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Smoking, quitting, and the risk of cardiovascular disease among women and men in the Asia-Pacific region

Asia Pacific Cohort Studies Collaboration†*

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Background Although smoking is a major risk factor for cardiovascular disease, it has been suggested that Asians may be less susceptible to the adverse effects of smoking than Caucasians. This may have contributed to the high prevalence of smoking, and the low quitting rates, in Asian men. Worldwide, smoking rates are increasing for women, amongst whom cardiovascular awareness is relatively poor.

Methods An individual participant data analysis of 40 cohort studies was carried out, involving 463 674 Asians (33% female) and 98 664 Australasians (45% female). Cox proportional hazard models, stratified by study and sex where appropriate, were employed.

Results The HR [95% confidence interval (CI)], comparing current smokers with non-smokers, for coronary heart disease (CHD) was 1.60 (1.49–1.72); haemorrhagic stroke 1.19 (1.06–1.33); ischaemic stroke 1.38 (1.24–1.54). There was a clear dose–response relationship between the number of cigarettes smoked per day and both CHD and stroke, with no significant difference ($P \geqslant 0.20$) between populations from Asia and Australia/New Zealand. Although there was no sex difference for stroke in the effect of amount smoked ($P = 0.16$), for CHD, women tended to have higher hazard ratios than men ($P = 0.011$). Quitting gave a clear benefit, which was not significantly different between the sexes or regions ($P \geqslant 0.63$). The HR (CI) for ex-smokers compared with current smokers was 0.71 (0.64–0.78) for CHD and 0.84 (0.76–0.92) for stroke.

Conclusions Unless urgent public health measures are put into place, the impact of the smoking epidemic in Asia, and among women, will be enormous. Tobacco control policies that specifically target these populations are essential.

Keywords Smoking, coronary heart disease, stroke, Asia

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Smoking is well known as a major risk factor for cardiovascular disease (CVD).[1] However, a question remains regarding the relative strength of the association within ethnic, age, and sex subgroups. Most importantly, there has been some suggestion that Asians may have less excess risk from smoking than Caucasians,[2] which may have contributed to the huge percentage of people (largely men) who now smoke in several Asian countries.[3] Given that one third of all cigarettes are smoked in China alone,[4] reliable data on the risks of smoking in Asia, and how they relate to risks elsewhere, are crucial but currently lacking. Information on age and sex differences are important for targeting health promotion activities, especially as smoking among young females has been on the rise in many populations.[4] A related issue is whether smoking has different effects for the three major components of CVD: coronary heart disease (CHD), ischaemic, and haemorrhagic stroke. In terms of total CVD events, Asian populations have a greater percentage of strokes, while among all strokes they have a greater percentage of haemorrhagic strokes than European and North American populations.[5]

To address these issues we analysed data from the Asia Pacific Cohort Studies Collaboration (APCSC), providing the largest individual participant data meta-analysis from this region to date.

Methods

The Asia Pacific Cohort Studies Collaboration is an overview of cohort studies in the region. As studies were recruited retrospectively, study protocols and conduct differ between studies. Details of study identification, data collection, and event verification are described elsewhere.[6,7] All studies in APCSC were conducted prospectively in a population from the Asia-Pacific region, continued follow-up for at least 5000 person-years, and recorded age, sex, and blood pressure at baseline and vital status at the end of the follow-up. Studies were excluded if entry was dependent upon having a particular condition or risk factor. A variety of methods were used to ascertain outcomes, involving monitoring, re-surveying and/or record linkage; in some studies non-fatal, as well as fatal, cardiovascular outcomes were recorded.

All data on cigarette smoking were self-reported at the time when the subject entered the study. All studies included here recorded current cigarette smoking status: yes/no. Some studies additionally recorded whether individuals were current, ex-smokers or never-smokers, and some recorded cigarettes per day for smokers. Most studies additionally measured, at the same time, total cholesterol (from serum) and body mass index [BMI: weight (kg) divided by squared height (m^2)]. Studies were classified as Asian if the participants were recruited from mainland China, Hong Kong, Japan, Korea, Singapore, Taiwan or Thailand and as ANZ if the participants were from Australia or New Zealand.

All outcomes were classified, after recoding when necessary, according to the ninth revision of the International Classification of Diseases (ICD): CHD (ICD 410–414); stroke (430–438); haemorrhagic stroke (431.0–432.9); ischaemic stroke (433.0–434.9); and all CVD (390–459). Deaths were ascribed solely to their underlying cause. For studies that collected data on both non-fatal and fatal events, the composite outcome was analysed.

