

# 2



## **Conceptual Basis for Prevention and Control of Non-communicable Diseases**

# 2



2.1 The following guiding public health concepts have been used in building of the framework —

- viewing health from a public health perspective;
- understanding health determinants;
- describing cluster of risk factors;
- adopting the life-course approach;
- identifying preventive strategy;
- balancing population-wide versus individual-based approaches;
- considering health disparity;
- recognising the importance of health literacy and social marketing in communicating health messages; and
- setting health priority.

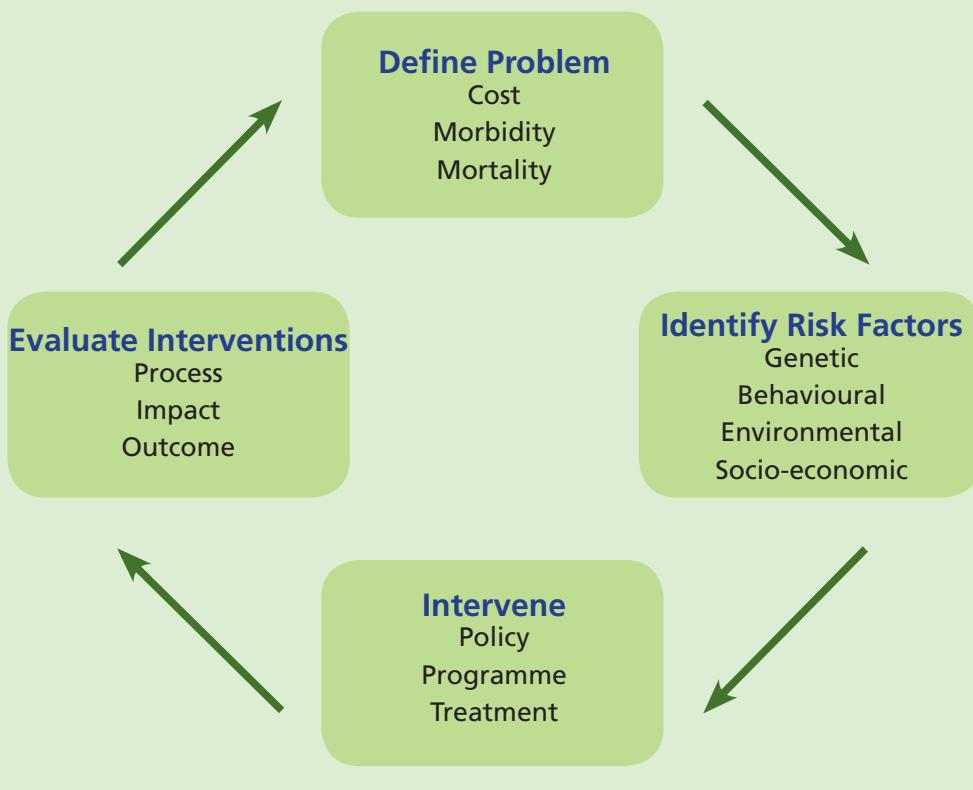


## 2. Conceptual Basis for Prevention and Control of Non-communicable Diseases

### Public Health Perspective

2.2 Public health can be described as "the science and art of preventing disease, prolonging life and promoting health through the organised efforts and informed choices of society, public and private organisations, communities and individuals".<sup>1</sup> A public health approach (Exhibit 2) which focuses on population and risk factors rather than on individuals' symptoms or diseases is important to achieve the goal of promoting health and preventing diseases, addressing the underlying factors that determine health, and increasing the effectiveness and efficiency of healthcare system.

