

# **Supplemental Material**

**Table S1. Definitions of comorbidities.**

<b>Diagnosis</b>	<b>ICD-10-CM code and definition</b>
Hypertension*	I10-I13, I15; and minimum 1 prescription of anti-hypertensive drug (thiazide, loop diuretics, aldosterone antagonist, alpha-/beta-blocker, calcium-channel blocker, angiotensin-converting enzyme inhibitor, angiotensin II receptor blocker).
Diabetes mellitus <sup>†</sup>	E11-E14; and minimum 1 prescription of anti-diabetic drugs (sulfonylureas, metformin, meglitinides, thiazolidinediones, dipeptidyl peptidase-4 inhibitors, $\alpha$ -glucosidase inhibitors, and insulin).
Liver cirrhosis	K74, K70.3, K70.4
Stroke	I63, I64
Transient ischemic attack	G458, G459
Thromboembolism	I74
Myocardial infarction <sup>†</sup>	I21-22
Congestive heart failure <sup>†</sup>	I50
Peripheral arterial disease*	I70, I73

\*  $\geq 1$  diagnosis during hospitalization, or  $\geq 2$  diagnoses at outpatient clinic, in the previous 1 year

<sup>†</sup>  $\geq 1$  diagnosis during hospitalization or at outpatient clinic, in the previous 1 year

ICD-10-CM, the International Classification of Disease, Tenth Revision, Clinical Modification;

**Table S2. AF risk according to each of metabolic syndrome component variation.**

	Patients, n	AF cases, n	AF incidence (1000 person- year)	Total	
				HR (95% CI)*	
				Model1	Model2
<b>Metabolic syndrome<sup>†</sup></b>					
HH	4,769,968	55,975	1.481	1(reference)	1(reference)
HM	608,158	14,090	2.944	1.237 (1.214-1.26)	1.155 (1.134-1.178)
MH	798,555	18,969	3.022	1.335 (1.313-1.357)	1.259 (1.238-1.28)
MM	1,388,850	46,566	4.300	1.454 (1.435-1.473)	1.308 (1.29-1.327)
<b>Increased waist circumference<sup>‡</sup></b>					
HH	5,557,418	79,689	1.814	1(reference)	1(reference)
HU	484,393	12,837	3.380	1.266 (1.242-1.29)	1.175 (1.151-1.198)
UH	559,475	12,830	2.916	1.247 (1.224-1.27)	1.171 (1.148-1.194)
UU	964,245	30,244	4.009	1.485 (1.465-1.505)	1.312 (1.289-1.335)
<b>High blood pressure<sup>‡</sup></b>					
HH	3,322,639	29,858	1.134	1(reference)	1(reference)
HU	823,877	13,006	1.995	1.234 (1.209-1.26)	1.183 (1.158-1.208)
UH	963,237	15,906	2.085	1.264 (1.24-1.289)	1.214 (1.191-1.238)
UU	2,455,778	76,830	4.003	1.581 (1.559-1.604)	1.462 (1.441-1.484)
<b>High fasting glucose<sup>‡</sup></b>					
HH	4,259,720	57,708	1.711	1(reference)	1(reference)
HU	865,970	16,787	2.456	1.112 (1.093-1.131)	1.078 (1.06-1.097)
UH	993,115	19,877	2.539	1.136 (1.118-1.155)	1.098 (1.08-1.115)
UU	1,446,726	41,228	3.656	1.197 (1.182-1.213)	1.122 (1.107-1.137)

<b>High triglyceride<sup>‡</sup></b>						
HH	3,968,673	55,786	1.780	1(reference)	1(reference)	
HU	783,301	15,546	2.515	1.05 (1.031-1.069)	0.987 (0.97-1.005)	
UH	947,270	19,548	2.615	1.162 (1.14-1.181)	1.107 (1.089-1.125)	
UU	1,866,287	44,720	3.046	1.147 (1.133-1.162)	1.047 (1.033-1.06)	
<b>Low HDL-C<sup>‡</sup></b>						
HH	4,621,611	62,431	1.707	1(reference)	1(reference)	
HU	737,844	14,542	2.493	1.125 (1.105-1.146)	1.087 (1.067-1.107)	
UH	879,956	20,889	3.028	1.29 (1.27-1.311)	1.242 (1.223-1.262)	
UU	1,326,120	37,738	3.637	1.284 (1.267-1.302)	1.212 (1.196-1.229)	
<b>Obesity</b>						
HH	4,710,947	73,095	1.966	1(reference)	1(reference)	
HU	356,409	8,444	3.017	1.209 (1.182-1.236)	1.207 (1.18-1.235)	
UH	428,876	7,654	2.256	1.164 (1.137-1.192)	1.162 (1.135-1.19)	
UU	2,069,299	46,407	2.847	1.328 (1.313-1.344)	1.324 (1.309-1.34)	

