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## **Prevention and Control of Chronic Non-communicable Disease in Nine Pacific Rim Cities**

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## **Prevention and Control of Chronic Non-communicable Disease in Nine Pacific Rim Cities**

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# **Prevention and Control of Chronic Non-communicable Disease in Nine Pacific Rim Cities**

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## **Abstract**

Populous, economically dynamic, and rapidly urbanizing, the Asia Pacific both reflects and strongly shapes trends in global public health. A comparative assessment of chronic disease prevalence, risk factors, and policy responses in nine Pacific Rim cities shows that chronic diseases are rapidly becoming the leading cause of morbidity and mortality even in the lower income cities of the Pacific Rim. Policy responses are heterogeneous, with few sufficiently funded or adequately informed by evidence. Much could be learned from comparative research and rigorous evaluation of prevention and control initiatives in this region.

Keywords: Asia, chronic disease, Pacific Rim, urban health

Word count: 3,690

## **Introduction**

Pacific Rim cities can be viewed as a critical bellwether for global public health: with the majority of the global population now living in cities, and the Asia Pacific one of the most populous and dynamic regions of the world, how the cities of this region confront chronic, non-communicable diseases (NCDs) of lifestyle and circumstance will strongly shape the future health of the region and beyond.

NCDs including cardiovascular diseases (CVD), diabetes, cancer and respiratory diseases account for almost half the global burden of disease (World Health Organization, 2008) and affect younger people than in western countries, leading to higher age-specific mortality and disability rates than high-income countries experienced at the peak of their CVD epidemics (Leeder, Raymond, Greenberg, Liu H, & Esson, 2004). Although many global health initiatives focus exclusively on infectious disease (e.g. the Millennium Development Goals do not include any NCD targets) (Anderson & Chu, 2007), NCDs more recently have become the focus of a global alliance of research funding agencies and other initiatives (Nabel, Stevens, & Smith, 2009). The World Health Organization (WHO) has endorsed a global strategy to address NCDs and their common preventable risk factors related to lifestyle (tobacco use, unhealthy diet and physical inactivity).

This paper presents information on NCD prevention and control in 9 Pacific Rim cities -- ranging from medium-sized ones like Danang (0.8m) in Vietnam, Kuala Lumpur (1.6m) in Malaysia and San Bernadino (2m) in California, to the city-state of Singapore (4.5m), the autonomous region of Hong Kong (7m), a Chinese provincial capital like Hangzhou (7.8m), to megacities like Jakarta (9m), Seoul (10m), and Tokyo (13m). As shown in Table 1, all are major urban centers at the forefront of the epidemiological and

demographic transitions sweeping across the Pacific Basin. Our aim is to provide a baseline comparative assessment of chronic disease prevalence, policy and programming in these cities to identify gaps and research needs for NCD control in the region.

### **Risk factors, morbidity and mortality attributable to NCDs**

Tables 2 and 3 present data on NCD risk factors and NCD prevalence rates for the 9 cities as well as for each corresponding nation or region. Unfortunately, strictly comparable data is not always available, such as for air pollution or lead exposures. What data there is clearly shows significant rates and upward trends in both NCDs and their risk factors such as physical inactivity and obesity. Rates of male smoking are particularly high.

Intriguing patterns underlie the epidemic of NCDs and its policy response in the region. In Singapore, for instance, several risk factors improved since 1998: the prevalence rates for daily smoking, high cholesterol, and hypertension declined, and the percentage of Singaporeans eating more than two servings of fruit and vegetables a day increased. But physical inactivity has risen sharply; prevalence of overweight and obesity has increased; and more Singaporeans report being frequent drinkers of alcohol. In Seoul, where cancer, cerebrovascular disease and heart disease are the top three causes of death, smoking prevalence is lower, but alcohol drinking higher, than the corresponding national rates (Korea Ministry of Health and Welfare, 2006). A national study showed that in Seoul as elsewhere in Korea, there is a gradient of educational differentials in mortality among both sexes, with higher mortality rates related to lower educational attainment (Khang & Kim, 2006).

According to WHO country data, the percentage of years of life lost attributable to NCDs ranges from lows of 32% in Indonesia (2004) and 46% in Vietnam (2004), to as high as 76% in Japan (2004); see Table 4. That lower-income countries are particularly ill-prepared for the shift toward NCDs is evident from their higher age-standardized mortality rates. The differences between high- and low-income areas in morbidity and mortality attributable to NCDs is still considerable, but narrower, when focusing on urban populations as we do. For example, the age-standardized mortality rate for all NCDs is 627 for China but 357 in Hangzhou, which is comparable to that of Singapore (354).

### **Economic burden of disease from NCDs**

Some studies have pointed to the large economic burden associated with NCDs. For example, loss of income to the economy attributable to obesity has been estimated at US\$ 203 per capita in 2006 for San Bernadino (and \$225 per capita for California), and the lost productivity due to physical inactivity as \$97 per capita (\$336 per capita for California) (California Center for Public Health Advocacy, 2006). The same study estimates that the medical care costs associated with physical inactivity are \$264 per capita in San Bernadino (\$219 for CA), and the medical expenditures due to obesity were \$188 per person (\$351 per person in the state as a whole). In Singapore, NCDs accounted for 82% of years of life lost in 2004 (Epidemiology & Disease Control Division of Ministry of Health in Singapore, 2004).