Analyses used individual participant data, and were restricted to individuals aged ⩾20 years at the time of the baseline survey for whom smoking status was recorded. Cox proportional hazards models, stratified by study and (where appropriate) sex, and adjusted for age and systolic blood pressure were used to estimate hazard ratios (approximate relative risks) associated with smoking. In some analyses, further adjustments were made for total cholesterol and BMI, which, unlike blood pressure, were missing for some participants. Homogeneity between groups defined by geographical area (Asia/ANZ), sex, and age groups was investigated by adding interaction terms to the Cox model. Confidence limits for dose–response hazard ratios were calculated using the floating absolute risk method,[8] using four ordinal cigarette consumption groups: 0, <20, 20, and >20 cigarettes per day. These groups were chosen so as to provide as near an equal four-way partition as possible (20 cigarettes corresponds to one standard pack). A random effects meta-regression[8] was used to relate log hazard ratios from Cox models to follow-up durations using individual study data.

Results

Of the 43 studies in APCSC, 40 (32 in Asia; 8 in ANZ) provided data on current smoking status, of which 33 distinguished ex-smokers from never-smokers and 23 provided data on cigarette consumption for current smokers (Table 1). Total person-years of follow-up were 1.3 million for smokers and 1.7 million for non-smokers in Asia, with corresponding figures of 177 000 and 702 000 in ANZ. Altogether, 8490 deaths from CVD and a further 3972 non-fatal MI or stroke events were recorded (Table 2). As expected, strokes outnumbered CHD only in Asia, whilst haemorrhagic strokes made up a greater percentage of all strokes in Asia compared with ANZ.

Current smoking was a significant predictor of all types of cardiovascular events; it was most strongly related to CHD and ischaemic stroke, where smokers had ~50% greater risk of an event than non-smokers (Figure 1). There were no significant differences in the relative effect of smoking on CHD or stroke between Asia and ANZ or between women and men, but some evidence of a decline in relative effect with age, leading to small effects in those aged >75 years (Figure 2). Additional adjustments for cholesterol and BMI made no substantive difference to the results (data not shown). The hazard ratio for CHD increased by 1% in both Asia and ANZ after extra adjustment for cholesterol and by 3% in Asia and 4% in ANZ after both adjustments. When Asian studies were subdivided by country, no statistical differences were noted. The hazard ratio (95% CI) relating smoking to CHD was 1.53 (1.30–1.81) in mainland China, 1.45 (1.12–1.87) in Korea, and 1.92 (1.44–2.56) in Japan. Corresponding results for stroke were 1.24 (1.13–1.37), 1.34 (1.17–1.54), and 1.38 (1.16–1.64).

For those studies that distinguished ex-smokers from never-smokers, the CHD hazard ratio (95% CI) for current compared with never-smoking was 1.75 (1.60–1.90), and for ex-smoking compared with current smoking was 0.71 (0.64–0.78). For stroke, these results were 1.43 (1.32–1.54) and 0.84 (0.76–0.92), respectively. There were no significant differences by region ($P = 0.68$ for CHD and 0.90 for stroke) or by sex ($P = 0.95$ for CHD and 0.63 for stroke).

Table 1 Baseline summary statistics and details of studies included in the analyses

Country	Study	Baseline	No. of subjects	Mean age (years)	Female (%)	Median follow-up (years)	Current smokers (%)		Ex-smokers (%)		Mean CPD	
							m	f	m	f	m	f
ANZ												
Australia	Busselton	1966–81	7804	44.9	52	20.5	44	24	25	12	19	16
Australia	Longitudinal Study of Aging	1992–93	1610	78.1	48	4.6	8	8	62	23	16	13
Australia	Melbourne	1990–94	41 285	54.8	59	8.5	15	9	45	22	21	17
Australia	National Heart Foundation	1989–90	9277	43.5	51	8.3	27	21	32	20	19	16
Australia	Newcastle	1983–94	5929	51.7	50	8.9	28	18	37	18	20	18
Australia	Perth	1978–94	10 230	45.1	48	14.4	30	21	31	18	20	16
Australia	WA AAA Screenees	1996–99	12 203	72.2	0	3.2	11		60		14	
New Zealand	Fletcher Challenge	1992–94	10 326	44.3	28	5.8	25	18	33	28	15	13
Subtotal		1966–99	98 664	53.2	45	8.3	20	14	43	21	18	16
Asia												
China	Anzhen	1991	8378	53.8	55	4.3	51	10	9	2	15	10
China	Anzhen02	1992–93	4151	47.0	51	3.0	42	0			14	7
China	Beijing Aging	1992	2092	69.8	51	4.8	45	14	23	10	13	8
China	Capital Iron & Steel Co	1974–80	5142	45.3	0	12.5	73	0				
China	CISCH	1992–93	2167	44.2	51	3.3	55	1	7	1	15	8
China	East Beijing	1977–94	1128	43.8	51	17.1	47	11				
China	Fangshan	1991–92	2619	47.3	67	3.6	75	21	6	2	16	9
China	Guangzhou Occupational	1985–98	166 695	41.5	22	7.3	60	1	1	0	15	12
China	Seven Cities Cohorts	1987	10 811	53.9	55	2.7	57	17	8	2		
China	Shanghai Factory Workers	1972–78	9347	48.5	31	14.0	61	7				
China	Six Cohorts	1982–86	19 387	44.7	47	9.0	76	12				
China	Tianjin	1984	9335	54.6	51	6.1	63	39				

