

helmets

A ROAD SAFETY MANUAL
FOR DECISION-MAKERS
AND PRACTITIONERS

Helmet

A road safety manual for
decision-makers and
practitioners



**World Health
Organization**



FIA Foundation
for the Automobile and Society



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Preface

Road traffic injuries are a major public health problem and a leading cause of death and injury around the world. Each year nearly 1.2 million people die and millions more are injured or disabled as a result of road crashes, mostly in low-income and middle-income countries. As well as creating enormous social costs for individuals, families and communities, road traffic injuries place a heavy burden on health services and economies. The cost to countries, possibly already struggling with other development concerns, may well be 1%–2% of their gross national product. As motorization increases, road traffic crashes are becoming a fast-growing problem, particularly in developing countries. If present trends continue unchecked, road traffic injuries will increase dramatically in most parts of the world over the next two decades, with the greatest impact falling on the most vulnerable citizens.

Appropriate and targeted action is needed most urgently. The *World report on road traffic injury prevention*, launched jointly in 2004 by the World Health Organization and the World Bank, identified improvements in road safety management together with specific actions that have led to dramatic decreases in road traffic deaths and injuries in industrialized countries that have been active in road safety. The use of seat-belts, helmets and child restraints, the report showed, have saved thousands of lives. The introduction of speed limits, the creation of safer infrastructure, the enforcement of blood alcohol content limits and improvements in vehicle safety, are all interventions that have been tested and repeatedly shown to be effective.

The international community must now take the lead encouraging good practice in road safety management and the take up of these interventions in other countries, in ways appropriate to their particular settings. To speed up such efforts, the United Nations General Assembly passed a resolution on 14 April 2004 urging greater attention and resources to be directed towards the global road safety crisis. Resolution 58/289 on “Improving global road safety” stressed the importance of international collaboration in the field of road safety. A further resolution (A58/L.60), passed in October 2005, reaffirmed the United Nation’s commitment to this issue, encouraging Member States to implement the recommendations of the *World report on road traffic injury prevention*, and commending collaborative road safety initiatives so far undertaken towards implementing resolution 58/289. In particular, it encouraged Member States to focus on addressing key risk factors, and to establish lead agencies for road safety.

To contribute to the implementation of these resolutions, the World Health Organization, the Global Road Safety Partnership, the FIA Foundation for the Automobile and Society, and the World Bank, have collaborated to produce a series of manuals aimed at policy-makers and practitioners. This manual is one of them. Each provides

step-by-step guidance to countries wishing to improve road safety organisation and to implement the specific road safety interventions outlined in the *World report on road traffic injury prevention*. They propose simple, effective and cost-effective solutions that can save many lives and reduce the shocking burden of road traffic crashes around the world. We would encourage all to use these manuals.

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Executive summary

Along with a global increase in motorization, particularly in low-income and middle-income countries, the use of motorized two-wheelers and bicycles is growing rapidly in many places. As a result, there are increasing fatalities and injuries among users of two-wheelers, with head injuries being a major concern. Motorcycle and bicycle helmets are effective both in preventing head injuries and in reducing the severity of injuries sustained by riders and passengers of two-wheelers.

Unfortunately, in many countries the use of helmets is low. The *World Report on Road Traffic Injury Prevention* described how wearing helmets would save many lives. Consequently, the Report recommended that countries set and enforce helmet laws for drivers and passengers of both motorized two-wheelers and bicycles.

The purpose of this manual is to provide advice on how to increase the use of helmets within a country. The manual is aimed at policy-makers and road safety practitioners and draws on experience from countries that have succeeded in achieving and sustaining high levels of helmet use. It provides the necessary evidence that will be needed to start a helmet use programme, and takes the user through the steps needed to assess the helmet situation in a country. It then explains the steps needed to design and implement a helmet use programme, including: setting up a working group; developing an action plan; introducing and enforcing mandatory helmet laws; creating appropriate standards for helmet production; effectively marketing helmets to the public; educating children and young people on helmet use; and consideration of the capacity for an appropriate medical response to be provided following a crash. Finally, the last section in the manual guides the user on planning and implementing an evaluation of the programme, such that results are fed back into programme design. For each of these activities, the document outlines in a practical way the various steps that need to be taken.

In developing the material for this manual, the writers have drawn on case studies from around the world to illustrate examples of “good practice”. Although the manual is aimed at countries with low use of helmets, the modular structure of the manual means it can be used in countries with very different levels of helmet use. The focus of the manual is on motorcycle helmets, although examples that pertain to bicycle helmet use are also addressed.



Introduction

Introduction

Background to the series of manuals

In 2004 the World Health Organization dedicated World Health Day to the topic of road safety. Events marking the day were held in over 130 countries – to raise awareness about road traffic injuries, stimulate new road safety programmes and improve existing initiatives. On the same day, the World Health Organization and the World Bank jointly launched the *World report on road traffic injury prevention*, highlighting the increasing epidemic of road traffic injuries. The report discusses in detail the fundamental concepts of road traffic injury prevention, the impact of road traffic injuries, the main causes and risk factors for road traffic crashes, and proven and effective intervention strategies. It concludes with six important recommendations that countries can take to improve their road safety record.

Recommendations of the *World report on road traffic injury prevention*

1. Identify a lead agency in government to guide the national road traffic safety effort.
2. Assess the problem, policies, institutional settings and capacity relating to road traffic injury.
3. Prepare a national road safety strategy and plan of action.
4. Allocate financial and human resources to address the problem.
5. Implement specific actions to prevent road traffic crashes, minimize injuries and their consequences and evaluate the impact of these actions.
6. Support the development of national capacity and international cooperation.

The report emphasises that the growing global problem can be averted with improved road safety organization and system-wide, multi-sectoral implementation of demonstrably effective interventions which are culturally appropriate and tested locally. In its fifth recommendation, the report makes it clear that there are several “good practice” – interventions already tried and tested – that can be implemented at low cost in most countries. These include strategies and measures that address some of the major risk factors for road traffic injuries, such as:

- setting laws requiring seat-belts and child restraints for all occupants of motor vehicles;
- requiring riders of motorcycles to wear helmets;
- establishing and enforcing blood alcohol concentration limits;
- setting and enforcing speed limits;
- managing existing physical road infrastructure in a way as to increase safety;
- improving vehicle safety.

