



AWI PUBLIC HEALTH PROJECT ON CHRONIC, NON-COMMUNICABLE DISEASES PHASE 1 Report: Baseline Assessment of Research, Policies & Programs

Introduction

Chronic, non-communicable diseases (NCDs) of lifestyle and circumstance account for the largest burden of mortality and morbidity in the Asia Pacific region. The staggering increase of NCDs threatens the quality of life among people throughout countries in the region, in addition to posing an unprecedented challenge to healthcare systems, many of which are unprepared and in transition. 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 NCDs will strongly shape the future health of the region and beyond.

NCDs including cardiovascular diseases, diabetes, obesity, cancer and respiratory diseases account for 59% of the 57 million deaths annually and 46% of the global burden of disease (WHO 2008). As Anderson and Chu (2007) emphasize, “despite the fact that a substantial burden of disease in the world’s poorer countries is caused by NCDs, most international aid agencies have focused primarily on preventing and treating infectious diseases.” For example, the Millennium Development Goals do not include any NCD targets. Of the multiple reasons for this disparity, some are not justified or reflect ignorance of the epidemiology of NCDs in low- and middle-income countries.

“Among the myths often cited and used as a rationale for inaction are that chronic diseases are mainly diseases of affluence affecting older people; that risks like smoking, unhealthy diets and a lack of physical activity are freely acquired and therefore government action is not warranted; and that infectious diseases should be controlled before addressing chronic diseases. [Yet chronic diseases, most prominently CVD (CVD)] will affect people in developing countries at younger ages than in developed countries; cause higher age-specific death and disability rates among them than those reported from developed countries when they experienced the peak of their CVD epidemics; and increasingly impact on poor people.” (*A Race against Time* p.iii)

CVD mortality in less economically advanced countries affects much younger people than in western countries and clearly diminishes a country's economic wellbeing.¹ For example, of the expected 9 million CVD deaths in China in 2030, over half will occur in the prime working ages 35-64 (*A Race against Time* p.iv).

More recently, NCDs have received more policy attention. Noting that NCDs are “an under-appreciated cause of poverty and a barrier to economic development,” the Joint Statement by the International Diabetes Federation, International Union Against Cancer and World Heart Federation (<http://www.idf.org/node/1491>) implores the international community to integrate NCD prevention into national health systems and the global development agenda and to ensure the availability of essential medicines for people living with NCDs in low- and middle- income countries.² More recently (June 15, 2009) “a new alliance of research funding agencies— including the US National Institutes of Health, the UK's Medical Research Council, the Canadian Institutes of Health Research, Australia's National Health Medical Research Council, and China's Ministry of Health—was launched to lead and coordinate research into chronic diseases worldwide. The alliance is a response to a growing recognition that chronic illnesses, such as cardiovascular disease, cancer, diabetes, and mental ill health, have been largely ignored by the international medical community” (“The Global Alliance for Chronic Diseases.” *Lancet* June 20, 2009). And the National Heart, Lung, and Blood Institute (NHLBI), a component of the US National Institutes of Health, has partnered with the UnitedHealth Group, to support centers of excellence in low-income and middle-income countries strengthen chronic disease prevention and control efforts (“Combating chronic disease in developing countries,” *Lancet* June 13, 2009, p.2004.)

The World Health Organization (WHO) has endorsed a global NCD strategy and recommended that this be adopted by member states. The strategy addresses the four most common NCDs: CVD, diabetes, cancer and chronic obstructive pulmonary disease (COPD). These diseases are linked by common preventable risk factors related to lifestyle, namely tobacco use, unhealthy diet and physical inactivity. The WHO strategy recommends that action to prevent these diseases should focus on controlling associated lifestyle risk factors in an integrated manner. Guidelines for countries to implement a comprehensive strategy include broad goals to generate an information base for action;

¹ The principal cardiovascular diseases are cerebral vascular complications, cardiac insufficiency, coronary diseases, chronic pulmonary heart, and vascular diseases. Risk factors for CVD consist of hypertension, increased cholesterol, and indirect factors such as smoking, alcohol, diet, obesity, and old age.

² Signaling recognition of the gravity of NCD threat to global health, the Committee on the U.S. Commitment to Global Health recently recommended that the U.S. government commit, in addition to \$13 billion for the health-related Millennium Development Goals (MDGs), an additional \$2 billion to address the challenges of noncommunicable diseases and injuries. The committee report notes that chronic and noncommunicable diseases and injuries “are responsible for more than half of the deaths below age 70 in low- and middle-income countries, but are not captured in the health-related MDGs. Cost-effective strategies, such as tobacco control, have the promise of averting millions of premature deaths from noncommunicable diseases in low- and middle-income countries” (p.3).

establish a national program; address issues outside the health sector that influence NCD control; and ensure health sector reforms are responsive to the NCD challenge.

This report presents information on chronic disease in 12 cities of the Pacific Rim: Beijing, Danang, Hangzhou, Hong Kong, Jakarta, Kuala Lumpur, San Bernadino, Seoul, Singapore, Sydney, Taipei, and Tokyo. These cities range from medium-sized ones like Danang (population about 800,000) and San Bernadino (county in California, US, population about 2 million),³ to city-states (Singapore 5m) and autonomous regions (Hong Kong 7m), to some of the largest cities in the world -- Jakarta 9m, Seoul 10m, Beijing 17m, Tokyo 35m. We highlight the role that public health and health care systems for urban populations will need to evolve to address NCDs as the primary cause of preventable morbidity and premature mortality for both the poor and the non-poor in Pacific Rim cities. The aim is to provide a baseline assessment of chronic disease research, policy and programming to identify gaps and research needs for NCD control in the region.

The report is organized as follows. The first section presents data on the prevalence and trends in NCDs and risk factors in each city and region, and reviews what evidence is available regarding the associated economic burden. The next section describes the primary policies and programs established to prevent and control NCDs in each city, reviewing successes and continuing challenges, and how these are related to the broader structure of health systems. In the conclusion, we discuss the implications of these data, focusing on four research and policy needs: (1) the need for improving surveillance and monitoring of health risk behaviors, especially among youth, to inform the development of effective family and community interventions and policies for the control and prevention of NCDs; (2) the need for developing strategies to improve human resources for health in the region, especially in lower-income countries, and training focused on NCDs; (3) the need for developing an evidence base regarding the most cost-effective workplace-based and public health strategies to prevent NCDs and improve self-management and medical management for patients with NCDs; and (4) the need for applying and evaluating innovative methods for creating action, including “breakthrough collaboratives” to reduce the largest NCD threats such as CVD deaths and disability.

Prevalence and trends in NCDs

³ That the US is a “Pacific nation” was affirmed by US President Obama in a recent speech in Tokyo: “The United States of America may have started as a series of ports and cities along the Atlantic, but for generations we also have been a nation of the Pacific....I am an American President who was born in Hawaii and lived in Indonesia as a boy.... the Pacific Rim has helped shape my view of the world....The fortunes of America and the Asia Pacific have become more closely linked than ever before....As America’s first Pacific President, I promise you that this Pacific nation will strengthen and sustain our leadership in this vitally important part of the world”

(<http://www.ft.com/cms/s/0/9e985a46-d0c2-11de-af9c-00144feabdc0.html>).

Mortality

The mortality and morbidity patterns in Vietnam have shifted from the dominance of communicable disease toward patterns in which NCDs dominate (the epidemiological transition). From 1998 to 2005, public hospitals reported a sharp increase in the share of inpatients suffering from NCDs, from 40% in 1998 to 62% in 2005 (Table 1). The share of inpatients seeking care for accidents, injury, or poisoning remained stable, while communicable diseases sharply declined (Figure 1).

Table 1. Trends in morbidity patterns of inpatients at public hospitals in Vietnam, 1998-2005

Disease groups	1998	1999	2000	2001	2002	2003	2004	2005
Structure (%)								
Communicable disease	46.7	37.0	32.1	25.0	27.2	27.4	26.1	25.2
NCD	39.5	53.7	54.2	64.4	63.7	60.6	60.8	62.2
Accident, injury, poisoning	13.9	9.3	13.7	10.6	9.2	12.0	13.1	12.7
Number of cases (1000)								
Communicable disease	2467	1974	1673	1783	1867	1941	1847	1221
NCD	2084	2863	2824	4589	4376	4288	4302	4592
Accident, injury, poisoning	732	494	713	756	631	846	927	934

Note: Number of cases is calculated by multiplying the total inpatient visits available in Health Statistics Yearbook with the percentage share of the 3 disease groups

Source: Vietnam Health Statistics Yearbooks [4]

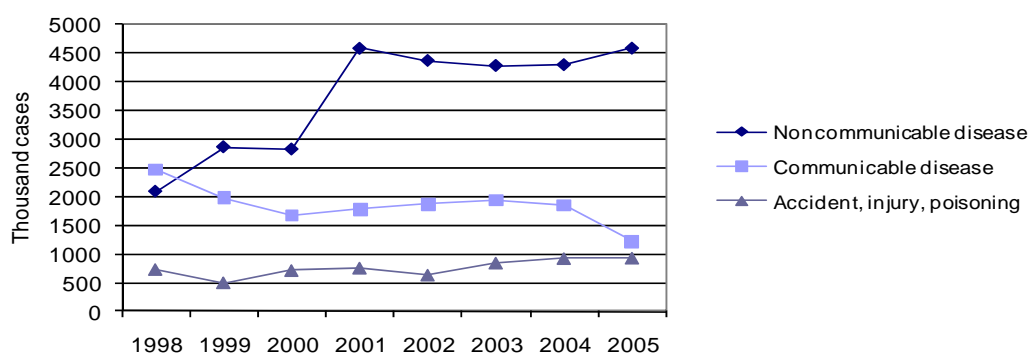


Figure 1. Trend in disease patterns of inpatients at public hospitals in Vietnam, 1998-2005

The trend presented in Figure 1 does not capture the overall trend in Vietnam, since it reflects the severe diseases for which patients seek hospital care. Currently in Vietnam the proportion of patients self-medicating, and the proportion seeking care as outpatients at hospitals, commune health stations (CHS), or private facilities is high. Formerly many patients with chronic NCDs might not have sought care. As living standards and the quality of hospital care improve, however, patients are increasingly seeking care. Other possible factors are that facilities are now better able to diagnose NCDs compared to the past, and patients with chronic NCDs may require multiple admissions to hospital in a given year. Hence, they are likely to be counted multiple times in the above statistics, somewhat inflating the case total for NCDs. Despite problems with the data, communicable diseases have clearly declined. The trend toward an increasing share of NCDs is consistent with an aging population and with improvements in living standards and subsequent increase in lifestyle-related diseases.

Another way to classify illnesses is based on the nature of the disorder, i.e., acute, chronic, or injury, as collected in a household survey. In the Vietnam National Health Survey (VNHS) 2001-2002, family members were asked about illnesses contracted during the 4 weeks before the interview, including both severe and minor illnesses. Table 2 shows that males were more likely than females to suffer from acute illness and injury, while females were more likely to suffer from chronic illness, perhaps because of their greater longevity. The prevalence of accidents and injury was highest in the groups aged 6 to 15 years and 16 to 30 years. The incidence of acute illness decreases as age increases, while the prevalence of chronic illnesses increased from nearly 2% in children to 54% among the elderly.

Table 2. Structure of self-reported illness and injury by household, sex, and age group in Vietnam, 2002

	Acute illness	Chronic illness	Accidents/ injuries/ poisoning	Total
Number of cases during 4 weeks prior to survey (million cases)	11.7	5.9	0.6	18.2
General structure (%)	64.3	32.4	3.3	100.0
Structure by sex				
Male (%)	66.2	29.2	4.7	100.0
Female (%)	62.9	34.8	2.2	100.0
Structure by age group				
<1 year	97.7	1.8	0.5	100.0
1-5 years	92.0	4.7	3.3	100.0
6-15 years	83.6	11.7	4.7	100.0
16-30 years	69.2	26.9	3.9	100.0
31-59 years	53.5	43.5	3.0	100.0
60-74 years	41.4	56.3	2.3	100.0
75 years and over	43.5	54.4	2.1	100.0

Note: The number of cases during 4 weeks is the aggregate national figure as extrapolated from the survey sample results over a 4-week reference period.

Source: VNHS 2001-2002 [19]

The Vietnamese health system was constructed at a time when communicable disease was predominant, and preventive health programs and commune health services focused efforts on communicable diseases. Although the hospital network is improving and healthcare personnel are being trained to diagnose and treat NCDs, the preventive health system and commune-level health services are not yet fully reconfigured to manage the new disease patterns. To prepare for the future, researchers and policy-makers need to focus greater attention on training health workers, investing in equipment, and developing appropriate programs to more effectively address NCDs.

Currently, the registration system for vital statistics in Vietnam cannot provide accurate data on the number of deaths, cause of death, or the age, sex, and living standard of people who died. Therefore, to assess trends in mortality patterns it is necessary to rely on mortality data collected in public hospitals. Table 3 indicates that the mortality rate from NCDs among inpatients at government hospitals increased from 44% in 1998 to 61% in 2005. Starting in 2003, the percentage of deaths from accidents, injuries, and poisoning exceeded deaths from communicable disease, making this group the second highest cause of death.

Table 3. Mortality patterns based on inpatient records at government hospitals in Vietnam, 1998-2005

Unit: %

Year	Communicable disease	NCD	Accidents/ injuries, poisonings
1998	35.4	44.0	20.6
1999	34.0	52.2	13.8
2000	26.1	52.3	21.7
2001	15.6	66.4	18.1
2002	18.2	63.3	18.5
2003	17.4	59.1	23.5
2004	17.0	57.9	25.1
2005	16.5	61.2	22.3

Source: Health Statistics Yearbooks [4]

Deaths in public hospitals reflect only about 5% of the total annual mortality and cannot reflect the general mortality patterns of the population. Most deaths in Vietnam occur outside hospitals. Hence, the above data do not reflect the overall causes of death.

Another information source on causes of mortality in Vietnam is VNHS 2001-2002. This survey asked about deaths of household members during the preceding 3-year period. Information on the specific causes of death collected in a household survey cannot be as accurate as information provided by a hospital. However, 54% of interviewees said that the cause of death that they reported was what they had been told by a doctor. An additional 36% of reported deaths were from obvious causes, eg, suicide, old age, perinatal death, or accidents. Only 9% of reported deaths could be considered to have an unconfirmed cause (Figure 2 and Table 4).

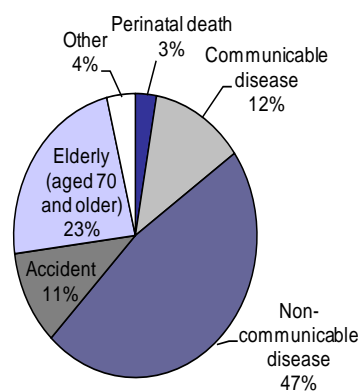


Figure 2. Structure of cause of death in Vietnam, 2002

Source: VNHS 2001-2002 [3]

Proportionate mortality rates of NCD from 2003-2007 are 59.1% (2003), 57.9 (2004), 61.1% (2005), 61.6 % (2006), 60.1% (2007) (**Vietnam Health Statistics Yearbooks 2007**)

Table 4. Cause of death by sex, age group, and living standard quintile in Vietnam, 2002

Unit: %

	Perinatal mortality	Communicable disease	Noncommunicable disease	Accident/injury	Elderly (over 70 years)	Other	Total	n
Overall	2.8	12.4	47.1	10.8	23.3	3.8	100.0	2476
Sex								
Male	2.6	14.7	50.2	13.7	15.2	3.6	100.0	1359
Female	3.1	9.7	43.2	7.1	32.9	4.1	100.0	1122
Age group								
<1	58.2	18.1	14.6	2.5	..	6.7	100.0	129
1-4	..	38.5	22.4	25.8	..	13.4	100.0	71
5-9	..	29.6	29.9	39.4	..	1.2	100.0	34
10-24	..	9.9	24.9	56.5	..	8.7	100.0	147
25-59	..	16.2	59.0	19.5	..	5.2	100.0	526
60+	..	9.5	48.8	3.2	36.1	2.4	100.0	1572
Living standard								
Poor	5.0	19.9	34.6	12.2	20.4	7.8	100.0	642
Middle	2.4	11.6	49.8	9.5	23.0	3.8	100.0	747
Rich	2.1	9.2	51.1	11.0	24.9	1.8	100.0	1087

Notes: Perinatal death includes children who died within 1 month of birth. The category “over 70 years” consists only of people aged 70 years and older whose more precise cause of death was unknown

Source: VNHS 2001-2002 [19]

Some distinct differences in the data become evident when comparing the VNHS 2001-2002 data against the government hospital data [21]. [HSPH colleagues: Please provide full citations for all the numbered references (which appear to link to an Endnote library); they were not listed in the submission to AWI]. The survey shows that NCDs accounted for 47% of deaths, in contrast to the 63.3% reported by hospital data in the same year. Communicable disease accounted for 12% of deaths in the survey versus 18.2% in the hospital data. Accidents and injuries accounted for 11% of deaths in the survey versus 18.5% in hospital data. Nevertheless, the general patterns are similar, showing that deaths from NCDs and accidents now predominate in Vietnam.

To further increase the effectiveness of providing health care to the population and contribute toward increasing life expectancy, higher priority must be given to investments addressing NCD and prevention of accidents and injury, while concurrently continuing to prevent communicable diseases and major epidemics that carry a high risk of mortality.

In Indonesia, NCD is the primary cause of death for all age groups (59.5%), compare to communicable disease (28.1%) and accidents (6.5%; data from National Basic Health Research, Riskesdas 2007). Among NCDs, the top killers were stroke (15.4%); hypertension (6.8%); diabetes mellitus (5.7%); tumor/cancer (5.7%); and CVD (5.1%).

Table 5 shows the mortality rates of selected non-communicable diseases (NCD) in Malaysia in 1998.

Table 5: Mortality rates of selected non-communicable diseases (NCD) in Malaysia, 1998.