China	Xi'an	1976	1695	44.4	34	19.7	54	12	2	1	14	9
China	Yunnan	1992	6581	55.8	3	4.5	70	0	14	0	12	
Hong Kong	Hong Kong	1985–91	2983	78.6	57	2.5	29	11	41	18	11	8
Japan	Akabane	1985–86	1834	54.5	56	11.0	62	1	21	0	23	9
Japan	Civil Service Workers	1990–92	9240	46.7	33	6.7	51	11	26	3		
Japan	Hisayama	1961	1601	56.1	56	24.6	76	17	4	1		
Japan	Konan	1987–95	1226	51.7	55	6.4	62	5	14	1	22	11
Japan	Miyama	1988–90	1073	60.8	56	6.6	58	7	25	3	21	12
Japan	Ohasama	1992–93	2240	59.5	64	4.1	51	2	11	0		
Japan	Saitama	1986–90	3615	54.5	62	11.0	63	8	21	2	21	13
Japan	Shibata	1977	2350	56.9	58	20.0	72	4	6	0	20	10
Japan	Shigaraki Town	1991–97	3730	57.1	59	4.4	59	8	22	2	22	13
Japan	Shirakawa	1974–79	4640	48.0	54	17.5	70	5	8	0		
Japan	Tanno/Soubetsu	1977	1978	51.1	53	16.4	71	10				
Singapore	Singapore Heart	1982–97	2321	40.7	49	14.6	40	3	14	1		
Singapore	Singapore NHS92	1992	3305	39.2	52	6.2	35	3	12	0		
South Korea	KMIC	1992	160 242	44.0	33	4.0	58	0	21	0		
Taiwan	CVDFACTS	1988–96	5729	47.2	55	6.0	48	1	7	0		
Taiwan	Kinmen	1993–97	2545	63.2	49	2.9	50	5	17	1		
Thailand	EGAT	1985	3494	43.0	23	11.4	54	6	18	2		
Subtotal		1961–98	463 674	45.1	33	6.3	60	5	11	1	15	10
Total		1961–99	562 338	46.5	35	6.8	54	7	16	6	16	15

ANZ, Australia and New Zealand; CPD, cigarettes per day for current smokers; m, males; f, females. Blank denotes no data available.

Table 2 Number of events in each study

	Fatal events					Non-fatal events			
Study	CVD	CHD	Stroke	Haem	Isch	MI	Stroke	Haem	Isch
ANZ									
Busselton	1200	685	261	35	40	461	486	27	93
Longitudinal Study of Aging	214	81	52	8	7				
Melbourne	551	323	100	35	11				
National Heart Foundation	115	77	17	0	2				
Newcastle	204	137	34	9	3				
Perth	313	195	63	10	4				
WA AAA Screenees	359	240	60	16	7	82	167	15	106
Fletcher Challenge	171	114	24	1	3	177	179	8	65
Subtotal	3127	1852	611	114	77	720	832	50	264
Asia									
Anzhen	192	65	98	52	40		103	18	80
Anzhen02	2	1	1	1		0	15		14
Beijing Aging	204		86						
Capital Iron & Steel Co	103	35	68	48	15	54	108	22	81
CISCH	1	1				14	9		
East Beijing	65	20	28	11	14				
Fangshan	23	0	11	4	3	5	23	4	17
Guangzhou Occupational	567	166	262	167					
Seven Cities Cohorts	512	84	186	140	38		143	53	88
Shanghai Factory Workers	390	86	255						
Six Cohorts	288	27	120	83	26	21	116	22	89
Tianjin	669	96	298	156	34	18	123	33	90
Xi'an	80	35	41	24	15				
Yunnan	222	18	106	93	12				
Hong Kong	202	86	73	16	6				
Akabane	35	7	12	1	9	21	26	4	7
Civil Service Workers	12	1	2	1					
Hisayama	302	53	177	54	99	53	222	17	193
Konan	24	2	12	3	7				
Miyama	24	2	10	1	6				
Ohasama	27	7	8	2	4		48	9	35
Saitama	119	24	55	15	27				
Shibata	346	67	209	36	77				
Shigaraki Town	28	3	13	2	4				
Shirakawa	162	45	72	28	28	22	32	4	25
Tanno/Soubetsu	73	24	33	16	10				
Singapore Heart	59	31	21	4	2	39	67	3	20
Singapore NHS92	33	22	6	2	2	15	41	2	12
KMIC	383	94	198	110	33	191	891	226	407
CVDFACTS	60	13	29	8	7				
Kinmen	105	10	14						
EGAT	51	33	16						
Subtotal	5363	1158	2520	1078	518	453	1967	417	1158
Total	8490	3010	3131	1192	595	1173	2799	467	1422