As for the economic burden associated with specific risk factors, that of tobacco use is the most widely available. In Hong Kong in 1998, the annual value of direct medical costs, long term care and productivity loss was estimated to reach US\$ 532

million for active smoking and US\$ 156 million for passive smoking; passive smoking accounted for 23% of the total costs. Adding the value of smoking-attributable lives lost brought the annual cost to US\$ 9.4 billion (McGhee, Ho, Lapsley, Chau, Cheung, Ho, et al., 2006). In Singapore, a study estimated that the cost of healthcare, absenteeism and loss of productivity stemming from smoking-related diseases cost the nation between \$700 million and \$800 million (or US\$563) in 1997 (Quah, Tan, Saw, &Yong, 2002). In Indonesia, the economic loss from tobacco-caused premature mortality, morbidity and disability was estimated to be at least US\$ 13.84 billion, or about 4.7 times larger than the tobacco tax revenues of US\$ 2.94 billion (Kosen, 1998). According to estimates from 1998, the economic burden of smoking in Korea (for the population over the age of 35) totaled US\$ 2.96 billion, with the vast majority of those costs (2.67b) from premature death (Kang, Kim, Park, Jee, Nam, & Park, 2003). In Japan, the burden of disease attributable to tobacco amounted to 10% of the total years of life lost and 7% of total DALYs (Shibuya, 2001).

### **NCD Prevention and Control Policies**

Most of the cities we study adopted within the last decade either national or local strategies to prevent and control NCDs. For example, Singapore has had a multi-pronged NCD management framework since 2000, developed through the Ministry of Health. The Japanese Ministry of Health, Labor and Welfare also launched its National Health Promotion Movement in 2000. In June 2002, the Vietnamese Prime Minister signed a government resolution establishing the “National Program on Prevention and Control of



NCDs for 2002-2010.” Similar programs were launched in Indonesia in 2006 and Hong Kong in 2008.

#### Overall objectives and strategies

As detailed in Table 5, most strategies focus on preventable conditions which share commonalities in their etiology and major modifiable risk factors. Within this broad framework, however, different Pacific Rim cities have developed emphases specific to their distinctive epidemiological, social, and institutional circumstances. For example, Japan’s national strategy is closely linked to population aging. Japan has established long-term care insurance and has put in place a 10-year strategy to reduce the use of long-term care by promoting physical and intellectual activities for the elderly. The “Healthy Japan 21” program encourages citizens to follow healthy lifestyles.

The aim of the Singapore Chronic Disease Management Program, launched in 2006, is to shift the focus away from episodic and reactive care of symptoms towards a paradigm of life-long holistic care. This strategy relies on four basic policies: emphasizing primary prevention; creating a supportive environment for the enhancement of health; actively setting goals and assessing results; and promoting effective, well-coordinated activities by the various implementing bodies.

In Hong Kong, six strategic directions have been identified: supporting new and strengthening existing health promotion activities; generating an effective information system to guide action across the disease pathway; fostering engagement of all relevant stakeholders; building capacity; ensuring a health sector that is responsive to NCD challenges; and strengthening health-promoting legislation.

## Organizational structure

The institutional arrangement for overseeing NCD control policies and programs differs considerably across jurisdictions. Sometimes new responsibilities are added to the mandates of existing agencies. In Japan, the Ministry of Health, Labor and Welfare oversees and finances the national plan, although some policies and programs involve other ministries and the cabinet. In many cases, new divisions or sections within health ministries have been created to target NCD control. Singapore's Ministry of Health created an autonomous but state-funded Health Promotion Board (HPB) in April 2001. In The Indonesian "Strategic Plan of the Ministry of Health 2005-2009" established the Directorate of NCDs under the Directorate for General Disease Control and Environmental Health. Jakarta's programs operate under that national framework. In Malaysia, the Disease Control Division of the Ministry of Health, created in 1992, includes a designated section on NCDs.

NCD control strategies often fall under the purview of more than one government agency. The China CDC and the MOH both have strategies and aims for NCD control and improvement of risk factors. Various governmental and professional agencies administer these programs, mostly financed by central and local governments. An ambitious program with a detailed list of specific targets, "Healthy China 2020," was announced in 2009 alongside a health system reform plan that involved coordination among 16 different government agencies and had been posted for public comment in fall 2008.

Hong Kong's "NCD Prevention and Control Strategic Framework," published by the Department of Health in October 2008, sets the scope, vision, goals, and strategic direction for NCD prevention and control in Hong Kong. In preparing the framework, the Department of Health held an Expert Group meeting with over 40 participants from various disciplines and sectors. Other organizations active in disease prevention include the Hospital Authority and the Tobacco Control Office.

In some cases, specific NCD programs fall under the jurisdiction of different government organizations. In Vietnam, for instance, the National Institute for Cardiovascular Disease manages the program on prevention and control of CVD; the National Institute of Oncology manages the program on cancer; and the National Institutes of Endocrinology and Psychiatry manage programs on diabetes and mental illness, respectively.

#### City-specific strategies

There is an interesting question of national versus city-specific NCD policies (except for the city-state of Singapore). In Danang, Jakarta, and San Bernadino, local authorities primarily implement guidelines established by national, state or provincial authorities. Other cities have begun to articulate their own NCD prevention and control strategies, even in the absence of national strategies. For example, although in Malaysia no specific targets have been set for NCD control, the Kuala Lumpur Federal Territory Health Department has a NCD subunit under the Disease Control Unit.

Hangzhou, like many other cities in the PRC, has developed its own strategies for population health improvement with local government, bureaus of health and China CDC

offices as the key players. In 2003, the Hangzhou health bureau published a policy reinforcing community-integrated prevention and treatment coordinated by community health centers. In 2004, the Hangzhou CDC developed prevention and treatment programs for hypertension, diabetes, malignant cancers and other NCDs, and trained relevant health professionals. Measuring blood pressure, limiting salt intake, and obesity interventions are the priority programs, with attempts to personalize recommendations for diet and physical activity for patients with diabetes. In September 2009, Hangzhou launched a three-year intervention plan for major chronic diseases that calls for creating electronic health records and monitoring blood pressure and blood sugar free of charge for adult residents before retirement (see Table 5).

The Department of Health in Seoul established two strategies and ten programs for NCDs for 2007-2010. One is the prevention and management project, which encompasses education and information about physical exercise; promotion of moderation in alcohol consumption and quitting smoking; early detection through regular health examinations; building databases and networks for management of NCDs in the community; and financial support for vulnerable groups. A second project in Seoul focuses on education about nutrition, healthy diets, and reducing environmental pollution.