NCD	Rates per 100,000 ^a		
	Males	Females	Total
Cardiovascular disease	51.1	31.1	41.3
Cancer	24.2	19.7	22.0
Stroke	17.5	13.8	15.7
Diabetes	3.1	3.7	3.4
COPD	7.1	2.0	4.6

Note : Population estimates for 1998 : Males = 10,877,024; Females = 10,569,007; Total = 21,446,031.

Source : Anonymous (1999). *Vital statistics Malaysia*. Kuala Lumpur: Department of Statistics, Malaysia.

In China, mortality rates from NCDs have been increasing rapidly, especially in urban areas. In 2007, the mortality rate for CVD was 100.6/100,000; for stroke, 111.5/100,000; diabetes, 19.0/100,000; and for cancer (in urban areas) was 176.2/100,000. The prevalence of NCDs varies across China's diverse localities. In Hangzhou in 2002, the mortality rate of NCDs for urban residents was 357.11/100000.

The standardized mortality rate for heart disease was 59.98/100000 in Hangzhou's urban population.

In Hong Kong, death rates for leading causes of death in 2007 (no. of registered deaths per 100 000 population) were malignant neoplasms 177.8; CVD 92.0; pneumonia: 71.9; cerebrovascular diseases: 50.7; chronic lower respiratory diseases: 30.3; external causes: 26.6; nephritis, nephritic syndrome and nephrosis: 19.5; septicaemia: 10.6; diabetes: 7.3; chronic liver disease and cirrhosis: 5.8. According to the Department of Health "NCD Prevention and Control Strategic Framework" as mentioned above, in 2006, approximately 61% of total registered deaths in Hong Kong were attributed to four major preventable NCDs. They were cancer (32.3%), heart diseases (15.0%), stroke (8.8%) and chronic lower respiratory diseases (5.1%). In terms of premature death which is measured by the number of potential years of life lost (PYLL) at age 75, cancer ranked first and accounted for two-fifths of the total PYLL in Hong Kong, followed by injuries and poisoning which were responsible for one-fifth in 2006.

In Taiwan in 2006, the leading causes of the death were malignant neoplasms, cerebrovascular disease, heart disease, and diabetes mellitus (see Table 6).

Table 6. Crude death rate per 100,000 populations & standardized mortality rate per 100,000 populations, Taiwan, 2006

NCD	Crude	Standardized
1 Malignant Neoplasm	166.5	139.3
2 Cerebrovascular Disease	55.2	44.7
3 Heart Disease	53.8	43.8
4 Diabetes Mellitus	42.5	34.9
5 Accidents & adverse effects	35.1	31.9
6 Pneumonia	23.6	18.9
7 Chronic Liver Disease & Cirrhosis	22.1	18.6
8 Nephritis, Nephrotic Syndrome & Nephrosis	20.7	16.8
9 Suicide	19.3	16.8
10 Hypertensive Disease	8.0	6.4

According to the report "*Health Statistics in Taiwan 2006*," in 2006, mortality in Taiwan totaled 135,071, with a mortality rate of 591.8 persons per 100,000, a decrease of 3.2 over that of the previous year. In 2006, the number of deaths of those aged 0~64 represented 34.2% of the total, and the number of deaths of those aged over 65 accounted for 65.8%. From a long-term perspective, the number and rate of deaths aged over 65 have been on the increase.⁴ In 2005, the standardized mortality rate was 495.4 persons per 100,000, a

⁴ Compared to 1986, the number of deaths aged 0~64 declined by 12.9% while the number of deaths aged over 65 increased by 12.9%, suggesting that the crude death rate in Taiwan has progressively increased because of population aging. But the mortality rate in 2006 declined.

decrease of 22.7% compared with 1996 and 11.3% compared to 2001, indicating the average life span for Taiwanese continues to increase. In addition, NCDs figure prominently among the top ten leading causes of death in Taiwan (which accounted for 75.5% of the number of the total deaths); for example, in 2006 28.1% died of malignant neoplasms, 3.0 times more than of cerebrovascular diseases.

In Korea, similarly, mortality rates for leading causes of deaths in 2007 (number of registered deaths per 100,000 population) were: malignant neoplasm (cancer) 137.5; cerebrovascular diseases 59.6; CVD 43.7; suicides 24.8; diabetes 22.9; accidents 15.5; chronic lower respiratory diseases 15.3; liver diseases 14.9; hypertension 11.0; and pneumonia 9.3 (Table 7).

Table 7. Number of registered deaths per 100,000 population in Korea

	1995	2005	2007
Malignant neoplasm (cancer)	110.8	134.5	137.5
Cerebrovascular diseases	79.7	64.3	59.6
Disease of Heart	38.7	39.6	43.7
Suicides	11.8	26.1	24.8
Diabetes	17.2	24.2	22.9
Accidents	36.9	16.3	15.5
Chronic lower respiratory diseases	14.9	15.5	15.3
Liver diseases	29.4	17.3	14.9
Hypertension diseases	18.3	9.3	11.0
Pneumonia		8.6	9.3

Singapore and Japan, mortality patterns also reflect the overwhelming important of NCDs. Cancer is the leading principal cause of death (27.7%) in Singapore, followed by ischaemic heart disease (19.8%) (Ministry of Health 2007). According to the WHO, age-standardized mortality rates in Singapore (in 2002 per 100,000 population) were 376.0 for NCDs overall; 171.4 for CVD; 127.5 for cancer; 45.0 for stroke; 16.3 for diabetes; and 15.5 for COPD. In Japan in 2006, NCDs overall accounted for 60% of all deaths, with deaths per 100,000 attributable to CVD 257.5; cancer 261.0; Stroke: 101.7; Diabetes: 11.1; COPD: 11.4; and Mental health problems: 4.1. (Japan's Population Survey Report 2006).

NCDs are estimated to be responsible for nearly 80 per cent of the total burden of disease and injury in Australia, and more than two-thirds of all health expenditure. Diabetes and heart disease alone cost the Australian health system more than \$6 billion each year. These chronic diseases are also having a large impact on some population groups, particularly Indigenous Australians (<http://www.measureup.gov.au/internet/abhi/publishing.nsf/Content/About+the+campaign-lp>). Despite declines in mortality rates in the past thirty years, CVD remains one of the leading causes of death in Australia in 2002, accounting for 50,294 or 38% of all deaths (ABS 2002), and remains a leading cause of premature death (AIHW & DHAC 1999).

Cancer is the leading cause of death in Australia in spite of a 30 percent improvement in survival over the last two decades. 1 in 3 Australian men and 1 in 4 Australian women

will be directly affected by cancer before the age of 75. Cancers most commonly causing death are lung, prostate and colorectal cancers in males and breast, lung and colorectal in women, which together account for 59% of all cancers. In the under 15 years group of childhood cancers, lymphoid leukaemia and brain and central nervous system cancers predominate while melanoma and breast cancers are most common in the 15-44 age groups. Most people in Australia will be affected by cancer at some stage in their lives, either personally or through family and friends. The survival rate for many common cancers has increased by more than 30 per cent in the past two decades, due to treatment improvements and new interventions brought about by research. Queensland has the highest incidence of all cancers in both males and females while Northern Territory has the lowest incidence. Melanoma risk is highest in northern areas and lower in more southern areas. Excluding melanoma, Tasmania has the highest incidence rate for all cancers combined and the highest mortality rates for both males and females while NSW has the lowest mortality rates. Between 1991 and 2001 the incidence rates for all cancers rose by 6.5% in females with no significant increase for males. In both males and females the mortality rates in 2001 was the lowest since the cancer registry began operations in 1971 (*Source: Australian Cancer Research Foundation, http://www.acrf.com.au/page/about_cancer.html*).

Stroke is Australia's second single leading cause of death, claiming 9.4% of all deaths. Stroke death rates fell by 28.1% among males and 27.3% among females over the period 1991–2002. In 2000–02, death rates from stroke in Indigenous Australians were twice as high as for other Australians

Diabetes-related deaths constituted 5% of all deaths in Australia in 2005. the death rates for diabetes-related deaths remained relatively stable for both males and females, but males had higher rates than females in all years. Conditions most commonly listed as associated causes of death included coronary heart disease (in 67% of deaths), kidney-related diseases (30%), and stroke and heart failure (20%).

In 2005 in Australia, COPD was the sixth leading cause of death in males and the seventh in females (AIHW 2008). Those dying or hospitalised with COPD are more likely than those without COPD to have other smoking related illnesses, such as lung cancer (ACAM, 2006). In NSW between 1987 and 2006, the overall male death rate from COPD decreased by 61.8%, while the overall female death rate decreased by 19.8%. The male and females rates peaked in 1989 (83.2 and 26.0 deaths per 100,000 population respectively). The COPD death rates in males and females aged 65 years and over are much higher (214.4 and 115.6 deaths per 100,000 population respectively), as the disease affects mainly older people (ACAM, 2006), and the changes over time are more obvious. Reductions in male mortality from COPD follow the decline in smoking rates among males and better management of the disease. The later decline in the female death rate could be due to the delay in the reduction in the proportion of female smokers compared with the earlier reduction in the proportion male smokers (AIHW, 2006).⁵

⁵ The impact of obstructive lung diseases (mainly COPD and asthma) on mortality and morbidity may be underestimated. For example, the number of death involving COPD among persons aged 55 years and over doubles when all deaths are counted where COPD is mentioned anywhere on the death certificate as opposed to counting only deaths where COPD is the underlying (or principal) cause of death (ACAM,

San Bernadino (a city and county inland from Los Angeles, California, US) has a high burden of NCDs, compared to other Pacific Rim cities and to other counties in California. Three-year (2005 – 2007) average age-adjusted mortality per 100,000 population in San Bernadino was 175.8 for cancer (compared to 159.3 for the state of California [CA]); stroke 47.1 (CA 44); Alzheimer's 28.1 (24.0 CA); Coronary Heart Disease 197.2 (CA 145.2); and diabetes 30.7 (CA 21.9) (<http://www.cdph.ca.gov/pubsforms/Pubs/OHIRProfiles2009.pdf>). Data was not available for CVD, COPD, or for NCDs overall.

Disease Prevalence

Various sources of data provide convincing evidence of the growing importance of NCDs as causes of morbidity in Vietnam. For example, the prevalence of 10 mental illnesses was studied in a clinical epidemiological survey on mental health conducted in 8 localities representing various geographic and socioeconomic conditions throughout the country. Over a 3-year period (2000-2002) the prevalence of 10 common mental illnesses in the population was 14.9% [15]. Tables 8 and 9 present the trend and the prevalence of each disease.

2006) (Source: http://www.health.nsw.gov.au/publichealth/chorep/res/res_copddth.asp).

Table 8. Prevalence of selected mental illnesses in Vietnam, 2000-2005

Unit: Number of cases

	2000	2001	2002	2003	2004	2005	Targets by 2005
Mental and behavioral disorders	73 324	29 052	35 965	121 022	161 483	114 198	
Cases of schizophrenia diagnosed and treated in community		10 000	17 643	23 826	35 000	114 198	50 000
Cases of schizophrenia diagnosed but not yet treated		3 984	8 995	15 000	21 000		35 000

Source: Health Statistics Yearbook [4] – Report on implementation of national target programs [15].

Table 9. Prevalence of 10 common mental illnesses in Vietnam, 2003

Diseases (Code ICD – 10)	Prevalence (%)
Schizophrenia (F 20)	0.47
Epilepsy (G40)	0.35
Post-concussional syndrome (F07.2)	0.51
Mental retardation (F70-F73)	0.63
Dementia (F00-F04)	0.88
Depression (F32)	2.8
Anxiety (F41)	2.6
Behavioral disorders of adolescents (F91)	0.9
Alcohol abuse (F10.1)	5.3
Drug addiction (F11)	0.3

Source: Report on implementation of national target programs [15]

Given only the 10 mental illnesses listed above, about 10 million people needed mental health care. If the survey could cover all 300 mental disorders, the prevalence would be estimated at 20% to 30% of the population.

The Vietnam National Health Survey (VNHS) 2001-2002 [3] estimates that the prevalence of hypertension (based on the WHO definition) in those aged 16 years and older is 15.1% in males and 13.5% in females. Figure 3.5 shows that the prevalence of hypertension increases with age for both males and females. An estimated 50% of men and women have hypertension at 65 years of age. In those of working age (20-59 years), the hypertension risk is higher among males than females. Obesity and urban residence

are also closely associated with hypertension. These results are similar to findings from smaller studies in Vietnam [55, 56].

Only 28% of males and 42% of females with hypertension are diagnosed [3]. The proportion of diagnosed patients in urban and wealthy groups is higher than that in rural and low-income groups.

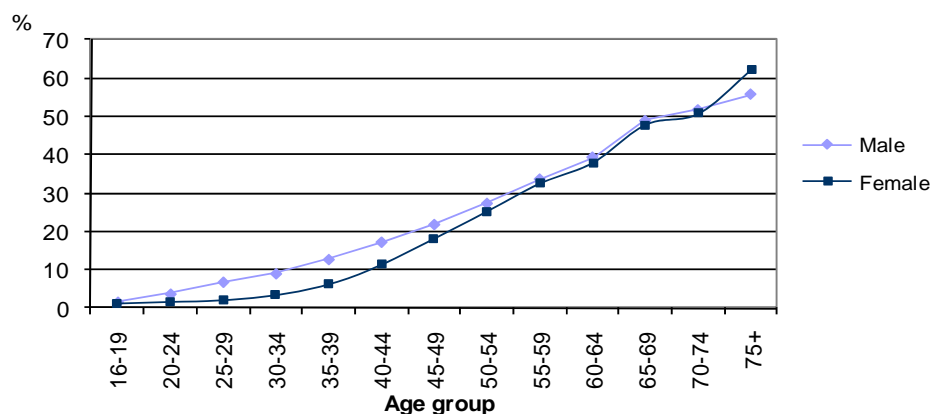
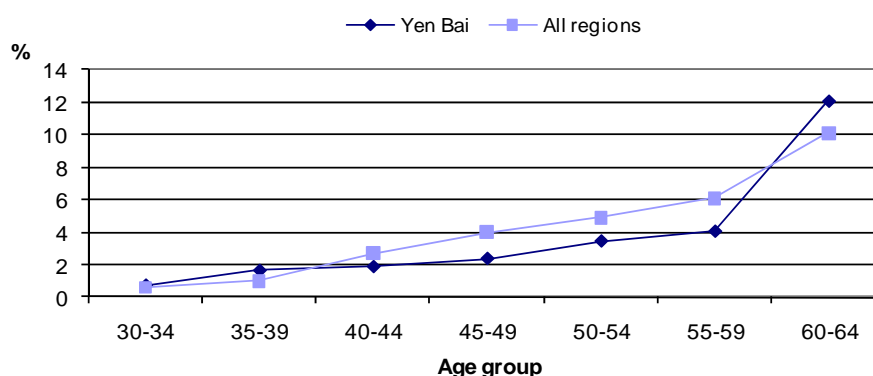


Figure 3. Prevalence of hypertension by age group and sex in Vietnam, 2002

Source: VNHS 2001-2002 [3]

In 2004, the Vietnam endocrinology hospital conducted an epidemiological survey nationwide on diabetes, which indicated that the standardized prevalence of diabetes in Vietnam is 2.7%. Cities have the highest standardized prevalence, at 4.4%, while the rate is 2.7% in the delta and 2.1% in the mountainous area [60]. Prevalence increased with age, eg, a survey in Yen Bai reported that prevalence was 0.72% and 0.60% in males and females respectively in the 30-34 age group, 2.37% and 4.0% respectively in the 45-49 age group, and 12.09% and 10.10% in the 60-64 age group. (Figure 4) [61]. A screening survey found that 65% of cases detected had not previously been diagnosed [60]. This suggests that many people in the community suffered from diabetes, but were unaware of it. Diabetes patients are at risk for complications such as blindness, renal insufficiency, and foot complications. Information on the trend of diabetes morbidity is unavailable, but risk factors such as obesity and old age are increasing, which indicates that the disease will tend to increase in the future. The national program on diabetes, supported financially by the World Diabetes Foundation, has implemented pilot research on improving the quality of treatment for diabetes in Vietnam through training doctors, nurses at district and commune levels, and health education about diabetes prevention, control, and management. This Vietnamese experience is one example of how the health workforce is being prepared to cope with the increasing burden of NCDs.

Figure 4. Prevalence of diabetes by age group in Vietnam, 2004



Source: Mui VT. Chuc NQ, 2004 [61]; Binh TV, 2004 [60]

Vietnam reports about 75 000 new cases of cancer per year (Table 3.10). The case fatality rate is high, and cancer accounts for around 12% of total deaths annually in Vietnam. As shown in the table, the incidence of cancer increased between 1990 and 2002.

Table 10. Number of cancer cases, incidence, prevalence, and mortality in Vietnam, 1990 and 2002

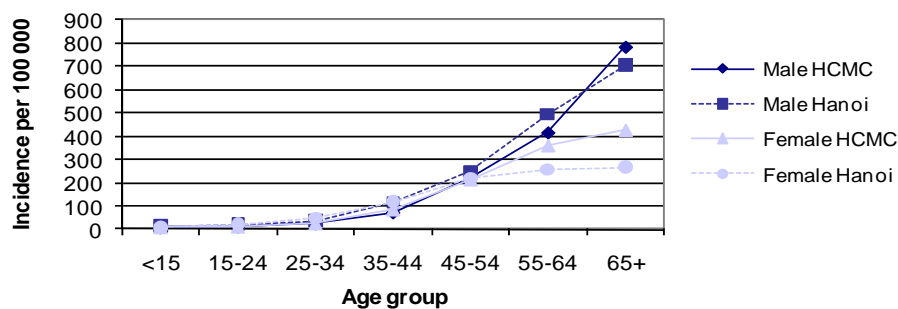
	1990				2002			
	Male		Female		Male		Female	
	No. of cases	Prevalence rate	No. of cases	Prevalence rate	No. of cases	Prevalence rate	No. of cases	Prevalence rate
Incidence	28	133	24	92	41	144	33	104
5-year prevalence	140	-	581	-	665	-	485	-
Mortality	-	-	-	-	885	-	811	-
	-	-	-	-	33	116	21	67
					318		324	

(Prevalence rates are per 100 000 population, standardized to the world population structure)

Source: Globocan 2002 [62]

Figure 5 shows that the incidence rate of cancer in Vietnam increased with age, reflecting a cumulative risk over the years, eg, smoking, contact with chemicals in agriculture, or toxins in food.