ANZ, Australia/New Zealand; CVD, cardiovascular disease; CHD, Coronary heart disease; Haem, Haemorrhagic stroke; Isch, Ischaemic stroke; MI, Myocardial infarction. Blanks denote no data available.

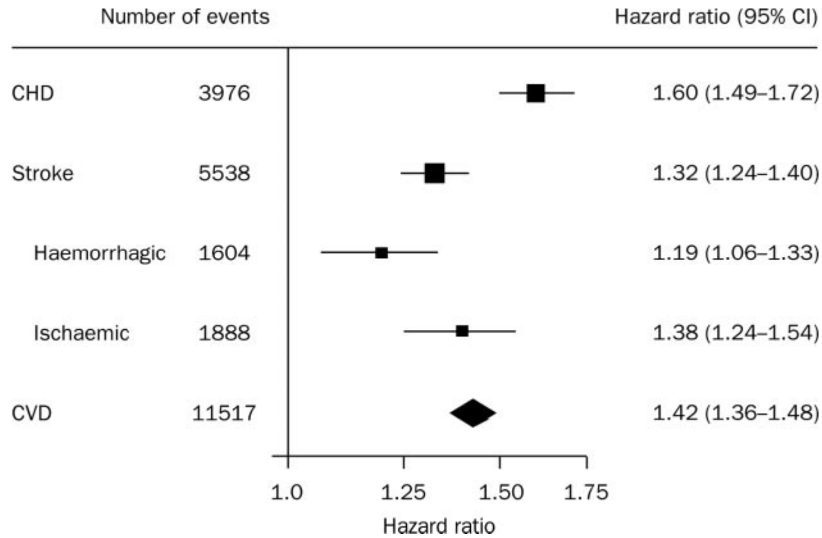

Figure 1 Hazard ratios (on the log scale) with 95% confidence intervals (CIs) for various cardiovascular events (fatal or non-fatal), comparing current smokers with non-smokers. Hazard ratios are adjusted for age and systolic blood pressure after stratification by sex and study. The horizontal lines and width of diamond are 95% confidence limits; the boxes are drawn in proportion to the number of events. CHD, coronary heart disease; CVD, cardiovascular disease