In some Pacific Rim cities, subsets of districts or wards implement more aggressive NCD control policies than elsewhere in the municipality. Several wards in Tokyo prohibit smoking in all public places, for example.

Defining specific targets

Several NCD control strategies around the Pacific Rim include specific targets that combine regular surveillance with programs designed to change behaviors. Tokyo is implementing Japan's National Health Promotion Movement, for example, which included 70 specific targets for 2010. Five examples are increasing the percentage of people who regularly exercise to more than 63%; decreasing the prevalence of people who feel stressed to 49% or less; increasing to 100% the fraction of people who know about the harmful effects of smoking; decreasing hyperlipidemia among males to less than 5.2% and among females to less than 8.7%; and increasing to 100% the percentage of patients with diabetes who adhere to treatment. In addition, the Health Promotion Law, enforced since May 2003, established legal foundations for facilitating greater health promotion efforts by citizens.

Seoul's strategies and programs for NCDs operate under the Korean National Health Plan for 2006-2010, developed by the Ministry for Health, Welfare and Family Affairs. The national plan includes specific goals such as reducing smoking among males from 61.8% in 2002 to 30% by 2010; reducing the number of excessive drinkers; and increasing exercise, nutrition, and cancer screening. Through such measures, the 5-year plan aims to extend the 'healthy life span' for males from 64.8 to 69.7 and for females from 70.8 to 74.2, and reduce disparities. The Korea CDC's 'Annual Guideline for the Chronic Disease Management Project' annually updates guidelines for national and community-based chronic disease prevention.

Designating numeric targets for improvement is not exclusive to higher-income Pacific Rim cities. Danang in Vietnam, for example, is implementing the national cancer control strategy; its goals for 2006-2010 include reducing the incidence of tobacco-

related cancers by 30%; vaccinating all newborns against Hepatitis B; and reducing the mortality rate for other cancers through screening, early detection, and timely treatment.

#### Prevention and control programs for specific NCDs

Starting from a common premise, the specific NCD programs adopted in Pacific Rim cities nevertheless vary considerably in scope and results, as might be expected from such a diverse range of municipalities.

As early as 1986, Singapore launched the National Smoking Control Program and established a National Smoking Control Coordinating Committee to make non-smoking a social norm and eliminate exposure to passive smoking. The strategy was multi-pronged, including legislation, tobacco taxation, health education, and smoking cessation services, as well as inter-sectoral collaboration and community mobilization. Smoking is prohibited in all public places; tobacco advertisement is prohibited; and graphic health warning labels on cigarette packs are mandatory.

To address other risk factors and NCDs, Singapore's Health Promotion Board offers workplace health promotion programs, a School Health Program, and works with community partners to promote healthy lifestyles. Since 2006, the Singapore Chronic Disease Management Program supports the promulgation of disease treatment protocols and provision of training for general practitioners and nurse educators. Trained "wellness coordinators" help the elderly actively manage their conditions. Singapore gave incentives for individuals to use up to S\$300 (or US\$ 211) a year out of Medisave for chronic disease outpatient treatment.

In Hong Kong, the Health Plan (2006-2010) established policies for decreasing the smoking rate and supporting nutrition for poor families. The Men's Health Program and the Cervical Screening Program promote health of men and regular use of pap smears to prevent cervical cancer in women, respectively. There are no territory-wide programs for other specific NCDs, although services provided by the Department of Health and the Hospital Authority target specific populations such as patients who are suffering from chronic diseases that are not well controlled. The Department of Health also organizes centers to screen older people for chronic diseases.

#### Evidence of results and implementation challenges

Documenting favorable results from NCD control strategies has been challenging (Chen, Zhang, & Zhang, 2008; Wu, Cai, & Sun, 2005). For example, the mid-term evaluation of "Healthy Japan 21" shows that progress has been made, but significant challenges persist. Age-adjusted mortality rates for CVD and stroke in Japan have declined, but obesity is just as prevalent among women as before, and among men obesity is increasing. The prevalence of diabetes and hyperlipidemia is increasing, while rates of physical activity are decreasing (Hideya, 2003).

In Singapore, tobacco taxation and comprehensive legislation have been effective tools for smoking control. Increasing retail prices of cigarettes since 1972 have coincided with decreasing per capita consumption. Taxes represent 67 percent of the average retail price of a pack of cigarettes. When Singapore ratified the WHO Framework Convention on Tobacco Control in December 2003, it was already exceeding the requirements pertaining to tobacco sponsorship, promotion and advertising. The daily-smokers

prevalence (aged 18-69 years) in Singapore has declined to one of the lowest in the world – from 20% in 1984 to 12.6% in 2004. However, smoking has increased among females from 1992 to 2004, particularly among those aged 18-29 years – a disturbing trend common in many developed countries.

Singapore's strategic NCD framework has garnered active support from the media and has had some success engaging providers and patients. However, numerous challenges remain, such as lack of disease management understanding among GPs and lack of evidence on the effectiveness of disease management programs.

There is also scant published data evaluating Hong Kong's numerous NCD programs. Hong Kong's fragmented primary, secondary and tertiary care (with primary care dominated by the private sector while secondary and tertiary care are dominated by the public sector) has yet to establish linkages that would be important for integrated NCD prevention and control.

Hangzhou illustrates some of the nascent NCD control policies in China's cities. Hangzhou's 45 community health centers and 205 community medical service stations cover 95% of residents. Studies suggest that medical records are reasonably complete for more than 70% of residents, a clear improvement from previously. Residents 60 years of age and older now receive regular physical examinations. By late 2006, 99,300 hypertensive patients and 19,100 patients with diabetes were followed up and managed, mostly in their local communities. After a year, blood pressure was in the normal range for 62% of hypertensive patients; the rate of smoking decreased 6.8% among hypertensive patients; alcohol consumption declined 1.3%; and the share of patients



attaining low salt diets was 47.6% (Chen, Zhang, & Zhang, 2008; Wu, Cai, & Sun, 2005).

