical activity <i>vs</i> others	0.90 (0.73-1.11)	0.334	0.81 (0.64-1.03)	0.093
Disease status (yes <i>vs</i> no)				
Hypertension	1.19 (0.93-1.51)	0.159	1.51 (1.17-1.95)	0.002
Cardiovascular disease	0.99 (0.73-1.35)	0.960	1.26 (0.92-1.72)	0.150
Dyslipidemia	0.96 (0.67-1.36)	0.806	1.68 (1.20-2.33)	0.002
Number of comorbidities (≥ 1 <i>vs</i> 0)	1.16 (0.94-1.44)	0.167	1.24 (0.97-1.59)	0.091
Body mass index (≥ 24 kg/m ² <i>vs</i> < 24 kg/m ²)	0.79 (0.62-1.00)	0.046	1.84 (1.42-2.38)	< 0.001
Self-reported general health (very good/good/fair <i>vs</i> poor/ very poor)	0.96 (0.75-1.22)	0.728	0.89 (0.68-1.17)	0.411
High-sensitivity C-reactive protein (every 1-mg/L increase)	0.98 (0.96-1.00)	0.078	1.01 (1.00-1.02)	0.208

^aAll the factors listed in this table were adjusted for.

OR: Odds ratio; CNY: Chinese Yuan.

Supplementary Table 6 Sensitivity analysis of associations between prediabetes transitions and clinical outcomes during 2015–2020 follow-up in the fasting plasma glucose-defined prediabetes cohort

Outcome/variables	<i>n</i>	<i>N</i>	Cumulative risk (95%CI)	Crude (95%CI)	OR <i>P</i> value	Adjusted (95%CI) ^a	OR <i>P</i> value
Cardiovascular disease							
Regression to normoglycemia	42	339	12.4% (8.9-15.9)	0.87 (0.60-1.26)	0.470	0.96 (0.65-1.41)	0.818

Persistent prediabetes	140	1004	13.9% (11.8-16.1)	1 (reference)		1 (reference)	
Progression to diabetes	39	185	21.1% (15.2-27.0)	1.65 (1.11-2.45)	0.013	1.01 (0.64-1.60)	0.964
Kidney disease							
Regression to normoglycemia	15	339	4.4% (2.6-7.2)	1.61 (0.85-3.05)	0.145	1.48 (0.77-2.85)	0.246
Persistent prediabetes	28	1001	2.8% (1.8-3.8)	1 (reference)		1 (reference)	
Progression to diabetes	12	183	6.6% (3.0-10.1)	2.44 (1.22-4.89)	0.012	2.23(0.99-5.01)	0.051
Mortality							
Regression to normoglycemia	12	352	3.4% (1.5-5.3)	1.03 (0.53-2.00)	0.936	1.09 (0.55-2.17)	0.807
Persistent prediabetes	35	1054	3.3% (2.2-4.4)	1 (reference)		1 (reference)	
Progression to diabetes	14	201	7.0% (3.4-10.5)	2.18 (1.15-4.13)	0.017	2.31 (1.15-4.64)	0.018

^aThe factors adjusted for included age, gender, marital status, education level, total household income, health insurance, physical activity, smoking status, drinking status, current health status, hypertension, dyslipidemia, comorbidity, body mass index, glucose-lowering therapy, antihypertensive therapy and lipid-lowering therapy.

OR: Odds ratio.

Supplementary Table 7 Sensitivity analysis of the associations between prediabetes transitions and clinical outcomes during 2015-2020 follow-up in the glycated hemoglobin-defined prediabetes cohort

Outcome/variables	<i>n</i>	<i>N</i>	Cumulative	risk	Crude	OR	<i>P</i> value	Adjusted	OR	<i>P</i> value
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			(95%CI)	(95%CI)		(95%CI) ^a	
Cardiovascular disease							
Regression to normoglycemia	1	11	9.1% (0.2-41.3)	0.55 (0.07-4.56)	0.580	0.39 (0.03-5.08)	0.474
Persistent prediabetes	18	117	15.4% (10.0-23.0)	1 (reference)		1 (reference)	
Progression to diabetes	8	41	19.5% (10.2-34.0)	1.33 (0.53-3.35)	0.540	0.53 (0.14-1.96)	0.339
Kidney disease							
Regression to normoglycemia	1	11	9.1% (0.2-41.3)	1.57 (0.18-14.08)	0.686	1.64 (0.09-28.58)	0.733
Persistent prediabetes	7	117	6.0% (2.9-11.8)	1 (reference)		1 (reference)	
Progression to diabetes	2	41	4.9% (0.6-16.5)	0.81 (0.16-4.04)	0.793	0.73 (0.05-9.71)	0.810
Mortality							
Regression to normoglycemia	0	11	0% (0.0-28.5)	- ^b	-	-	-
Persistent prediabetes	2	121	1.7% (0.5-5.8)	1 (reference)		-	-
Progression to diabetes	1	41	0.2% (0.1-12.9)	1.49 (0.13-16.85)	0.748	-	-

^aThe factors adjusted for included age, gender, marital status, education level, total household income, health insurance, physical activity, smoking status, drinking status, current health status, hypertension, dyslipidemia, comorbidity, body mass index, glucose-lowering therapy, antihypertensive therapy and lipid-lowering therapy.