Figure 5. Annual incidence rate of cancer in Hanoi and HCMC by age group and sex, 1997-1998



Source: Hanoi- IARC-Cancer Incidence in 5 continents, Vol. VIII [63]; HCMC- Quoc NM, Hung NC, Parkin DM [64]

Incidence, prevalence, and mortality rates for the 5 most important cancers in Vietnamese males and females are presented in Tables 11 and 12. The tables show that liver, lung, and stomach cancers are the most common cancers in males, while cervical, breast, and stomach cancers are the most common in females.

Table 11. Cancer in men, Vietnam, 2002

Male Cancer	Incidence			Mortality			Prevalence		Code ICD-10
	No. of cases	Crude rate	Standardized rate	No. of cases	Crude rate	Standardized rate	1 year	5 year	
Lung	8089	20.3	29.6	7480	18.8	27.4	2635	6285	C33-C34
Liver	6933	17.4	23.7	6515	16.3	22.3	1582	3444	C22
Stomach	6104	15.3	21.8	5190	13.0	18.6	2870	7910	C16
Colon, rectu	3428	8.6	11.8	2220	5.6	7.6	2431	8454	C18-C21
Throat, mouth	2113	5.3	6.9	1343	3.4	4.5	1557	5241	C11

Notes: Number of cases, crude incidence rates, and standardized rates per 100 000. Standardization is according to world population structure.

Source: GLOBOCAN 2002, IARC [62].

Table 12. Cancer in women, Vietnam, 2002

Cancer	Incidence			Mortality			Prevalence		Code
	No. of cases	Crude rate	Standardized rate	No. of cases	Crude rate	Standardized rate	1 year	5 year	ICD-10
Cervix	6224	15.5	20.3	3334	8.3	11.2	5031	19 262	C53
Breast	5268	13.1	16.2	2284	5.7	7.1	4755	19 049	C50
Stomach	3159	7.9	10.0	2661	6.6	8.4	1512	4 295	C16
Colon, rectum	2601	6.5	8.3	1664	4.1	5.2	1840	6 390	C18-C2 1
Lung	2219	5.5	7.3	2043	5.1	6.7	731	1 775	C33-C3 4

Notes: Number of cases, crude incidence rates and standardized rates are per 100 000. Standardization is according to world population structure.

Source: GLOBOCAN 2002, IARC [62].

Cancer is a disease that is difficult to treat, but it is possible to reduce the risk factors for cancer. According to international experience, 98% of stomach cancer can be prevented [65]. An estimated 30% of cancer cases in Vietnam are related to smoking, and about 35% are related to chemicals in food [66, 67].

In the Pacific Rim city of focus in this case study, Danang,⁶ we know there has been an increase in the number of cancer patients among inpatients between 2005 and 2007 (see Table 13). Unfortunately there is not much specific epidemiological data on the prevalence of other NCDs in Danang.

Table 13. Proportion of cancer patients among total hospitalized patients in Danang, Vietnam, 2005-2007

Year	Total number of patients	Cancer patients	Proportion (%)
2005	131,710	3,524	2.68
2006	148,190	3,650	2.46
2007	147,870	3,819	2.58

In Indonesia, prevalence of specific NCDs per 100,000 population were CVD 7.2; hypertension 31.7; tumor/cancer 4.3; stroke 8.3; diabetes 11; asthma 3.5; and mental illness 4.6 (National Research on Basic Health, Riskesdas 2007). For the capital city of Jakarta, the corresponding figures were higher: CVD 8.1; hypertension 28.9; tumor/cancer 7.4; stroke 12.5; diabetes 26; asthma 2.9; and mental illness 30.3. In South Sulawesi

⁶ Danang has an area of 1,255.53 square kilometers. Mountains and hills cover most of the territory including Hoang Sa Island district with an area of 305 square kilometers. There are various kinds of soil including sand dunes, white, saline, aluminous, alluvium, arid brown, brown, black, basaltic and humus basaltic. Alluvium on the coastal plains is suitable for rice, vegetable and flower cultivation while basaltic land in mountainous areas is used for long-term cash crops, special crops, medicinal plants, cattle raising and is stable for construction. The population in 2007 was 806,744.

Province (which includes Makasar as the capital City), NCD prevalence rates per 100,000 population were CVD 9.4; hypertension 29; tumor/cancer 4.8; stroke 7.4; diabetes 8; asthma 4; and mental illness 3.2.

The National Health and Morbidity Surveys provide some evidence on the increasing prevalence of diabetes and hypertension in Malaysia and its capital, Kuala Lumpur, between 1986 and 2006 (see tables 14-17).

Table 14: Prevalence of Diabetes in Malaysia (1986-2006)

Diagnosis	Prevalence of Diabetes			
	NHMS I (1986)	NHMS II (1996)	NHMS III (2006)	NHMS III (2006)
	≥35 years	≥30 years	≥18 years	≥30 years
Overall	6.3%	8.3%	11.5%	14.9%
Known diabetes	4.5%	6.5%	7.0%	9.5%
Newly diagnosed	1.8%	1.8%	4.5%	5.4%
Impaired glucose tolerance * Impaired fasting glucose **	4.8% *	4.3% *	4.2% **	4.7% **

Note : NHMS I: First National Health and Morbidity Survey 1986
 NHMS II: Second National Health and Morbidity Survey 1996
 NHMS III: Third National Health and Morbidity Survey 2006

Table 15: Prevalence of hypertension in Malaysia (1986-2006)

	NHMS I (1986)	NHMS II (1996)	NHMS II (1996)	NHMS III (2006)	NHMS III (2006)
	≥25 years	≥18 years	≥30 years	≥18 years	≥30 years
Definition of Hypertension (mmHg)	≥160/95	≥140/90	≥140/90	≥140/90	≥140/90
Prevalence	14.4%	29.9%	32.9%	32.2%	42.6%

Note : NHMS I: First National Health and Morbidity Survey 1986
 NHMS II: Second National Health and Morbidity Survey 1996
 NHMS III: Third National Health and Morbidity Survey 2006

Source : Personal communication (2009). Division of Disease Control, Ministry of Health Malaysia.

Table 16: Prevalence of Diabetes in Kuala Lumpur in 1996 and 2006

Diagnosis	Prevalence of Diabetes	
	NHMS II (1996)	NHMS III (2006)
	≥30 years	≥18 years
Overall	8.9%	12.6%
Known diabetes	6.2%	6.6%
Newly diagnosed	2.7%	6.0%
Impaired fasting glucose	N.A.	6.1%

Note : NHMS II: Second National Health and Morbidity Survey 1996
 NHMS III: Third National Health and Morbidity Survey 2006
 N.A. – Not available

Table 17: Prevalence of hypertension in Kuala Lumpur, 2006

	NHMS III (2006)
	≥18 years
Definition of Hypertension (mmHg)	≥140/90
Prevalence	22.5%

Note : NHMS III: Third National Health and Morbidity Survey 2006, Malaysia.

Source : Personal communication (2009). Division of Disease Control, Ministry of Health Malaysia.

China has also registered a significant increase in prevalence of NCDs, especially in urban areas. In 2003, national prevalence (per 100,000) of NCDs overall was 123.3; for stroke, 6.6; diabetes 5.6; COPD 7.5; CVD 4.6; and 11.15% of those age 15 and above reported being sad, annoyed or depressed. In Hangzhou, prevalence rates for men and women were CVD 12.55% and 13.68%; cancer 2.42% and 3.08%; stroke 3.9% and 2%; diabetes 7.71% and 6.27%, respectively. The standardized prevalence rates of type 2 diabetes in rural and urban areas of Hangzhou municipality were 1.38% and 1.87% in

2003, respectively. The chronic bronchitis prevalence rate was 0.54% in 2006, and that for mental disorders was 1.47%.

In Hong Kong, the prevalence rates of major chronic health conditions in 2004 were as follows: Hypertension: 27.2%; High blood cholesterol: 8.4%; Diabetes: 3.8%; Asthma: 1.9%; Coronary heart disease: 1.6%; COPD: 1.4%; Cancer: 1.3%; Stroke: 1.1%. The prevalence of major doctor-diagnosed mental health problems in Hong Kong were as follows: Anxiety disorder: 2.0%; Depression: 1.5%; Schizophrenia: 0.2%; and Dementia: 0.3% (Population Health Statistics (2003/2004) by Department of Health at <http://www.chp.gov.hk/epidemiology.asp?lang=en&id=363&pid=362&ppid=134>).

In Taiwan, according to the *National Health Interview Survey Report 2002* from the BHP, the chronic disease prevalence rates for each gender in the representative Taiwanese population (n=26,685) were as given in Table 18.

Table 18. chronic disease prevalence rates in Taiwan, 2002

NCD, self-reported rate, %	Women	Men
Heart disease	7.7	5.9
Lung disease	4.0	6.5
Hypertension	10.9	11.7
Diabetes mellitus	4.3	4.6
Hyperlipidemia	8.9	11.6
Stroke	1.2	1.9
Peptic ulcer or duodenal ulcer	6.6	7.5
Chronic paranasal sinusitis	5.2	6.3
Chronic liver disease	4.5	7.8
Chronic kidney disease	2.7	3.1
Prostate disease		3.0
Ovary disease	4.3	

Source: Taiwan *National Health Interview Survey Report 2002*.

ADL impairment, including more than one activity difficulty, was 2.7% (2.6% for men and 3.0% for women) in Taiwan. In the National Health Interview Survey done by BHP in 2005, the prevalence rate of kidney disease (interviewees' self-report based on being told by medical personnel that they have the disease) was 5.1% among those 40 to 64 years old and 8.3% among those over 65 years old. The prevalence rate of chronic respiratory tract disease was 3.0% among 50-64 year olds and 7.8% among those over 65 years old.

According to the Korea Centers for Disease Control and Prevention (KCDC) data on disease prevalence from the Korea National Health and Nutrition Examination Survey (NHANES; <http://www.cdc.go.kr/kcdchome/>), the prevalence of hypercholesterolemia and asthma have increased overall since 1998, and diabetes since 2001 (see Table 19).

Table 19. Prevalence of selected NCDs in Korea, 1998-2007

	1998	2001	2005	2007

Diabetes (Age over 30)	11.6	8.6	9.2	9.5
Male	13.5	9.5	10.6	11.8
Female	9.9	7.9	7.7	7.2
Asthma (Age over 19)	1.2	1.4	2.1	2.2
Male	1.	1.4	2.1	1.8
Female	1.3	1.3	2.1	2.6
Hypercholesterolemia (over 30)	10.0	10.6	8.1	10.8
Male	8.7	10.0	7.3	9.3
Female	10.6	11.1	8.4	11.7

Source: Korea NHANES

In Singapore, the prevalence of specific NCDs is as follows: stroke about 3.65% (>49, age and sex-standardized), incidence of 1.8/1000 patient-years (Venketasubramanian et. al 2008); diabetes: 8.2% (among 18-69 year olds; (NHS 2004); COPD: 2.3% in 2003 (Tan 2003); and depression: 5.6% (depression population weighted lifetime & 4.9% - recent prevalence (20-59)/ 3.1% (>60); NMHS 2004).

For Japan, prevalence rates of specific NCDs in 2005 (per 100,000 population) were cancer: 1114; CVD: 2812; stroke 1068; diabetes 1933; asthma 855. For COPD, estimated prevalence in 2000 was 8.6% (Report from Ministry of Health, Labour and Welfare, 2005; Fukuchi, et al. 2004).

An estimated 77% of the Australian population had one or more long-term medical condition in 2004–05.⁷ According to the National Health Survey, all people aged 85 years and over in 2004–05 had at least one long-term condition. At the other end of the scale, nearly 60% of people aged 0–14 years had no long term conditions, and the distribution shifted fairly evenly in between. (Source: AIHW (2006) *Chronic diseases and associated risk factors in Australia*; <http://www.aihw.gov.au/publications/index.cfm/title/10319>). In 2001, 17% of Australians reported having CVD, with a higher prevalence among females (18.8%) than males (14.8%). However, women were more likely than men to report having oedema and varicose veins and men were more likely than women to report other ischaemic heart disease and diseases of arteries, arterioles and capillaries.

(<http://www.abs.gov.au/Ausstats/abs@.nsf/Previousproducts/4821.0.55.001Main%20Features22001?opendocument&tabname=Summary&prodno=4821.0.55.001&issue=2001&num=&view=>). The prevalence rate of CVD increases with age, peaking at 61% for people aged 75 and over, as compared with 4% for people aged 18-24. There was no substantial difference in the numbers of females (16%) and males (14.5%) with CVD.

Indigenous Australians have one of the highest prevalence rates of rheumatic heart disease in the world at 13.3 per 1,000 population in 1999. In the Northern Territory for

⁷ A long-term medical condition was defined as one which has lasted or is expected to last for at least six months (ABS 2006).

example, 93% of people with the disease were Aboriginal and Torres Strait Islanders people. By comparison, the rate for non-Indigenous Australians was 0.34 per 1,000 in 1999.

In 2004-05, 2% of Australians reported that they currently had a medically diagnosed neoplasm. Of these people, 87% reported that they had a malignant neoplasm (cancer) and 14% reported that they had a benign neoplasm or neoplasm of an uncertain nature. There has been a significant increase between 2001 and 2004-05 in the number of people who reported that they had malignant skin cancer; however, the overall number of people reporting a medically diagnosed neoplasm of any kind has not significantly changed. In 2004-05, of all persons who reported that they had a medically diagnosed neoplasm (cancer), there was a greater number of men reporting the condition (53%) than women (47%). Cancer was most prevalent in the 65 years and over age group (11% of males and 4% of females in this age group reported having cancer; <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4822.0.55.001>).

In 2001, 2.9% of the Australian population reported they had diabetes. Over half the people who reported having CVD (54%) also reported having diabetes. In the 2004-05 ABS National Health Survey, nearly 700,000 Australians reported that they had diabetes. Of these, 580,000 said they had Type 2 diabetes. However, it is recognized that many more people have undiagnosed diabetes, in part because the symptoms of the disease are not apparent in its early stages. The prevalence of Type 2 diabetes rises with age. The highest prevalence rates were among males aged 65-74 and 75 and over. A more accurate estimate of the prevalence of diabetes requires a biomedical survey using blood samples. The only recent national survey of this type was the 1999-2000 Australian Diabetes, Obesity and Lifestyle (AusDiab) Study, which found that about 850,000 Australians aged 25 and over had Type 2 diabetes, representing 7.2% of that population (7.6% of males and 6.7% of females; http://www.aihw.gov.au/cdarf/data_pages/incidence_prevalence/index.cfm#Stroke).

The 2001 National Health Survey showed that around 217,500 Australians had a stroke sometime in their lives. It is estimated that each year there are about 40,000–48,000 stroke events among Australians (<http://www.aihw.gov.au/publications/cvd/hsvd04/hsvd04-c02.pdf>). Based on self-reported data from the 2003 Survey of Disability, Ageing and Carers, an estimated 346,700 Australians have had a stroke sometime in their lives. More males than females had experienced a stroke (178,334 versus 168,334) and males were more likely to have a stroke at a younger age (60-74) than females.

The prevalence of chronic obstructive pulmonary disease (COPD) is not measured in the National Health Surveys. The best estimate of its prevalence is a combination of self-reported bronchitis and emphysema. About 3.3% of Australians reported having bronchitis and/or emphysema in the 2004-05 NHS, compared to 3.5% in 2001, 4.1% in 1995 and 3.0% in 1989. Although these estimates would contain some cases of bronchitis that were not chronic in nature, it is still likely to have underestimated the true prevalence of COPD in Australia. This is because COPD is usually not diagnosed until it begins to restrict a person's lifestyle and is moderately advanced. The prevalence is slightly higher among females than males at younger ages, but this situation is reversed after age 65. The prevalence of bronchitis/emphysema rises with age, to nearly 10% at the age of 75 years

and over. (http://www.aihw.gov.au/cdarf/data_pages/incidence_prevalence/index.cfm#Chronic%20obstructive%20pulmonary%20disease).

In the 2004-05 ABS National Health Survey, approximately 2 million (10.2%) Australians reported asthma as a current or long-term condition (9.0% of males and 11.5% of females). The prevalence in males was highest in the 10-14 years age group, whereas in females it was highest in 15 to 24 years olds. The overall prevalence was 11.4% in children (0 to 14 years) and 9.9% in adults (15 years and over). During childhood (0 to 14 years), prevalence was consistently higher in males. However, from the age of 15 years this was reversed and females demonstrated higher prevalence across all ages. For adults, there is no convincing evidence of any change in the prevalence of asthma during the 1990s. For children, there is consistent evidence of a rise in the prevalence of asthma during the 1980s and into the early 1990s. The most recent data from one study suggest that the rising trend may have peaked and is now levelling off, but this needs to be confirmed in other time series studies (http://www.aihw.gov.au/cdarf/data_pages/incidence_prevalence/index.cfm#Asthma).

In 2004-05, 11% of all Australians reported they currently have a long-term mental or behavioral problem. In the 1997 National Survey of Mental Health and Wellbeing of Adults (SMHWB), which is based on diagnostic criteria rather than self report, almost one in five adults (18%) had a mental disorder at some time during the twelve months prior to the survey. Half (50%) of all persons reporting mental and behavioral problems in the 2004-05 NHS had mood (affective) problems, and 46% had anxiety related problems. The proportion reporting a long-term mental or behavioral problem has increased over the last three National Health Surveys. In 1995 the proportion was 5.9%, in 2001 it was 9.6% and in 2004-05 it was 11.0% (after adjusting for age differences). This may reflect an increased willingness to report mental disorders. In 2004-05, 13% of all adults reported experiencing high/very high levels of psychological distress in the last four weeks. Psychological distress was first collected from adults in the NHS in 2001. Similar levels of high/very high levels of psychological distress were reported by adults in the 2001 and 2004-05 surveys, at 12.6% and 13.0% respectively (after adjusting for age differences). Females were more likely than males to report a long-term mental or behavioral problem in 2004-05 (11.4% of females compared to 10% of males). Women were also more likely to report high/very high levels of psychological distress than men (15% compared to 10%). In 2004-05 females reported higher rates than males for mental or behavioral problems overall in each five-year age group, with the exception of those aged under 18 years and those aged over 75 years.