However, there remains a dearth of studies on the relative effectiveness and cost-effectiveness of various approaches to NCD prevention and control in China. A key barrier in Hangzhou, as in many other localities in China, has been the relatively low level of government financial support for health. The April 2009 announcement of national reforms promises significant increases in government financing for public health and social health insurance, financed from both central and local governments. It remains to be seen how significantly this will impact NCD prevention and control.

NCD programs in Seoul confront many of the same barriers as elsewhere in Korea. The government has responsibility for public health services but still plays a modest role in disease prevention and health promotion, and has a limited role as a provider of curative services. Hospitals operate extended outpatient departments and many clinics provide inpatient treatments, particularly in surgery and obstetrics. Demographic shifts, such decreased fertility and population ageing, have been even more acute in Seoul. One area of some progress has been tobacco control. A foundation for sustainable health promotion has been established by earmarking the income from tobacco taxes for antismoking efforts consistent with the Framework Convention on Tobacco Control.

Additional challenges for NCD programs around the Pacific Rim include high out-of-pocket costs for medical services (e.g. in Korea) or limited insurance coverage (such as in the US before reform), and pressure from unfavorable trends in the broader social determinants of health, especially during the recent economic crisis.

## **Discussion**

The epidemic of chronic NCDs around the Pacific Rim is clearly evident in the 9 cities studied. NCDs are rapidly becoming the leading cause of morbidity and mortality even in the low income cities of the Pacific Rim.

Responses differ among health systems, with the most aggressive policies and programs in systems where the burden of NCDs is the largest and of longest standing. Several regions have begun exemplary programs. Singapore's anti-smoking efforts have been impressive. Other Asia-Pacific programs in Korea and Australia have been cited by the WHO as models for earmarking tobacco and alcohol taxes for NCD prevention and control (The Women's Professional Racquetball Organization (WPRO), 2008).

However, compared to the depth and breadth of the challenge to population health, most responses do not appear to be well coordinated or well funded, or adequately informed by evidence. In particular, the burden of NCDs on the poor in the context of rapid urbanization is not well documented or recognized in policy. Challenges to implementation abound, and rigorous evaluations are limited. Since NCDs originate from a complicated set of social determinants and cannot be addressed by the health sector working in isolation, the success of policies and programs are also profoundly shaped by the broader context of fiscal federalism, decentralized decision-making, and uneven economic development.

As a collaboration of researchers from Pacific Rim research universities, we in particular note the vital link between research and action for NCD control. Although some researchers and other stakeholders have played a role in achieving progress, few

jurisdictions have organized forums for researchers and policy makers to jointly discuss and prioritize research needs, or for captains of industry, commerce and civil society to interact with public health policy and research groups on establishing research needs.

Significant research gaps remain. Our review highlights four specific areas that would benefit from comparative and collaborative approaches. First, there is inconsistent health risk behavior data available, especially for youth. Strategies for NCD control should include empirical investigation of how rapid social, economic and cultural change impact health risk behaviors.

Second, the health workforce needs to be prepared for confronting NCDs. One example comes from Vietnam, where the national program on diabetes seeks to improve quality through training doctors and nurses at district and commune levels.

Third, monitoring and evaluation of policies and programs should integrate studies of economic efficiency. Few rigorous studies assess the cost-effectiveness of patient self-management, comprehensive primary care, alternative provider payment schemes, or organizational innovations in health service delivery.

Fourth, there is considerable scope to strengthen links from research to action. Research collaborations should focus on providing measurable health improvements, drawing on best practices and incorporating multi-institution collaborative improvement methods (Øvretveit, Bate, Cleary, Cretin, Gustafson, McInnes, et al., 2002). A series of “breakthrough collaboratives” among key stakeholders in Pacific Rim cities could play an important role in bridging research and practice to improve population health in this key region of the world.

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**Table 1. Demographic and Socioeconomic Characteristics of Selected Pacific Rim Economies, 2007**