A week after World Health Day, on 14 April 2004, the United Nations General Assembly adopted a resolution calling for greater attention and resources to be directed towards road safety efforts. The resolution recognized that the United Nations system should support efforts to tackle the global road safety crisis. At the same time, it commended WHO and the World Bank for their initiative in launching the *World report on road traffic injury prevention*. It also invited the World Health Organization, working in close cooperation with the United Nations Regional Commissions, to act as coordinator on road safety issues within the United Nations system.

Following the mandate conferred on it by the United Nations General Assembly, since the end of 2004 WHO has helped develop a network of United Nations and other international road safety organizations – now referred to as the “United Nations Road Safety Collaboration”. The members of this group have agreed on common goals for their collective efforts, and are initially focusing attention on the six recommendations of the *World report on road traffic injury prevention*.

A direct outcome of this collaboration has been the setting up of an informal consortium consisting of WHO, the World Bank, the FIA Foundation for the Automobile and Society and the Global Road Safety Partnership. This consortium is working to produce a series of “good practice” manuals covering the key issues identified in the *World report on road traffic injury prevention*. The project arose out of the numerous requests to WHO and the World Bank from road safety practitioners around the world asking for guidance in implementing the report’s recommendations.

The manuals are aimed at governments, nongovernmental organizations and “road safety practitioners” in the broadest sense. Written in an accessible manner, they provide practical steps on how to implement each recommendation in a way identified with good practice, while also making clear the roles and responsibilities of all those involved. The manuals are based on a common template that was used in a similar document on increasing seat-belt use, developed by the FIA Foundation in 2004. Although primarily intended for low-income and middle-income countries, the manuals are applicable to a range of countries and adaptable to different levels of road safety performance. Each manual includes case studies highlighting examples from both developed and developing countries.

The *World report on road traffic injury prevention* advocates a systems approach to road safety – one that addresses the road, the vehicle and the user. Its starting point is that

to effectively tackle road traffic injuries, responsibility needs to be shared between governments, industry, nongovernmental organizations and international agencies. Furthermore, to be effective, road safety must have commitment and input from all the relevant sectors, including those of transport, health, education and law enforcement. These manuals reflect the views of the report; they too advocate a systems approach and – following the principle that road safety should be pursued across many disciplines – they are targeted at practitioners from a range of sectors.

Background to the helmet manual

Why was the helmet manual developed?

Many countries around the world are facing the problem of a rapidly rising number of people injured or killed while riding two-wheelers – motorcycles and bicycles. A large proportion of the deaths and severe injuries result from injuries to the head. Helmets are effective in reducing the likelihood of head injuries, as well as their severity. Increasing helmet use in a country is thus an important way of improving road safety.

This manual seeks to provide practical advice to road safety practitioners on how to achieve a much higher proportion of users of two-wheeled vehicles wearing helmets. It follows on from the *World report on road traffic injury prevention*, which described evidence that setting and enforcing mandatory helmet use was an effective intervention for reducing injuries and fatalities among two-wheeler users. As already mentioned, the manual is one of a series of documents providing, in an accessible form, practical advice to countries on the steps necessary for improving their overall road safety record.

Who is the manual for?

The manual is for use in countries that want to improve the rates of helmets use among users of two-wheelers, nationally or at a local level. It is targeted at governments, nongovernmental organizations and road safety practitioners. The list of possible users will vary according to the country and its current situation with regard to helmet use, but will certainly include:

- policy-makers and decision-makers;
- members of the judiciary;
- politicians;
- police officers;
- road safety and public health professionals;
- transport managers;
- manufacturers of motorcycles and bicycles;
- helmet manufacturers
- employers in the public and private sectors;

- nongovernmental organizations;
- insurance industry personnel;
- school and college teachers;
- researchers on road safety;
- instructors in driving and road safety.

The manual provides practical steps mainly on increasing helmet use among motorcycle users, though it also highlights case studies which illustrate issues around bicycle helmet use. Although aimed particularly at low-income and middle-income countries with low levels of helmet use, it is intended to be useful for all countries.

What does this manual cover and how should it be used?

Increasing the rate of helmet use requires a number of steps. Exactly how many steps are needed will depend on how much is already in place in a particular country in the way of helmet programmes. This manual helps users identify which steps are relevant to their situation, and then provides the practical advice needed to implement the steps. As well as focusing strongly on technical measures, the manual also describes the institutional structures that need to be in place for a helmet programme to be successful.

As explained in Module 1 of this manual, the burden of deaths and injuries among users of two-wheelers is predominantly in low-income and middle-income countries. For this reason, the manual draws considerably on experience from such countries, with the intention that the content will be most relevant to other countries with a similarly high burden of injuries among two-wheeler users. Nonetheless, the structure of the manual is such that it can be applied to a wide range of countries in terms of their economies and levels of helmet use.

What is covered?

The manual focuses primarily on *motorcycle helmets*, since from a global perspective it is motorcycle users who suffer the majority of injuries and fatalities among two-wheeler users. However, it also addresses *bicycle helmets*. In order, though, to minimize the duplication that would result from addressing each issue first for motorcycle helmets and then for bicycle helmets, the main steps are discussed predominantly with reference to motorcycle helmets.

There are some controversial issues related to both motorcycle and bicycle helmet use and the manual addresses these. Tackling such issues will certainly increase the success of policies aimed at cutting the rate of injuries among motorcyclists and cyclists.

The technical content of this manual is divided into four modules, structured as follows.

- *Module 1* explains **why interventions are needed to increase helmet use**. It describes how helmets protect wearers and how effective they are in reducing head injuries.
- *Module 2* guides the user through the process of **assessing a country's situation on helmet use**. It outlines the data needed for a good diagnosis, and how these data can be used to set realistic targets and priorities for a programme.
- *Module 3* is about **designing and implementing a helmet programme**, including how to develop an action plan, including setting objectives, and deciding on activities needed to meet these objectives, estimating resources and setting a timeframe. The module includes sections on developing legislation and standards on helmet use, improving compliance, and establishing appropriate marketing and publicity strategies. Educational interventions are also discussed, as well as the need to consider the capacity to respond appropriately when motorcycle crashes do occur.
- *Module 4* is about **evaluation of a helmet programme**. This includes identifying the aims of the evaluation, considering different types of evaluation and choosing the most appropriate methods, and choosing the performance indicators to be used. The module also discusses the need to disseminate the evaluation results and use them to improve the programme.