\*The associations were tested using a Cox proportional hazards model adjusted for multivariable.

Model 1: adjusted for age, sex

Model 2: adjusted for age, sex, alcohol consumption, smoking status, physical activity, and BMI.

<sup>‡</sup>Subjects stratified into four groups according to the change of metabolic syndrome status as follows: MM, patients who were in MetS in both health checkups; HM, healthy in first checkup but newly diagnosis as MetS in the second checkup; MH, MetS in the first exam but changed to healthy in the second checkup; and HH, healthy in both checkups.

<sup>‡</sup>The components of metabolic syndrome were defined based on the AHA/NHLBI definition for Asian populations as follows: 1) waist circumference  $\geq 85$  cm in women or  $\geq 90$  cm in men, 2) serum triglycerides  $\geq 150$  mg/dL, 3) serum high-density lipoprotein (HDL) cholesterol  $< 50$  mg/dL in women or  $< 40$  mg/dL in men, 4) systolic BP  $\geq 130$  mmHg or diastolic BP  $\geq 85$  mmHg or drug treatment for elevated BP, and 5) fasting serum glucose  $\geq 100$  mg/dL or drug treatment for elevated blood glucose. Subjects stratified into four groups according to the change of relevant component of metabolic syndrome as follows: UU, metabolically unhealthy of relevant component in both checkups; UH, metabolically unhealthy of relevant component in the first exam but changed to healthy in the second checkup; HU, metabolically healthy of relevant component in the first exam but changed to unhealthy in the second checkup; and HH, metabolically healthy of relevant component in both checkups

AF, atrial fibrillation; AHA/NHLBI, American Heart Association/National Heart, Lung, and Blood Institute; BP, blood pressure; HR, hazard ratio; HDL-C, high-density lipoprotein cholesterol; MetS, metabolic syndrome

**Table S3. AF risk according to change of MetS status and each of MetS component variation including 3rd health examination.**

		3rd exam status	Patients, n	AF cases, n	Total	AF incidence (1000 person- year)	HR (95% C.I)*	
					Average duration to 3rd exam (years)		Model1	Model2
<b>Metabolic syndrome<sup>†</sup></b>								
HH	Healthy (HHH)		2,516,994	15,928	1.999	1.578	1 (reference)	1 (reference)
	MetS (HHM)		321,126	3,953	2.000	3.077	1.323(1.277-1.37)	1.251 (1.208-1.296)
HM	Healthy (HMH)		203,964	2,213	2.000	2.702	1.16(1.109-1.213)	1.092 (1.044-1.142)
	MetS (HMM)		234,198	3,399	2.000	3.641	1.335(1.286-1.386)	1.226 (1.18-1.274)
MH	Healthy (MHH)		188,865	2,280	2.000	3.004	1.189(1.138-1.243)	1.109(1.06,1.159)
	MetS (MHM)		143,037	2,168	2.000	3.790	1.338(1.279-1.4)	1.21 (1.155-1.267)
MM	Healthy (MMH)		117,437	1,831	2.002	3.904	1.346(1.282-1.413)	1.218 (1.159-1.28)
	MetS (MMM)		577,419	11,191	2.001	4.897	1.448(1.412-1.485)	1.273 (1.238-1.309)
<b>Waist circumference<sup>†</sup></b>								
HH	Healthy (HHH)		2,968,293	23,114	1.999	1.942	1 (reference)	1 (reference)
	Unhealthy (HHU)		223,322	2,369	2.001	2.652	1.159(1.111-1.209)	1.112 (1.065-1.161)
HU	Healthy (HUH)		163,299	2,301	2.001	3.035	1.171(1.118-1.226)	1.122 (1.07-1.176)
	Unhealthy (HUU)		104,462	1,602	2.000	3.438	1.388(1.327-1.453)	1.303 (1.243-1.366)
UH	Healthy (UHH)		162,536	1,966	2.000	3.538	1.222(1.17-1.276)	1.159 (1.108-1.212)
	Unhealthy (UHU)		149,905	2,054	2.001	3.852	1.337(1.27-1.406)	1.242 (1.177-1.31)
UU	Healthy (UUH)		107,648	1,819	2.002	4.250	1.392(1.327-1.46)	1.292 (1.228-1.359)
	Unhealthy (UUU)		423,575	7,738	2.001	4.603	1.596(1.555-1.638)	1.436 (1.387-1.488)
<b>Blood pressure<sup>†</sup></b>								
HH	Healthy (HHH)		1,579,083	7,456	1.999	1.183	1 (reference)	1 (reference)
	Unhealthy (HHU)		314,829	2,569	2.002	2.029	1.257(1.202-1.315)	1.208 (1.155-1.264)