Demographic and socioeconomic statistics		P.R.China	Hangzhou	Hong Kong	Japan	Tokyo	Indonesia	Jakarta	Malaysia	Kuala Lumpur	Singapore	R.O.Korea	Seoul	U.S.	California	San Bernadino	Vietnam	Danang
Population	Total (million)	1336.3	7.86	6.9	128	12.8	231.6	8.9 (00)	26.6	1.6	<b>4.4</b> (06)	48.2	10.4	305.8	36.4	2	87.38	0.81
	Median age	33	33	39(06)	44	42.8 (05)	27	n/a	25	n/a	<b>38</b> (06)	36	n/a	36	n/a	n/a	26	n/a
	Under 15 (%)	21	13.02	13.3	14	11.7	28	n/a	30	32.2	<b>19</b> (06)	18	16.44	20	27 (<17)	30.1 (<17)	28	n/a
	Over 60 (%)	11	10.81 (65+)	16.5	28	19.7 **	9	n/a	7	n/a	<b>13</b> (06)	15	n/a	17	10.6 (65+)	8.2 (65+)	8	n/a
	Annual growth rate (%)	<b>0.6</b> (06)	2.68	0.6 (06)	<b>0</b> (06)	0.78	<b>1.2</b> (06)	n/a	<b>1.8</b> (06)	n/a	<b>1.3</b> (06)	<b>0.4</b> (06)	n/a	<b>1</b> (06)	n/a	n/a	<b>1.4</b> (06)	n/a
	Living in urban areas (%)	43	69.01	na	66	n/a	50	n/a	70	n/a	<b>100</b> (06)	81	n/a	81	n/a	n/a	27	79
Total fertility rate (per woman)		1.7	na	0.98 (06)	1.3	1.05	2.2	n/a	2.6	n/a	<b>1.3</b> (06)	1.2	0.92	2.1	n/a	n/a	2.2	n/a
Adolescent fertility rate (per 1000)		<b>3</b> (02)	na	na	<b>6</b> (04)	n/a	<b>54</b> (01)	n/a	<b>12</b> (00)	n/a	<b>7</b> (04)	<b>2</b> (04)	n/a	<b>43</b> (02)	n/a	n/a	<b>25</b> (00)	n/a
Adult literacy rate (%)		<b>90.9</b> (00)	14.99	93 (06)*	n/a	n/a	<b>90.4</b> (04)	n/a	<b>88.7</b> (00)	n/a	<b>89.1</b> (90)	n/a	n/a	n/a	n/a	n/a	<b>90.3</b> (99)	n/a
Net primary school enrollment rate (%)	Male	n/a	n/a	99.9 (06)	<b>100</b> (05)	n/a	<b>96</b> (05)	n/a	<b>99</b> (04)	n/a	<b>77</b> (02)	<b>100</b> (02)	n/a	<b>91</b> (05)			<b>96</b> (01)	n/a
	Female	n/a	n/a	99.9 (06)	<b>100</b> (05)	n/a	<b>93</b> (05)	n/a	<b>99</b> (04)	n/a	<b>77</b> (02)	<b>93</b> (02)	n/a	<b>92</b> (05)	total	total	<b>91</b> (01)	n/a
Gross national income per capita (1000 PPP int. \$)		<b>4.6</b> (06)	n/a	43.9 (08)**	34.6	n/a	3.6	n/a	13.6	n/a	<b>43.3</b> (06)	24.8	n/a	45.9	n/a	n/a	2.6	n/a
Population living <\$1 (PPP int. \$) a day (%)		<b>9.9</b> (04)	n/a	n/a	n/a	n/a	7.5 (02)	n/a	<1 (05)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	22.8 (05)	n/a

\* The adult literacy rate refers to the % of people aged 15 or above with primary education or above.

\*\* For Hong Kong, the figure refers to gross domestic income per capita (in internationally comparable dollars)

**Table 2. Risk Factors for Chronic Disease in Nine Pacific Rim Cities, 2006**

Risk Factors (%)		P.R.China	Hangzhou	Hong Kong	Japan	Tokyo	Indonesia	Jakarta	Malaysia	Kuala Lumpur	Singapore	R.O.Korea	Seoul	U.S.	California	San Bernardino	Vietnam	Danang		
Adult <sup>1</sup> Obesity	M	<b>2.4 (02)</b>	n/a	32.2* (08)	<b>2.9 (01)**</b>	**	<b>1.1 (01)</b>	n/a	<b>10.1 (03)</b>	14.4	<b>6.4 (04)</b>	n/a	31.7 (07)	<b>31.1 (04)</b>	43.4 over-weight or obese (05-07)	55.7 over-weight or obese (05-07)	0.3 (07)	n/a		
	F	<b>3.4 (02)</b>	n/a	13.6* (08)	<b>3.1 (01)**</b>	**	<b>3.6 (01)</b>	n/a	<b>18.8 (03)</b>	14.4	<b>7.3 (04)</b>	n/a	31.7 (07)	<b>33.2 (04)</b>	43.4 over-weight or obese (05-07)	55.7 over-weight or obese (05-07)	0.6 (07)	n/a		
Adult alcohol consumption (L/person/yr)		5.2 (03)	n/a	18.1*** (08)	7.59 (03)	n/a	4.6***	<b>4**</b>	1.06 (03)	n/a	<b>2.17 (03)</b>	7.87 (03)	n/a	8.61 (03)	21.9***	29.7***	0.85 (03)	n/a		
Smoking	Adult	M	59.5 (05)	58	20.5 (06)	36.8 (08)	n/a	63.2	54.4 (05)	n/a	n/a	53.3 (05)	n/a	26.3 (05)	11.6 (self-reported current smokers among teens and adults)	15.1 (self-reported current smokers among teens and adults)	45.7 (05)	n/a		
		F	3.7 (05)	2.7	3.6 (06)	9.1 (08)	n/a	4.5	2.8 (05)	n/a	n/a	5.7 (05)	n/a	21.5 (05)			2.5 (05)	n/a		
		overall	<b>31.8 (05)</b>	n/a	11.8 (06)	21.8 (08)	n/a	35.4 (05)	28.8 (05)	15.7(06)	n/a	29.7 (05)	25.3(07) age>19	<b>23.9 (05)</b>			24.3 (05)	n/a		
	Adolescent <sup>2</sup>	M	<b>7.1 (05)</b>	n/a	8.7 (09)	7.3 (04)&	n/a	<b>26.1</b>	<b>40 (03)</b>	n/a	10.5 (05)	<b>10.9 (05)</b>	n/a	n/a			11.6 (self-reported current smokers among teens and adults)	15.1 (self-reported current smokers among teens and adults)	<b>3.2 (03)</b>	n/a
		F	<b>4.1 (05)</b>	n/a	3.3 (09)	4.8 (04)&	n/a	<b>4</b>	<b>11.5 (03)</b>	n/a	7.5 (05)	<b>8.8 (05)</b>	n/a	n/a					<b>1 (03)</b>	n/a
		overall	<b>5.5 (05)</b>	n/a	6 (09)	n/a	n/a	<b>13.5</b>	<b>25.8 (03)</b>	n/a	12.6#	<b>10.2 (05)</b>	n/a	n/a					<b>2.2 (03)</b>	n/a
Insufficient fruit and vegetable consumption		n/a	n/a	n/a	n/a	n/a	<b>93.6</b>	4.5	n/a	n/a	57.2(04)	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Physically inactive		n/a	n/a	n/a	n/a	n/a	<b>48.2</b>	55	n/a	54.9(06)	48.1(04)	n/a	13.9 (07)	n/a	10.3 (05-07)	16.2 (05-07)	n/a	n/a		
Hyper-cholesterolemia		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	16.6(06)	18.7(04)	n/a	10.8(07) Age>30	n/a	n/a	n/a	n/a	n/a		

1) Adults are aged ≥ 15 years

2) Adolescent is 13–15 years old.