Case studies, in the form of boxed text, are included throughout the manual. These examples have been chosen to illustrate processes and outcomes, with experiences from a wide range of countries, reflecting regional, cultural and socioeconomic diversity. Less detailed “notes” are also included as boxed text to illustrate briefer points of interest.

How should the manual be used?

The manual is not intended to be prescriptive, but rather adaptable to particular needs.

The technical modules contains flowcharts and checklists to help readers determine where their country stands with regard to helmet use, and to take those steps offering the greatest potential for improvement. The modular structure of the manual is intended to help this process of using only the relevant parts of the document.

Although it would help everyone to read the whole document, it is envisaged that particular sections will meet the needs of different countries. Nonetheless, all users will probably benefit from reading Module 2, enabling them to assess their situation and to pick particular actions to undertake. The choices made at this point will decide which of the remaining sections are useful. For example, a country where use of two-wheelers is high but lacking a helmet law and helmet standard might usefully work through all the technical sections. On the other hand, a country with an existing helmet law and helmet standard, an effective public awareness campaign around helmet use, but without monitoring or evaluation procedures, may choose primarily to use Module 4, while reading the other modules only for reference.

We encourage users to adapt the manual to local conditions: this means it may need to be translated and that sections of it may need to be altered to suit the local environment. We would also appreciate feedback on users' experiences in this process.

What are the manual's limitations?

This manual is not meant to be comprehensive. It draws upon the experience of its contributors from around the world to identify practical and effective steps that can be taken on helmet use, and thus reflects the views of those involved in its production. There may well be successful interventions followed by other countries that are not addressed here. Similarly, the case studies – used to illustrate processes, good practice and practical constraints – are not exhaustive but merely illustrate points made in the main text.

While the manual focuses on helmet use among motorcyclists, it also addresses cyclists. However, where the steps involved in a process are the same for both motorcycle and bicycle helmet use, they are presented only for motorcycle helmet use, to avoid repetition.

The manual is not an academic document. The references contained are only to material used in its development, and there is no attempt at an exhaustive literature review.

How was the manual developed?

The manual was based on a standard template that was developed jointly by the four partner organizations (the World Health Organization, the World Bank, the FIA Foundation for the Automobile and Society, and the Global Road Safety Partnership), and reviewed externally. The template was not meant to be rigid, but to provide a loose structure which, where possible, would unify the manuals in their form and approach.

An advisory committee of experts from the different partner organizations oversaw the process of developing each manual, and to provide guidance on its content. A small editorial committee for each manual then coordinated its technical content.

An outline of this manual on helmet use was produced by WHO as the project leader, and sent to the advisory and editorial committees for comment. Technical modules of the document were contracted out to organizations or individuals with particular expertise in an area. These people further developed the outline of their modules, reviewed the relevant literature and wrote the technical content, ensuring it reflected the latest scientific views on good practice.

The technical modules were reviewed independently by road safety practitioners, researchers and other experts from around the world. The document was then sent for technical editing.

Dissemination of the manual

The manual is being translated into a number of languages, and countries are encouraged to translate the document into local languages. The manual will be disseminated widely through the distribution network used for the *World report on road traffic injury prevention*. The four partner organizations involved in the manual will plan training workshops to accompany in-country launches of the manual.

The manual will also be available in PDF format to be downloaded free from the web sites of all four partner organizations (see page 145).

This helmet manual is downloadable from
www.who.int/violence_injury_prevention/publications/road_traffic/en/index.html

How to get more copies

Further copies of the manual can be ordered by writing to:

Department of Injuries and Violence Prevention,
World Health Organization
20 Avenue Appia, CH-1211
Geneva 27, Switzerland

Or by e-mailing: traffic@who.int

1

Why are helmets needed?

Why are helmets needed?

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THIS MODULE provides the user with background material on why helmets are needed. Such information is important in persuading political leaders and the public to support a helmet programme.

The sections in this module are structured as follows:

- **1.1 Many people around the world die in motorcycle collisions:** The module begins by describing the magnitude of the problem of motorcycle crashes, and resulting head injuries. It explains the global distribution of the problem, noting that if present trends continue, many low-income and middle-income countries are likely to experience an increase in the number of motorcycle crashes in the near future. The section describes how head injuries that result from motorcycle collisions are a leading cause of death and disability.
- **1.2 A helmet protects your head:** This section describes what can happen to the head in the event of a motorcycle or bicycle collision. It then goes on to explain the physical components of a helmet and the way in which they reduce the impact of a collision. This section also describes how helmets are designed to meet certain requirements.
- **1.3 Helmet use is effective at reducing head injuries:** This section summarizes the evidence from studies that have evaluated the effectiveness of helmets in reducing death and injury.
- **1.4 Helmet programmes are effective at getting helmets on heads:** Introducing legislation on helmet use has been shown to be effective in increasing helmet-wearing rates and reducing head injuries, as summarized in this section.

As mentioned in the Introduction, this manual is focused on how to increase helmet use among motorcycle users. The increasing use of motorized two-wheelers, and the high speed at which motorcycles can travel compared to bicycles, means that the primary audience of this manual will be those seeking to increase motorcycle helmet use. Nonetheless, it is assumed that much of the technical guidance that is provided in the text will be equally relevant, and can be applied easily, to those seeking to introduce a helmet programme for bicycle users.

1.1 Many people around the world die in motorcycle collisions

Road traffic injuries are a major public health problem and a leading cause of death and injury around the world. Each year nearly 1.2 million people die as a result of road crashes, and millions more are injured or disabled (1). In many low-income and middle-income countries, where motorcycles and bicycles are an increasingly common means of transport, users of two-wheelers make up a large proportion of those

injured or killed on the roads. Motorcycle and bicycle riders are at an increased risk of being involved in a crash. This is because they often share the traffic space with fast-moving cars, buses and trucks, and also because they are less visible. In addition, their lack of physical protection makes them particularly vulnerable to being injured if they are involved in a collision.