HU	Healthy (HUH)	273,388	1,927	1.998	1.744	1.124(1.069-1.182)	1.082 (1.029-1.138)
	Unhealthy (HUU)	287,788	3,042	2.000	2.628	1.311(1.256-1.368)	1.232 (1.18-1.286)
UH	Healthy (UHH)	271,919	2,062	1.999	1.882	1.197(1.14-1.257)	1.148 (1.093-1.206)
	Unhealthy (UHU)	203,678	2,197	2.001	2.681	1.353(1.289-1.419)	1.267 (1.208-1.33)
UU	Healthy (UUH)	198,680	1,997	1.998	2.497	1.281(1.219-1.347)	1.203 (1.144-1.265)
	Unhealthy (UUU)	1,173,675	21,713	2.000	4.650	1.618(1.573-1.664)	1.474 (1.432-1.518)
<b>Fasting glucose<sup>‡</sup></b>							
HH	Healthy (HHH)	2,030,296	14,521	2.000	1.782	1 (reference)	1 (reference)
	Unhealthy (HHU)	421,751	4,341	2.002	2.572	1.146(1.108-1.185)	1.11 (1.073-1.148)
HU	Healthy (HUH)	299,416	2,895	1.999	2.404	1.086(1.043-1.13)	1.056 (1.015-1.1)
	Unhealthy (HUU)	264,350	3,256	2.000	3.087	1.173(1.13-1.219)	1.108 (1.066-1.151)
UH	Healthy (UHH)	306,328	3,136	1.999	2.543	1.134(1.091-1.178)	1.103 (1.061-1.146)
	Unhealthy (UHU)	184,198	2,321	2.002	3.158	1.194(1.143-1.248)	1.133 (1.084-1.184)
UU	Healthy (UUH)	146,457	1,822	1.998	3.113	1.189(1.133-1.249)	1.134 (1.08-1.191)
	Unhealthy (UUU)	650,244	10,671	2.000	4.156	1.2(1.17-1.231)	1.11 (1.081-1.139)
<b>Triglycerid<sup>‡</sup></b>							
HH	Healthy (HHH)	1,918,375	14,430	2.000	1.886	1 (reference)	1 (reference)
	Unhealthy (HHU)	338,739	3,782	1.998	2.785	1.186(1.144-1.229)	1.135 (1.094-1.176)
HU	Healthy (HUH)	248,601	2,502	2.002	2.503	1.095(1.05-1.143)	1.043 (1-1.089)
	Unhealthy (HUU)	288,808	3,442	2.000	2.966	1.14(1.098-1.183)	1.063 (1.023-1.103)
UH	Healthy (UHH)	251,683	2,648	1.999	2.618	1.027(0.986-1.071)	0.965 (0.925-1.006)
	Unhealthy (UHU)	197,378	2,334	1.999	2.941	1.11(1.062-1.159)	1.017 (0.973-1.062)
UU	Healthy (UUH)	185,943	2,114	2.002	2.827	1.041(0.994-1.089)	0.951 (0.908-0.996)
	Unhealthy (UUU)	873,513	11,711	2.001	3.350	1.144(1.116-1.172)	1.024 (0.998-1.051)
<b>HDL cholesterol<sup>‡</sup></b>							
HH	Healthy (HHH)	2,333,926	16,901	2.000	1.804	1 (reference)	1 (reference)