※ **13.0** separate estimate for Hong Kong (11.8) and Hangzhou (13.6) by 32.7 for Kuala Lumpur.

# adults age 18-69

\* Obesity refers to BMI ≥ 25.

\*\*In Japan, over-weight (defined as BMI ≥ 25) was 28.6% for males and 20.6% for females in 2008. For Tokyo, 25.3% of males and 15.3% of females were overweight in 2007.

\*\*\* % of people who have at least one alcoholic drink at least 1 day per week

& Among 14-15 year old adolescents (grade 3 middle school), the percent in 2004 who reported smoking once or more during the previous 30 days



**Table 3. Prevalence of Non-Communicable Diseases in Nine Pacific Rim Cities, 2007**

Prevalence of NCDs (%)	P.R. China		Hangzhou		Hong Kong		Japan		Tokyo		Indonesia		Jakarta		Malaysia		Kuala Lumpur		Singapore		R.O.Korea		Seoul		U.S.		California		San Bernardino		Vietnam		Danang	
Asthma	n/a	n/a	1.9 (04)	0.855 (05)	1.04 (05)	3.5	2.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2.2 (07)	n/a	13.3 (05-07)#	14.9 (05-07)#	2(rural)-6(urban) (04)	n/a	n/a	n/a	n/a	n/a			
Cancer/Tumor	n/a	2.75	1.3 (04)	1.11	1.07 (05)	0.43	0.74	12.9 (03)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6.3 (05-07)#	8.2 (05-07)#	1.24 (02)	2.58% of hospitalized patients (07)	n/a	n/a	n/a	n/a			
COPD	0.75 (03)	6.01	1.4 (04)	n/a	0.16 (05)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
CVD	0.46(03)	13.1	1.6(04)	n/a	n/a	7.2	8.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.7 (05-07)#	6.5 (05-07)#	14.3(01-02)	n/a	n/a	n/a	n/a	n/a		
Depression	11.15 (03)*	n/a	1.5 (04)	n/a	n/a	n/a	na	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		
Diabetes	0.56 (03)	7	3.8 (04)	1.93 (05)	1.48 (05)	1.1	2.6	14.9**	12.6 (06)#	8.2 (04)***	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.0 (05-07)#	9.2 (05-07)#	n/a	n/a	n/a	n/a	n/a			
Hypertension	18.8(02)	32.6	27.2 (04)	6.11 (05)	5.36 (05)	31.7 #	28.8#	32.2‡	22.5 (06)‡	20.1 (04)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.9 *	1.39 *	14.3 (01-02)+	n/a	n/a	n/a	n/a	n/a		
Mental illness	11.15 (03)*	1.47 (06)&	2.5 (04)	n/a	2.26 (05)	0.46	2.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	32.9 (05-07)#	50.5 (05-07)#	14.9 (00-02)	n/a	n/a	n/a	n/a	n/a		
Stroke	0.66 (03)	2.95	1.1 (04)	1.07 (05)	0.85 (05)	0.83	1.25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.7 (05-07)#	2.6 (05-07)#	n/a	n/a	n/a	n/a	n/a	n/a		
NCDs overall	12.33	n/a	16.7 (08)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		

\* Aged ≥15 years; \*\*Aged ≥30 years; \*\*\* Aged 18-69 years; + Aged ≥16 years; # Aged ≥18 years; & Aged ≥60 years

※ Aged >49 years (age and sex-standardized), incidence of 1.8/1000 patient-years

† with one or more long-term medical conditions

‡ ≥18 years, Definition of Hypertension: ≥140/90mmHg

**Table 4. Mortality and Burden of Disease in Selected Pacific Rim Cities, 2007**

		P.R.China	Hangzhou	Hong Kong	Japan	Indonesia	Jakarta	Malaysia	Singapore	R.O.Korea	Seoul	U.S.	California	San Bernardino	Vietnam
Distribution of years of life lost by broad causes (%)	Communicable	20(04)	n/a	n/a	8(04)	31(04)	n/a	28(04)	12(04)	6(04)	n/a	9(04)	n/a	n/a	39(04)
	Non-communicable	59(04)	n/a	n/a	76(04)	32(04)	n/a	55(04)	73(04)	72(04)	n/a	73(04)	n/a	n/a	46(04)
	Injuries	21(04)	n/a	n/a	16(04)	37(04)	n/a	17(04)	14(04)	22(04)	n/a	18(04)	n/a	n/a	15(04)
Age-standardized mortality rates by cause (per 100 000 population)	Non-communicable (total)	627(04)	357.11(02)*	n/a	284(04)	690(04)	n/a	623(04)	376(02); 345(04)	470(04)	n/a	450(04)	n/a	n/a	611(04)
	Of which: cardiovascular	279(04); 100.6(07)*	23.49(02)*	92	103(04)	344(04)	5.1	275(04)	171.4(02); 164(04)	168(04)	43.7# (07)	179(04)	n/a	n/a	295(04)
	COPD	n/a	36.85(02)*	n/a	n/a	n/a	n/a	n/a	15.5(02)	n/a	n/a	n/a	n/a	n/a	n/a
	diabetes	19*	5.89(02)*	7.3	n/a	n/a	5.7	n/a	16.3(02)	n/a	22.9# (07)	n/a	21.9(05-07)	30.7(05-07)	2.7(04)
	cancer/malignant tumor	143(04); 176.2(07)*	69.81(02)*	177.8	120(04)	127(04)	5.7	137(04)	113(04); 127.5(02)	161(04)	137.5# (07)	133(04)	159.3(05-07)	175.8(05-07)	115(04)
	stroke	111.5*	n/a	n/a	n/a	n/a	15.4	n/a	45(02)	n/a	n/a	n/a	44(05-07)	47.1(05-07)	n/a
	cerebrovascular disease	n/a	41.37(02)*	50.7	n/a	n/a	n/a	n/a	n/a	n/a	59.6# (07)	n/a	n/a	n/a	n/a
	Injuries	73(04)	n/a	n/a	39(04)	233(04)	n/a	53(04)	27(04)	67(04)	15.5# (07)	50(04)	n/a	n/a	64(04)

\*urban residents; # not age-standardized

Note: All data are for 2007 unless otherwise indicated by the number in parentheses; for example, (04) = 2004. No comparable data available for Tokyo, Kuala Lumpur, or Danang.