**Exhibit 2: Public health approach to disease control**

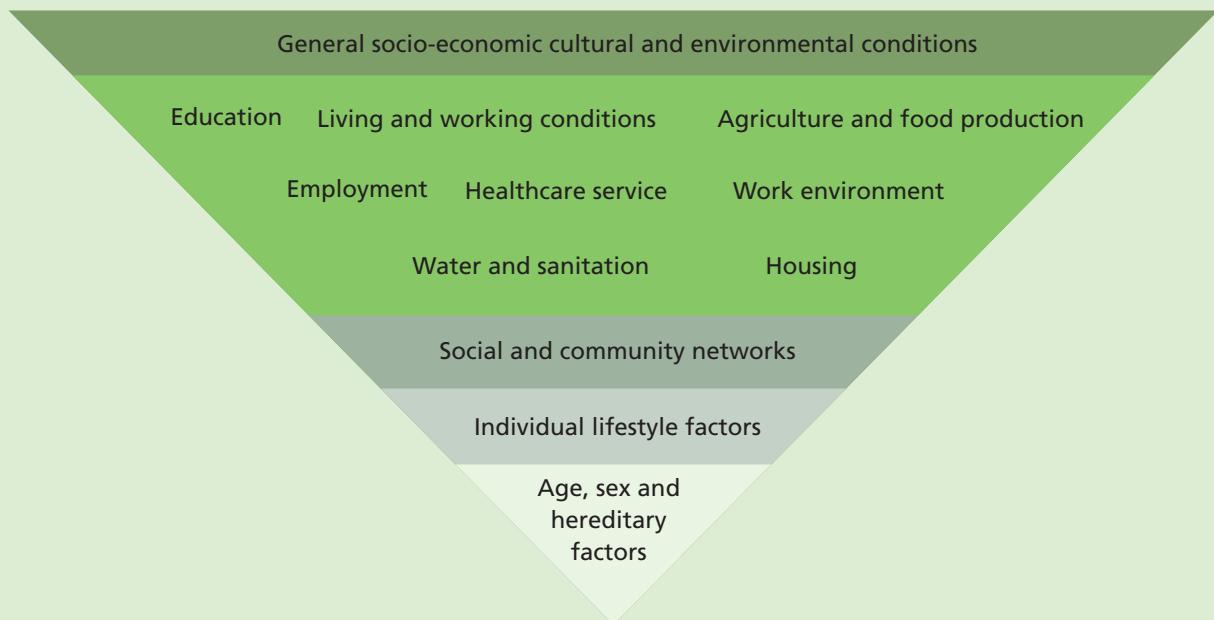


## **Health Determinant**

- 2.3 Health status goes beyond the mere presence or absence of disease. Health in the broader sense includes physical, psychological and social well-being, a culture of egalitarianism and a sense of belonging within a community, along with equity in access to quality health and relevant social services.<sup>2</sup> For public health policy to be optimal, it is important that we have a good understanding of the underlying factors that determine health.
- 2.4 The health experience of an individual or a community is influenced by a variety of factors and conditions (Exhibit 3). The factors which have been found to have the most significant influence on health - for better or worse - are known as 'the determinants of health'. Broadly speaking, these health determinants cover people's genetic predisposition, lifestyles and other behavioural factors, social relationships with families, friends and community, and the powerful forces of the general socio-economic and cultural environment where they learn, play, work and live. These different determinants operate together to influence health and disease status at both the population and individual levels.<sup>3</sup> While certain health determinants such as an individual's genetic makeup and the ethnic composition of the population are non-modifiable, many are avoidable or preventable.

## 2. Conceptual Basis for Prevention and Control of Non-communicable Diseases

### Exhibit 3: The wider determinants of health



(Adapted from Dahlgren and Whitehead 1991)

### Cluster of Risk Factor

- 2.5 NCD are attributed to the complex web of factors described above. Many of these diseases share common behavioural risk factors. For example, four of the most important NCD - diseases of the circulatory system, cancer, chronic respiratory diseases, and diabetes mellitus - share three major behavioural risk factors, namely smoking, physical inactivity and unhealthy diet, which are mediated through common biomedical risk factors, notably excess weight, hypertension and adverse lipid profile.<sup>4-6</sup> Alcohol misuse also contributes to the health burden of cancer, heart diseases and injuries and poisoning (Exhibit 4).

2.6 Preventive actions addressing these common behavioural risk factors will improve the community's health profile, which includes optimal body weight, blood pressure and lipid profile. The community will then be benefited from lower incidence of diseases and better health condition.