	Unhealthy (HHU)	349,510	4,361	1.997	3.132	1.252(1.211-1.295)	1.204 (1.164-1.245)
HU	Healthy (HUH)	222,248	2,254	2.002	2.543	1.1(1.052-1.149)	1.061 (1.015-1.109)
	Unhealthy (HUU)	259,706	3,598	2.000	3.488	1.204(1.161-1.249)	1.137 (1.096-1.18)
UH	Healthy (UHH)	257,564	2,628	2.001	2.533	1.105(1.06-1.151)	1.069 (1.025-1.114)
	Unhealthy (UHU)	157,821	2,073	1.999	3.277	1.192(1.138-1.248)	1.124 (1.073-1.177)
UU	Healthy (UUH)	141,876	1,685	2.003	2.966	1.121(1.065-1.179)	1.061 (1.009-1.117)
	Unhealthy (UUU)	580,389	9,463	2.001	4.112	1.252(1.211-1.295)	1.16 (1.128-1.192)
<b>Obesity<sup>†</sup></b>							
HH	Healthy (HHH)	2,522,301	21,715	1.999	2.152	1 (reference)	1 (reference)
	Unhealthy (HHU)	153,664	1,391	2.002	2.246	1.194(1.131-1.26)	1.117 (1.057-1.18)
HU	Healthy (HUH)	92,445	1,062	1.998	2.862	1.197(1.125-1.273)	1.114 (1.046-1.185)
	Unhealthy (HUU)	154,475	1,407	1.999	2.262	1.178(1.116-1.244)	1.09 (1.031-1.152)
UH	Healthy (UHH)	113,659	1,458	2.000	3.216	1.125(1.067-1.186)	0.99 (0.936-1.047)
	Unhealthy (UHU)	84,992	1,026	2.001	3.016	1.226(1.152-1.306)	1.07 (1.001-1.142)
UU	Healthy (UUH)	107,909	1,492	2.000	3.467	1.237(1.174-1.304)	1.075 (1.016-1.138)
	Unhealthy (UUU)	1,073,595	13,412	2.001	3.126	1.376(1.347-1.406)	1.131 (1.09-1.174)

\*The associations were tested using a Cox proportional hazards model adjusted for multivariable.

Model 1: adjusted for age, sex

Model 2: adjusted for age, sex, alcohol consumption, smoking status, physical activity, and BMI. <sup>†</sup> Subjects stratified into four groups according to the change of metabolic syndrome status as follows: MM, patients who were in MetS in both health check-ups; HM, healthy in the first check-up but newly diagnosis as MetS in the second check-up; MH, MetS in the first exam but changed to healthy in the second check-up; and HH, healthy in both check-ups.

<sup>‡</sup> The components of metabolic syndrome were defined based on the AHA/NHLBI definition for Asian populations as follows: 1) waist circumference  $\geq 85$  cm in women or  $\geq 90$  cm in men, 2) serum triglycerides  $\geq 150$  mg/dL, 3) serum high-density lipoprotein (HDL) cholesterol  $< 50$  mg/dL in women or  $< 40$  mg/dL in men, 4) systolic BP  $\geq 130$  mmHg or diastolic BP  $\geq 85$  mmHg or drug treatment for elevated BP, and 5) fasting serum glucose  $\geq 100$  mg/dL or drug treatment for elevated blood glucose. Subjects stratified into four groups according to the change of relevant component of metabolic syndrome as follows: UU, metabolically unhealthy of a relevant component in both check-ups; UH, metabolically unhealthy of a relevant component in the first exam but changed to healthy in the second check-up; HU, metabolically healthy of a relevant component in the first exam but changed to unhealthy in the second check-up; and HH, metabolically healthy of a relevant component in both check-ups

AF, atrial fibrillation; AHA/NHLBI, American Heart Association/National Heart, Lung, and Blood Institute; BP, blood pressure; HR, hazard ratio; HDL-C, high-density lipoprotein cholesterol; MetS, metabolic syndrome