**Table 5. Chronic Disease Policies and Programs in Nine Pacific Rim Cities**

		Current NCD control and prevention strategies	Management programs for specific chronic diseases	Availability of funds or financial incentives to finance Chronic Disease Management Programs
China	PRC	*"Healthy China 2020" (2008)	Varies by province/region	Varies by province/region
	Hangzhou	• Efforts to provide community-based integrated prevention and treatment of NCDs through community health centers	In September 2009, Hangzhou launched a "three-year intervention plan for major chronic diseases" that calls for creating electronic health records and monitoring blood pressure and blood sugar free of charge for adult residents before retirement (males age 35-59 and females age 35-54).	
	Hong Kong	*"NCD Prevention and Control Strategic Framework" (2008): focus on underlying lifestyle factors; health promotion movement *Health Plan" (2006-2010)	No specific territory-wide program, but there are programs/services provided by the Department of Health or the Hospital Authority targeting specific populations such as patients who are suffering from NCDs whose conditions are not well-controlled.	Pilot projects include partially subsidizing purchase of primary care services from the private sector in Tin Shui Wai North district; implementing a public-private shared care program for chronic disease patients; subsidizing end stage renal disease patients to purchase haemodialysis service from private centers, etc.
Japan	National	*"National Health Promotion Movement" includes many specific numeric targets for NCD control; the Focused Health Checkup/Focused Health Consultation system was started from April 2008.		
	Tokyo	Implementing Japan's National Health Promotion Movement; several wards prohibit smoking while walking in public places		
Indonesia	National	*"Healthy Indonesia 2010" *Strategic Plan of the Ministry of Health 2005-2009": control cancer, chronic and degenerative conditions, heart and circulatory disorders, diabetes and metabolic conditions, and prevent	N	N
	Jakarta			
Malaysia	National	No specific policy on NCDs. The "MOH Strategic Plan 2006-2010" calls for focus on road traffic injuries, ischemic heart disease, mental illness, cerebrovascular diseases, cancer, asthma, COPD, diabetes, dengue, HIV and others.	Y - There are specific programs for diabetes & cardiovascular diseases, cancers, violence & injury, substance abuse including alcohol, tobacco control, occupational & environmental health	Y - No program- specific budget for management of NCDs but it is part of the national operating health budget
	Kuala Lumpur	Follows the National Health Policy. There are programs for specific NCDs like diabetes and mental health.	Y - There are specific programs for diabetes & cardiovascular diseases, cancers, violence & injury, substance abuse including alcohol, tobacco control, occupational & environmental health	Y - No program- specific budget for management of NCDs but it is part of the national operating health budget
Singapore		• Government finances broad range of health promotion activities accompanied by supportive legislation.  • Established Health Promotion Board in 2001 which targets all segments of the population using a variety of strategies and approaches. Programs include Breast screening, Cervical screening, Childhood Injury Prevention, Community Health Screening, Mental Health Education, Myopia Prevention, Physical Activity, Smoking Control, Nutrition, Osteoporosis Education and Workplace Health Promotion.	•Chronic Disease Management Programme (CDMP) (2006) with focus on diabetes , hypertension, hyperlipidemia, stroke, asthma, depression and schizophrenia. The program has enlisted the support of more than 700 GP clinics and GP groups to provide systematic, evidence-based chronic disease management programs on an outpatient basis.	Incentives for individuals to use up to S\$300 a year out of Medisave for chronic disease outpatient treatment
South Korea	National	*"Health Plan for 2006-2010": numerous specific goals for prevention and control of NCDs.	Korea CDC develops an 'Annual Guideline for the Chronic Disease Management Project' to update guidelines for national and community-based chronic disease prevention	
	Seoul	Seoul Department of Health established 2 strategies and 10 programs for NCDs for 2007-2010. The prevention and management project encompasses education and information about physical exercise; promotion of moderation in drink and quitting smoking; early detection through regular health examinations; building databases and networks for management of NCDs in the community. A second project in Seoul is "preparing the environment for prevention of NCDs," which includes education about nutrition and healthy diets and reducing environmental pollution.		Seoul's prevention and management project offers support in paying medical bills for vulnerable groups of patients suffering from NCDs.
USA	National	*"Healthy People 2010": 1) Increase Quality and Years of Healthy Life 2) Eliminate Health Disparities; •Promote institutions and organizations to use framework to direct action; •Education for self-management	A range of programs through given insurers (e.g. health maintenance organizations)	A range of programs through given insurers (e.g. health maintenance organizations)
	San Bernadino	•promote cooperation between community organizations		• Incentives specific to private insurers and employers, as well as through California's Medical Assistance Program (Medi-Cal)
Vietnam	National	*National Cancer Prevention and Control Program of Vietnam 2006 and 2010 *National Program on Prevention and Control of NCDs for the period 2002-2010": includes cardiovascular diseases, cancer, diabetes and some metal diseases	NCD prevention and control programs have not yet widely expanded to provincial, district and commune levels. There is limited coordination of activities or involvement of non-health sectors and communities.	
	Danang	•cervical cancer prevention and control		