In most high-income countries, motorcycle fatalities typically comprise around 5% to 18% of overall traffic fatalities (2,3). This proportion reflects the combined effect of several important factors including the relatively low ownership and use of motorcycles in many developed countries, and the relatively high risk of these motorcycles being involved in crashes involving fatalities. Typically, these risks are much higher for motorcycle than for vehicle travel (4).

In low-income and middle-income countries, car ownership and use rates are generally much lower than in high-income countries. However, the ownership and use of motorcycles and other two-wheelers is generally relatively high – for example, in India 69% of the total number of motor vehicles are motorized two-wheelers, considerably higher than in high-income countries (3). Reflecting this difference, the levels of motorcycle rider fatalities as a proportion of those injured on the roads are typically higher in low-income and middle-income countries than in high-income countries (Figure 1.1). For instance, 27% of road deaths in India are among users of motorized two-wheelers, while this figure is between 70–90% in Thailand, and about 60% in Malaysia (3,5,6). In China, motorcycle ownership between 1987 and 2001 grew rapidly from 23% to 63%, with a corresponding increase in the proportion of traffic fatalities sustained by motorcyclists rising from 7.5% to 19% over the same period (7). However, in other low-income and middle-income countries, a lack of high quality road safety data means that precise levels of motorcycle rider fatalities are still not known.

1.1.1 Head injuries are a leading cause of death and disability

Injuries to the head and neck are the main cause of death, severe injury and disability among users of motorcycles and bicycles. In European countries, head injuries contribute to around 75% of deaths among motorized two-wheeler users; in some low-income and middle-income countries head injuries are estimated to account for up to 88% of such fatalities (6,8). The social costs of head injuries for survivors, their families and communities are high, in part because they frequently require specialized or long term care. Head injuries also result in much higher medical costs than any other type of injury (9), such that these injuries exert a high toll on a country's health care costs and its economy.

Globally, there is an upward trend in the number and use of motorcycles and bicycles, both for transport and recreational purposes. Indeed, most of the growth in the number of vehicles on the world's roads comes from an increasing use of motorized two-wheelers. Asian countries, in particular, are expected to experience a

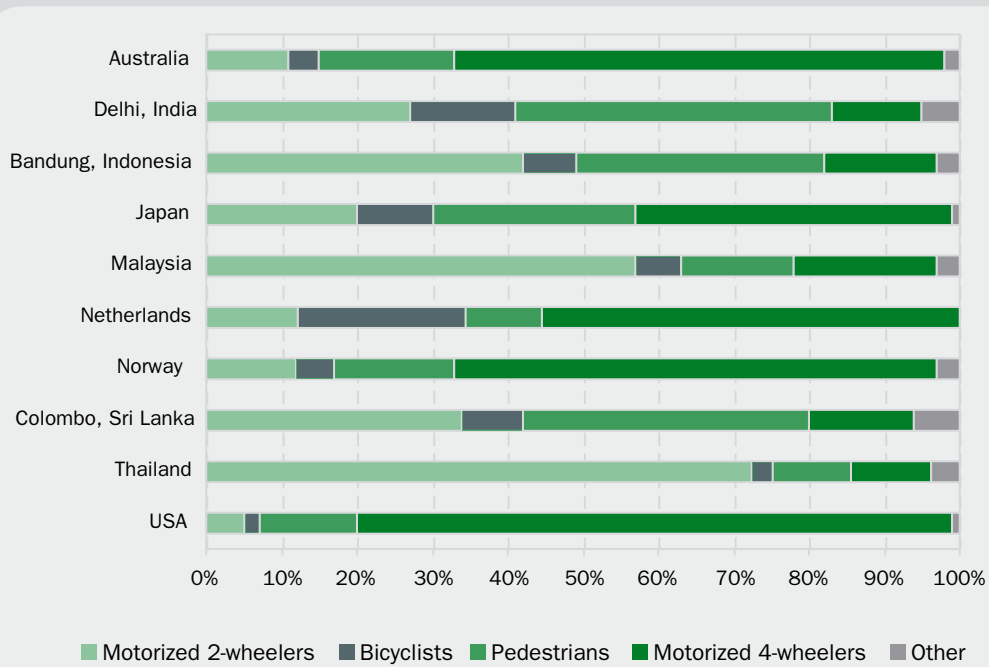
considerable rise in the number of motorized two-wheeler vehicles on their roads. This rapid growth in the use of motorcycles in many low-income and middle-income countries is already being accompanied by a considerable increase in the number of head injuries and fatalities that will only continue to increase if present trends continue unchecked.



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Helmet programmes will be important to policy-makers in Africa, where there is an increasing use of motorized two-wheelers.

Figure 1.1 Road users killed in various modes of transport as a proportion of all road traffic deaths



Adapted from reference 1

BOX 1.1: The story behind the helmet

Satien Luangpitak, 28, is a motorcycle taxi driver in northern Bangkok. As in much of urban Thailand, motorcycle taxis are a common means of personal transport. However, despite a national mandatory helmet law for taxis and passengers, enforcement is sporadic and it is common to see unhelmeted drivers and passengers.

In May 2004 Satien was involved in a crash while driving in heavy traffic. As he tried to overtake a car, he collided with another motorcycle taxi in front of him. Satien was travelling at 80 km/h and, upon impact, was thrown forward and landed on the pavement, striking his helmeted head and his left shoulder. He lost consciousness for about half an hour. Another motorcycle taxi driver stopped to assist him: rather than call and wait for the emergency services, this man lifted Satien and removed him from the roadway. He then moved him to a vehicle and evacuated him to a hospital – an action meant in good faith, but that he later learnt may have inflicted a spinal cord injury on Satien.