**Table S4. AF risk according to the number of metabolic syndrome components.**

No. of MetS components		Total, N	AF patients	AF incidence	HR (95% C.I)*	
At first visit	At second visit				Model1	Model2
1 ≤	1 ≤	3,058,312	27,304 (0.9%)	1.2804	1(ref.)	1(ref.)
	2	675,135	10,144 (1.5%)	2.15799	1.201(1.173,1.229)	1.164(1.138,1.192)
	3	250,868	4,841 (1.9%)	2.77969	1.374(1.332,1.417)	1.316(1.275,1.357)
	≥ 4	73,572	1,910 (2.6%)	3.75495	1.555(1.483,1.63)	1.465(1.397,1.536)
2	1 ≤	585,312	8,782 (1.5%)	2.15185	1.151(1.124,1.18)	1.108(1.081,1.136)
	2	542,136	11,269 (2.1%)	2.99529	1.32(1.291,1.35)	1.246(1.218,1.275)
	3	331,180	7,708 (2.3%)	3.36023	1.417(1.381,1.454)	1.321(1.286,1.356)
	≥ 4	158,186	4,945 (3.1%)	4.53596	1.657(1.606,1.709)	1.516(1.469,1.565)
3	1 ≤	184,728	3,498 (1.9%)	2.72008	1.255(1.212,1.301)	1.193(1.151,1.236)
	2	285,411	6,699 (2.3%)	3.38526	1.359(1.322,1.396)	1.26(1.225,1.296)
	3	373,107	10,231 (2.7%)	3.97116	1.493(1.459,1.528)	1.371(1.338,1.405)
	≥ 4	272,184	8,851 (3.3%)	4.72205	1.626(1.587,1.667)	1.473(1.435,1.512)
≥ 4	1 ≤	45,269	1,097 (2.4%)	3.49307	1.39(1.308,1.477)	1.285(1.209,1.367)
	2	108,156	3,222 (3.0%)	4.30935	1.526(1.471,1.584)	1.394(1.342,1.448)
	3	218,006	7,151 (3.3%)	4.76058	1.581(1.539,1.624)	1.432(1.392,1.472)
	≥ 4	556,633	21,653 (3.9%)	5.67899	1.717(1.685,1.75)	1.523(1.492,1.556)

\*The associations were tested using a Cox proportional hazards model adjusted for multivariable.

Model 1: adjusted for age, sex

Model 2: adjusted for age, sex, alcohol consumption, smoking status, physical activity, and BMI.