#### Exhibit 4: Relationship between common risk factors and major NCD

	Risk Factors							
	Behavioural				Biomedical			
Disease/ condition	Smoking	Physical inactivity	Unhealthy diet	Alcohol misuse	Excess weight	Hypertension	Adverse lipid profile	
Diseases of the circulatory system	+	+	+	+	+	+	+	
Cancer	+	+	+	+	+			
Chronic respiratory diseases	+		?					
Diabetes mellitus	+	+	+		+	#	#	
Injuries and Poisoning		+		+	?			
Excess weight	+	+						
High blood pressure	+	+	+	+				
Adverse lipid profile	+	+			+			

Keys: + Established risk factor ? Possible risk factor # Association/Co-morbidity

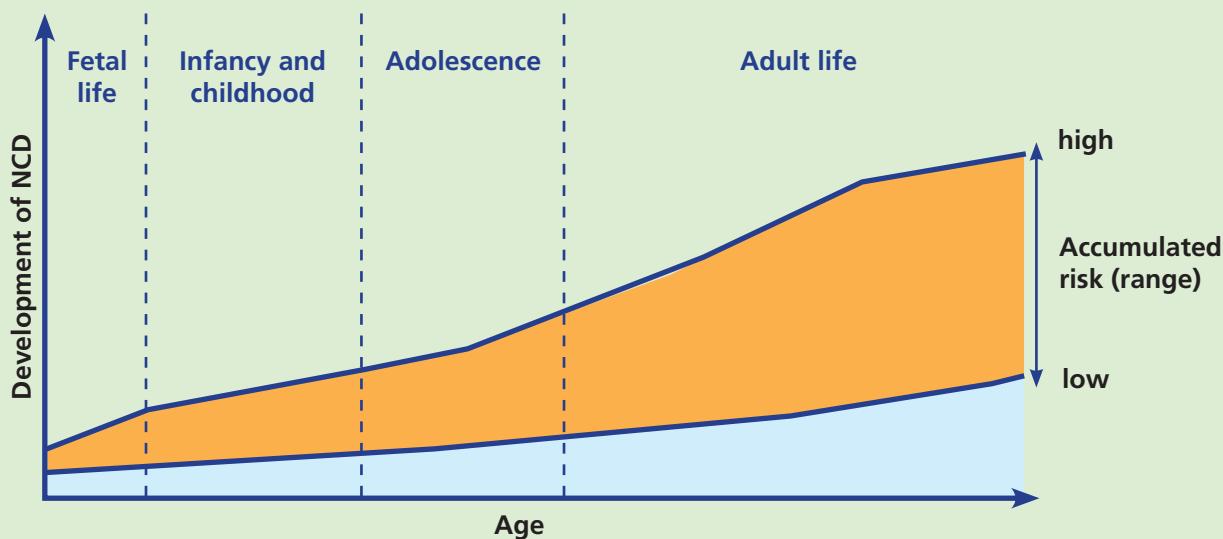
(Adapted from Brownson et al. Chronic Diseases Epidemiology and Control, 1998; National Public Health Partnership. Preventing Chronic Disease: A Strategic Framework (Background Paper), 2001; WHO. Global Strategy for the Prevention and Control of Non-communicable Diseases, 2000)

## 2. Conceptual Basis for Prevention and Control of Non-communicable Diseases

### Life-course Approach

- 2.7 Individuals are influenced by factors acting at all stages of the life span and the risk of developing NCD accumulates with age (Exhibit 5). Life-course approach acknowledges such interactive and cumulative impact of social and biological influences throughout life, particularly the importance of early life factors predisposing to NCD in later years.<sup>7</sup>

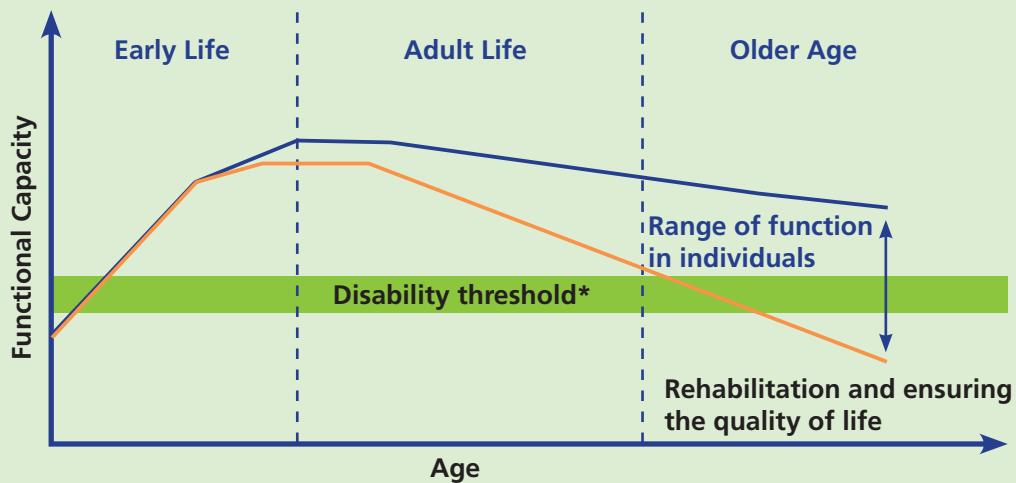
**Exhibit 5: Scope of NCD prevention - a life-course approach**