^bOdds ratios could not be calculated due to zero events in one or more cells.

OR: Odds ratio.

Supplementary Table 8 Sensitivity analysis of the associations between prediabetes transitions and clinical outcomes during the 2015-2020 follow-up, adjusted for covariates collected in 2011 or using multiple imputation for missing covariates at the 2015

Outcome/variables	OR (95%CI) adjusted for P value covariates in 2011^{a,b}	Adjusted OR (95%CI) based P value on multiple imputation data^{a,c}
Cardiovascular disease		
Regression to normoglycemia	0.90 (0.62-1.32)	0.605
Persistent prediabetes	1 (reference)	1 (reference)
Progression to diabetes	1.01 (0.64-1.57)	0.975
Kidney disease		
Regression to normoglycemia	1.44 (0.76-2.70)	0.261
Persistent prediabetes	1 (reference)	1 (reference)
Progression to diabetes	1.75 (0.79-3.85)	0.166
Mortality		
Regression to normoglycemia	1.16 (0.58-2.32)	0.676
Persistent prediabetes	1 (reference)	1 (reference)
Progression to diabetes	2.63 (1.33-5.23)	0.006

^aThe factors adjusted for included age, gender, marital status, education level, total household income, health insurance, physical

activity, smoking status, drinking status, current health status, hypertension, dyslipidemia, comorbidity, body mass index, glucose-lowering therapy, antihypertensive therapy and lipid-lowering therapy.

^bAll models were adjusted for covariates assessed at the 2011 baseline survey. Missing values in these covariates were handled using the same approach as in the primary analysis.

^cAll models were adjusted for covariates assessed using the same approach as in the primary analysis (2015 survey). Missing values in these covariates were addressed using multiple imputation.

OR: Odds ratio.

Supplementary Table 9 Sensitivity analysis of the associations between prediabetes transitions and clinical outcomes during the 2015-2020 follow-up, using Cox proportional hazards regression and competing-risk regression for time-to-event outcomes

Outcome/variables	<i>n</i>	<i>N</i>	Cumulative risk (95%CI)	Crude (95%CI) ^a	HR	<i>P</i> value	Adjusted (95%CI) Cox models ^{a,b}	HR from value	<i>P</i>	SHR from Gray models ^{b,c}	(95%CI) Fine- value	<i>P</i>
Cardiovascular disease												
Regression to normoglycemia	43	359	12.0% (8.6-15.3)	0.87 (0.62-1.23)		0.432	0.93 (0.66-1.32)	0.699		0.94 (0.67-1.31)		0.720
Persistent prediabetes	148	1092	13.6% (11.5-15.6)	1 (reference)			1 (reference)			1 (reference)		
Progression to diabetes	40	210	19.0% (13.7-	1.52 (1.07-2.16)		0.019	0.99 (0.67-1.47)	0.955		0.99 (0.66-1.49)		0.960

24.4)

Kidney disease

Regression to normoglycemia	16	359	4.5% (2.3-6.6)	1.62 (0.88-2.97)	0.119	1.47 (0.79-2.74)	0.098	1.47 (0.78-2.74)	0.098
Persistent prediabetes	30	1092	2.7% (2.6-8.9)	1 (reference)		1 (reference)		1 (reference)	
Progression to diabetes	12	210	5.7% (2.3-6.6)	2.19 (1.12-4.27)	0.022	1.93 (0.89-4.20)	0.222	1.89 (0.89-4.04)	0.230

Mortality

Regression to normoglycemia	12	359	3.3% (1.5-5.2)	1.04 (0.54-2.01)	0.899	1.11 (0.57-2.16)	0.759	- ^d	-
Persistent prediabetes	35	1092	3.2% (2.2-4.2)	1 (reference)		1 (reference)		-	-
Progression to diabetes	14	210	6.7% (3.3-10.0)	2.11 (1.14-3.93)	0.018	2.19 (1.14-4.20)	0.018	-	-

^aCox proportional hazards models were used to estimate HRs for time-to-first event.

^bThe factors adjusted for included age, gender, marital status, education level, total household income, health insurance, physical activity, smoking status, drinking status, current health status, hypertension, dyslipidemia, comorbidity, body mass index, glucose-lowering therapy, antihypertensive therapy and lipid-lowering therapy.

^cFine-Gray subdistribution hazard models were used to estimate Subdistribution hazard ratios, treating all-cause mortality as a competing risk.

^dFor the outcome of all-cause mortality, the competing-risk model was not applicable (indicated as "-").

HR: Hazard ratio; SHR: Subdistribution hazard ratio.