At hospital, Satien received treatment for trauma to his head and shoulder. He was discharged from the hospital after six hours with a neck brace and partial body brace. He received follow-up treatments and was able to return to a full work schedule a month later. Aside from the initial loss of consciousness, in the two years since his crash, he has suffered no ill effects from the trauma to his head. While his injured shoulder has regained “100 percent functionality”, he still experiences pain in his neck and shoulder when lifting heavy objects with his left arm.

When interviewed, Satien pointed out that at no time did anyone, including the medical staff specially trained to deal with motorcycle crash victims, advise him to replace his helmet after the crash. Crash helmets offer little or no protection after having absorbed the impact of a crash.

Fortunately, all of Satien’s medical costs were covered by Thailand’s mandatory third-party liability insurance coverage. However, he incurred costs



Satien explains that his experience has increased his awareness of the need to wear a helmet consistently.

in repairing his motorcycle (15 000 baht, about US\$ 390), and as a result of his lost income during his recovery period, which he estimates at 10 000 baht (US\$ 260).

The crash has also had an emotional impact: Satien constantly worries that he may eventually suffer a debilitating injury from a crash, is fearful of driving at higher speeds in traffic, and has become increasingly uneasy when his passengers refuse to wear a helmet. His experience has also altered his behaviour with regard to helmet use: prior to the crash, he admits he was inconsistent about using his helmet in areas where he knew enforcement was unlikely, but that now he wears a helmet at all times. He also explains that since the crash, he has taken out disability insurance.

Source: In May 2006 Satien Luangpitak was interviewed by Daniel Brod, ASIRT

1.2 A helmet protects your head

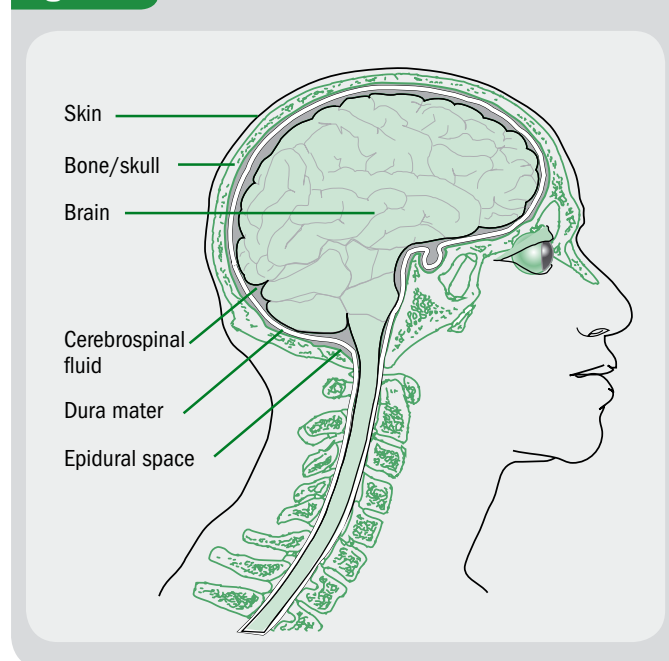
The technical expertise behind the design of high quality helmets is based on an understanding of what happens to the head in the event of a motorcycle crash. This section describes what happens in the event of a motorcycle crash, and then explains how a helmet works to reduce this effect.

1.2.1 The mechanism of head injuries

An appreciation of the anatomy of the head is important in understanding the mechanism of injuries to the head and brain (Figure 1.2). Briefly, the important anatomical information about the head to note is the following:

- The brain is enclosed within a rigid skull.
- The brain “sits” on bones that make up the base of the skull.
- The spinal cord passes through a hole in the underside of the brain.
- Under the skull, adhering to the bones, is a tough tissue called the dura that surrounds the brain.
- Between the brain and the dura is a space containing cerebrospinal fluid that protects the brain tissue from mechanical shock.
- The brain “floats” in the cerebrospinal fluid but it can only move about 1 millimetre in any direction.
- The skull is covered by the scalp, which provides some additional protection.

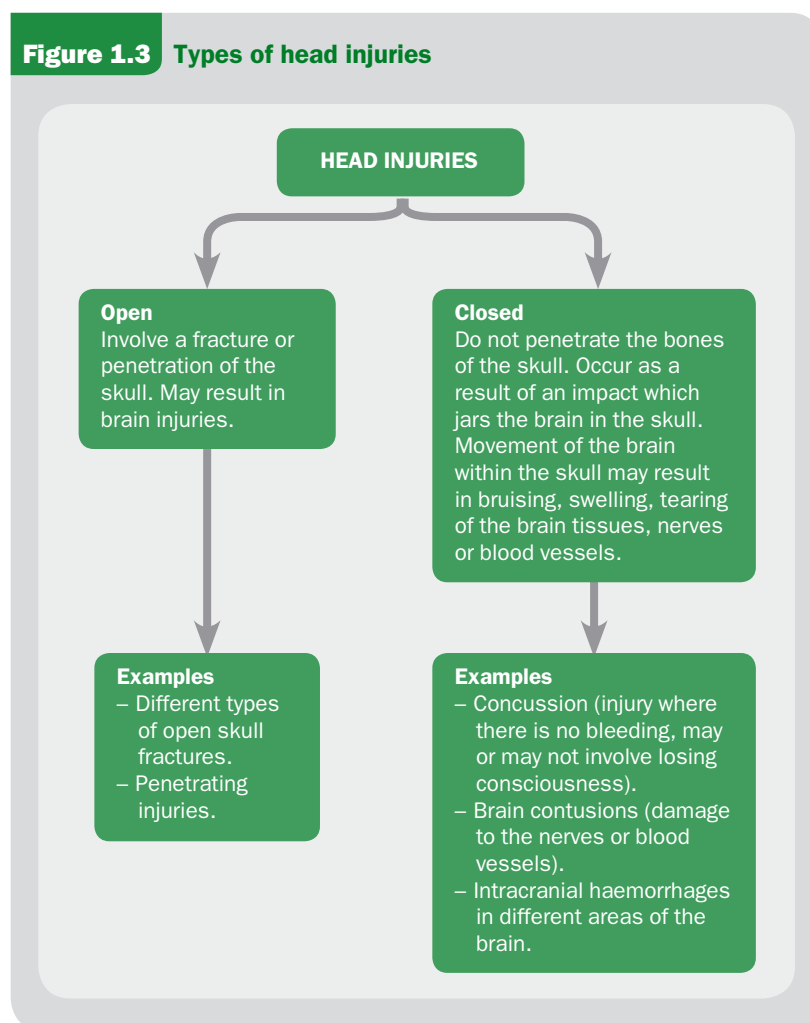
Figure 1.2 Structure of the head and brain



During a motorcycle or bicycle crash there are two principal mechanisms of injury to the brain: through direct contact and through acceleration–deceleration. Each mechanism causes different types of injuries.