In 2004-05, 7% of people aged 0-17 years reported mental or behavioral problems. The prevalence of mental or behavioral problems generally increased with age until the 35-44 year age group, with 14% of people aged 35-44 reporting a mental or behavioral problem. The prevalence of mental or behavioral problems then declined to 10% of people aged 75 years and over. In the 1997 Survey of Mental Health and Wellbeing, young adults aged 18-24 years had the highest prevalence of mental disorders (27%) The prevalence decreased by age to 5.5% of those aged 65 years and over (ABS 1997). In 2004-05, problems of psychological development (2.8%) and emotional and behavioral problems with usual onset in childhood/adolescence (3.0%), were most prevalent among

those aged 0-17 years (<http://www.abs.gov.au/ausstats/abs@.nsf/mf/4824.0.55.001>).

In the US, we focus for comparison on California, and the city of San Bernadino. According to the 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), the self-reported prevalence of CVD among adults in San Bernadino was 6500 per 100,000, higher than the state average (4677 per 100,000). Similarly, prevalence among adults of any cancer was 8200 (CA 6292); stroke 2600 (CA 1662); diabetes 9200 (CA 5033); pre-diabetes 1400 (CA 787); and mental illness 50,500 (CA 32,932). Among all ages, the self-reported prevalence of asthma was 14,900 (CA 13,268).

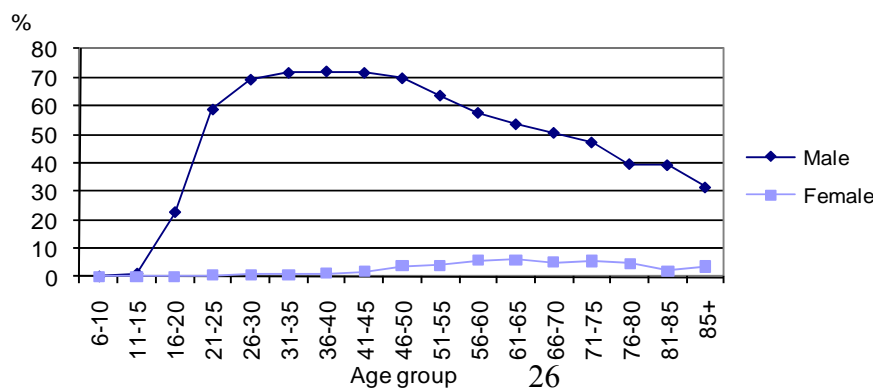
Risk factor prevalence

In Vietnam, tobacco consumption (including industrially produced cigarettes, hand-rolled cigarettes, and water pipe tobacco) is high among males and increasing. In 1998, the adult male smoking prevalence was 50% [85]. In 2002 it was 56% [3]. A male smoker aged 15 years and older consumes 12.5 cigarettes on average per day, and a female smoker aged 15 years and older consumes 8.1 cigarettes per day [3].

According to the Vietnam National Health Survey (VNHS) 2001-2002 [224], the prevalence of male smokers aged 15 years and older is 56.1%, while the prevalence of female smokers at that age is 1.8%. Although the smoking prevalence among females is low in comparison to males, the increase in recent years warns of potential risks related to smoking among females. Female smokers have a two-fold higher risk of lung cancer than males do, their odds of conceiving a child decrease 40%, while their odds of miscarriage or having a low birthweight baby increase, and their odds increase for contracting disorders commonly found in women, such as osteoporosis, early menopause, and early aging. Female smoking also affects child health. Children who regularly breathe tobacco smoke have a greater tendency to become ill and have a higher risk of respiratory disease, middle ear infection, asthma, sudden infant death syndrome, cancer, and leukemia [154].

Figure 6 illustrates that the highest prevalence of smoking, according to the VNHS 2001-2002 [3], is found in males aged 36 to 40 years (72.1%) and females aged 61 to 65 years (6.0%). Most smokers started smoking before 25 years of age. Among younger smokers (those between the ages of 15 to 30 years), 29.7% of male and 1.7% of female smokers began smoking at 18 to 19 years of age according to the Survey Assessment of Vietnamese Youth (SAVY).

Figure 6. Smoking prevalence by gender and age group in Vietnam, 2002



Source: VNHS 2001 - 02 [3]

In Vietnam, many chronic NCDs related to nutrition and lifestyle have increased. The National Institute of Nutrition has suggested recommendations on nutrition appropriate to the situation in Vietnam. Generally, the Vietnamese diet today is high in vegetables and fruit and low in fat, which is an important protective factor. But, this situation could change rapidly, especially among risk groups in cities where access to high energy foods is easy.

Vietnam is still primarily an agricultural country; 80% of the population is engaged in heavy manual work as farmers. Sports and exercise are undertaken mainly by young people, the elderly, and white-collar professionals. The VNHS estimates that 65% of people aged 15 and older do not participate in physical exercise, among those with sedentary jobs this share is 57% [3]. VNHS 2001-2002 found that 34.9% of people aged 15 years and older get physical exercise or participate in sports, of which half do it regularly, 5 or more times per week.

In Indonesia, male smoking rates are also high. Among Indonesians 15 years old or older, 63.2% of males and 4.5% of females smoke daily; 13.5% of students (13-15 years) currently use any form of tobacco, with average consumption 12 cigarettes per day. Lack of sufficient fruit and vegetable consumption behavior is 93.6% nationally [is a decimal misplaced?], 4.5% in Jakarta, and 3.7% in the province of South Sulawesi. Excessive alcohol consumption is estimated at 4.6% nationally, 4.0% in Jakarta, and 5.9% in South Sulawesi Province. The proportion of Indonesians who do not get regular physical exercise is estimated to be 48.2%, with the corresponding figures for Jakarta and South Sulawesi being 54.7% and 49.1%, respectively (Indonesia Report Card: Status of Tobacco Use and Its Control; National Research on Basic Health, Riskesdas 2007).

The prevalence of selected risk factors for NCDs in Malaysia is reported in Table 20. Decreases in physical activity and increases in overweight and obesity between 1996 and 2006 are evident. Kuala Lumpur residents are estimated to be slightly more overweight and physically inactive than the rest of Malaysia's population (see table).

Table 20: Prevalence of selected risk factors of NCDs in Malaysia, 1996-2006.

Risk factor	NHMS II (1996)	MANS (2003)	MyNCDS-1 (2005)	NHMS III (2006)
	≥18 years	≥18 years	25-64 years	≥18 years
Smoking	24.8%	N.A.	25.5%	21.5%
Physically inactive	88.4%	85.6%*	60.1%	43.7%
Unhealthy diet	N.A.	N.A.	72.8%	N.A.
Overweight (BMI ≥25 kg/m ² & <30 kg/m ²)	16.6%	27.4%	30.9%	29.1%
Obesity (BMI ≥30 kg/m ²)	4.4%	12.7%	16.3%	14.0%

Hypercholesterolaemia	N.A.	N.A.	53.5%	20.6%
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*18-59 years age group

Note : NHMS II: Second National Health and Morbidity Survey 1996

NHMS III: Third National Health and Morbidity Survey 2006

MANS: Malaysia Adult Nutrition Survey 2003

MyNCDS-1: First Malaysia NCD Surveillance 2005/2006

Source : Personal communication (2009). Division of Disease Control, Ministry of Health Malaysia.

Table 21: Prevalence of selected risk factors of NCD in Kuala Lumpur, 2005 and 2006.

Risk factor	MyNCDS-1 (2005)	NHMS III (2006)
	25-64 years	≥18 years
Smoking	26.9%	15.7%
Physically inactive	62.2%	54.9%
Unhealthy diet	79.7%	N.A.
Overweight (BMI ≥ 25 kg/m ² & < 30 kg/m ²)	33.9%	32.2%
Obesity (BMI ≥ 30 kg/m ²)	33.9%	14.4%
Hypercholesterolaemia	49.5%	16.6%

Note : NHMS III: Third National Health and Morbidity Survey 2006
MyNCDS-1: First Malaysia NCD Surveillance 2005/2006

Source: Personal communication (2009). Division of Disease Control, Ministry of Health Malaysia.

In China in 2003, among adults age 15 and older, 26% smoked and 8.2% abused alcohol. According to data from 2002 for adults 18 and over, the prevalence of hypertension was 18.8%; overweight 22.8%, and obesity 7.1%. In Hangzhou, survey data reveals that the percentage of smoking males was 22.5% among 1796 males aged 30-50 years. Another study showed that percentage of smokers was 57.64% and 2.71% among males and females, respectively. The prevalence rate of hypertension among 1452 residents aged 20-70 years was 29.13% in 2005. The hypertensive prevalence rate of rural areas (19.53%) was significantly lower than that of urban residents (38.50%). Overweight and obesity accounted for 27% and 6.9% among Hangzhou urban residents, respectively.

In Hong Kong, the prevalence of major behavioral risk factors (as of April 2008) was as follows: daily smoking: 14.4%; low level of physical activity (IPAQ classification): 22.7%; inadequate daily fruit and vegetable intake: 78%; binge drinking (in the past month): 9.2%; using World Health Organization classification for adult Asians for BMI, overweight (BMI 23.0 - < 25.0) 17.1% and obese (BMI ≥ 25.0) 22.2%. An April 2006 figure estimates only 7.1% Hong Kong residents had no stress in their lives. (Hong Kong Center for Health Protection, <http://www.chp.gov.hk/behavioral.asp?lang=en&id=280&pid=10&ppid=>).

In Taiwan, according to the report from the *Telephone Survey on the Smoking Behavior of Adults*, in the 1980s, the smoking rates were 60.4% and 3.4% for males and females

respectively. A 2002 survey showed that the male smoking rate had declined to 48.2%, whereas that of females had increased to 5.3%. The 2004 and 2005 telephone surveys showed that the smoking rates were 42.78% and 39.88% for males and 4.54% and 4.76% for females. The preliminary findings of the 2006 survey showed that the smoking rates were 39.56% and 4.12% for males and females respectively, indicating a gradual decline of the smoking rates of adult males. In 2007, the percentages of male and female smokers over 18 years old were 38.9% and 5.1%, respectively. Historical records show that the percentage of male smokers is declining while that of female smokers is still under close observation. The percentage of individuals exposed to second-hand smoke in indoor public areas is 34.9%. In terms of teenager use of cigarettes, the percentage of smoking in junior high school students between 13 and 15 years old in 2004 was around 6.5% (8.5% for males and 4.2% for females) while that in 2006 was around 7.5% (9.7% for males and 4.7% for females). The percentage of smoking in senior high and vocational school students between 16 and 18 years old in 2005 was around 14.0% (20.7% for males and 7.8% for females), indicating that the percentage of teenage smokers is increasing by year and by age. In addition, there are as many as 1.5 million betel quid chewers.

Trends regarding other NCD risk factors are also of concern in Taiwan. Based on the foregoing survey, prevalence rates for the population over 45 years old were 39% for hypertension, 14.7% for hyperglycemia, and 18.3% for high cholesterol. The prevalence rates for the population over 65 years old were 56% for hypertension, 20.7% for hyperglycemia, and 21.5% for high cholesterol. The prevalence rate of metabolic syndrome among Taiwan residents between 20 and 79 years old was 17.6% (20.4% for males and 15.3% for females). In 2007, the Health Behavioral Risk Factor Survey showed that among people over 18 years old in Taiwan area, 51.54% of interviewees did any physical exercise in the past two weeks and 48.46% did not. The 2001-2002 National Nutrition and Health Survey in Taiwan revealed that 15% of 6-12 year-old children were overweight, and 12% were obese. The Ministry of Education performed another health condition survey in 2005 targeting at elementary and junior high school students. It was found that 15% of 6-12 year-old students were overweight, and 10.3% were obese (Table 2-1). Child obesity is still a very important issue. Among adults, a 2002 survey found that among 20-79 year olds, 13.4% of females and 19.2% of males were obese; however, female obesity proportions were greater than males after the age of 50. The survey also found that among Taiwanese adults with BMI greater than 24, 65% of females and 68% of males have symptoms of metabolic syndrome.

Table 22 shows the prevalence of risk factors for NCDs in Korea, age standardized, between 1998 and 2007. Although there is a significant increase in obesity, trends have been more favorable for hypertension and smoking among men.

Table 22. Prevalence of Risk factors for NCDs in Korea (age standardized by 2005 population)

	1998	2001	2005	2007
Obesity (over30)				
BMI\geq25	26.0	29.2	31.3	31.7
Male	25.1	31.8	34.7	36.2
Female	26.2	27.4	27.3	26.3
Hypertension (over 30)	30.0	28.7	28.0	24.9
Male	32.5	33.2	31.5	27.1
Female	26.9	25.3	23.9	22.1
Tobacco use (over 19)	35.4	30.2	28.8	25.3
Male	66.8	60.9	51.6	45.0
Female	6.6	5.2	5.7	5.3
Drinking Alcohol (over 19)	-	-	54.6	57.2
Male	-	-	72.6	73.5
Female	-	-	36.9	41.5
Nutrition Intake (kcal)	1933.5	1896.7	1979.1	1808.6
Male	2151.6	2107.0	2213.6	2084.0
Female	1728.5	1713.1	1742.2	1529.4
Strenuous Exercise (over 19) IPAQ	-	-	15.2	13.9
Male	-	-	19.7	16.9
Female	-	-	10.8	10.9
Moderate Exercise (over 19) IPAQ	-	-	18.7	9.9
Male	-	-	19.1	10.7
Female	-	-	18.5	9.3
Stress (over 19)	36.5	34.6	35.1	27.1
Male	36.0	34.2	34.7	23.6
Female	36.6	34.6	35.2	30.4
Experience of hypochondria (over 19)	-	-	15.4	12.5
Male	-	-	11.5	8.1
Female	-	-	19.2	16.6

Source: Korean Statistical information Service, http://www.kosis.kr/planstic/stat_theme/term_index.jsp.

In Seoul, 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. A gradient of educational differentials in mortality were observed among both sexes, with higher mortality rates related to lower educational attainment in most causes of death. However, positive associations were identified between education levels and mortality rates with respect to ischaemic heart disease among older males and breast cancer among older females. The magnitude of educational inequality in mortality was not constant across causes and in some cases differed by sex.

The prevalence of various risk factors in Singapore was as follows:

Source: National Health Surveys 1998 and 2004.

In Japan, in 2005 smoking rates were 45.8% among males and 13.8% among females; and prevalence rates for 100,000 population were 6112 for hypertension; 3.9 for obesity;

Risk factors	Prevalence (%)	
	1998 (age 30-69)	2004 (age 18-69)
Tobacco: cigarette, daily user (age 18-69)	15.0%	12.6% (2007)
Hypertension:	27.3%	20.1%
High cholesterol:	25.4%	18.7%
Obesity/Overweight:	6.0%	6.9%
Alcohol: (frequent drinker)	2.6%	7.0%
Nutrition: > 2 servings fruit/day	20.1%	28%
> 2 servings vegetables/day	5.8 %	42.8%
Physical Inactivity:	16.8%	48.1%

34 for alcohol abuse; and 1198 for hyperlipidemia (Report from the Ministry of Health, Labour and Welfare, 2005).

In Australia, since 1989-90 the proportion of adults who were current smokers has declined (down from 28% to 24% in 2001). After adjusting for age differences, a similar proportion of adults (aged 18 years and over) with and without CVD reported being a current daily smoker (24% and 25% respectively). Tobacco smoking is the largest single preventable cause of death and disease in Australia (Cancer Council 2006). Smoking is a key risk factor for the three diseases that cause most deaths in Australia: ischaemic heart disease, cerebrovascular disease and lung cancer. Smoking is responsible for around 80% of all lung cancer deaths and 20% of all cancer deaths (smoking has been linked to cancers of the mouth, bladder, kidney, stomach and cervix, among others) (DoHA 2006). Tobacco smoking is overwhelmingly the strongest risk factor for COPD (AIHW, 2008). About 73.4% of COPD deaths in Australia in 2003 could be attributed to tobacco smoke (Begg et al., 2007). Other risk factors include exposure to passive (environmental) tobacco smoke, indoor and outdoor air pollution, occupational dusts and chemicals, and viral respiratory infections (AIHW, 2008).

The 2003 Australian Burden of Disease Study indicates that tobacco smoking was second behind overweight among the leading causes of burden of disease in Australia. It was estimated that tobacco smoking was responsible for about 8% of the total burden of disease and injury for all Australians (9.5% of total for males and 6.1% of total for females) (AIHW 2006).

In 2004-05, 23% of adult Australians were current smokers. 21% of adults reported being regular daily smokers (representing 92% of smokers), while 2% reported smoking less frequently than daily. 30% of adults reported being ex-smokers and 47% reported

never smoking regularly. Rates of current smoking have decreased slightly for both men and women in recent years, based on age-adjusted estimates from the last three National Health Surveys (1995, 2001 and 2004-05). Over the period 1995 to 2004-5 the estimated proportion of men who were current smokers changed from 28% to 26% , and the corresponding change for women was 22% to 20%, after adjusting for age differences. In 2004-05, 26% of men and 20% of women were current smokers. For both men and women, smoking rates are highest in younger age groups and decline with increasing age. The highest rates of smoking for men were reported in the 18-24 years age group (34%) and for women in the 25-34 years age group (27%). There were decreases in age-specific rates for current smoking in many adult age groups over the period 1995 to 2004-05. In particular, decreases are evident in older age groups (65 years and over) for both men and women, and also in some younger age groups (particularly in the 18-34 year age group for women and the 25-34 year age group for men).

People who start smoking when they are young are more likely to smoke heavily, to become more dependent on nicotine and to be at increased risk of smoking-related illness or death (McDermott, Russell and Dobson 2002). According to the 2004 National Drug Strategy Household Survey, Australian males had their first cigarette at age 15.2 years on average and females at 16.5 years (of Australians aged 14 years and older who had ever smoked) (AIHW 2005). 12.7% of males aged 14 to 19 years were current smokers, compared to 14.2% of females (AIHW 2005).