(Source: Aboderin et al, 2002)

- 2.8 Utilising opportunities at each stages of life, it may be possible to have fewer disabilities and reduce premature deaths. The functional capacity, such as muscular strength and cardiovascular output, accumulates in childhood and peaks in adulthood, and then declines in older age (Exhibit 6). As the rate of functional capacity decline is largely determined by behavioural factors, adopting a healthy lifestyle will help maintain or prevent early decline in functional capacity during older age. For example, stop smoking at age 60, 50, 40 or 30 gains about 3, 6, 9 and 10 years of life expectancy respectively.<sup>8</sup> Thus, it is important to secure growth and development in early life, maintain the highest possible level of function in adult life as well as maintain independence and prevent disability in older life.<sup>9</sup>

## Exhibit 6: Maintaining functional capacity over the life course



Note: \* Changes in the environment can lower the disability threshold, thus decreasing the number of disabled people in a given community

(Source: Kalache and Kickbusch, 1997)

## Preventive Strategy

- 2.9 The planning of NCD prevention and health promotion programmes is based on the three levels of prevention: primary, secondary, and tertiary.

### ***Primary prevention***

- 2.10 Primary prevention is concerned with measures that prevent the onset of disease. Some of the important strategies under this category include health education, immunisation, environmental measures and social policy (Exhibit 7). The ultimate goal is to bring about a change in behaviour or factors affecting individuals so that diseases will be prevented from developing. This approach has contributed to some notable examples of successful intervention in public health especially those related to NCD.

### Exhibit 7: Healthy eating — "2 plus 3 A Day"

Low fruit and vegetables consumption is among the top ten risk factors for global mortality, and up to 2.7 million lives could potentially be saved each year with sufficient global fruit and vegetables consumption. The WHO recommends a minimum of five servings of fruit and vegetables a day, or a daily intake of at least 400 grams of fruit and vegetables, to obtain optimal health benefits.<sup>10</sup>



The DH launched a territory-wide "2 plus 3 A Day" campaign in June 2005. It aims to raise community awareness on healthy diet and promote the consumption of at least two servings of fruit and three servings of vegetables every day as part of a balanced diet in order to promote optimal health. Health messages are disseminated via various channels including mass media, pamphlets and recipes distribution, exhibition boards display, posters and 24-hour health education hotline and the internet (<http://2plus3.cheu.gov.hk>) and different activities such as health talks, colouring and drawing contest, experience sharing and food diary competitions.

### **Secondary prevention**

- 2.11 Secondary prevention refers to stopping the progression of a disease after its occurrence, by early detection and diagnosis followed by prompt and effective treatment. The prevention of relapse or recurrence of disease conditions through intervention or attention to lifestyle improvement measures, e.g. smokers to quit smoking after a heart attack is also grouped under this category. Screening, which is one form of secondary prevention, has been more accepted by the general public as a means to "prevent" diseases in recent years (Exhibit 8).

## **Exhibit 8: Health check-up package — How to choose?**

The main purpose of health check is to detect diseases at an earlier stage, for the better control of diseases and hence to decrease risk of complications and reduce mortality in some cases. Only a few chronic illnesses can be detected by health check. A comprehensive health check should include history taking, health risk assessment, physical examination and appropriate investigations.

Certain investigations are considered "basic". Some investigations are more expensive and have potential risks, and thus they are only suitable for those who are at higher risk of developing that particular disease. In practice, there is no "plan" that suits every person. On the other hand, unnecessary investigation will waste money and time and cause unnecessary fear and anxiety. Therefore, it is advisable to consult family doctors to recommend types and frequency of health check.

As investigation results can be false-negative or false-positive, the results should be evaluated and interpreted by doctors. No single health check-up programme can check all diseases/conditions. People should not rely solely on health screening.