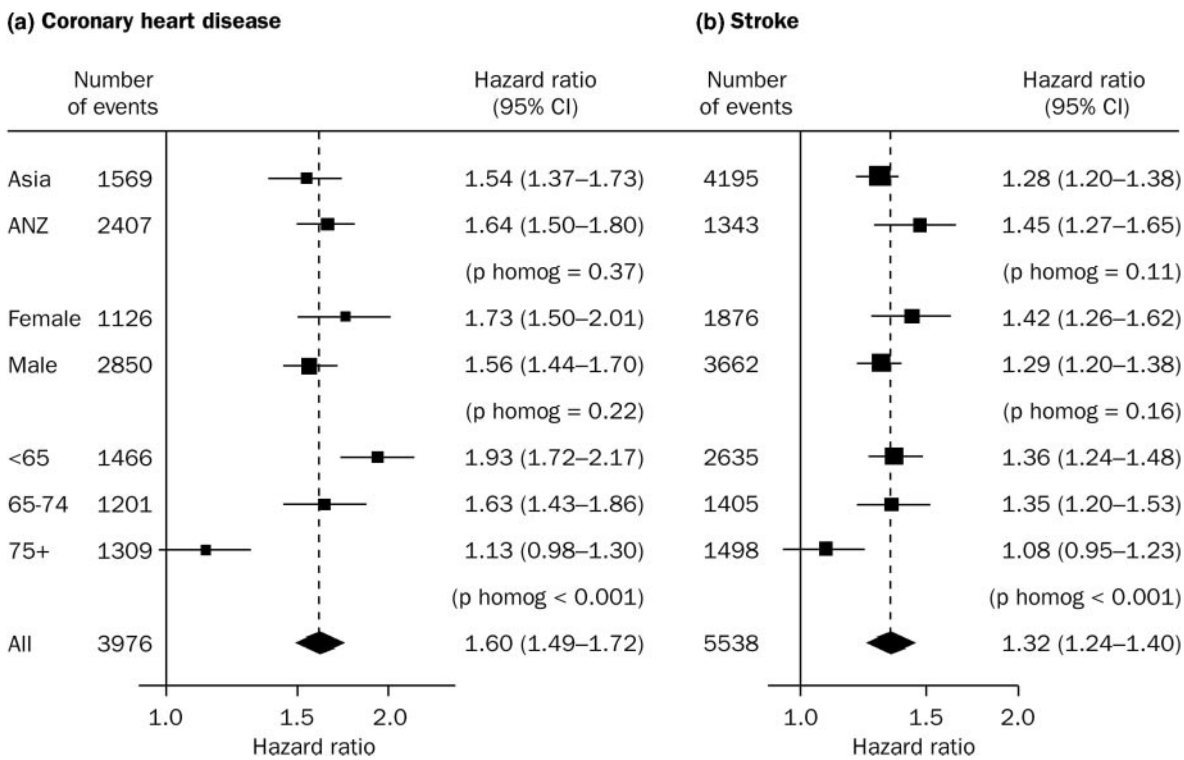

Figure 2 Hazard ratios, adjusted for age and systolic blood pressure, for (a) coronary heart disease and (b) stroke, comparing current smokers with non-smokers, among demographic subgroups. Conventions as in Figure 1. *P* values are shown for tests of homogeneity between subgroups

Figures 3 and 4 show a positive dose–response relationship between the number of cigarettes smoked and the hazard ratio for CHD and stroke for each of Asians, those in ANZ, women and men. Although hazard ratios for any level of cigarette smoking, compared with non-smokers, are always lower in Asia than in ANZ, this difference does not reach traditional levels of statistical significance for CHD or stroke (Figure 3). For both CHD and stroke, hazard ratios comparing smokers of ⩾20 cigarettes per day with non-smokers are much higher for women than men (Figure 4). However, the

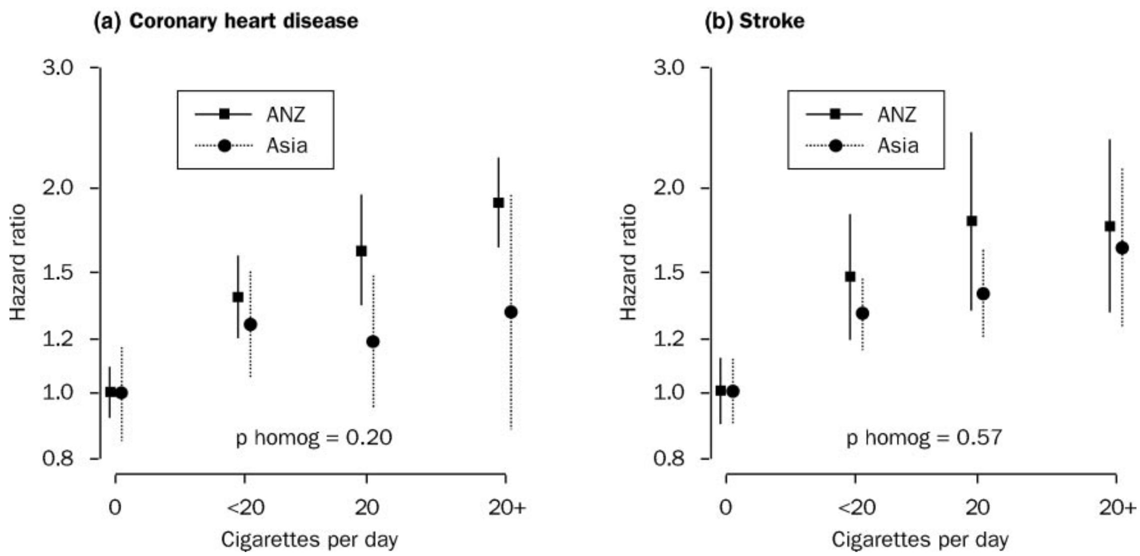

Figure 3 Hazard ratios, adjusted for age and systolic blood pressure, for (a) coronary heart disease and (b) stroke by number of cigarettes per day smoked (base = non-smoker), for Asia and for Australia and New Zealand (ANZ). Bars show 95% CIs calculated using the floating absolute risk method. *P* values are shown for tests of homogeneity between Asia and ANZ