(<http://www.abs.gov.au/ausstats/abs@.nsf/mf/4831.0.55.00>).

According to the California Health Interview Survey (CHIS 2005 - 2007), tobacco use among teens and adults in San Bernadino is significant; self-reported current smokers are 15,100 per 100,000 (for the state of California, the rate was 11,567 per 100,000). The rates per 100,000 for other risk factors also indicate why NCD prevention and control is a growing priority: hypertension 27,900 (CA 17,980); stress 8,900 (CA 6,273); obesity and overweight 55,700 (CA 43,357); alcohol abuse as measured by binge drinking in the last year, 29,700 (CA 21,869); poor nutrition as measured by eating fast food two or more times in the last week, 42,500 (CA 34,380); and lack of physical activity 16,200 (CA 10,330).

Economic burden of disease

Compared to information on mortality, morbidity, and risk factors, less information is available about the economic burden of NCD prevalence in Pacific Rim cities. Most countries have some information about the direct costs of financing medical treatment for NCDs and/or government financing for programs targeting control of specific chronic diseases. For example, Table 23 shows the government and donor financial commitments to specific NCD programs in Vietnam from 2002 to 2006. In Korea, the National Health Insurance Corporation (NHIC) and the Health Insurance Review & Assessment Service (HIRA) report the overall utilization and expenditure status of the national health insurance. Table 24 shows this data for medical treatment of selected NCDs.

**Table 23: Summary funding for research/intervention on NCDs from 2002-2006 in Vietnam
(Thousand of VND*)**

Research/Intervention	Gov. budget	Donors	Total
Diabetes control program	3,550,000	3,592,838	7,142,838
Cancer control program	3,700,000	7,180,000	10,880,000
Mental health control program	4,526,000	112,000	4,638,000
Cardiovascular diseases control program	2,450,000	5,040,000	7,490,000
Total	14,338,000	15,812,383	30,150,383

*The exchange rate of Vietnamese Dong to USD is 17,000.00 VND/1 USD

Table 24. Medical Treatments by Disease Categories in South Korea

Division	Patients	Cases	Treatment Amount	
			1,000 won	1,000 dollar
Malignant neoplasm (C00~D48)	1,867,703	6,307,782	2,625,535,232	1,750,357
Diabetes (E10~E14)	1,723,523	12,392,892	382,810,468	255,207
Obesity (E66)	19,679	32,781	457,765	305
Hypertension (I10~I15)	4,544,104	32,051,566	566,870,495	37,791

Source: Korea National Health Insurance Statistical Yearbook for 2007.

The economic burden associated with tobacco is perhaps most widely available for our Pacific Rim economies. In Indonesia, the economic loss due to premature mortality, morbidity and disability was estimated to be at least US\$ 13.84 billion (Rp 125 trillion), or about 4.7 times larger than the tobacco tax revenues of US\$ 2.94 billion (Rp 32,65 trillion; Indonesia Report Card: Status of Tobacco Use and Its Control). Lost annual income is estimated to be US\$115 for individuals and for family members who use tobacco (Kosen 1998). In the Hong Kong population of 6.5 million in 1998, the annual value of direct medical costs, long term care and productivity loss was USD 532 million for active smoking and USD 156 million for passive smoking; passive smoking accounted for 23% of the total costs. Adding the value of attributable lives lost brought the annual cost to USD 9.4 billion (McGee 2006). Table 25 shows the economic burden of smoking in Korea (estimates from 1998). 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).

Table 25. Economic burden of smoking in Korea, population over the age of 35, 1998

Types of costs	Disease specific approach
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	Current smokers	Ex-smokers	Total
Medical costs *	130.25	64.00	194.25
Transportation	3.00	1.17	4.17
Caregivers	15.92	7.08	23.00
Absence from work	39.33	18.17	57.50
Premature death	2089.92	587.92	2677.83
Total	2278.42	678.33	2956.75

Unit: million dollars.

*Medical costs include treatment cost for hospitalization and physician visits

[Ref: HY Kang et al. Economic burden of smoking in Korea. *Tob.Control.* 2003;(12)37-44.]

The estimates that are available of the economic burden associated with selected other NCDs around the Pacific Rim highlight the enormity of the challenge. In China, 131.39 million DALYs were lost in 2002, and the estimated direct expenditure for specific NCDs (in billion RMB Yuan) was cancer 28.45, stroke 39.27, CVD 58.79, COPD 25.98, diabetes 17.59, and hypertension 38.38.

In Hong Kong, annual total direct medical costs of type 2 Diabetes Mellitus per patient were US\$ 1,492-1,716. Costs of Type 2 DM have a significant impact on the local healthcare budget, contributing in 2004 up to 3.9% of the total HK healthcare expenditure and 6.4% of the HK Hospital Authority's (public sector) expenditures on health (Chan et al. 2007). The estimated hospitalization costs in Hong Kong's public hospitals were US \$ 0.43 billion in 2002.

In Taiwan, the direct costs associated with NCDs were the largest component of total expenditure (5.4-7.1 billion NTD), followed by morbidity costs (3.2 billion NTD), and mortality costs (0.4-1.5 billion NTD). Categorized by disease type, hypertensive diseases accounted for the largest share of costs (6.8-7.7 billion NTD), followed by cerebrovascular diseases (1.0-1.9 billion NTD). Disorders of arteries, arterioles, and capillaries accounted for the smallest share (41 million to 1 billion NTD). [Yang & Huang. *J Formos Med Assoc.* 1999 Jun;98(6):394-402.]

Singapore's total expenditure on health as % of GDP was 3.5% (2005) while total expenditure on health per capita (Intl \$, 2005) was 1,140. NCDs account for 79.9 % of years of life lost (2002). The economic burden of asthma was US\$ 34 per annum (2002) while smoking -related diseases cost 800 million S\$ per year. The mean cost of treating stroke was S\$7,547 (Hospital Costs for Stroke Care in Singapore).

In Japan, where in 2006 total expenditure on health per capita (in PPP international \$) was \$2,514, representing 7.9% of GDP (WHO), the total annual cost of various NCDs in 2005 has been estimated as follows: cancer: \$26.1 billion; CVD: \$25.9 billion; mental health: \$19.1 billion; stroke: \$18.2 billion; diabetes: \$11.3 billion; and COPD: \$6.8 billion

(2004 figure). As percentage of 2006 total health expenditure in Japan, cancer absorbs 11.5%; CVD 23% COPD 8.5%; and mental health 7.7%.

Australia is facing an increased economic and social burden because of chronic diseases and their associated risk factors. Twelve chronic diseases and conditions accounted for an estimated 42 per cent of the total DALY's lost in Australia in 1996 (AIHW). In 2005, 17.5% of people in Australia were obese, with the largest number in the 55-59 age group. Direct financial costs include cost of running hospital and nursing homes, GP and specialist services, cost of pharmaceuticals, allied health services, research and other costs such as health administration. Other costs include productivity cost, carer costs, deadweight loss from transfers (lost taxation, welfare costs), and other costs (aids, equipment and modifications, transport and accommodation costs, respite and the bring-forward component of funerals. The total financial cost of obesity in Australia in 2005 was estimated at \$58 billion (Report by Access Economics Pty Ltd to Diabetes Australia, The economic costs of obesity, October, 2006).

The health system costs for CVD are the highest in Australia for all diseases and are expected to increase over the next few decades. CVD accounted for the largest proportion of the total health system costs, amounting to \$3.719 billion in total direct costs during 1993-4. When risk factors are taken into account, CVD is responsible for \$3.9 billion of total recurrent health expenditure (AIHW & DHAC 1999; CATI Technical Reference Group National Public Health Partnership, CVD in Australia, May 2003).

Focusing on cancer in NSW, on average households can expect to lose \$47,200 in financial costs when a member of that household is diagnosed with cancer. This includes nearly \$9,000 in health care and other out-of-pocket costs. The economic costs of these cancers are even higher, with each incidence of cancer costing almost one million dollars per person over their lifetime to the NSW economy. The total expected lifetime economic cost of cancer for people diagnosed with cancer in 2005 in NSW is around \$32.5 billion. The total lifetime financial cost of cancer of people diagnosed with cancer in 2005 in NSW is \$3.9 billion – equivalent to 1.3% of gross state product (A report by Access Economics Pty Ltd for the Cancer Council of NSW, Cost of Cancer in NSW, 2007).

Dewey and colleagues (2003) estimate that total lifetime costs for all strokes in 1997 in Australia was \$1.3 billion. Total lifetime costs were greatest for ischemic stroke was \$936.8 million. The average cost per case during the first year was greatest for total anterior circulation infarction (\$28 266). Over a lifetime, the present value of average costs was greatest for intracerebral hemorrhage (\$73 542), followed by total anterior circulation infarction (\$53 020), partial anterior circulation infarction (\$50 692), posterior circulation infarction (\$37 270), lacunar infarction (\$34 470), and unclassified stroke (\$12 031).

Some studies have pointed to the large economic burden associated with NCDs in the US Pacific Rim cities. For example, loss of income to the economy attributable to weight complications such as 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; http://www.publichealthadvocacy.org/PDFs/Economic_Costs_Table.pdf). 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).

Research

Most of research on NCDs are conducted and funded by governments. In China, this includes the national and local government agencies such as China CDC. University research also plays an important role, as does research conducted by others in the health care delivery system such as physicians, hospitals, and staff in long term care facilities.

In Vietnam, there appears to date to have been a lack of research to support effective NCD prevention and control efforts. What studies that do exist on NCDs in Vietnam have been mainly observational; the few intervention studies were small scale, and most studies have not included efficiency or cost-effectiveness.

For Indonesia, it remains unclear what percentage of current health research funding of the Ministry of Health focuses on NCDs, but commitment and funding have no doubt increased now that there is a Directorate devoted to NCDs. Other research on NCDs has been done by universities and NGOs with internal, government or international donor agency funding, but these studies may be duplicative since there is little coordinate or communication among these constituencies and the majority of such studies are kept as the unpublished reports rather than published in the peer-reviewed literature.

In Malaysia as well, the trend is toward more research focused on NCDs, and concrete progress has been made by the four research universities, research and training institutes like the Institute of Medical Research and National Institute of Occupational Safety and Health, and NGOs like the National Cancer Council. There are research forums like the National Public Health Colloquium and the Public Health Conference. Research funding is available from the government through the Ministry of Science, Technology and Innovation.

According to the Hong Kong Department of Health “NCD Prevention and Control Strategic Framework” as mentioned above, in 1996 and 2001, the Government and private sector spent about 2.3% and 2.5% respectively of the entire health expenditure on disease prevention and health promotion. However, there is no available information on the percentage of current health research funding on NCD.

Korea has made significant progress in structures to promote NCD control. The Korea CDC develops an ‘Annual Guideline of Chronic Disease Management Project’. They annually update the guideline of national based chronic disease prevention and community based chronic disease prevention. Each prevention projects has their own standardized evaluation of results. According to the Korea Institute for Health and Social Affairs’ report named ‘Health and affair budget 2008’, the budget for ‘Health and disease management’ earmarked for ‘Family Health, Health Education and infection disease management, Chronic disease management, Mental Health, Cancer & Rare Disease, Mental disease management, Hygiene management’ is 51,762,294,000 won (\$ 34,508,196) in 2008. According to ‘The fourth plan for community medical health in Seoul (2007~2010)’, the budget of Public Health was 54,556,000,000 won (\$ 36,370,667). That was 2.5% of the total government budget.

In Singapore, based on the number of research and evaluation projects that HPB has conducted in 2008, approximately 80% were NCD-related, and the same percentage

should be focused on research funding (Research and Evaluation Department, HPB). The HPB and the MOH do research independently if each other, such as the MOH focus on scientific and medical research through National Medical research council (NMRC). Other centers of research on NCDs in Singapore include the National University Hospital, Singapore National Eye Center, National Neuroscience Institute, National Cancer Center, Singapore Cancer Society, Institute of Mental Health, and the Research Pacific Group Pte Ltd (an independent research company that carried out the NHSS). The HPB's research and evaluation projects on NCDs are funded through the MOH and Singapore Totalisator Board. In addition, a Health Research Endowment Fund was established on 1 April 2000 (by MOH) to encourage and support medical research in Singapore.

These policies have yielded some success. The MOH published a one year result on the CDMP. The HPB also conducted the Economic Evaluation of Smoking Control Program (with results in April 2009), as well as an economic analysis of the School Dental Service FY09 and an economic assessment for Obesity FY09. Singapore's programs are also planned and evaluated using National Health Surveys. Multiple fora allow for stakeholder input regarding specific policies and programs, such as the Asia Pacific Physical Activity Network, the Singapore Association for Mental Health, the Singapore Cancer Society, and various national conferences on topics such as workplace health promotion or Disease Management. Furthermore, the HPB, as a statutory board under the MOH, also has the autonomy to identify important or emerging health issues, such as those surrounding migrants. Generally, the MOH identifies the key priority health policy areas for the nation; these areas then come under the purview of the HPB and the relevant health program departments, in consultation with the Research & Strategic Planning Division, who jointly identify program development gaps and research needs. The HPB may conduct research on these specific gaps and needs. Despite this well-coordinated structure, there remain gaps between knowledge and action in primary prevention (including individual knowledge, quality of care, and understanding among GP's), with limited economic evaluation and lack of evidence in disease management programs. Primary care research in Singapore is under-developed compared to specialist research (Koh and Lim 2008).

In Australia during 2007-08, total payments made in grants for medical research by NHMRC were \$589 million, allocated mostly to basic science (46%) and clinical medicine and science (32%), with the remainder going to public health (10%), health services research (3%), and preventative medicine (2%; NHMRC Annual Report 2007-2008). It is not clear how much ends up supporting NCD-related basic and clinical research, health services research for chronic disease, or prevention for NCDs. The funds go to universities (70.1%), institutes (27.8%), hospitals (1.1%), local governments and others.

Over the last decade, strategies have been initiated in Australia to address the rising prevalence of chronic diseases. In 2001, the National Public Health Partnership Group and National Strategies Coordination Working Group, in conjunction with the National Health Priority Action Council and with the support of the Australian Health Ministers' Advisory Council, put forward a strategic framework for preventing chronic diseases. The framework is intended to provide the basis for a comprehensive, evidence-based, public health response to the priority diseases and health issues. To help organize the national

population health effort more effectively and efficiently, the framework focuses on a number of preventable conditions which share commonalities in their aetiology and the major modifiable risk factors, and determinants of these conditions. Based on a list of selection criteria, the primary conditions targeted are heart diseases, stroke, type 2 diabetes mellitus, hypertension, abnormal blood lipid profiles and obesity. Other conditions proposed under the framework include renal disease, certain cancers and chronic lung disease, whereas the primary behavioral risk factors targeted include smoking, unhealthy diet, physical inactivity and alcohol misuse.

For the chronic disease prevention strategy, the goals are to:

- improve the health of all Australians by reducing the health, social and economic impacts of chronic diseases;
- reduce health disparities among different segments of the population;
- establish a national system of health promotion and chronic disease prevention strategies that meet the needs of the population at each stage of the life course;
- incorporate chronic disease prevention objectives into policies; and
- create and sustain the partnerships, systems and leadership needed to achieve these goals.

To achieve the goals, the framework underlines the importance of a life course approach to disease prevention and health promotion, and harnessing the contribution of different groups and interests in society to address the burden of chronic diseases. In line with the WHO's recommendation, the framework recommends building the organization of the national prevention effort in Australia around three key domains of activity. These are: ensuring an effective information base; strengthening prevention and health promotion; and improving systems of care for those with chronic diseases (http://www.dh.gov.au/english/pub_rec/pub_rec_ar/pdf/ncd/chap_3.pdf).

Australia also has developed forums for researchers and policy makers to interact and jointly prioritize research needs. For example, the beyond blue Victorian Center of Excellence (bbVCoE) encompasses the whole population accessing the health system across the spectrum from primary care to specialist mental health:

The bbVCoE focuses on development of research into depression, anxiety and related disorders across the lifespan and across specific issues related to populations and communities such as culturally and linguistically diverse communities, young people, families, early childhood, perinatal (including postnatal) depression, anxiety and parenthood, and people in regional and rural areas. The bbVCoE also focuses on the management of depression in mid to later life. Major life changes during this period, including menopause, bereavement and grief, divorce, retrenchment and retirement are all of relevance to depression and related disorders, and warrant further investigation as well as intervention. Within the above contexts, the bbVCoE addresses a broad range of issues, including risk factors, causes, presentation, triage, acute assessment, acute treatment and the prevention of recurrence (http://www.beyondblue.org.au/index.aspx?link_id=6.731&print=true).

Nevertheless, significant gaps remain in the NCD research base in Australia. According to the Chronic Care Alliance, areas that need attention are workforce participation for people with chronic illness; access to transport; sick leave provisions; chronic illness workplace adjustment; carer responsibilities; older workers; maternity leave; and child care issues (<http://www.chronicillness.org.au/downloads/CIAPolicy07Realflexibilityintheworkforce.pdf>).

In the US, according to records of the NIH for fiscal year 2008, at least \$US 23 billion of the NIH budget is earmarked for research on specific NCDs: about \$7.7b for cancer; 3.4b for substance abuse, drugs and tobacco; 2.8b for mental illness; \$4b for CVD; 2b for obesity and nutrition; 1.2b for lung disease (including COPD); 1b for diabetes; as well as nontrivial amounts for stroke, asthma, hypertension, and other categories that may include NCDs with other medical conditions.

Strategies and programs to prevent and control NCDs and their challenges

Most of the studied cities and countries had recently adopted national or local strategies and programs to prevent and control NCDs. Some cities have specific programs or strategies, but in many countries, local authorities wait to implement guidelines established by national authorities.

In June 2002, the Vietnamese Prime Minister signed government resolution number 77/2002/QĐ-TTg to approve the “National Program on Prevention and Control of NCDs for the period 2002-2010.” This program aims to decrease morbidity and mortality of NCDs including cardiovascular diseases, cancer, diabetes and some mental diseases.

