



衛生防護中心
Centre for Health Protection

Non-Communicable Diseases Watch

Volume 5 Number 11 November 2012

Health Tips

To get the most benefit and enjoyment out of cycling, safety is the key.

Most cycling injuries can be prevented with good cycling skills and manners and constant vigilance while cycling.

Safe Cycling

Cycling is an affordable, convenient and achievable form of physical activity for people of all ages and with different fitness levels. As an aerobic activity at the recreational level, regularly cycling can offer a number of health-enhancing effects.¹ Although cycling is a healthy and low-impact activity, it is not without risk of injury if safety precautions are not taken.

Do you know that ...

Bicycles were introduced in the 19th century. Nowadays, the number of bicycles is about 1 billion worldwide, twice as many as motor vehicles.²

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Health Benefits of Cycling

Along with a balanced diet, cycling is one of the best ways to control or lose weight; it raises metabolic rate, builds muscle and burns body fat. At a typical commuting intensity, cycling (which has an intensity of about 6-8 metabolic equivalents [MET]) can burn more calories and yield greater health benefits than walking (at about 2.5-3.5 MET).³ For a 70 kg adult, cycling for an hour can burn approximately 420 - 560 kilocalories.

Many scientific studies have demonstrated the health benefits of cycling. In a systematic review released in 2011, all but two of the 16 cycling-specific studies included showed a positive relationship between cycling and health benefits among different age groups.⁴ For children and adolescents, cross sectional and longitudinal studies showed that those who cycled to school had higher levels of cardiovascular and muscular endurance than those who walked or travelled by motorised transport. For working-age adults, interventional studies indicated consistent improvements in cardiovascular fitness and some improvements in cardiovascular risk factors from commuter cycling. As to the middle-aged and elders, prospective observational studies demonstrated an inverse relationship between commuter cycling and all-cause mortality, cancer mortality and morbidity. Some studies also showed that the more cycling the healthier for both sexes. For example, a study on Chinese adults aged 30 - 74 reported that the risk of colon cancer in men who cycled 30 - 60 minutes, 61 to 120 minutes, and more than 120 minutes a day was estimated to be 19%, 48% and 59%

This publication is produced by the Surveillance and Epidemiology Branch, Centre for Health Protection of the Department of Health

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lower than that in men who cycled less than 30 minutes a day respectively. The corresponding decrease in risk for women was 24%, 46% and 56%.⁵ Another study on cycling for transport and mortality among Chinese women in Shanghai found that women who reported cycling 0.1 - 3.4 and 3.5 or more MET-hours per day were at 21% and 34% reduced risk of all-cause mortality relative to those women who reported no cycling.⁶

In addition to physical benefits, cycling is good for mental well-being too. As an aerobic exercise, cycling can stimulate the release of endorphins and serotonin, two brain 'feel good' chemicals which can produce feelings of pleasure, reduce anxiety and wash away bad moods. A study on young healthy adults showed that 20-minute sessions of cycle ergometer exercise were effective in reducing state anxiety, regardless of whether the subjects cycled at low intensity (at 40% of maximum oxygen consumption [$\text{VO}_{2\text{max}}$]) or high intensity (at 70% $\text{VO}_{2\text{max}}$).⁷ An intervention study on patients with depressive and anxiety disorders also reported significantly decreased state anxiety and negative affect after 20 minutes of cycling.⁸

Injuries from Cycling

As with all forms of physical activities, overuse injuries are common among cyclists. Cyclists are also susceptible to traumatic injuries, the severity of which can range from minor abrasions, lacerations and bruises of the skin, to fractures and joint dislocations or even fatal head trauma.

Overuse injuries

Most overuse injuries caused by cycling occur due to poor bike fit, improper riding techniques or over-doing. For instance, a seat positioned too far from the handlebars can cause pain in the neck and lower

back, whereas a seat too close to the handlebars may lead to strain on both arms and back. Improper wrist positioning with too much pressure on the handlebars may cause compression neuropathies in the hands. An ill-fitting saddle can cause perineal compression and symptoms like genital numbness and erectile dysfunction in men. Repetitive bending and straightening of the hips and knees at too much pedal resistance during cycling can result in overuse injuries to those joints and surrounding soft tissues.