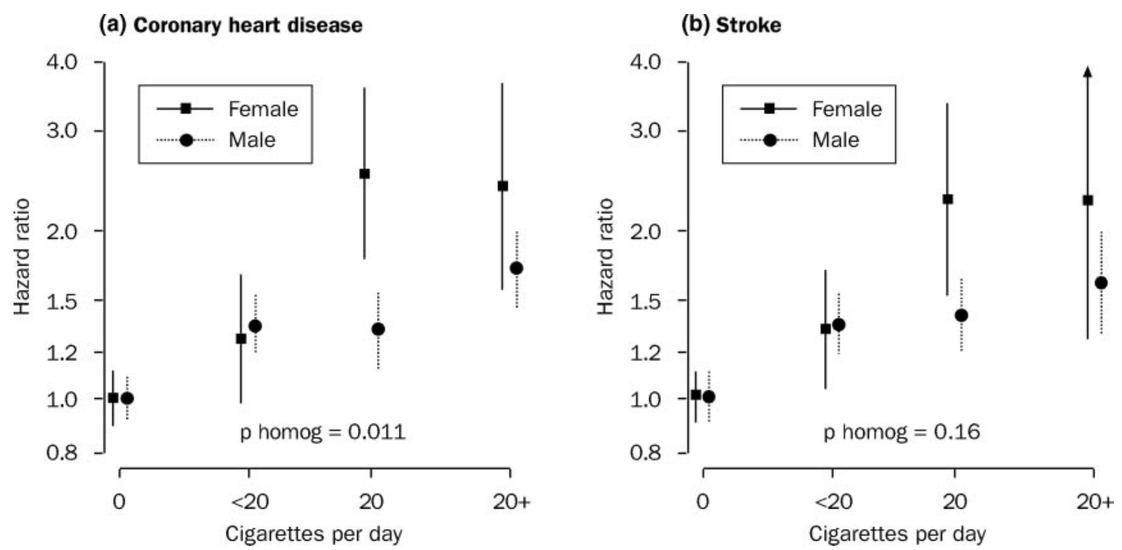

Figure 4 Hazard ratios, adjusted for age and systolic blood pressure, for (a) coronary heart disease and (b) stroke by number of cigarettes per day smoked (base = non-smoker), for women and for men. Bars show 95% CIs calculated using the floating absolute risk method. *P* values are shown for tests of homogeneity between women and men

overall sex difference in the risk by smoking amount is only statistically significant ($P = 0.011$) for CHD. The region and sex comparisons stratified by dose of smoking in Figures 3 and 4 are likely to be more meaningful than those that ignore the amount smoked in Figure 2. The lower mean daily cigarette consumption among female smokers (10 in Asia; 15 in ANZ) compared with male smokers (16 and 20, respectively) explains the contrasting findings in Figure 2 (which shows no sex difference when comparing current smokers with non-smokers) and Figure 4 (which shows greater risk for women with high consumption, when comparing according to amount smoked).

As a sensitivity analysis, all the results in Figures 1–4 were reproduced for fatal events only. In every case the hazard ratios were similar and the patterns shown by the plots were unchanged (data not shown).

Discussion

The results from this, the largest ever study of smoking in the Asia-Pacific region, and one of the largest anywhere in the world, confirm that cigarette smoking is a risk factor for both CHD and stroke, independent of the effects of BMI, blood pressure, and cholesterol, with ameliorations of the effects after quitting. Importantly, the results also show that smoking is an independent risk factor for haemorrhagic stroke, the most common type of stroke in Asia and more likely than ischaemic stroke to lead to death within 28 days.[5] The large numbers involved make the overall estimates of the relative effects of smoking more precise than those in most previous studies. Our results also show that younger people and women have greater relative risks of CVD from smoking than others. Most importantly, we find that Asians and the predominantly Caucasian Australians and New Zealanders have similar increased proportional cardiovascular risk from smoking cigarettes and similar relative risk reduction from quitting.