In Indonesia, in 2006 the Minister of Health’s Decree No. 331 (Strategic Plan of the Ministry of Health 2005-2009) established the Directorate of NCDs under the Directorate for General Disease Control and Environmental Health. This Directorate of NCDs began operations in 2007 with a focus on controlling cancer, chronic and degenerative conditions, heart and circulatory system disorders, diabetes and other metabolic conditions, and preventing accidents and injuries. The national strategy includes some specific targets for program managers of NCDs in central and local units. The objective is to work together with communities and households to control risk factors to reduce morbidity, disability and deaths caused by NCDs in Indonesia.

In Malaysia, the Disease Control Division of the Ministry of Health (which was created in 1992) includes a designated section on NCDs. The main focus of this NCD section is health promotion, early diagnosis and prompt treatment of NCDs like CVD, cancer and diabetes. Although no specific targets have been set, localities have begun implementing their own strategies. The Kuala Lumpur Federal Territory Health Department has a NCD Subunit under the Disease Control Unit. Its activities are mainly limited to public health awareness and health promotion campaigns regarding NCDs.

The Chinese government has several strategies and aims for NCD control and risk factors, such as improving nutrition status and decreasing tobacco use (for example, through decrees limiting or forbidding smoking in public places). 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, “Health China 2020,” has been in planning stages since 2008. Many localities, including Hangzhou, have developed strategies for health improvement including NCDs, with local government, bureaus of health and China Center for Disease Control (CDC) offices as the key players.

Other Pacific Rim cities, especially those of higher average income and with aging populations, have recently developed detailed plans for NCD prevention and control. The Hong Kong Department of Health (DH) published a **NCD Prevention and Control Strategic Framework** in October 2008. The framework states overarching principles for the prevention and control of NCD as well as sets the scope, vision, goals, and strategic directions for NCD prevention and control in Hong Kong. In preparing the framework, DH has held an Expert Group meeting with over 40 participants from various disciplines and sectors. Six strategic directions have been identified: (1) support new and strengthen existing health promotion and NCD prevention initiatives or activities that are in line with this strategy; (2) generate an effective information base and system to guide action across the disease pathway; (3) strengthen partnership and foster engagement of all relevant stakeholders; (4) build the capacity and capability to combat NCDs; (5) ensure a health

sector that is responsive to the NCD challenges and to improve the system of care; and (6) strengthen and develop supportive health promoting legislation.

In Taiwan, the Bureau of Health Promotion of the Department of Health (BHP/DOH), is responsible for the prevention and control of NCDs. The BHP/DOH 2007 Annual Report listed the following objectives for NCDs:

1. Create a supportive healthy living environment, promote preventative measures, improve exercise behavior, and assist the general public to practice healthy living;
2. Promote tobacco prevention and provide diverse services to quit smoking, create a smoke-free supportive environment;
3. Reinforce cancer screening program, improve the quality of cancer treatment, promote hospice and supportive services for cancer patients;
4. Construct a better environment for reproduction and parenting to improve the well-being of children and young adults, and reinforce preventative measures for chronic diseases such as diabetes, hypertension, and hyperlipidemia;
5. Assist with the improvement of local health and medical care services, enhance community health knowledge and skill, and work with NGOs to undertake health promotion tasks;
6. Facilitate oral hygiene, and reinforce oral health services for children and the physically and mentally challenged.

The important related policies include the National Five-Year Cancer Control Plan; the Tobacco Hazard Control Plan; the Chronic Renal Disease Prevention Plan; the Five-Year National Oral/Dental Health Care Project (First phase); and the Five-Year Oral/Dental Care Project for the mentally and physically impaired (<http://www.bhp.doh.gov.tw/>). The contents of these policies set the scope, vision, goals and strategic direction for NCD prevention and control in Taipei, as for the rest of Taiwan.

In Korea, the Ministry for Health, Welfare and Family Affairs developed a Health Plan for 2006-2010 articulating numerous specific health goals including prevention and control of NCDs. For example, the plans calls for extending 'healthy life span' between 2005 and 2010 for males from 64.8 to 69.7 and for females from 70.8 to 74.2. The plan lays out specific aims for improvement of health behaviors, such as reducing smoking among males from 61.8% in 2002 to 30% by 2010, reducing the number of excessive drinkers, increasing exercise, nutrition, cancer screening, and improved treatment for NCDs including mental health conditions. An additional aim is to reduce disparities in health among Koreans of different socioeconomic status.

Since 2000, Singapore has had a multi-pronged management framework for chronic disease, developed through the Ministry of Health. This framework focuses on supportive information technology infrastructure promotion of self-management; changes to the clinical care process (e.g. clinical guidelines and pathways); interaction between the care giver and patient using good communication skills and various clinical tools; and feedback about patient outcomes. To promote good health and reduce illnesses, the framework includes a strategic plan for health promotion and comprehensive disease management programs, review of Medisave, MediShield and Medifund programs (the 3 Ms), strengthened training of doctors, clinical quality assurance programs, as well as promoting integrated care and contracting private practitioners to provide subsidized primary health care to the elderly (<http://www.moh.gov.sg/mohcorp/about.aspx?id=116>).

The framework also includes missions to strengthen epidemiological data and surveillance systems. The key players are the Ministry of Health, spearheading the overall effort, and with HPB providing operating support (and financed by the Ministry of Health).

In most cases it is unclear what specific events triggered the formation of national and municipal plans for NCD prevention and control. For Singapore, it appears that triggers included the increasing mortality rates due to chronic diseases (83% of all deaths in 2002, http://www.who.int/chp/chronic_disease_report/en/) and the associated need for consistent, coordinated, evidence-based treatment to improve health as well as save medical costs. Other factors were the problem of duplicate laboratory and radiological investigations caused by lack of sharing of medical records, and the lost opportunity associated with only sporadic, unplanned, and uncoordinated efforts of patient education. Obstacles to the strategic NCD framework include lack of disease management understanding among GPs and lack of sufficient existing evidence of disease management programs. The program received significant support from the media and the authorities have actively sought stakeholder support by engaging providers (GP clinics and GP groups) and patients (e.g., offering the possibility of using Medisave to reduce out of pocket expenses and seeing GPs instead of hospital specialists as well as providing patients with education material for self-monitoring chronic disease) and providers (Chea 2001, Yong and Yee 2007, Lim 2008).

In Japan, the nation with the longest life expectancy in the world, the Ministry of Health, Labour and Welfare launched a National Health Promotion Movement in 2000. The objectives are to prevent and control NCDs and underlying lifestyle factors and to extend the health promotion movement so that self-motivated individuals actively manage their own health and quality of life. This strategy relies on 4 basic policies: a) Importance of primary prevention; b) Creation of a supportive environment for the enhancement of health; c) Goal setting and assessment; and d) Promotion of effective, well-coordinated activities by the various implementing bodies. Activities cover 9 areas: 1) diet and nutrition, 2) physical activity and exercise, 3) leisure and mental health, 4) smoking, 5) alcohol, 6) dental health, 7) diabetes, 8) CVD and 9) cancer. The national strategy was triggered by the rapidly increasing elderly population in Japan, and has been spearheading and financed by the Ministry of Health, Labour and Welfare. Of 70 specific targets to be reached by 2010, five examples are increasing the percentage of people who regularly exercise to $\geq 63\%$; decreasing the prevalence of people who feel stressed to 49% or less; increasing to 100% the fraction of people who know about the harmful side effects of smoking; decreasing hyperlipidemia among males to $< 5.2\%$ and among females to $< 8.7\%$; and increasing to 100% the percentage of patients with diabetes who adhere to treatment. In addition, the Health Promotion Law, enforced starting May 2003, established legal foundations for facilitating greater health promotion efforts by citizens (Sakurai Hideya 2003).

To date, results of Japan's national NCD strategy have been only mildly encouraging. Age-adjusted mortality rates for CVD and stroke have been improving, but the mid-term evaluation of 2005 concluded that overall, improvement was not enough. Tokyo is no exception to this rule.

The final Pacific Rim city we examine is Sydney, Australia. The [National Chronic Disease Strategy](#) provides an overarching national framework for improving chronic disease prevention and care across Australia. It is a nationally agreed agenda to encourage

coordinated action in response to the growing impact of chronic disease on the health of Australians and the health care system.

Details on policies and programs

This section gathers specific information about policies and programs related to NCD prevention and control in the selected Pacific Rim cities. Comprehensive information is not available regarding all such programs, but those mentioned here illustrate the current state of affairs.

Consider, for example, cervical cancer screening in Vietnam. There is no national cervical cancer program. At the central level, certain policies and strategies on cervical cancer prevention and control have been mentioned both in relation to the National Cancer Prevention and Control program and Reproductive health programs. However, these policies are neither clear nor comprehensive. In the Strategy on Reproductive Health from 2001 to 2010, the policy and strategy on cervical cancer prevention were not clearly stated, but rather implicitly included in the section on cancer diseases of the reproductive tracts in both males and females. A strategy on cervical cancer prevention was stated more clearly in the National Cancer Prevention and Control Program of Vietnam 2006 and 2010. Under this program, to reduce the burden of cancer deaths, the government aims to promote early detection of cervical cancer (along with other cancers including breast cancer, recto-colon cancer, and skin cancer) through screening and consecutive early treatment. To ensure the success of the screening, health education on cancer prevention is also incorporated in the national program. However, there were no systematic linkages and/or coordination (from central down to grassroots levels) between the two fields of Oncology and Reproductive Health to reinforce the common efforts and resources for the purpose of cervical cancer prevention and control. At the provincial level, in provinces such as Hanoi, Ho Chi Minh City, Can Tho and Da Nang, policies and regulations/guidelines related to cervical cancer prevention and control have been formulated and implemented to different extents (Assessing Program Needs in Cervical Cancer Prevention in Vietnam, March 2008).

Another example comes from Vietnam's efforts to prevent alcohol abuse. Associated policies include those of the national government for regulation of production and trade in alcoholic beverages (such as setting tax rates, licensing of establishments selling alcohol, prohibiting the sale of alcohol in some locations, and regulations on advertising and financial support) and policies for alcohol consumption (such as the blood alcohol level in drivers, and prohibiting state employees from drinking alcohol during working time). Several localities have their own policies tailored to the own situations. However, difficulties in policy implementation abound: lack of devices for alcohol breath testing, illegal alcohol imports, and widespread home-brewing of alcohol, to name a few. Some policies are lacking, and existing policies have gaps and deficiencies. For instance, beer with a high alcohol concentration is advertised in the mass media; domestically produced alcohol with a 15% or less concentration of alcohol is restrictively advertised; guidelines to limit the number of liquor shops are lacking; policies on controlling the production and trade of home-brewed alcohol are lacking; no policies address education, information, and communication in preventing and controlling harmful alcohol use; and policies are lacking on health care for harmful consumers of alcohol, alcoholics, and alcohol

consumption by pregnant women and breastfeeding mothers. Moreover, preventing harm from alcohol consumption is not only the responsibility of the health sector, but requires multisectoral cooperation, which to date has been lacking in Vietnam.

Vietnam also has several specific programs for NCD control. The program on prevention and control of CVD, managed by the National Institute of Cardiovascular Disease in Vietnam, specifies targets for increasing knowledge, controlling risk factors, and strengthening the capacity of health workers regarding prevention, early detection and treatment of hypertension. The program on prevention and control of cancer is managed by the National Institute of Oncology (National Cancer Hospital); goals for the 2006-2010 period include reducing the incidence rate of tobacco-related cancers by 30%, vaccinating all newborns against Hepatitis B, and reducing the mortality rate for such common cancer types (cancer of the breast, cervix, oral cavity, rectum and skin) by screening, early detection and timely treatment. The program for the prevention and control of diabetes, managed by the National Institute of Endocrinology, aims for to reduce the incidence, complications and mortality due to diabetes in Vietnam. And the program on the prevention and control of mental diseases, managed by the National Institute of Psychiatry, aims to reduce suicides among depressed patients, improve management of Parkinson patients, and strengthen other aspects of mental health care.

According to the general process evaluation of the National Program on NCD prevention and control in the period from 2002 to 2006, Vietnam has achieved significant progress along multiple dimensions. For example, it has begun to establish a basic network on NCD prevention and control at central level and started to coordinate some common activities within the network. Health education on NCD prevention and control in communities has been implemented to some extent, and surveillance systems on NCDs and their risk factors have been put into place. The quality of NCD treatment in specialized institutes and hospitals has been improving, and diagnostic and treatment systems at the provincial level have expanded. Community-based NCD management and treatment models have been piloted, and some integrated models for NCD prevention and control have also tested on a small scale.

Challenges for Vietnam's programs remain formidable. The network of national NCD prevention and control programs has not yet expanded to provincial, district and commune levels. There is limited coordination of activities within the network, and the involvement of non-health sectors as well as communities in combating NCDs is limited. Training activities for health workers on NCDs have been only carried out in provinces covered by the program. Treatment appears to garner more attention and resources than prevention. Vietnam needs a surveillance system for both diseases and risk factors. Health education programs on NCD were mainly carried out in big cities and through mass media. A systematic and comprehensive plan for NCD health education was not yet developed. And the budget for all these activities remains limited.

In Indonesia, the Directorate of NCDs is still in the early stages of developing policies and programs. The intent is to have an evidence base, using results from the national survey of health or national household survey. Strategies include efforts to strengthen administration; develop cooperation and partnerships with all stakeholders in human investment; improve NCD epidemiology surveillance, focusing on risk factors, disease and mortality; develop and standardize NCD health services (organization, human resources, technology); facilitate and assist with technical aspects (methods, technological

efficiency, case management); and develop integrated monitoring and evaluation of NCD control strategies.

Other stakeholders have been active in achieving some NCD policy progress. For example, researchers on tobacco control at the University of Indonesia, Indonesian Public Health Association, Demographic Institute, and others played an important advocacy role leading to increases in the price and tax rates for tobacco and policies for protection from second-hand tobacco smoke, banning tobacco advertising, promoting health warnings, and forcing the government to ratify the Framework Convention of Tobacco Control. Many NGOs, including hospitals and clinics, have also contributed significantly to activities related to NCD risk factor control and research in Indonesia. Most cities, including Jakarta and Makasar, follow the lead of national policies and have few independent initiatives for NCD control.

Challenges include the system of decentralization, so that not all local governments have the budget capacity or political will to implement the NCD control programs, and (perhaps partly as a result) there are so many intervention programs managed by NGOs and donor agencies that are not coordinated or systematically reviewed in a way that would allow dissemination of best practices across Indonesia. The quality of previous data sometime is doubtful since the methodology in collecting and analyzing the data is not appropriate. But now the MoH (Institute of Research and Development) has collaboration with universities when doing survey starting from research design, implementation, analyzing and interpreting the data. The gaps in access to healthcare between poor and rich people are big. Community health providers remain scarce, unevenly distributed, and in need of further training and skill refreshment. Indonesia's diversity of cultures and religions can be benefits or obstacles for the programs, depending how implementers manage the differences.

In Malaysia, health promotion activities on diabetes and CVD reach patients through government and private hospitals and clinics, and the general population through public forums, pamphlets and exhibitions. Although some policies are evidence-based,⁸ as in many countries there remains a wide gap between research and policy. Except for academic and scientific forums, there is little effort to bring together academia, scientists and policy makers.

To illustrate NCD policies and programs in China, tobacco control is once again a good example. The Chinese People's Congress has ratified the Framework Convention on Tobacco Control, which will give a strong impetus to tobacco control work. Measures to control smoking will be intensified, including anti-smoking intervention targeted at adolescents and bans on smoking in public places and advertising tobacco products. China has been carrying out "Nationwide Fitness Programs" to promote various kinds of exercises, such as aerobics, *taiji*, jogging, and so on. To help fill the gaps between research and implementation, Chinese authorities have developed guidelines for balanced diets, hypertension prevention and treatment (including practical norms at the grass-roots level), obesity prevention and control among adults, diabetes prevention and treatment, and cerebrovascular disease prevention and treatment.

⁸ For diabetes control policies, the Malaysia Ministry of Health draws on patient data from government health facilities. For cancers, there is the National Cancer Registry.

Some Chinese cities have built upon this national framework to implement policies and programs tailored to local conditions. In Hangzhou, for example, hypertension and cancer have received the most emphasis. Policies for NCD prevention and control are developed by the local government and CDC of Hangzhou city. In 2003, the Hangzhou health bureau published the policy entitled “Several suggestions about reinforcing community integrated prevent and cure of chronic non-communicable diseases.” The policy clarifies that community health centers should be the primary force for preventing and treating NCDs. 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 for adults. Attempts are made to personalize diet and physical activity recommendations for diabetes patients.

These programs have had some success. There are 45 community health centers and 205 community medical service stations in Hangzhou city, covering 94.9% of residents. The medical documents are recorded for more than 70% residents. The regular physical exam is performed among residents aged ≥ 60 years. The residents with hypertension and / or diabetes are followed up and managed. By late 2006, 99,300 hypertensive patients and 19,100 diabetes patients were followed up and managed. So far, management based on various degrees of hypertension was administered in most local communities. After 1 year management administration, blood pressure was kept in normal range among 62.16% of hypertensive patients; the rate of smoking decreased by 6.75% among hypertensive patients; the rate of alcohol drinking reduced by 1.34%; and the share of patients attaining low salt diets reached to 47.55%.

To date a key barrier in Hangzhou as in many other localities in China has been the relatively low level of government financial support for health, which deters progress even though the government may realize the importance of NCDs. The April 2009 announcement of national reforms promises significant increases in government financing for public health and social health insurance. It remains to be seen how this will impact NCD prevention and control. Furthermore, the general population lacks knowledge regarding preventive and treatment for specific NCDs, so educational programs should be developed.

In Hong Kong, according to the “*NCD Prevention and Control Strategic Framework*” as mentioned above, since 2000, the Department of Health has strengthened health promotive and disease preventive activities in various service areas such as family health services, health service for students and elderly health services. On top of that, the Tobacco Control Office has been established to enhance and co-ordinate efforts on tobacco control, and the Men's Health Program and the Cervical Screening Program have been launched to promote health of men and regular use of cervical smears to prevent cervical cancer in women respectively. The ‘Health Plan’ (2006-2010) project has established policies for decreasing smoking rate and support nutrition for lower social stratum people.