Most importantly, to prevent diseases, people should always pursue healthy lifestyles by avoiding smoking, maintaining normal body weight, taking regular physical activities and healthy diet. At times when they are in doubt about their health, medical advice should be sought.

- 2.12 However, special consideration and careful evaluation are necessary before population screening policies for the public are to be introduced. The factors which need to be considered include the prevalence of the condition, sensitivity and specificity of the screening tests (i.e. identifying how many false-positives and false-negatives may be detected because of the test), the availability of effective treatment, and any inherent hazards of the screening test itself (Exhibit 9).<sup>11</sup>

### Exhibit 9: Cervical cancer screening

Cervical cancer is one of the few cancers where pre-cancerous lesions are detectable and treatable. To date, cervical smear is the only test known to reduce cervical cancer incidence and death effectively, particularly with organised screening programmes. Along with appropriate follow-up treatment, the test can prevent cervical cancer from developing in many cases.



Cervical screening services have been available in Hong Kong for many years, yet women in general have only gone for opportunistic screening. A cost-effectiveness analysis of alternative cervical cancer screening strategies in Hong Kong has shown that organised screening with conventional (or liquid-based) cytology every 3 years can produce over 90% reduction in the lifetime risk of developing cervical cancer compared to no screening, whereas opportunistic screening can only generate a corresponding reduction of 40%.<sup>12</sup>

Since March 2004, the DH launched a territory-wide Cervical Screening Programme (CSP) for women in collaboration with other service providers. The CSP recommends 3-yearly smears following two normal consecutive annual smears. However, women at higher risk (e.g. history of human papillomavirus infection or low immunity) may be screened more frequently as advised by their healthcare providers.

### **Tertiary prevention**

- 2.13 Tertiary prevention refers to the rehabilitation of patients with an established disease to minimise residual disabilities and complications and maximise potential years of enjoyable life, thereby improving the quality of life even if the disease itself cannot be cured (Exhibit 10).

## **Exhibit 10: Improving quality of life — Cardiac rehabilitation**

Cardiac rehabilitation is a programme supervised by healthcare professionals to help patients with cardiac diseases recover quickly and improve their overall physical and psychological functioning. Studies have shown that comprehensive cardiac rehabilitation is cost-effective and can substantially improve the health of people with ischaemic heart disease.<sup>13, 14</sup>

The overall goals are to reduce the risk of another cardiac event and to enable patients to live productively. Cardiac rehabilitation programmes usually include patient education and counselling, exercise training, risk factor modification, vocational counselling and emotional support. When supervised by a physician, cardiac rehabilitation is helpful to patients with recent heart attack and heart failure. Combining all aspects of cardiovascular rehabilitation in appropriate patients, it can improve functional capacity and quality of life, reduce risk factors and create a sense of well-being and optimism about the future.

In Hong Kong, cardiac rehabilitation services are available in both public and private sectors.

## 2. Conceptual Basis for Prevention and Control of Non-communicable Diseases

### Population-wide versus Individual-based Approach

- 2.14 The distribution of health determinants and risks in a population has implications for successful prevention strategies. While a population-wide strategy for prevention targets at controlling the determinants of health in the population as a whole, an individual-based (also known as high-risk) strategy for prevention identifies high-risk susceptible individuals and offers them some individual protection.<sup>15</sup>
- 2.15 The two approaches have their inherent pros and cons (Exhibit 11). The population-wide approach seeks to promote healthy behaviour to achieve an overall lowering of the risk in the entire population. The potential gains are comparatively extensive but the effect on each participating individual may not be very significant. In contrast, the individual-based approach may appear more appropriate to the individuals. However, it only has a limited effect at a population level and it does not alter the underlying causes of illness. Such an approach also requires continuous and expensive screening processes to identify the high-risk individuals.<sup>16</sup>

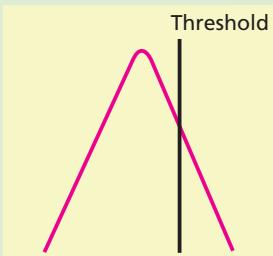
**Exhibit 11: Population-wide approach versus individual-based approach**

	Population-wide approach	Individual-based approach
Benefit is high for	The whole population	The individual
Subject motivation	Low	High
Doctor motivation	Low	High
Benefit-risk ratio	Worrisome	Favourable
Screening costs	No/Low screening costs	High
Depth of solution	Radical	Palliative, temporary