Our findings of greater relative risks for CHD from smoking for women than men are in agreement with recent literature.[9–13] Although one study from the west of Scotland has shown lack of difference between the sexes,[14] it contradicts a national Scottish study of comparable size.[11] Past estimates of such differences have rarely been as precise. One study that is larger than ours is the American Cancer Society Cancer Prevention Study II, which showed, both for CHD and stroke, greater relative risks (current vs never-smokers) for women compared with men at all ages, as well as a steady decline in relative risk with age,[15] as we find in APCSC. Possibly women experience an anti-oestrogenic effect from smoking, as well as the thrombogenic effect experienced by both men and women.[16]

The overall lack of regional differences in relative risks, and the moderate differences by sex when comparing all smokers with non-smokers, might be contrasted with the large differences in attributable risks. Taking typical current prevalences[3] of smoking across Asia to be 70% in men and 5% in women, the attributable risk for CHD from smoking is ~30% in men and 3% in women,[8] using the overall age and blood pressure-adjusted hazard ratio for CHD from Figure 1. Equivalent figures for stroke are 18 and 2% for men and women, respectively. In ANZ, assuming 25% current prevalence in men and 20% in women,[3] the results for CHD are 13 and 11% for men and women, respectively, and the results for stroke are 7 and 6% for men and women, respectively. Trends in smoking should make numbers converge in the future.

This study has a major advantage of being very large; however, it has a number of disadvantages. Few variables on smoking habits are included in the Collaboration. Relative risks relating to cigarette smoking may vary by type of cigarette smoked (filter/not; black/blond tobacco; hand rolled/manufactured; etc.) and inhalation habits. These may well vary by region, age, and sex.

As no data were collected on lifetime smoking, we cannot take duration of smoking into account when making comparisons between regions, age groups, or the sexes. Since smoking is generally longer established in ANZ than Asia, in men than women, and in older than younger people, our analyses of current smoking will have relatively underestimated the true relative risk of current smoking for Asians, women, and younger people. Although we have shown no significant difference between the relative risks of smoking on CHD and stroke for Asians and Caucasians, we did find lower relative risks for Asians at each level of cigarette smoking. In APCSC, we can only estimate the effects of differences in smoking duration during follow-up, which is but one component of the overall effect of smoking duration. The median follow-up in Asian APCSC studies (6.3 years) was 2 years shorter than in ANZ studies (8.3 years). From a meta-regression[8] of log hazard ratios against median follow-up in APCSC we estimated that the hazard ratio (95% CI) for CHD would be increased by 2.0% (0.02–3.7%) for each extra year of follow-up. Thus, as found in the British Doctors Study,[17] relative risks for smoking tend to increase as duration of follow-up increases, and we would expect to find smaller relative risks in our studies from Asia, compared with ANZ, even if the effect of smoking was homogeneous across regions. Furthermore, the immaturity of the smoking epidemic in Asia, compared with ANZ, suggests that Asian smokers may tend to be of relatively high social class compared with smokers in ANZ. Thus we would also expect that adjustments for other cardiovascular risk factors, unmeasured in our study, would reduce the differentials in relative risks for smoking between Asia and ANZ.

No objective measures of tobacco consumption were available in the APCSC database. These have been shown to have important advantages over self-reports in CVD research when there are many self-reported quitters,[18] as indeed there are in the ANZ, though not the Asian, cohorts in APCSC (Table 1). Another restriction is that the current analyses only use smoking habits recorded at baseline; changes in habit over the duration of follow-up were available from so few studies that no meaningful analysis could be undertaken. However, when we restricted analyses to 1, 2, and 3 years follow-up, where changes in smoking status would be expected to be relatively few, there were no important differences in the ratio of relative risks, comparing Asia with ANZ.

Finally, differences between studies may have biased the results in some unknown way. The individual studies used different laboratory and physical examination methods, which will compromise the statistical adjustments for blood pressure, cholesterol, and BMI. Furthermore, different methods were used to verify outcomes. In particular, only 57% of fatal strokes were classified by subtype, and, while most strokes should have been verified by imaging or autopsy, we have limited information from many studies.

Our data provide precise estimates of the relative impact of smoking upon cardiovascular health in the Asia-Pacific region, where data previously have been scarce,[19] thus avoiding the need for indirect estimation of the public health impact of smoking.[20] The Asian results here mainly agree with recent reports from Asia,[21–23] except that two Japanese studies have reported a protective effect of smoking for haemorrhagic stroke.[24,25] This may possibly be explained by chance findings with smaller sample sizes or differences in the make-up of this heterogeneous disease.[5,22,24] Our results underline the observations made by previous authors[4,25,26] that if smoking goes unchecked, the impact of smoking upon health in Asia, and particularly China, will be huge.