The Hong Kong Hospital Authority has also played an active role in health promotion and disease prevention. For example, the Health InfoWorld organizes exhibits, workshops and health promotion activities relating to major disease burdens in collaboration with community partners, various professionals, corporations, patient groups and volunteers. Its Patient/Health Resources Centers, based in hospitals, serve as a platform for engaging

discharged patients and their carers in health education and self-management programs with the aim of enhancing patient mutual support as well as secondary prevention in relevant disease groups. The general and specialist outpatient clinics also provide health talks to patients and the population at large.

There is no specific territory-wide program implemented for certain chronic diseases. However, there are programs/services provided by the Department of Health or the Hospital Authority targeting specific populations, usually cluster-based. For example, in a cluster of the Hospital Authority, it has a telephone nursing services targeted on patients who are suffering from chronic diseases that are not well controlled. This service is organized by the nurse and they will make regular calls to the target population and the patients could call back if they have questions on their conditions. In the Department of Health, they have elderly Centers to screen older people for chronic diseases. However, there are no publishable data evaluating the programs so that we have no idea how well do they work. These deficiencies may be addressed as the Hong Kong government works to implement the October 2008 “NCD Prevention and Control Strategic Framework.” But challenges will be formidable, since 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 public sector) has yet to establish linkages that would be important for integrated NCD prevention and control.

Taiwan’s approach has some similarities... There are several NCD programs implemented by the government and NGOs, including ones focusing on tobacco smoking, betel quid chewing, cancer prevention and control, community-based “three-in-one” (blood pressure, blood glucose and blood cholesterol) screening and integrated screening care service models. For example, the metabolic syndrome prevention and control program seeks to enhance public knowledge and promote waist circumference within a target range to prevent metabolic syndrome, as well as to enhance the knowledge of campus medical staff in elementary, junior high, and senior high schools in the prevention and control of metabolic syndrome. The diabetes prevention and control program assists counties and cities with the promotion of a “diabetes share care network”; has established a certification system to enhance the quality of diabetes medical professionals; helps to organize diabetes health promotion institutions and promotes other activities designed to enhance the self-management knowledge of diabetic patients, such as support for a nationwide diabetes patients self-help groups network.

Taiwan’s cardiovascular disease prevention and control program also seeks to enhance knowledge and self-management ability of patients. It also aims to combine community resources to make blood pressure measurement stations readily accessible to all patients, as well as develop an innovative, patient-centered community care model with a stroke registration system to prevent stroke recurrence. The chronic kidney disease (CKD) prevention and control program supports health education about kidney disease prevention and patients' self-care abilities, while aiming to improve early detection and intervention for high-risk groups and cases, and fully prepare patients for successfully receiving dialysis therapy. In addition, Taiwan has a program on health of the elderly that strives to enhance the ability and knowledge of the elderly in health promotion, works with the Ministry of the Interior towards enacted related regulations, and is organizing a resource-integrating elderly health promotion pilot program.

Results to date give some reason for cautious optimism... In the sphere of promoting patient self-management skills, the diabetes share-care network includes 352 townships and 1256 health care facilities, and the stroke registration system was established, including successful configuration of the stroke registration platform, the registration standard flowchart and the registration information quality mechanism. Between 2006 and 2007, a total of 35 contact hospitals participated in online registration and more than 16,000 patients completed registration. In addition, twelve coronary artery disease patient self-care learning groups were established in the northern, central, southern and eastern parts of Taiwan. A total of 278 patients and their family members participated. There were 81 kidney health promotion institutions, with 9,693 newly enrolled patients and providing 20,821 outpatient visits. There were 1,374 patients who received hemodialysis, peritoneal dialysis, and kidney transplant and 26.6% of the patients received peritoneal dialysis. There were 315 patients who received hemodialysis for the first time on an outpatient basis instead of hospitalization or emergency care, which is 126 more than in 2006. However, further improvement in many areas appears needed to address the rising challenge of NCDs in Taiwan: evidence-based guidelines are not yet available, for example, and the fragmentation among primary, secondary and tertiary health care units makes coordination difficult.

In Korea, Health Plan 2010 is the national strategy for health. One of the goals of Health Plan 2010 is to assess its achievements with numerical targets. An important discussion point involves the optimal number of targets for evaluation. The targets draw on an evidence base that includes surveillance and data analysis from the Korea National Health and Nutrition Examination Survey (KNHANES) each three years since 1998, and the Community Health Survey annually since 2008.⁹

Two important illustrations of policies and programs in Korea are tobacco control and nutrition support. The Korean government has established medium- and long-term plans for antismoking efforts consistent with the Framework Convention on Tobacco Control. A foundation for sustainable health promotion has been established by earmarking the income from tobacco tax for this fund. This program has high credibility, being associated with the Ministry of Health, Welfare and Family in Korea and the Korea Center for Disease Control and Prevention (KCDC). Considerable effort has also gone into extending the nutrition support program for people of lower socioeconomic status to cover the whole population of Korea. According to 2008 estimates, there are 52,000 pregnant women and infants of lower socioeconomic status, and policies to support supplemental food for malnourished individuals were put into place after evaluation (national expenditure, \$9,266,667).

Health promotion strategies have been developed and implemented in Seoul. For 2007-2010, the department of health in Seoul city established 2 strategies and 10

⁹ KNHANES is a cross-sectional survey, employing a multi-stage probability sampling method based on the Korean National Census Registry. A total of about 40000 subjects participated; of these, about 6000 took the examination survey and completed the interview survey with no missing items. The final sample included about 5000 subjects aged 20 to 79 years, from whom complete information was obtained. The Community Health Survey is cross-sectional. Every public health center (totaling 253) surveys their residents' health status. The final sample included about 800 subjects aged over 20 years per PHC, from whom complete information was obtained. The overall national sample is about 200,000; that for Seoul city includes 25 PHCs and a sample of about 21,000 residents.

programs for NCDs. One is the prevention and management project, which encompasses education and information for NCD prevention; 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; and support for vulnerable groups in paying their medical bills. 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.

These programs in Seoul confront many of the same barriers as elsewhere in Korea. The government has a limited role as a provider of curative services and has responsibilities for public health services but still plays a modest role in disease prevention and health promotion. Basically the government has a laissez faire policy towards regulating private suppliers, the dominant providers in Korea’s delivery system. Medical institutions in Seoul (and Korea) are not clearly differentiated. Hospitals operate extended outpatient departments and many clinics provide inpatient treatments, particularly in surgery and obstetrics. Demographic shifts, such as the rapid increase in the elderly population and a decrease in the birth rate, have been even more acute in Seoul.

Singapore’s Ministry of Health created an autonomous but state-funded Health Promotion Board (HPB) in April 2001 to “build a nation of healthy and happy people”. It is the major driver for national health promotion and disease prevention programs, targeting the “healthy”, the “at-risk”, and the “unhealthy” segments of the population and promoting healthy lifestyle practices. It screens them for obesity and other major risk factors for key chronic diseases such as diabetes and hypertension.

The HPB offers comprehensive workplace health promotion programs and a School Health Program that covers health screening, immunization, dental care, and health education. It also works with partners from schools, workplaces, healthcare industry and community to promote healthy lifestyles. Such collaborative activities include joint events, exhibitions, workshops, talks and support group sessions. Since 1992, there has been an annual “National Healthy Lifestyle Campaign,” focusing on a particular area of concern each year. The priority themes have been Nutrition, Physical Activity, Mental Health, and Smoking. During the 2007 National Healthy Lifestyle Campaign, for instance, HPB collaborated with the Institute of Mental Health, Singapore Association for Mental Health, SAGE Counseling Center and the Gerontological Society and managed to reach 160,000 people with its “Healthy Mind, Happy Life” message through talks, workshops, forums, seminars, fairs and exhibitions.

As early as 1986, there was already a national focus on smoking, with the launch of the National Smoking Control Program and the establishment of a National Smoking Control Coordinating Committee. The aim was to make non-smoking a social norm and reduce smoking prevalence in Singapore by preventing smoking initiation among youths, promoting smoking cessation among smokers, and protecting non-smokers by eliminating 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.

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. Comprehensive legislation for smoking control has proven to be a powerful and effective tool. The first laws concerning smoking were passed in the early 1970s. Since then, they have been periodically revised to incorporate proven international best practices. There are two major legislation instruments: the Prohibition on Smoking in Certain Places Act (1971) and the Control of Advertisement and Sale of Tobacco (1991) Act. Smoking is prohibited in all public places including public transport, cinemas, bus shelters, and even entertainment places such as pubs, bars and discos. There is also prohibition of tobacco advertisement in any form in the media and public, mandatory graphic health warning labels on cigarette packs and prohibition of the sale or supply of tobacco products to persons below 18 years of age.

Singapore's proactive stance is illustrated by its banning of cigarette vending machines before they could be introduced, simply by looking at experiences of other countries. And by introducing legislation early, Singapore prevented the tobacco industry from ever becoming important event sponsors. When Singapore ratified the WHO Framework Convention on Tobacco Control (FCTC) in Dec 2003, it was already exceeding the requirements pertaining to tobacco sponsorship, promotion and advertising.

Tobacco taxation is another key strategy used to discourage smoking in Singapore. Increasing retail prices of cigarettes since 1972 have coincided with decreasing per capita consumption over the same period. Before 2003, cigarettes had been taxed by weight, but since July 2003 cigarettes are taxed by the stick. The average retail price of a pack of 20 cigarettes is S\$ 11.30, 67% of which is tax.

The crude prevalence of daily smoking was 21.8% among males compared to 3.5% among females in 2004. But while the crude prevalence in males decreased from 1992 to 2004, it dramatically increased among females, particularly among those aged 18-29 years. This increasing rate of young female smokers seems to follow a global trend in developed countries, and is a concern.

Singapore launched a comprehensive Chronic Disease Management Program (CDMP) in 2006. This is a national effort to radically change the way NCDs are treated. The aim is to shift the focus away from sub-optimal, episodic, or reactive care of symptoms, towards a paradigm of life-long holistic care that emphasizes prevention and health maintenance. Hypertension, high blood cholesterol, diabetes, stroke, asthma, chronic obstructive pulmonary disease, schizophrenia, and major depression are the chronic conditions currently focused on. There is a comprehensive support structure for this program, including the promulgation of disease treatment protocols, provision of training for general practitioners who see the majority of outpatients with NCDs, and of Nurse Educators in the community to support general practitioners in the health education of their patients. Trained "wellness coordinators" also help the elderly actively manage their conditions, e.g, comply with medication and follow up with their doctors. Singapore's

Medisave scheme has also been liberalized to include payment of outpatient treatment for these conditions.

In Japan, numerous policies and programs – put in place by the Ministry of Economy, the Ministry of Health, Labour and Welfare, and the cabinet -- support NCD prevention and control. Consider the policies in place regarding smoking: the Act for Prohibiting Minors from Smoking prohibits people younger than 20 years old from buying or smoking cigarettes; tobacco advertisements are banned from all media (TV, radio, internet, magazines, etc.); there are mandatory health warning labels on cigarette packages and bans on smoking in public places; by law, since 2008 all vending machines have a build-in age verifier device; 58% of the retail price represents tax revenue; and some cities, such as several wards in Tokyo, prohibit smoking while walking in public places. To confront Japan's rapid pace of 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 Health Japan 21 Program is based on health promotion, encouraging citizens to follow healthy lifestyles and endeavoring to motivate them to take responsibility for their own health and quality of life.

The mid-term evaluation of "Health Japan 21" shows that progress has been made, but significant challenges persist. There has been improvement in age-adjusted mortality from CVD and stroke, but no change in the prevalence of obesity in women and increasing obesity among men; and the prevalence is increasing for diabetes and hyperlipidemia, while rates of physical activity are decreasing.

Similarly, there are some encouraging trends in Australia. Age-standardized death rates in 1995–2004 declined by –39% for CHD for both men and women and –32% for men and 31% for women for cerebrovascular disease (AIHW, CVD in Australia. Current state and recent trends; http://www.aihw.gov.au/eventsdiary/ah06/presentations/chris_stevenson_cardiovascular_disease.pdf). Yet it is unclear to what extent this is directly attributable to the national and regional policies and programs for NCD prevention and control.

A centerpiece of Australia's NCD policies and programs is "Preventing Chronic Disease: A Strategic Framework." The Background Paper National Public Health Partnership October 2001 was endorsed by the Australian Health Ministers' Advisory Council on 31 May 2001 as the basis for further national collaborative action. This paper sets out a strategic framework for the prevention and control of chronic NCDs in Australia. The framework is intended to provide the basis for a comprehensive, evidence-based, public health response to the National Health Priority Area initiative. The paper's focus is on the relationship between the chronic diseases (and associated conditions) and the modifiable risk and protective factors (behavioral, psychosocial and biomedical) shared by many of these conditions. The framework is intended to inform research, priority setting, service planning and action at all levels of the health system in Australia. Leadership to translate the framework into action will be the responsibility of the National Public Health Partnership Group (NPHPG), working in close collaboration with the National Health Priority Action Council (NHPAC) (<http://www.nphp.gov.au/publications/strategies/chrondis-bgpaper.pdf>). Policies are

mostly evidence-based, drawing on such sources of information as the National Health Survey.¹⁰

For example, the “Western Australia Healthy Lifestyles: A Strategic Framework for Primary Prevention of Diabetes and CVD” aims to facilitate a more coordinated and strategic approach to the development and implementation of strategies and interventions to prevent type 2 diabetes and CVD in this state. The Healthy Lifestyles strategic framework provides: linkages with existing state and national prevention plans; the capacity to overlay state, regional and service area plans and prevention activities; the basis for funding primary prevention services by the DoH; and a clear vision, goals and strategic objectives for those engaged in achieving improved healthy lifestyles for Western Australians (Healthy Lifestyles. A strategic framework for primary prevention of diabetes and CVD in Western Australia 2002 – 2007).

To understand recent developments in Australia, it is useful to look back at historical developments. By the end of the 1990’s Australia had nearly 30 national public health strategies, covering population groups (Indigenous health, ageing, women), risk and protective factors (breast cancer, diabetes, HIV infection), and settings (schools). Some were well –funded programs, others brought stakeholders together for periodic meetings, and yet others lobbied for more attention. These ‘stove pipes’ competed for scarce resources more often than they built alliances for common action. At the same time, Australian health ministers declared four health priorities beginning in 1993: heart disease, cancer, injury and mental health. Following the election of the Howard Government in 1996, diabetes was added as a fifth national priority. In 1999, asthma was also added to the

¹⁰ The NHS collects information from approximately 26,900 people from all States and Territories living in private dwellings, selected at random using a multi-stage area sample of private dwellings. The survey is undertaken across much of Australia, but excludes the 'sparsely settled' areas, which comprised less than 1% of the non-Indigenous population and 25% of the Indigenous population at the 2001 Census: a separate Australia-wide survey of the health of Indigenous people, also conducted in 2001, surveyed these sparsely settled areas.

The survey includes self-reported details of health conditions (both acute and long term) and major risk factors, as well as demographic and socioeconomic information about the survey respondent. Respondents were asked if they had been told by a doctor or nurse that they had asthma, cancer, heart and circulatory conditions, and/or diabetes. These conditions, together with injuries and mental health, form the NHPAs. However, for long term mental health problems, respondents were not asked whether they had been told by a doctor or nurse that they had any mental health problems; thus, the responses may be based on self-diagnosis, rather than diagnosis by a health practitioner. Respondents were also asked a series of questions about other specific, non-NHPA, conditions, covering eye and sight problems, ear and hearing problems, and arthritis, rheumatism and gout. They were then shown a series of three prompt cards (two with conditions listed, while the third contained more general descriptions of condition types) and asked whether they had any of the conditions shown or conditions similar to those shown or described. In each of these cases, details were recorded for conditions reported as current at the time of the survey; respondents were also asked whether the condition had lasted, or was expected to last, for six months or more. Information was gathered directly from individuals aged 15 years and older. For children up to the age of 15 years, information was provided by proxy, from a parent or guardian. Source: John D Glover , Diana MS Hetzel and Sarah K Tennant (2004) The socioeconomic gradient and chronic illness and associated risk factors in Australia, *Australia and New Zealand Health Policy* 2004, 1:8 (<http://www.anzhealthpolicy.com/content/1/1/8>)

list. In 2002, arthritis became the seventh national priority. “In this increasingly complex world of competing priorities, in the face of shrinking resources and economic rationalist reform, the question for public health policy was whether to persist with an expansionary agenda, led by interest groups and defined around population groups, risk factors and diseases which often overlapped with each other” (Lin, Smith and Fawkes, pp182-3). More recent national strategic frameworks have responded to that situation.

The **National Strategy for an Ageing Australia** was developed by the Office for an Ageing Australia as a framework to support the Australian Government's strategic response to the ageing of the Australian population. The National Strategy identifies a set of principles, goals and actions to guide the responses by governments, business, the community and individuals in the community. The **ACT Ministerial Advisory Council on Ageing strategic plan 2003 – 2005** concentrates on broad positive ageing issues affecting older people collected under three theme areas: healthy and meaningful ageing; transport, accommodation and planning; and employment, education and training. The New South Wales *Health Ageing Framework 1998-2003* outlines six key areas for NSW Government action. Key areas for action include attitudes to ageing and older people, participation in community life, making your own decisions, supportive neighbourhoods and communities, health, accommodation, care and support and making the best use of resources. Other states have developed strategies tailored to their own conditions.¹¹

Greater focus on provision of coordinated care at primary health care level is supported in Australia. For example, Dennis S. et al. (2008) conducted a systematic review between January 1990 and February 2006, finding that the interventions most likely to be

¹¹ **Northern Territory Seniors strategy:** For the first time the Northern Territory Government is to have a comprehensive strategy for senior territorians. The Office of Senior Territorians is developing the *Seniors strategy* and is talking with seniors in the community and other organisations involved in delivering programs and services for seniors. Queensland's *Framework for Ageing* contains a vision and a set of principles and directions of the Queensland Government. Five key areas for action have been identified for the Queensland Government to undertake in partnership with older Queenslanders. The key areas are: state government leadership on ageing issues, community participation, community infrastructure, health and wellbeing, employment and retirement planning. The *10 year plan for South Australia* expresses a vision for ageing in South Australia for the period 1996 to 2006. The key areas of the plan are living in the community, participating in the community and independence in the community. The *Plan for Positive Ageing 2000-2005* provides a broad policy and planning framework for action by the Tasmanian Government and the community, including local government. The Plan addresses five major issues which are community attitudes, participating in your community, living in your community, health, independence and community support and education and information in your community. The Forward Agenda in Victoria provides strategic directions that focus on whole of government effort in partnership with local government, business and non-government organisations and the community to encourage and assist older people in all aspects of their lives. The key directions of the *Forward Agenda* are: age to be valued, age to be involved, age to be productive, age to be active and age to be consumer wise. The Active Ageing Strategy for Western Australia provides a framework for across government initiatives and community and private sector partnerships. The WA Government will implement initiatives to address active ageing under five priority areas which are: health and wellbeing, employment and learning, community awareness and participation, protection and security and planning and the built environment (<http://www.alga.asn.au/policy/healthAgeing/ageing/resources/ageingPolicy.php>).

effective in the context of Australian primary care were engaging primary care in self-management support through education and training for general practitioners and practice nurses, and including self-management support in care plans linked to multidisciplinary team support. The current Practice Incentives Payment and Service Incentives Payment programs could be improved and simplified to encourage guideline-based chronic disease management, integrating incentives so that individual patients are not managed as if they had a series of separate chronic diseases. Their major findings were discussed with policymakers and key stakeholders in relation to current and emerging health policy in Australia.