An epidemiological analysis of overuse injuries among 518 recreational cyclists overseas showed that 85% of the cyclists reported one or more overuse injury/complaints. The most common anatomical sites reported were the neck (48.8%), followed by the knees (41.7%), groin/buttocks (36.1%), hands (31.1%), and back (30.3%).⁹ Another study on 109 professional road cyclists found that low back pain and anterior knee pain were the most prevalent overuse injuries, with an annual prevalence of 58% and 36% respectively.¹⁰ While one literature review of 62 articles on bicycling-related urogenital symptoms found that genital numbness was reported in 50% - 91% of all cyclists¹¹, another review of 35 studies on bicycle riding and erectile dysfunction showed that the prevalence of moderate to severe erectile dysfunction in bicyclists was 4.2%.¹²

Traumatic injuries

As for the disease burden due to traumatic injuries associated with cycling, in the U.S. alone, bicycle-related injuries account for approximately 900 deaths, 23 000 hospital admissions, 580 000 emergency department visits and more than 1.2 million physician contacts per year.¹³ Among children and adolescents aged 19 or below, cycling was one of the most common sports and recreational activities associated with emergency treatment for nonfatal

traumatic brain injuries (TBI). Between 2001–2009, a study showed that 8.1% of all emergency department visits for cycling injuries were TBIs.¹⁴ Cyclists are among the most ‘vulnerable road users’ because they are unprotected in traffic compared to other motor vehicle occupants. In a collision with a motor vehicle, they are almost always the weakest party and are more likely to sustain serious injuries or death. In Australia, hospitalisation data showed that the number of pedal cyclists injured with high threat to life due to a road traffic crash increased from 523 (or a rate of 2.7 per 100 000 population) in 2000/2001 to 917 (or a rate of 4.3 per 100 000 population) in 2007/2008.¹⁵ In Great Britain, the number of pedal cyclists seriously injured or killed in road accidents has gone up 24.5%, from 2 564 in 2007 to 3 192 in 2011; the total reported casualties among pedal cyclists have gone up 18.6%, from 16 195 to 19 215 in the same period.¹⁶ The most common vehicle involved in collisions with cyclists was a car or taxi. In a serious injury involving heavy goods vehicles, buses and coaches, “passing too close to the cyclist” was judged to be a contributory factor in a quarter of the accidents.¹⁷

The proportion of people died in road traffic injuries as cyclists varies between countries and regions, depending on the popularity of cycling as a form of commuting, degree of motorisation, design of road traffic system, land use policy, and legislative or related measures. In 2006/2007, the proportion varied from 2% - 3% in the U.S., Canada, Australia and New Zealand to 9% - 13% in China, Singapore and Japan. In the Netherlands, where there is a high cycling rate, cyclist deaths accounted for 24% of all road fatalities.¹⁸

Other health risks

Apart from injuries, there are concerns that cycle commuters in high-traffic areas are exposed to components of car exhaust fumes, including

elemental carbon, ultrafine particles and soot, and that such fume components can contribute to heart and respiratory illness. A study on 42 healthy urban cyclists revealed that short-term exposure to traffic-related air pollution might contribute to acute changes in heart rate variability in the hours immediately after cycling.¹⁹

Local Situation

In Hong Kong, although cycling is not the primary means of commuting, it is a popular activity for recreational and fitness purposes.²⁰ Cycling crashes and injuries are thus not uncommon. The Road Traffic Accident Statistics of the Transport Department showed that the annual number of cyclists involved in reported road accidents in Hong Kong has risen from 1 576 in 2001 to 2 027 in 2010, representing an increase of 28.6%.²¹ Over the same period, among the pedal cyclists injured in traffic accidents, there were a total of 93 registered deaths, giving an average of about 9 cyclist deaths per year. Deaths in males outnumbered those in females, with an overall male to female ratio of about 4.5 to 1 (Table 1), and 72.0% of fatalities were among people aged 45 and above (Table 2). Overall, 63.4% of cyclist fatalities resulted from a collision with a car, a pick-up truck or a van, and 14.0% from a collision with a heavy transport vehicle or a bus. In 2010, cyclist deaths accounted for 8.2% of all road traffic fatalities.²²