When a motorcycle or bicycle is involved in a collision, the rider is often thrown from the cycle. If the rider's head hits an object, such as the ground, the head's forward motion is stopped, but the brain, having its own mass, continues to move forward until it strikes the inside of the skull. It then rebounds, striking the opposite side of the skull. This type of injury can result in anything from a minor head injury, such as concussion, to a fatal head injury.

Head injuries that result from either contact or acceleration–deceleration injuries are themselves divided into two categories: open or closed head injuries. Most traumatic brain injuries are the result of closed head injuries – that is, there is no open wound to the brain. Figure 1.3 describes the two broad types of head injuries and gives examples of the types of lesions in each category – from the mildest to the most severe.



Motorcycle riders who do not wear a helmet run a much higher risk of sustaining any of these head and traumatic brain injuries, or a combination of them. Helmets create an additional layer for the head and thus protect the wearer from some of the more severe forms of traumatic brain injury.

1.2.2 How a helmet works

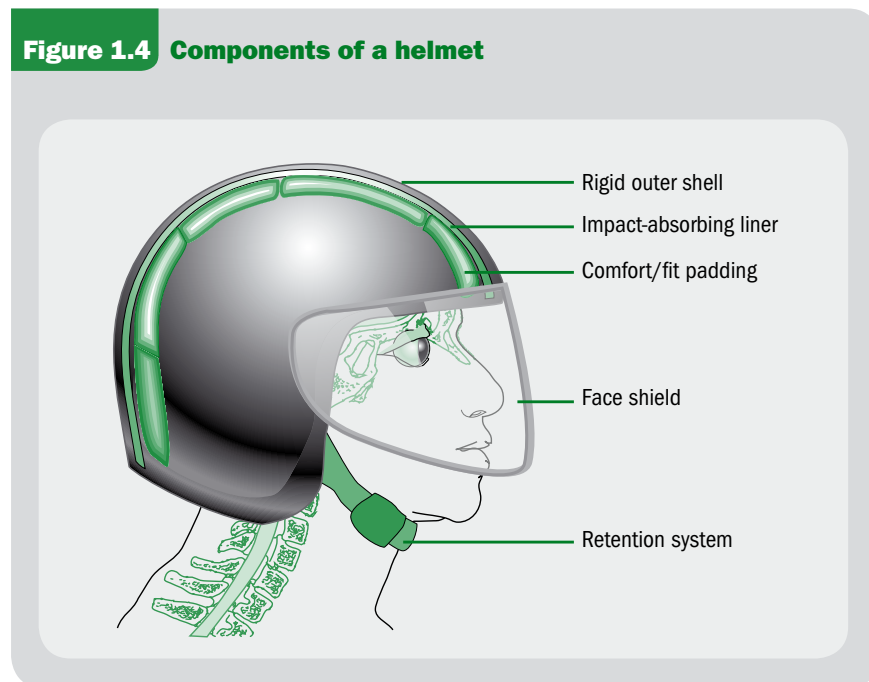
A helmet aims to reduce the risk of serious head and brain injuries by reducing the impact of a force or collision to the head.

A helmet works in three ways:

- It reduces the deceleration of the skull, and hence the brain movement, by managing the impact. The soft material incorporated in the helmet absorbs some of the impact and therefore the head comes to a halt more slowly. This means that the brain does not hit the skull with such great force.
- It spreads the forces of the impact over a greater surface area so that they are not concentrated on particular areas of the skull.
- It prevents direct contact between the skull and the impacting object by acting as a mechanical barrier between the head and the object.

These three functions are achieved by combining the properties of four basic components of the helmet that are described below (Figure 1.4).

Figure 1.4 Components of a helmet



The shell

This is the strong outer surface of the helmet that distributes the impact over a large surface area, and therefore lessens the force before it reaches the head. Although the shell is tough, it is designed to compress when it hits anything hard. It provides protection against penetration by small, sharp and high speed objects and it also protects the padding inside the helmet from abrasions and knocks during daily use. These requirements mean that the shell must be hard, usually with a smooth exterior finish.

The impact-absorbing liner

This is made of a soft, crushable padded material – usually expanded polystyrene, commonly called “styrofoam”. This dense layer cushions and absorbs the shock as the helmet stops and the head tries to continue moving.

The comfort padding

This is the soft foam-and-cloth layer that sits next to the head. It helps keep the head comfortable and the helmet fitting snugly.

The retention system, or chin strap

This is the mechanism that keeps the helmet on the head in a crash. A strap is connected to each side of the shell. Chin and neck straps, which are specifically designed to keep the helmet on during an impact, must be correctly used for the helmet to function as it is designed to (see box below).

NOTE Using helmets properly

A study in Malaysia examined the compliance of helmet use in a typical Malaysian town. Of the 5000 motorcyclists studied, only 54% used helmets properly, 21% used them improperly, and 24% did not wear them at all. Younger people, men and those with less formal education were more likely to not wear helmets properly (10).



Many helmet users do not secure their helmets properly – and sometimes not at all – thereby rendering the helmet of little – if any – value in the event of a collision.

NOTE**What helmets *don't* do**

Helmets are designed to reduce the chances of *head, brain, and facial injuries* occurring, but are not designed to prevent injuries to other parts of the body. To reduce the likelihood of injuries to other parts of the body, the following strategies can be employed:

- Appropriate clothing can be helpful to reduce other types of injuries (for example, jacket and trousers of particular materials which cover arms and legs completely; sturdy shoes or boots; gloves which give a better grip and protect the hands in the event of a crash).
- Obeying the laws of the road, including adhering to speed limits and not driving while drunk are behaviours that will reduce the chance of a motorcyclist being involved in a crash, and thus their likelihood of incurring any type of injury.