The National Mental Health Plan (2003-2008) for Australia consolidates the achievements of the First and Second Plans, addresses gaps identified in both, and takes the National Mental Health Strategy forward with restated and new directions. It can be viewed as an ongoing agenda for service and community development that sets priorities and strengthens partnership between the key stakeholders in mental health (<http://www.mmha.org.au/information/policy/national-mental-health-plan-2003-2008>)

Despite these many efforts, gaps between research and policy remain. According to Gross, Leeder and Lewis (2003), while some prevalence rates and use of hospital resources have been estimated, accurate data are lacking about how the total direct costs of managing chronic conditions vary with age, number of risk factors or number of comorbidities. Better data about the costs of the prevalent risk factors listed in the Australian Institute of Health and Welfare report are essential. There also is no clear evidence of the success of initial attempts to organize and pay more efficiently for the management of chronic conditions. It is time to bring the private healthcare sector into the policy review process in Australia

(http://www.mja.com.au/public/issues/179_05_010903/gro10737_fm.html). Another example of a research gap is that about one in four Australians have multimorbidity (two or more types of chronic conditions). “The current health care system in Australia focuses on single diseases – creating challenges for GPs, who care for the ‘whole’ person, rather than on only one body system. Calls are growing for a more holistic consideration of the patient, because multimorbidity has a negative impact on quality of life and increases health service use” Prof Britt said. Among the elderly, 83% of the surveyed patients had multimorbidity

(<http://www.accessibility.com.au/news/defining-health-care-needs-for-chronic-illness>).

Workforce challenges are a theme that Australia shares with many other countries. As noted in the *Australian Review of Public Affairs* (<http://www.australianreview.net>), the ageing of the population and the increase in chronic illnesses are placing increasing demands on an ageing health workforce that is already over-worked and poorly distributed. New entrants to the workforce are increasingly female and looking to work fewer hours in areas and specialties that will offer financial rewards to offset educational costs. A wider and stronger national endorsement of the National Health Workforce Strategic Framework would go a long way towards addressing these problems. Specific recommendations include facilitating workplace innovation to make better use of available health workforce skills; more responsive education and training arrangements; consolidated national accreditation and registration regimes; improving funding-related incentives for workplace change; better focused and more streamlined projections of future workforce requirements; explicit consideration of rural and remote workforce

issues; and addressing the workforce requirements for people with special needs, including Indigenous communities, people with mental illness and disabilities, and people in aged care.

How health system features impact NCDs prevention and control

We have already alluded to the features on each of the countries' health systems to varying extents, since no discussion of NCDs could be divorced from the broader incentive structures governing health system financing and delivery. This section provides a few country-level examples of how health system features impact NCD prevention and control.

In Indonesia in the late 1990s, there was reform at all sectors including health. As Indonesia is one of the largest democratic countries, the governance system has been decentralized, except security, defense, finance, and foreign policy. Decentralization has exacerbated inequalities across regions, and appears most likely to work in situations where the local community is involved in the planning and implementation process. As noted earlier, health policies like NCD control face challenges when decentralized financing and delivery systems preclude a more integrated and cross-subsidized approach for the poorest regions.

Other large low- and middle-income countries like China face many similar challenges. 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 deeply shaped by the broader context of fiscal federalism, decentralized decision-making, and uneven economic development. China's system in particular is sensitive to the priority allocated by the top local and national leadership to population health and health care system reform. Issues that rise to the top of the political agenda receive considerable attention and support for program implementation – such as control of infectious disease outbreaks such as SARS in 2003 or H1N1 influenza in 2009, or national health reforms in 2009 to address the problem of “*kan bing nan, kan bing gui*” (health care being expensive and difficult to access). However, policy and programs languish if the top leaders ignore that issue. It remains to be seen whether NCD prevention and control will emerge as a top priority for China's population health strategy and be implemented effectively across the PRC's diverse localities, as envisioned in “Healthy China 2020.”

Taiwan's National Health Insurance system is a social insurance program organized by the government and operated by the Bureau of National Health Insurance, launched on March 1, 1995. The Bureau of National Health Insurance was founded on the idea of marshaling the resources of the majority to resolve the difficulties certain people have in paying for health care. Regardless of one's social or economic status, ethnicity, or place of residence, every individual is afforded equal access to medical treatment. Those who cannot afford their premiums are eligible for assistance from the Bureau, which is responsible for the system's planning, promotion, execution, supervision, research and development, training, information management and auditing. Its operations are funded out of the central government budget.

Taiwan has successfully provided universal coverage, health care of acceptable quality, comprehensive benefits, and convenient access to treatment, while keeping

premiums low and health care expenditures under control. Copayments for physician visits are required but remain low. Socially and economically disadvantaged households have equal access to the system through the many subsidies provided by the Bureau, and average households are protected from the fear of losing their health insurance or going bankrupt over medical bills. These many advantages have made it one of Taiwan's most successful public programs, with satisfaction ratings consistently above 70 percent. The cover rate was 99%, with 22.3 million people in 2007 (the remaining 1% were citizens living overseas for extended periods of time).

Korea recently introduced three major health care reforms: in financing (1999), pharmaceuticals (2000), and provider payment (2001). In these three reforms, new government policies merged more than 350 health insurance societies into a single payer, separated drug prescribing by physicians from dispensing by pharmacists, and attempted to introduce a new prospective payment system. The change of government, the president's keen interest in health policy, and democratization in the public policy process toward a more pluralist context opened a policy window for reform. Civic groups played an active role in the policy process by shaping the proposals for reform—a major change from the previous policy process that was dominated by government bureaucrats.

Korea has achieved universal (if partial) social health insurance coverage over a very short period, and at relatively low cost. Three factors can help to explain the low cost of achieving universal coverage: the limited benefit package (including high co-payments and service exclusions); low fees imposed on providers for insured services; and regulation of the growth of fees to keep their increase similar to that of general prices in the Korean economy.

The three reforms also showed important differences in the role of interest groups. Strong support by the rural population and labor unions contributed to the financing reform. In the pharmaceutical reform, which was a big threat to physician income, the president and civic groups succeeded in quickly setting the reform agenda; the medical profession was unable to block the adoption of the reform but their strikes influenced the content of the reform during implementation. Physician strikes also helped block the implementation of provider payment reform. Future reform efforts in Korea will need to consider the political management of vested interest groups and the design of strategies for both scope and sequencing of policy reforms.

Singapore's health system has several distinctive features that also shape its approach to NCDs. With health care primarily financed through Medisave (since 1984), the co-payment requirements enable the health care system to be sustainable through demographic shifts and the cost pressures of advances in medical technologies. The system is based on the assumption that encouraging the individual to act economically will help to avoid sharp increases in health expenditures and wasteful overuse. Building upon this, incentives were set for individuals to use up to S\$300 a year out of **Medisave** for chronic disease outpatient treatment. Each individual should be covered through the system of **Medishield** (since 1990 - in case treatment costs exceed the amount saved), and a minimum health provision (**Medifund**) is guaranteed for persons unable to save (since 1993). About S\$ 22 million of the Medishield 2007 disbursements benefited elderly patients and the mentally ill, and in 2008 Medifund financing was increased further. **Eldershield** (since 2002) is Singapore's affordable severe disability insurance scheme. The Government also offers a wide range of promotion and prevention activities.

Hong Kong has a “dual” health care system with both public and private sectors providing primary, secondary and tertiary care services. Most of the primary care preventive services are provided by the public sector, i.e. the Department of Health. According to the data from the Thematic Household Survey Report No. 30, for curative primary care services, private practitioners of Western medicine accounted for more than half of consultations (55.8%) in 2005/06. Doctors in outpatient departments of the Hospital Authority (HA) accounted for about 25.6%, while practitioners of Chinese medicine accounted for 15.4%. Private practitioners operate independently of the government and without subsidy. Secondary and tertiary health care encompass services that are most commonly provided in the inpatient setting and are curative in nature.

In contrast with curative primary health care services, the public sector is the dominant provider of secondary and tertiary services in Hong Kong, accounting for 93% of all hospitalizations in 2005 [HA Healthcare Facts and Figures, http://www.ha.org.hk/hesd/v2/AHA/HAINFOCUS/Facts_Figures_2006.pdf.] The HA manages all public hospitals in Hong Kong. The comprehensive range of public health care services is highly subsidized by the Government at some 95% of the overall cost. The actual level of subsidization varies across different services, with the highest level of subsidization (around 97%) for inpatient services. Public healthcare is predominantly funded by the Government through general taxation. However, Hong Kong has one of the lowest tax regimes among developed economies. There is no sales tax and the highest progressive rate for Salaries Tax is only 17% (for the financial year 2007/08). Salaries tax is further capped by a standard rate of 16% (for the financial year 2007/08) and will not exceed the amount charged by applying the standard rate to the net total work-related income. Private healthcare services are paid for mostly by out-of-pocket payments, accounting for some 70% of private health expenditure (in 2004/05). By comparison, employer-provided medical benefits and individual voluntary medical insurance are relatively small financing sources, at 17% and 11% respectively (in 2004/05). [Your health, Your life: consultant document of health care reform, Food and Welfare Bureau, SAR Government.

http://www.fhb.gov.hk/beStrong/textonly/eng/consultation/consultation_cdhr.html]

The “dual” and separated organization and financing of health care in Hong Kong has resulted in a weak linkage between primary, secondary and tertiary care and between public and private sector, which hinders the development of NCD control and prevention activities.

Australia’s health system also features a mixture of public and private sector health service providers and a range of funding and regulatory mechanisms. The Australian government has the primary role of developing broad national policies, regulation and funding. State and Territory and Local governments are primarily responsible for the delivery and management of public health services and for maintaining direct relationships with most health care providers, including regulation of health professionals and private hospitals. Private practitioners include general practitioners, specialists and consultant physicians, as well as for-profit and non-profit organizations and voluntary agencies.

The Australian Government’s funding includes three major national subsidy schemes: Medicare, the Pharmaceutical Benefits Scheme and the 30% Private Health

Insurance Rebate. Medicare and the Pharmaceutical Benefits Scheme cover all Australians and subsidize their payments for private medical services and for a high proportion of prescription medicines. Under Medicare, the Australian and State governments also jointly fund public hospital services so they are provided free of charge to people who choose to be treated as public patients. Australian Government funding of the 30% Rebate and other key incentives support people's choice to take up and retain private health insurance. Australians make their contribution to the health care system through taxes and the Medicare levy based on their income, and through private financing such as private health insurance. The aim of the national health care funding system is to give all Australians, regardless of their personal circumstances, access to health care at an affordable cost or at no cost, while allowing choice for individuals through substantial private sector involvement in delivery and financing (<http://www.medicareaustralia.gov.au/about/whatwedo/health-system/index.jsp>).

The existing division of responsibilities in health in Australia creates the potential for cost-shifting between different levels of government, and gives rise to frequent claims of blame-shifting and “buck-passing.” For example, it is often argued that the division of responsibility, whereby the states and territories run public hospitals and the Commonwealth runs the aged care system, allows the Commonwealth to under-fund aged care in the knowledge that the states will fund the costs of those waiting in public hospital beds for access to the aged care sector. According to one estimate [please provide citation], this costs Australian taxpayers an extra \$580 million per year. It has also been argued that there is an increasing trend for public hospitals to discharge patients after fewer bed days than in previous years for similar procedures—with the patient being provided with a prescription for medication to be taken at home. In this case, the cost of treating a patient would shift from the states (responsible for public hospitals) to the Commonwealth (responsible for subsidizing the cost of pharmaceuticals through the PBS). Similarly, while many public hospitals offer specialist care through outpatient clinics, the hospitals are reluctant to promote the clinics' use because of the costs associated with running them. Instead, they hospitals prefer that patients seek specialist care outside the hospital system, where the Commonwealth government would pick up the cost under Medicare. A fourth and final example of cost shifting (or the potential for cost shifting) and blame shifting between the Commonwealth and the states is the interface between the primary and public acute care sectors in Australia. For example, some commentators have argued that declining bulk billing rates compromises access to and affordability of primary care (GP) services. As a consequence, it is argued, people who cannot afford to pay for GP services present at emergency departments seeking GP-style care, putting pressure on the public hospital system. State/territory governments and other commentators argue that increases in waiting times in emergency departments are the result of the Commonwealth under-funding the primary care sector (<http://www.aph.gov.au/Library/pubs/bn/2008-09/HealthReform.htm>).

One vision for a revamped healthcare system attuned to chronic illness in Australia health care system emphasizes that the system will provide quality care that is centered on the patient, community-based, coordinated, continuous, cost-effective, and utilizes clinical information [Mabel Chew and Martin B Van Der Weyden (2003) Chronic illness: the burden and the dream, *MJA* Vol 179 1 September

(http://www.mja.com.au/public/issues/179_05_010903/che10510_fm.pdf).

Many elements of the health system and broader social and economic context in US cities contribute to the challenge of preventing and controlling NCDs. For example, according to the California Health Interview Survey (CHIS 2005 - 2007), almost 14% of residents of San Bernadino report not having a usual source of medical care (a place to go regularly when sick); a slightly higher number report being uninsured. Another 13-14% are covered under the federal and state program Medicaid. More than a third of San Bernadino residents are not employed (either looking for work or not, as students or retirees), and more than a third report that they are not able to afford enough [quality] food for their families.

Conclusion

The epidemic of chronic NCD around the Pacific Rim is clearly evident in the 12 cities studied. Review of the data reveal that 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 evident in systems where the burden of NCDs is the largest and of longest standing. Several regions have begun exemplary programs. In fact, some have been cited by the WHO as models. One WHO report urges members states to “establish financing mechanisms to channel sustainable funding to NCD prevention and control initiatives, such as through earmarking tobacco and alcohol taxes for health promotion, as was done in Australia by the Victorian Health Promotion Foundation (VicHealth) and in the Republic of Korea, and was initiated in Malaysia, Mongolia and Tonga” (Report to WHO Regional Office for the Western Pacific 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 is not well documented or recognized in policy. Challenges to implementation abound. Responses need to take account of significant geographic and regional differences (such as between northern and southern parts of Vietnam); large disparities in purchasing power, education levels, and social context complicate one-size-fit-all strategies. Although scattered information exists, for most countries and cities it is difficult to isolate what percentage of current health research funding is focused on NCDs. Only a few countries have reported evaluations regarding the success of NCD control and prevention programs, and among those, very few included cost-effectiveness results. Only a few jurisdictions have organized forums for researchers and policy makers to interact and jointly discuss and prioritize research needs, as well as for captains of industry, commerce and civil society to interact with public health policy and research groups on establishing research needs.

Around the cities of the Pacific Rim, we think it is possible to identify research gaps and opportunities for policy improvement that would benefit from comparative and collaborative approaches. Our overview highlights four important points:

First, although there is ample evidence to conclude the NCDs are the primary public health challenge facing residents of Pacific Rim cities, there is inconsistent health risk

behavior data available for adults, and almost none available on youth, in the Asia Pacific region. This lack of data thwarts our knowledge of the determinants of NCDs and hampers our ability to develop effective policy responses. Therefore any well-designed strategy to enhance prevention and control of NCDs in the region should include empirical investigation of the role of rapid social, economic and cultural change on health risk behaviors, including substance use, poor diet and sedentary behavior; mental health and life stressors, and health practices and outcomes in communities in low-, middle-, and high income settings.

Second, to overcome NCDs threats, it is necessary to strengthen health systems. In all health systems, health workers command a significant share of health budgets, in some cases more than 75%. However, in many developing countries, the health workforce is used for communicable disease control and not so much for NCDs. In all countries, but perhaps especially in the lower-income countries of the region, reducing the morbidity and mortality associated with NCDs will require a particular focus on preparing the health workforce for this task.

Third, monitoring and evaluation should integrate studies of economic efficiency and cost-effectiveness of alternative strategies. Some Pacific Rim cities have implemented economic evaluations to understand burden of disease (such as for tobacco) or to assess specific programs. However, there is a dearth of rigorous studies on several key issues: the most cost-effective workplace-based and public health strategies to prevent NCDs; how payment incentives and organization impact effectiveness of programs; what factors enhance patient self-management of NCDs; and how the health care delivery system should be “re-engineered” to provide quality care that is coordinated and cost-effective rather than focused on acute episodes.

Fourth, research and action should be intertwined and reinforcing. Research collaborations should focus on providing measurable health improvements for specific populations, by drawing on focused expertise and experience from across the region. For example, one project of the AWI public health research group aims to reduce CVD deaths and disability using multi-institution collaborative improvement methods. A collaborative (as these methods in aggregate have been termed) brings together groups of practitioners from different healthcare organizations to improve an aspect of the quality of their service. Collaborative programs, particularly the “Breakthrough” methodology, are helping to spread best practice across organizational and national borders (Ovretveit J 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 the health of the Asia Pacific.

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