As for the types of cycling injuries and the prevalence of helmet use in Hong Kong, an earlier local study on 698 bicycle-related injuries presenting to the emergency department of the Prince of Wales Hospital in 2006 provided some insights. Among the injuries, other than minor external wounds (including abrasions, lacerations and contusions), limb injuries were the most common (20.2%), followed by head injury (9.6%).

Table 1: Number (Rate*) of registered deaths due to pedal cyclist injured in traffic accident by sex, 2001-2010

Year	Male	Female	Total
2001	3 (0.1)	0 (0.0)	3 (<0.05)
2002	12 (0.4)	1 (<0.05)	13 (0.2)
2003	8 (0.2)	3 (0.1)	11 (0.2)
2004	10 (0.3)	2 (0.1)	12 (0.2)
2005	4 (0.1)	1 (<0.05)	5 (0.1)
2006	7 (0.2)	2 (0.1)	9 (0.1)
2007	8 (0.2)	3 (0.1)	11 (0.2)
2008	9 (0.3)	1 (<0.05)	10 (0.1)
2009	7 (0.2)	2 (0.1)	9 (0.1)
2010	8 (0.2)	2 (0.1)	10 (0.1)
Total	76	17	93

Note: *Rate per 100 000 population of respective sex and year.

Sources: Department of Health and Census and Statistics Department.

Compared to the children aged 15 and below, those aged above 15 were 9.3 times more likely to be involved in a crash with a motor vehicle and sustain more serious injuries. More importantly, only 3 out

of the 698 cyclists wore a helmet at the time of injury, giving an extremely low prevalence of helmet use at 0.4%.²³

Table 2: Number (Rate*) of registered deaths due to pedal cyclist injured in traffic accident by age group, 2001-2010

Year	14 years and below	15-29 years	30-44 years	45-59 years	60 years and above	Total
2001	0 (0.0)	1 (0.1)	0 (0.0)	1 (0.1)	1 (0.1)	3 (<0.05)
2002	2 (0.2)	0 (0.0)	3 (0.2)	3 (0.2)	5 (0.5)	13 (0.2)
2003	0 (0.0)	0 (0.0)	1 (0.1)	9 (0.6)	1 (0.1)	11 (0.2)
2004	0 (0.0)	2 (0.1)	1 (0.1)	6 (0.4)	3 (0.3)	12 (0.2)
2005	1 (0.1)	1 (0.1)	1 (0.1)	0 (0.0)	2 (0.2)	5 (0.1)
2006	0 (0.0)	1 (0.1)	1 (0.1)	3 (0.2)	4 (0.4)	9 (0.1)
2007	3 (0.3)	4 (0.3)	0 (0.0)	3 (0.2)	1 (0.1)	11 (0.2)
2008	1 (0.1)	0 (0.0)	2 (0.1)	3 (0.2)	4 (0.3)	10 (0.1)
2009	0 (0.0)	1 (0.1)	0 (0.0)	3 (0.2)	5 (0.4)	9 (0.1)
2010	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.1)	8 (0.6)	10 (0.1)
Total	7	10	9	33	34	93

Note: *Rate per 100 000 population of respective age group and year.

Sources: Department of Health and Census and Statistics Department.