AF, atrial fibrillation; HR, hazard ratio

**Table S5. AF risk according to each of metabolic syndrome component changes by age.**

AGE	20-39				40-64				≥65			
	AF patients	AF incidence	HR(95%CI)*		AF patients	AF incidence	HR(95%CI)		AF patients	AF incidence	HR(95%CI)	
			Model1	Model2			Model1	Model2			Model1	Model2
<b>Metabolic syndrome<sup>†</sup></b>												
HH	7,481	0.54783	1 (Reference)	1 (Reference)	31,187	1.74169	1 (Reference)	1 (Reference)	18,831	8.16341	1 (Reference)	1 (Reference)
HM	1,058	0.88134	1.398 (1.296-1.509)	1.34 (1.238-1.45)	10,142	2.85216	1.262 (1.229-1.295)	1.179 (1.148-1.21)	8,204	9.3446	1.142 (1.11-1.175)	1.078 (1.047-1.11)
MH	775	0.8928	1.414 (1.324-1.51)	1.363 (1.273-1.46)	7,206	2.65229	1.383 (1.352-1.415)	1.306 (1.276-1.336)	6,535	8.81161	1.218 (1.186-1.251)	1.16 (1.13-1.192)
MM	1,131	1.11471	1.679 (1.574-1.791)	1.571 (1.46-1.691)	22,267	3.63906	1.573 (1.546-1.602)	1.413(1.385-1.442)	24,488	9.3033	1.261 (1.236-1.286)	1.146 (1.122-1.171)
<b>Waist circumference<sup>‡</sup></b>												
HH	7,658	0.5655	1 (Reference)	1 (Reference)	43,439	1.9653	1 (Reference)	1 (Reference)	30,749	8.1027	1 (Reference)	1 (Reference)
HU	804	0.7706	1.228 (1.123-1.343)	1.166 (1.059-1.282)	6,582	2.9225	1.288 (1.254-1.324)	1.188 (1.154-1.223)	5,770	8.8869	1.148 (1.115-1.181)	1.143 (1.11-1.176)
UH	526	0.7753	1.241 (1.153-1.337)	1.195 (1.105-1.292)	6,142	2.9932	1.314 (1.28-1.349)	1.228 (1.195-1.262)	6,546	9.4923	1.216 (1.183-1.249)	1.109 (1.058-1.123)
UU	1,457	0.9874	1.514 (1.429-1.603)	1.404 (1.301-1.517)	14,639	3.7625	1.571 (1.542-1.602)	1.373 (1.339-1.409)	14,993	10.5234	1.362 (1.335-1.389)	1.223 (1.191-1.256)
<b>Blood pressure<sup>‡</sup></b>												
HH	5,073	0.51152	1 (Reference)	1 (Reference)	19,101	1.51205	1 (Reference)	1 (Reference)	6,449	6.28945	1 (Reference)	1 (Reference)
HU	1,450	0.66134	1.15 (1.08-1.223)	1.111(1.043-1.183)	8,928	2.27356	1.25 (1.216-1.284)	1.198 (1.166-1.232)	5,975	8.05255	1.197 (1.152-1.243)	1.163 (1.12-1.208)
UH	1,349	0.67138	1.144(1.077-1.215)	1.107(1.042-1.183)	7,245	2.23839	1.271 (1.239-1.304)	1.221 (1.189-1.252)	4,776	7.78717	1.246 (1.202-1.291)	1.216 (1.173-1.26)
UU	2,573	0.98224	1.572 (1.494-1.654)	1.469(1.392-1.549)	35,528	3.38305	1.609 (1.58-1.639)	1.484 (1.456-1.513)	40,858	9.77971	1.492 (1.453-1.532)	1.405 (1.367-1.443)
<b>Fasting glucose<sup>‡</sup></b>												
HH	6,458	0.54747	1 (Reference)	1 (Reference)	30,582	1.93989	1 (Reference)	1 (Reference)	22,182	8.2747	1 (Reference)	1 (Reference)
HU	1,409	0.72439	1.331 (1.255-1.413)	1.3 (1.225-1.38)	10,409	2.50077	1.106 (1.079-1.133)	1.07 (1.045-1.096)	8,611	9.36199	1.07 (1.041-1.099)	1.049 (1.021-1.077)
UH	1,387	0.8039	1.182 (1.114-1.253)	1.147 (1.082-1.217)	8,769	2.40646	1.148 (1.122-1.174)	1.106 (1.081-1.131)	7,123	9.08472	1.101 (1.073-1.129)	1.077 (1.05-1.104)
UU	1,191	0.93601	1.394 (1.307-1.486)	1.307 (1.224-1.395)	21,042	3.12807	1.246 (1.224-1.269)	1.159 (1.137-1.18)	20,142	9.26507	1.103 (1.82-1.125)	1.053 (1.033-1.074)