1.2.3 Motorcycle helmet design

In addition to meeting the previously described functions and conforming to standards (to be discussed in Module 3), a helmet needs to be designed to suit the local weather and traffic conditions. The following are some of the considerations usually addressed by helmet designers:

- Materials used in the construction of a helmet should not degrade over time, or through exposure to weather, nor should they be toxic or cause allergic reactions. Currently, the plastic materials commonly used are Expanded Poly-Styrene (EPS), Acrylonitrile Butadiene Styrene (ABS), Poly Carbon (PC) and Poly Propylene (PP). While the material of the helmet shell generally contains PC, PVC, ABS or fibre glass, the crushable liner inside the shell is often made out of EPS – a material that can absorb shock and impact and is relatively inexpensive. However, helmets with EPS liners should be discarded after a crash, and in any case users should replace such helmets after 3–5 years of use.
- Standards often set the minimum coverage of a helmet (see Module 3). Half-head helmets offer minimal coverage. Full-face helmets should ensure that the wearer's peripheral vision and hearing are not compromised.
- To ensure that a helmet can absorb the shock of a crash, the crushable liner should be between 1.5 cm and 3.0 cm in thickness.

NOTE**Does the colour of a helmet matter?**

Research in New Zealand has examined whether the colour of a helmet affects the risk of a crash. The study compared motorcycle drivers who had been involved in motorcycle crashes that led to hospital treatment with those who had not (as a control group), while examining the colour of the helmets worn by all study participants. The results showed that higher proportions of drivers who had been involved in crashes reported wearing black helmets, while fewer reported white helmets. Compared with wearing a black helmet, use of a white helmet was associated with a 24% lower risk of crash. Similarly, having a “light-coloured” helmet – compared with a “dark-coloured” one – was associated with a 19% lower risk of a crash. The researchers concluded that some 18% of crashes could be avoided if non-white helmets were eliminated; similarly, 11% could be avoided if all helmets were not “dark”.

Although the results of the study cannot necessarily be generalized to other settings or countries, it seems reasonable to assume that there is greater protection from white helmets as opposed to black ones, and from lighter-coloured ones generally as against darker ones. The study therefore suggests that policies encouraging white and lighter-coloured helmets can help prevent motorcycle crashes.

Source: 11



A light-coloured helmet has been shown to reduce the risk of a crash.

Copyright WHO

In addition to the previously mentioned design issues, there are also various styles of helmets which afford different protection. The four most common types are:

Full-face helmets (Figure 1.5a)

These helmets offer facial protection in addition to impact protection. Their principal feature is a chin bar that extends outwards, wrapping around the chin and jaw area. Extending above the jaw, there is a vision port that allows the wearer maximum range of sight, in line with the requirements for peripheral and vertical vision.

Open-face helmets (Figure 1.5b)

Open-face helmets give standard protection from impact with their hard outer shell and crushable inner liner. Compared to the full-face type, they offer only limited

protection for the jaw and chin area. They may or may not have retractable visors to protect the eyes.

Half-head helmets (Figure 1.5c)

These helmets provide protection by means of a hard outer shell and a crushable inner liner. They do not offer protection for the chin or jaw area and are rarely equipped with visors. The half-head helmet may or may not have ear flaps attached to the retention system.

Helmets for tropical use (Figure 1.5d)

These are helmets specifically designed for South Asian and South-East Asian countries with extremely hot and humid climates. They are actually half-head helmets with ventilation holes to provide a maximum flow of air so as to reduce the heat. Their extreme lightness of weight is achieved by using semi-rigid vacuum-forming PVC material.

Figure 1.5 Helmet styles



a. Full-face



b. Open-face



c. Half-head



d. Tropical

© Asia Injury Prevention Foundation

NOTE

Children: what type of helmet?

Few countries have helmets specifically designed for children, which results in children either not wearing helmets or else being forced to wear adult-size helmets. In some countries, for example Viet Nam and Thailand, however, children's helmets are now being designed.



Helmet developed in Thailand for children aged 2.

1.3 **Helmet use is effective at reducing head injuries**

Wearing a helmet is the single most effective way of reducing head injuries and fatalities resulting from motorcycle and bicycle crashes. Motorcyclists who do not wear helmets are at a much higher risk of sustaining head injuries and from dying from these injuries. In addition, riders who do not wear helmets place additional costs on hospitals (see boxed example below), while the disability that results from these head injuries incurs costs at an individual, family (or carer) and societal level.

There is considerable research that has been conducted on the effects of wearing a helmet on the risk of a head injury as a result of a collision. The results show slightly different effects, depending on the study type, population, situation etc. Consequently it is useful to examine this research collectively – in what is known as a *systematic review* on the topic of interest. Systematic reviews of studies are a means of objectively examining the evidence for a particular claim (in this case, helmet use in preventing head injury) and combining the results in a way that minimizes any bias. Reviewers conducting such reviews search widely for all the studies on the topic and include those of a sufficiently high methodological quality. When the data from all the studies included in the review are summarized, the result should provide a more accurate estimate of the effect of the intervention than is possible from individual studies.

NOTE**Hospital costs are reduced by helmet use**

Researchers in Michigan, USA, studied the impact of motorcycle helmet use on patient outcomes and cost of hospitalization. Despite Michigan's mandatory helmet law, 19% of the 216 patients included in the study were not using helmets when they crashed, allowing the researchers to compare costs among helmeted and unhelmeted riders.

On average, helmet use led to average hospital costs that were about 20%, or US\$ 6000, less than costs for those who did not wear helmets. For patients who were treated on an inpatient rehabilitation floor after leaving the trauma unit, average costs for unhelmeted riders were nearly twice those of helmeted riders, in part due to the fact they were kept in hospital longer. The results also confirmed earlier findings that riders without helmets were younger, suffered more head and neck injuries, and had higher overall injury severity scores.

Failure to wear a helmet adds to the financial burden created by motorcycle-related injuries. The authors concluded that individuals who do not wear helmets should therefore be required to pay higher insurance premiums.