Cycling Safety and Prevention of Injuries

Cycling is a healthy and relatively safe activity, and the risks of cycling are low in general. While cycling injuries can be attributed to defective bike component, adverse weather conditions or some road factors such as potholes or objects on the road²⁴, cyclist's behavior also make a significant contribution. In fact, the major cyclist contributory factors in traffic accidents include careless cycling, losing control, riding inattentively, disobeying traffic signal, and starting negligently.²⁵ To get the most benefit and enjoyment out of cycling, safety is the key. Most cycling injuries can be prevented with good cycling skills and manners and constant vigilance while cycling. Here are some safe cycling rules, riding tactics and general health tips for cyclists to observe:

Preparation and safety checks before starting

- > Choose a bike that fits your size; you should be able to touch the ground with tiptoes when sitting on the bike seat. A bike that is too big or too small can be dangerous and hard to control. Check and make sure the bike is in good condition, including the brakes, tyres, lights/reflectors, chain and horn/bell.
- > Wear a properly fitted helmet that meets the international standards. Research showed that wearing a helmet could reduce the risk of head or brain injuries by approximately two-thirds or more, regardless of whether the crash involved a motor vehicle.²⁶ Wear protective pads at the elbows and knees can reduce the severity of injury to your limbs in case you fall from your bike; wear cycling gloves to prevent hand numbness and pain that can occur on longer rides or off-road biking.
- > Dress appropriately. Wear bright or light-coloured clothing during the day and reflective or fluorescent clothing at night or under poor visibility. Make sure your pants are not so loose or so long that they can get caught up in the chain while you are cycling.

Wear shoes that are enclosed and appropriate (e.g. stiff sole shoes can distribute pressure evenly over the pedal and reduce foot pain), and make sure that shoelaces are not loose or lengthy that they can get caught up in the chain. Do not wear sandals, flip-flops or go barefoot.

- > Get familiar with the cycling traffic rules and signs. Equip yourself with some emergency handling skills, such as dodging obstacles, quick turns and safe braking. For example, braking under normal circumstances can be performed by applying the rear brake before the front brake. Use the rear brake for smooth gradual slowing down and only brake when the front wheel is straight.

When cycling on the road

- > Always use a cycling track if it is available. Where possible, select a cycling route that is away from traffic.
- > Obey all traffic rules, including traffic light signals, traffic signs and road markings. Ride at a safe speed. In crowded places, slow down or even dismount and wheel your bicycle. When using the pedestrian crossing, dismount and push your bicycle across. Yield to pedestrians at all times.
- > Keep left and cycle along the direction of traffic stream. Do not weave in and out of traffic. Ride in a single file when travelling in groups, except when overtaking.
- > Maintain a safe distance from the bicycle or vehicle ahead of you. Leave extra room riding near buses, trucks and parked cars. Avoid riding between two lanes of moving vehicles.
- > When negotiating turns or intersections, signal well in advance the direction you wish to go. Perform a shoulder check every time you want to change directions. Make eye contact with other road users before making your move.

- > Watch out for obstacles on the road and surface hazards, such as raised surfaces, potholes, sewer grates, loose gravel, rocks, puddles of water or sharp objects.
- > Be visible and be heard on the roads. Switch on the front and rear lights when riding in the dark or at times of poor visibility. Use a bell or horn if indicated.
- > Do not carry passengers, and things that block your vision or upset your balance. Do not hold onto other vehicles.

Other general health and safety tips

- > Never use handheld mobile phone or do any other activities that will distract your attention while cycling. Do not wear headphones as that will compromise your awareness of what is going on around you.
- > Cover exposed skin with sunscreen on a sunny day. On hot days, keep plenty of fluids at hand and drink regularly to prevent dehydration. Cycle at a sensible rate to avoid overheating. Avoid cycling outdoors on days with elevated air pollution levels; you may exercise indoors for a change.
- > Do not drink alcohol before or during cycling. Avoid cycling with an empty or full stomach.
- > Warm up and stretch your muscles and joints before embarking on a hard ride, or at least take it easy in the initial stages.
- > Check with a doctor before taking up challenging or competitive cycling if you have any health concerns or existing medical problems.
- > Stop cycling if you feel unwell and seek medical advice if indicated.