<b>Triglyceride<sup>†</sup></b>												
HH	5,626	0.5325	1 (Reference)	1 (Reference)	28,775	1.92155	1 (Reference)	1 (Reference)	22,898	8.98813	1 (Reference)	1 (Reference)
HU	1,341	0.70408	1.151 (1.075-1.231)	1.086 (1.014-1.164)	10,356	2.6466	1.061 (1.035-1.089)	0.996 (0.97-1.021)	8,330	9.33748	0.998 (0.971-1.025)	0.956 (0.93-0.983)
UH	1,063	0.7167	1.162 (1.093-1.235)	1.114 (1.047-1.186)	7,896	2.39738	1.199 (1.172-1.227)	1.142 (1.116-1.168)	7,070	8.71894	1.089 (1.062-1.117)	1.054 (1.027-1.081)
UU	2,415	0.8669	1.288 (1.224-1.356)	1.176 (1.113-1.242)	23,775	2.92924	1.22 (1.198-1.241)	1.106 (1.086-1.127)	19,760	8.5617	1.015 (0.995-1.035)	0.954 (0.935-0.973)
<b>HDL-C<sup>†</sup></b>												
HH	7,499	0.58108	1 (Reference)	1 (Reference)	33,781	1.95646	1 (Reference)	1 (Reference)	22,778	8.76279	1 (Reference)	1 (Reference)
HU	1,121	0.83146	1.097 (1.02-1.18)	1.066 (0.99-1.146)	11,022	2.84024	1.16 (1.131-1.19)	1.12 (1.091-1.149)	9,240	9.55475	1.058 (1.029-1.088)	1.034 (1.005-1.063)
UH	843	0.64235	1.404 (1.317-1.496)	1.356 (1.446-1.271)	7,474	2.34486	1.349 (1.319-1.378)	1.296 (1.325-1.268)	6,731	8.57183	1.177 (1.149-1.207)	1.147 (1.119-1.176)
UU	982	0.8372	1.373 (1.282-1.469)	1.305 (1.217-1.399)	18,525	3.10643	1.387 (1.361-1.413)	1.304 (1.279-1.33)	19,309	8.74973	1.132 (1.109-1.155)	1.087 (1.064-1.109)
<b>Obesity</b>												
HH	6,008	0.54152	1 (Reference)	1 (Reference)	36,543	1.98538	1 (Reference)	1 (Reference)	32,530	8.38039	1 (Reference)	1 (Reference)
HU	710	0.67163	1.1 (0.99-1.221)	1.088 (0.979-1.208)	4,180	2.5301	1.229 (1.189-1.269)	1.225 (1.186-1.266)	2,976	8.68753	1.185 (1.147-1.225)	1.186 (1.148-1.226)
UH	384	0.67865	1.136 (1.049-1.23)	1.13 (1.043-1.223)	4,132	2.72498	1.219 (1.18 -1.259)	1.216 (1.177-1.256)	4,147	9.56372	1.086 (1.045-1.128)	1.086 (1.045-1.128)
UU	3,343	0.83133	1.294 (1.237 -1.353)	1.279 (1.223-1.338)	25,947	2.97442	1.361 (1.339-1.383)	1.354 (1.332-1.376)	18,405	9.68347	1.265 (1.241-1.288)	1.266 (1.243-1.29)

\* The associations were tested using a Cox proportional hazards model adjusted for multivariable.

Model 1: adjusted for age, sex

Model 2: adjusted for age, sex, alcohol consumption, smoking status, physical activity, and BMI. <sup>†</sup>Subjects stratified into four groups according to the change of metabolic syndrome status as follows: MM, patients who were in MetS in both health checkups; HM, healthy in first checkup but newly diagnosis as MetS in the second checkup; MH, MetS in the first exam but changed to healthy in the second checkup; and HH, healthy in both checkups. <sup>‡</sup>The components of metabolic syndrome were defined based on the AHA/NHLBI definitions for Asian populations as follows: 1) waist circumference  $\geq 85$  cm in women or  $\geq 90$  cm in men, 2) serum triglycerides  $\geq 150$  mg/dL, 3) serum high-density lipoprotein (HDL) cholesterol  $< 50$  mg/dL in women or  $< 40$  mg/dL in men, 4) systolic BP  $\geq 130$  mmHg or diastolic BP  $\geq 85$  mmHg or drug treatment for elevated BP, and 5) fasting serum glucose  $\geq 100$  mg/dL or drug treatment for elevated blood glucose. Subjects stratified into four groups according to the change of relevant component of metabolic syndrome as follows: UU, metabolically unhealthy of relevant component in both checkups; UH, metabolically unhealthy of relevant component in the first exam but changed to healthy in the second checkup; HU, metabolically healthy of relevant component in the first exam but changed to unhealthy in the second checkup; and HH, metabolically healthy of relevant component in both checkups. AF, atrial fibrillation; AHA/NHLBI, American Heart Association/National Heart, Lung, and Blood Institute; BP, blood pressure; HR, hazard ratio; HDL-C, high-density lipoprotein cholesterol; MetS, metabolic syndrome

Figure S1. Study population stratified flow according to the change of each component of metabolic syndrome.