We found no difference in the reductions in risk of CVD, for those who have stopped smoking, between Asians and Caucasians. Taken together with a recent meta-analysis,[27] which showed no ethnic differences in the benefit of quitting among those who had previous coronary disease, this suggests that there will be real benefit, in huge absolute numbers, from campaigns to promote quitting in Asia. Previous evidence of the benefits of quitting among Asians is scarce, largely because it happens so rarely (see, for example, Table 1). Unfortunately, in some parts of Asia there is a common belief that sudden quitting after long-term smoking may be harmful.[28] Higher risks among ex-smokers, compared with current smokers, do sometimes occur in observational studies when, as is often the case in Asia, quitting is generally recent. However, this is merely an artefact caused by quitting among those with incident disease,[18] and benefits would be expected to appear soon after quitting in disease-free populations.

It is important that tobacco control activities in Asia take account of gender differences, because of the different causes of, and perceptions about, smoking among Asian women and men.[29,30] The greater relative impact of cigarette smoking, on women's cardiovascular health, which we have demonstrated is of particular public health concern given that the tobacco epidemic is still spreading among women, with a peak not expected for a few decades. If current trends are not halted, it is estimated that there will be over 530 million female smokers by 2025.[31] Furthermore, female smoking generally has a greater impact on family health than does smoking among males.[4] We recommend that tobacco control policies should always, in future, include messages specifically targeted at women.

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KEY MESSAGES

- For CVD, smoking is just as harmful, and quitting is just as beneficial, for Asians as it is for Caucasians within the Asia-Pacific region.
- For CVD, women have greater excess risk from heavy smoking than men, but equal benefit from quitting.
- Public health efforts to limit tobacco use are urgently needed in Asia.
- Tobacco control policies should include items specifically targeted at women.

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Commentary: Smoking and atherosclerotic diseases in Asia—the implication in global atherosclerosis prevention

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Atherosclerotic disease including stroke and coronary artery disease (CAD) is the most important health issue of modern society. Cigarette smoking has been associated with this disease in Western countries.[1] In comparison, the impact of smoking on cardiovascular health has been less well documented in Asia, and, in particular, its impact in China where the population at risk currently comes up to one-quarter of the global population is unclear. Interest in the impact of smoking in China is inspired by the fact that although 70% of Chinese males smoke (compared with current prevalence in the range 20–30% for men in most Western populations), the prevalence of CAD in Chinese men is one-quarter of that for Western men.[2] Furthermore, there is evidence that young Chinese adults have less arterial endothelial dysfunction (a novel surrogate atherosclerosis marker predictive of cardiovascular outcome) than white adults with similar direct or indirect exposure to cigarette smoke.[3] A second cross-sectional study, similarly using a surrogate marker of cardiovascular disease [carotid intima-media thickness (IMT)], found that Chinese adults who had Western lifestyles had thicker IMT than native rural Chinese, and that the detrimental effect of cigarette smoking on IMT was greater in Westernized Chinese living in Hong Kong and Sydney than it was in native rural Chinese.[4] These differences suggest a relative protection of Chinese from the effect of cigarette smoking, possibly due to certain gene differences, which may be modified by Westernization, and subscribe to a gene–environment interaction process, or to an interaction between smoking, changes in lifestyles, and other risk factors in the process of Westernization. While evaluation of the underlying lifestyles, dietary habits, and subsequently physiological and biochemical changes related to such Westernization process are awaited with much interest, these early results call for further studies that examine and compare smoking-related effects in acculturated migrant Chinese population with those in village natives in mainland China.[5]

To illuminate this important health issue, the paper from the Asian Pacific Cohort Studies Collaboration in this issue of the journal[6] addressed the problem from an epidemiological perspective. With the strength of large numbers of subjects (n = 562 338) and, therefore, more precise estimates, they confirmed that smoking is a risk factor for both coronary heart disease (CHD) and stroke, independent of the effects of BMI, blood pressure, and cholesterol, with the amelioration of the effects after quitting. Of much interest and importance, Asians and Caucasians (in Australia and New Zealand) had similar increased proportional cardiovascular risk (relative risk) from smoking cigarettes, and similar relative risk reduction from quitting. Moreover young people and women had greater relative risk of cardiovascular disease from smoking, but the effect declined with age. This report also appropriately

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