(Source: Rose 1985)

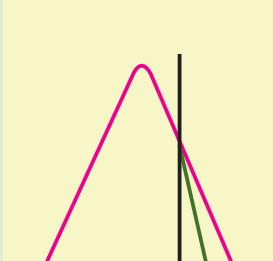
- 2.16 Cardiac rehabilitation programme, which is an example of individual-based approach for prevention, is known to be effective in reducing cardiac deaths. Patients are encouraged to exercise and change their lifestyles after having a heart attack or other heart problems and they can be benefited from tailored lifestyle programmes. A systematic review reported that total cardiac mortality was reduced by 26% to 31% in the exercise only and comprehensive cardiac rehabilitation groups.<sup>14</sup> Another study showed that lifestyle intervention using such approach reduced the risk of people with impaired glucose tolerance in developing diabetes mellitus by 58% over 6 years.<sup>17</sup>
- 2.17 With regard to effective interventions using population-wide approach, raising the duties on tobacco products has resulted in a large improvement in population health because fewer people smoke as the price of tobacco rises. Reducing the salt content of processed foods available for sale in the markets, either through legislation or self-regulation of the industry, has resulted in a corresponding reduction in age-specific and sex-specific mean systolic blood pressure.<sup>18,19</sup>
- 2.18 When NCD are prevalent in the community, even modest changes in risk factor levels through population-wide approach will yield significant public health benefit. In light of the inherent benefit of individual-based approach for people at high risk, it should also be included in the overall prevention and control of NCD (Exhibit 12).<sup>17</sup> A key challenge is to achieve a balance between individual-based and population-wide approaches.

### Exhibit 12: Population-wide and individual-based strategies



#### ***Original distribution***

The level of risk factors is normally distributed within the population as illustrated by the red curve — It means that majority of people have risk factor level below the threshold, while minority are above the threshold.



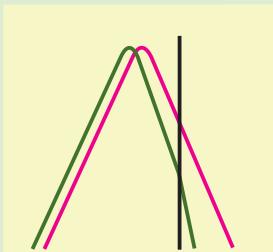
#### ***Individual-based approach***

This approach concentrates its efforts on the high-risk individuals with risk factor level above a certain threshold. When preventive measures are targeted at these identified people at high-risk, the distribution of risk factor level can only shift a little to the low level direction as indicated by the green curve.



#### ***Population-wide approach***

This strategy seeks to shift the whole distribution of risk factor level to the low level. The whole distribution of risk factor level, as indicated by the shifted green curve towards left to lower values.



#### ***Combined strategies***

Therefore, combining individual-based and population-wide approach will shift the distribution of risk factor level to a lower range that yield better health outcome among the whole population.

(Source: Rose 1985)

- 2.19 There are many examples worldwide on successful mix of population-wide approach and individual-based approach for preventing and controlling NCD (Exhibit 13).

### **Exhibit 13: Successful mix of population-wide and individual-based NCD prevention programmes**

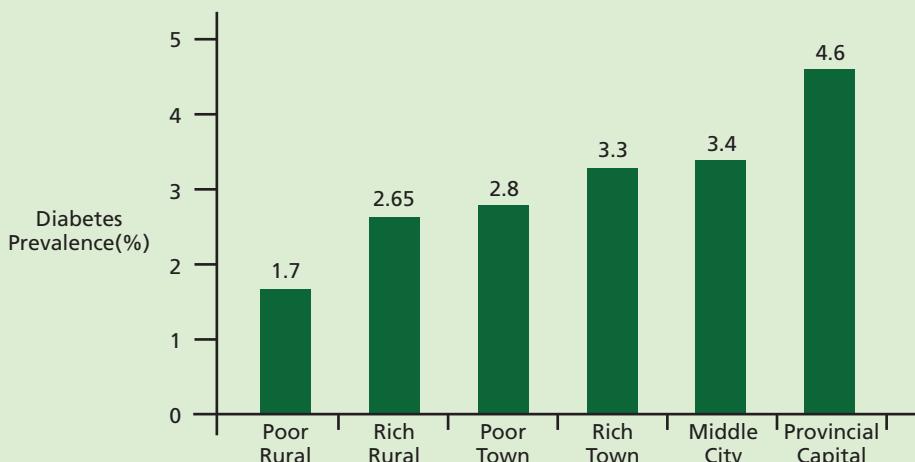
Communities can make major gains once becoming involved in reducing health risk behaviours associated with many chronic diseases. Some of the most notable cardiovascular diseases prevention trials are the Stanford Three-Community Project,<sup>20</sup> North Karelia Project,<sup>21</sup> Stanford Five-City Project,<sup>22</sup> Minnesota Heart Health Program<sup>23</sup> and the Pawtucket Heart Health Program.<sup>24</sup> These projects have made known that cardiovascular diseases are preventable through modifications of established risk factors including cigarette smoking, elevated blood lipids, elevated blood pressure and sedentary lifestyle.