Of note, children under the age of 11 unaccompanied by an adult are not allowed to ride a bicycle on the road. Even in the company of parents or carers, children should only ride on cycling tracks or in recreation grounds (such as parks, playgrounds and waterfront promenades) for safety purposes. Moreover, parents and carers

should get their children a bike that fits them. Do not buy a bike that they can 'grow into'. They should also teach children how to ride properly and safely and the basic cycling rules (including the need for courtesy with other road users) and ask them to wear a helmet all the time while cycling. Parents and carers should act as good role models and follow the road rules as a cyclist themselves. For more details on how to cycle safely in Hong Kong, please refer to the Safe Cycling Guides that was available from the Transport Department's website at http://www.td.gov.hk/en/road_safety/safe_cycling_guides/index.html. People interested in cycling activities may also visit the Cycling Information Centre at http://www.td.gov.hk/mini_site/cic/en/index.html. It is a one-stop information platform which contains relevant information supplied by various Government departments on recreational and leisure cycling activities, including cycling courses, locations of existing cycling tracks and parking sites.

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A study found that the health and other benefits associated with cycling in an urban environment outweigh the potential risks of road traffic accidents or exposure to air pollution.

The study constructed a scenario of 500 000 people aged 18 - 64 shifting from cars to bicycles for short trips of 7.5 - 15 km each day in the Netherlands, and estimated the impact of this shift on all-cause mortality, taking into consideration the health effects of air pollution, traffic accidents, and physical activity obtained from the literature. Results showed that there was a substantial net gain in beneficial effects for the people who shifted from cars to bicycles for short trips – a gain in life expectancy of 3 - 14 months as a result of increased physical activity, set against a loss of 0.8 - 40 days owing to more exposure to air pollution and a loss of 5 - 9 days due to increased road traffic accidents involving cyclists. For the society as a whole, the gain in benefits were even greater because of a modest reduction in air pollution and greenhouse gas emissions as well as fewer traffic accidents overall.

The study concluded that the health benefits of cycling outweigh its potential risks because the health of individual cyclists will improve when they drive less and exercise more. The accompanying decrease in exhaust emissions will also benefit the entire society.

[Source: De Hartog JJ, Boogaard H, Nijland H, et al. Do the health benefits of cycling outweigh the risks? *Environ Health Perspect* 2010; 118(8): 1109-16.]



Data Brief

A local survey showed that a substantial proportion of cyclists did not wear a helmet while cycling, and some of them rode with headphones.

The survey was conducted in April 2012 and telephone-interviewed over 2 000 randomly selected community-dwelling people aged 18-64 who were asked, among others, a few questions on their cycling behaviour. Of the 589 (28.9%) respondents who reported they rode a bike (excluding stationary bike) in the 12 months before the survey, 88.7% claimed that they had never put on a helmet while cycling; 12.7% rode with headphones listening to the radio, music or answering phone calls at least some of the time.

To reduce the risk of head and facial injuries in the event of a crash, cyclists should wear a helmet while cycling at all times. Besides, cyclists should not wear headphones while cycling, because riding with headphones compromises their awareness of approaching cars and other warnings like shouting pedestrians.

Frequency of wearing a helmet and headphones during cycling in the 12 months before enumeration

	Proportion
Wearing a helmet during cycling	
All of the time	6.5%
Most of the time	1.6%
Some of the time	3.3%
None of the time	88.7%
Wearing headphones during cycling	
All of the time	2.4%
Most of the time	2.4%
Some of the time	7.9%
None of the time	87.3%

Base: 589 respondents who reported they rode a bike in the 12 months before enumeration.

Note: Percentages may not add up to 100% due to rounding.

Source: Behavioural Risk Factor Survey, April 2012 (provisional).

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Non-Communicable Diseases (NCD) WATCH is dedicated to promote public's awareness of and disseminate health information about non-communicable diseases and related issues, and the importance of their prevention and control. It is also an indication of our commitments in responsive risk communication and to address the growing non-communicable disease threats to the health of our community.

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