## List of Tables

Table 1. Demographic and Socioeconomic Characteristics of Selected Pacific Rim Economies, 2007

Sources: World Health Organization (2009), with the following exceptions: the data in bold are from the United Nations; and all data for Hong Kong are from the Census and Statistics Department, Hong Kong Special Administrative Region, except gross domestic income per capita (which is comes from World Bank 2008); data from Japan from Japan Ministry of Health, Labour and Welfare sources (Current population statistics in 2008, <http://www.mhlw.go.jp/toukei/saikin/hw/jinkou/kakutei08/index.html>; Health and nutrition survey in 2008, [www.vic-japan.gr.jp/guideline/MHLW/h1109-1b.pdf](http://www.vic-japan.gr.jp/guideline/MHLW/h1109-1b.pdf) ; Health and nutrition survey in 2007, [http://www.fukushihoken.metro.tokyo.jp/kenkou/kenko\\_zukuri/ei\\_syo/tomineiyou/](http://www.fukushihoken.metro.tokyo.jp/kenkou/kenko_zukuri/ei_syo/tomineiyou/); National survey of smoking and taking alcoholic status among minority in 2004, <http://www.health-net.or.jp/tobacco/product/pd110000.html>); Japan Bureau of Social Welfare and Public Health, Tokyo Metropolitan Government, Patient Survey in 2005, <http://www.mhlw.go.jp/toukei/saikin/hw/kanja/05/05.html> and [http://www.fukushihoken.metro.tokyo.jp/kiban/chosa\\_tokei/eisei/kanja/index.html](http://www.fukushihoken.metro.tokyo.jp/kiban/chosa_tokei/eisei/kanja/index.html).

Table 2. Risk Factors for Chronic Disease in Nine Pacific Rim Cities, 2006

Sources: World Health Organization (2009); Data in bold from United Nations. If 2006 data not available, most recent year in parenthesis. For data from Japan, see sources listed under Table 1. For Hangzhou, Qiu X, Liu QM, Chen RH. Investigation of chronic disease-related knowledge, attitudes and risk behavior among adults in Hangzhou. *Disease Surveillance* 2007;22(11):766; Qiu WK, He YF. The prevalence and risk of chronic disease among residents in Xiacheng district, Hangzhou. *Zhejiang Prev Med* 2007;19(1):26; Cai HP. The prevalence and risk of five chronic diseases among old adults in one community, Hangzhou. *Clinical Ed General Practice* 2008;6(2):148; Fang SY, Zhu XX. Investigation of the prevalence of hypertension and related knowledge and behavior. *Zhejiang Prev Med*. 2005;17(10):60; Fang SY, Shi SF, Liu QM. Relationship between overweight, fat and disease in residents of Hangzhou city. *Chin J Public Health* 2006;22(7): 852. For Hong Kong, Department of Health, Hong Kong Center for Health Protection, <http://www.chp.gov.hk/behavioral.asp?lang=en&id=280&pid=10&ppid=>, Census and Statistics Department for adult smoking data, and School of Public Health, Hong Kong University, for adolescent smoking data. Also Ko GT, Chan JC. Burden of obesity-lessons learnt from Hong Kong Chinese. *Obesity Reviews* 2008;9(1):35-40. Singapore National Health Surveys 1998 and 2004. California Health Interview Survey (CHIS 2005 - 2007).

Table 3. Prevalence of Non-Communicable Diseases in Nine Pacific Rim Cities, 2007

Sources: For data on Japan, see sources listed under Table 1 and Fukuchi Y, Nishimura M, Ichinose M, Adachi M, Nagai A, Kuriyama T, et al. COPD in Japan: the Nippon COPD Epidemiology study. *Respirology* 2004;9(4):458; Nishimura S, Zaher C. Cost impact of COPD in Japan: Opportunities and challenges?. *Respirology* 2004;9(4):466. For Hangzhou, see sources listed under Table 2; for Hong Kong, Population Health Statistics (2003/2004) by Department of Health, available at <http://www.chp.gov.hk/epidemiology.asp?lang=en&id=363&pid=362&ppid=134>, and Chan BS, Tsang MW, Lee VW, Lee KK. Cost of Type 2 Diabetes mellitus in Hong Kong Chinese. *Int.J.Clin.Pharmacol.Ther.* 2007 Aug;45(8):455-468; for Indonesia, National Research on Basic Health, Riskesdas 2007, and Indonesia Report Card: Status of Tobacco Use and Its Control; for Malaysia, Malaysian Third National Health and Morbidity Survey 2006 and personal communication (2009) from Division of Disease Control, Ministry of Health Malaysia; for Singapore, Venketasubramanian et. al 2008; NHS 2004; NMHS 2004; for California and San Bernadino, California Health Interview Survey (CHIS 2005 - 2007 Adult, Adolescent, Child Public Use File [<http://www.chis.ucla.edu/default.asp>] Los Angeles, CA: UCLA Center for Health Policy Research, January 2007.

#### Table 4. Mortality and Burden of Disease in Selected Pacific Rim Cities, 2007

Sources: World Health Organization (2009). For data from Japan, see sources listed under Table 1. Data for Hangzhou are from Jin DF, Fang SY, Zhu XX, Xu WM, Liu QM, Jin XY. The effect of chronic disease, injury and toxicosis on the life span of urban residents in Hangzhou. *Chin J Dis Control Prev* 2004;8(1):70. For California and San Bernadino, California Health Interview Survey (CHIS 2005 - 2007 Adult, Adolescent, Child Public Use File [<http://www.chis.ucla.edu/default.asp>] Los Angeles, CA: UCLA Center for Health Policy Research, January 2007.

#### Table 5. Chronic Disease Policies and Programs in Nine Pacific Rim Cities

Sources: Hong Kong Special Administrative Region, Department of Health. (2008) *NCD Prevention and Control Strategic Framework*; and sources listed under previous tables.