The basic premise for this work is that community-wide strategies lead to a reduction in disease rates through changes in individual and community risk factors. Each provides valuable models, diversified methodologies addressing awareness and education, skill-building and advocacy, and strategies for planning and implementing community-based/led programmes. These programmes are cost-effective, easily transferable and have dramatic impacts on health policy development.<sup>25</sup>

## **Health Disparity**

- 2.20 Disparity in health usually refers to a broad range of differences in health status between population subgroups. Although some disparities in health are inevitable because of genetic and biological make-up in individuals, health disparities are often attributed to differences in personal lifestyle, exposure to material resources and opportunity of receiving healthcare services.<sup>26</sup> For example in China, as the result of increasing affluence and the adoption of western diet, people living in the cities had a 2.7-fold increase risk of having diabetes mellitus than those living in poor rural area (Exhibit 14).<sup>27</sup>
- 2.21 Striving to minimise the health gap between population subgroups has become a challenge in public health.<sup>2</sup> Thus, an important public health task is to identify the underlying health determinants attributable to health disparities and develop responsive policies for their reduction.

### Exhibit 14: The widening health gap



Analysis of diabetes mellitus prevalence in China showed the proportion of people living with diabetes mellitus increased from 1.7% in poor rural areas to 4.6% in provincial capital of China.

(Source: Ng et al, 2002)

### Health Literacy and Social Marketing

- 2.22 Health literacy is the ability to read, understand, and act on healthcare information. Study has indicated that poor health status is disproportionately high among people with low health literacy.<sup>28</sup> For enhancing the population health, therefore, the health literacy of the whole population needs to be increased.
- 2.23 Social marketing, as an effective health promotion method, can motivate people to use health information and change behaviour in ways that promote and maintain good health. Over years, many places including Hong Kong have used social marketing campaigns for health promotion (Exhibit 15).

### Exhibit 15: Use of social marketing strategies for health promotion

Since its re-organisation in 2002, the Central Health Education Unit (CHEU) of DH has strengthened the use of social marketing strategies to inform and influence the public on options that enhance health. For example, CHEU collaborated with the media to produce and broadcast various campaigns on different important health issues such as the "All for Health" campaign to promote the concept of positive health, as well as international health initiatives including the "World No Tobacco Day", "World Health Day", "World Breastfeeding Week", "World Chronic Obstructive Pulmonary Disease Day" and the "World Diabetes Day". Health messages have been disseminated via mixed channels with the application of social marketing in all campaigns.

## Setting Health Priority

- 2.24 There is never as much funding as is needed to address all important health problems, so priorities need to be set. Priority setting is imperative for the rational utilisation of resources for public health programmes in a community. However, identification of priority health areas is not easy. Whether or not a particular disease or health condition should be focused and targeted for preventive activities depends on a number of factors (Exhibit 16).
- 2.25 Over the past two decades, some developed countries have gone through the process of identifying health priorities and started working on the identified health priority areas. For example, Australia has selected seven National Health Priority Areas for action, including asthma, cardiovascular health, cancer control, injuries prevention and control, diabetes mellitus, mental health and arthritis and musculoskeletal conditions, while the United States (US) also views heart disease and stroke, cancer and diabetes mellitus the most important health problems. We need to agree what priorities should be set in Hong Kong and what targets need to be met.

### Exhibit 16: Criteria for priority setting<sup>29</sup>

- Public health importance as a cause of death
- Consequences as a source of morbidity
- Financial cost to the community
- Preventability or possibility of early detection
- Potential for increase in morbidity or mortality
- Opportunity for achieving substantial health gain through cost-effective interventions
- Importance in terms of public perception