

**Supplementary Data 3. Descriptive Summary of Included Studies**

(K=9)

No.	Author (year), country	Study design	Number of participants, mean age	MetS definition	Exposure	Follow up duration	Outcomes	Covariate
1	Ekblom-Bak (2021), Sweden	Cohort study	3,693 (M: 1,727, F: 1,966), NR	AHA	Leisure-time PA level during the past year - Self-reported through the question (regular high-intensity PA, regular moderate-intensity PA, light-intensity PA, sedentary)	20 years	CVD incidence CVD mortality All-cause mortality	3, 15, 18, 27, 35, 36, 43
2	Fan (2023), China	Cohort study	8,301(M: 3,727, F:4,574), 56.70	IDF	Diet - Adherence to the alternative Mediterranean (aMED) diet	12 years	CVD mortality All-cause mortality	1, 15, 17, 30, 34, 36
3	Lee (2023), Korea	Cohort study	9,628,109 (M: 5,319,688, F: 4,308,421), 46.30	Harmonized definition for MetS	PA - Frequency of light, moderate and vigorous PA	8.3 years	CVD incidence All-cause mortality	1, 3, 7, 25, 36, 37
4	Park (2021), Korea	Cohort study	6,099,717 (M: 3,522,596, F: 2,577,121), 43.79	Harmonized definition for MetS	Smoking - Categorize to smoking status (non-smoker, ex-smoker, current smoker)	4 years	CVD incidence	1, 36

5	Park (2020), Korea	Prospective cohort study	1,212,376 (M: 710,633, F: 501,743), 46.54	Harmonized definition for MetS	Moderate-to-vigorous PA - Assess intensity of MV-PA (vigorous activity, moderate activity, light activity) - Assess frequency of MV-PA (none, 1 to 2 days per week, 3 to 4 days per week, and $\geq 5$ days per week)	4.28 years	CVD incidence All-cause mortality	1, 2, 6, 7, 9, 16, 22, 25, 33, 36
6	Stensvold (2011), Norway	Cohort study	13,449 (NR), 53.04	Harmonized definition for MetS	Physical activity - Light and hard PA (none, less than one hour, one to two hours or at least three hours)	10 years	CVD mortality All-cause mortality	1, 3, 15, 30, 31, 36, 37
7	Wu (2023), China	Cohort study	118,872 (M: 58,842, F: 60,030), NR	Harmonized definition for MetS	Diet - Assess tea and coffee consumption following question 'How many cups of tea/coffee do you drink each day?'	14 years	CVD mortality All-cause mortality	1, 3, 4, 7, 10, 12, 13, 15, 17, 26, 32, 36, 37, 38, 40
8	Wu (2022), China	Cohort study	87,342 (M: 39,508, F: 47,834), 57.57	Harmonized definition for MetS	Healthy lifestyles - Count lifestyle score based on seven recommended lifestyle behaviour (moderate alcohol consumption, never/quit smoking, good sleep, healthy diet, sufficient physical activity, social support,	13 years	CVD mortality All-cause mortality	1, 4, 7, 8, 10, 14, 15, 17, 19, 26, 31, 36, 39, 42

					and less sedentary behaviour)			
9	Ye (2020), China	Cohort study	8,968 (M: 3,111, F: 5,857), 56.70	The Diabetes Society of Chinese Medical Association	Sleep - Assess sleep duration and make 5 groups (< 6, 6–7 h, 7–8 h, 8–9 h, and > 9 h per day)	10 months	CVD incidence	1, 7, 12, 20, 36, 41

Note. AHA = American Heart Association; aMED = alternative mediterranean diet; F = female; CVD = cardiovascular disease; IDF = International Diabetes Foundation; M = male; MetS = metabolic syndrome; MV-PA = moderate-to-vigorous physical activity; NR = not reported; PA = physical activity; TDI = townsend deprivation index.

<sup>1</sup>Covariates: 1 = age; 2 = alanine aminotransferase; 3 = alcohol consumption; 4 = antihypertensive medication; 5 = appetite; 6 = aspartate aminotransferase; 7 = body mass index; 8 = cancer; 9 = Charlson comorbidity index score; 10 = cholesterol-lowering medication; 11 = diastolic blood pressure; 12 = depression; 13 = diet; 14 = diabetes mellitus; 15 = education; 16 = estimated glomerular filtration rate; 17 = ethnicity; 18 = family history of CVD; 19 = family history of hypertension; 20 = fasting glucose; 21 = health status; 22 = hemoglobin; 23 = high-density lipoprotein cholesterol level; 24 = history of metabolic syndrome; 25 = income; 26 = insulin; 27 = intake of fruit and vegetables; 28 = lack of regular exercise; 29 = low-density lipoprotein cholesterol level; 30 = marital status; 31 = occupational activity; 32 = physical activity; 33 = place of residence; 34 = poverty to income ratio; 35 = systolic blood pressure; 36 = sex; 37 = smoking; 38 = socioeconomic status; 39 = TDI; 40 = tea or coffee intake; 41 = triglyceride; 42 = the number of metabolic syndrome component trait; 43 = waist circumference; 44 = % of linoleic acid and % of eicosapentaenoic acid (EPA) of total fatty acids.