Source: 12

Systematic reviews have been published examining the effectiveness of both motorcycle helmets and bicycle helmets (13,14). The review on motorcycle helmets included 53 studies, and summarized the current available evidence on helmets and their impact on mortality, as well as on head, face and neck injuries, following motorcycle crashes. Table 1.1 provides a summary of the main results of this review.

Table 1.1 Summary of systematic review of effectiveness of motorcycle helmets

Not wearing a helmet	Wearing a helmet
increases the risk of sustaining a head injury;	decreases the risk and severity of injuries by about 72%;
increases the severity of head injuries;	decreases the likelihood of death by up to 39%, with the probability depending on the speed of the motorcycle involved;
increases the time spent in hospital;	decreases the costs of health care associated with crashes.
increases the likelihood of dying from a head injury.	

Source: 13

The following are the main conclusions of this research:

- Motorcycle helmets reduce the risk of mortality and head injury in motorcycle riders who crash, although the effect on death may be modified by other factors surrounding the crash, such as the speed the motorcyclist was travelling at when the crash occurred. Crashes at higher speeds may result in multiple injuries likely to cause death, regardless of how well the head is protected.
- There was not enough evidence to determine the effect of motorcycle helmets on face or neck injuries, although some studies suggest that helmets have no effect on the risk of neck injuries but are protective for face injuries.
- There was insufficient evidence to demonstrate whether differences in helmet types (full-face versus open-face) confer more or less advantage in injury reduction. Further research should be conducted to determine the effectiveness (and cost effectiveness) of different helmet types – especially those used in low-income and middle-income countries – on mortality and on head, neck and face injuries.
- Increasing motorcycle helmet use in countries where such use has been low is likely to dramatically reduce head injury and death. Policy-makers would do well to consider measures to increase helmet use, such as legislation for compulsory helmet use and its enforcement, along with community education campaigns.

A systematic review has also been conducted on bicycle helmets. The review on the effectiveness of bicycle helmets in reducing head and facial injuries found them to be effective at reducing head and brain injury for all ages of bicyclists (see Box 1.2). However, there is a broader debate about whether helmet use is the best way to

improve the safety of cyclists, and Box 1.3 illustrates an alternative approach to this issue, adopted in the Netherlands.

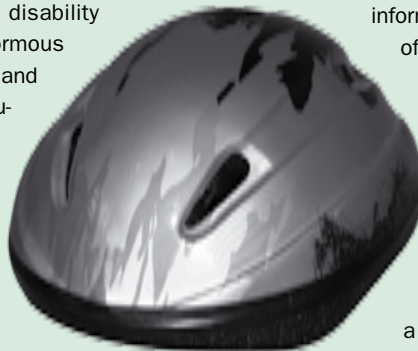
Two further reviews are currently underway examining the impact of motorcycle helmet legislation, and the impact of bicycle helmet legislation, in reducing head injuries and death (15, 16). Final results for these reviews will be published in late 2006.

BOX 1.2: **Bicycle helmets decrease the risk of head and brain injuries**

Bicycles are an important means of transportation in many parts of the world. They are accessible, economical and non-polluting. With a growing recognition of the problem of obesity and lack of physical activity in many countries, bicycling offers an enjoyable means of recreation and vigorous physical activity. The promotion of bicycle use is therefore to be encouraged widely.

Bicycling, though, does have associated risks. Approximately two-thirds of serious injuries to cyclists requiring hospitalization and three-quarters of cyclists' deaths are due to head injuries. These injuries can occur from falls following a loss of control, from hitting a hole in the road, or from colliding with another bicycle or a motor vehicle. Head injuries are a major source of disability everywhere, and create an enormous burden on the victims' families and on society. Prevention of head injury is thus an important goal.

Studies over the last 15 years in the United States, Europe, Australia and New Zealand indicate that bicycle helmets are very effective in decreasing the risk of head and brain injuries. There have been five case-control studies of helmet effectiveness, in which individuals who sustained head or brain injuries through a bicycle crash were compared to those who received injuries not involving the head. Taking all the studies together, it was found that wearing a helmet decreased the risk of a head injury by 69%. Head injury is a broad term and includes injuries to the scalp, the skull and the brain. Considering brain injury alone – the most serious type of injury – helmets decrease the risk of brain injury also by 69%, and the risk of severe brain injury by 79%. Helmets



appear to be similarly effective for all age groups, including young children and older adults (14).

One concern expressed is that helmets might not be effective for people hit by motor vehicles while riding their bicycles. The studies, though, indicate that helmets are equally effective for crashes involving motor vehicles as for those that do not.

Helmets are also effective in preventing injuries to the middle and upper portions of the face – the area above the upper lip. Helmets decrease the risk of injuries to this part of the face by about two-thirds, probably because of the “overhang” of the helmet.

The fact that helmets are effective in preventing a potentially devastating injury should inform public policy. Different types of programmes have been found effective in promoting helmet use, especially among children. These consist of educational programmes, programmes to reduce the cost of helmets, and legislation mandating helmet use. Such programmes should carry a single, clear message – *Wear Helmets* – and be disseminated widely to people in many different settings. Helmets can usually be provided at a reduced cost through bulk purchases or through arrangements between nongovernmental organizations, manufacturers and retail outlets. Legislation has been shown to be effective in increasing helmet use in a number of countries, including the United States and Australia.

All injuries should be considered to be preventable. This is clearly the case with head injuries related to bicycling.

Photo: John Foliot, stock.xchng

BOX 1.3: **Steering clear of mandatory helmet use: the Dutch approach to cycling safely**

In the Netherlands, four out of every five citizens own a bicycle and cycling – a tradition for more than 80 years – is generally considered an everyday, safe activity. Reflecting the fact that cyclists are seen as important road users, the road environment includes features such as bicycle paths, bicycle lanes, bicycle crossings – as for pedestrians – and bicycle traffic lights.

Research conducted in the 1980s on the relative impact of these different facilities showed that cycle paths alongside urban through-roads were safer for cyclists than cycle lanes, and that cycle lanes were not less safe than where there were no separate bicycle facilities. It was also found that at through-road intersections, separate paths were less safe for cyclists than lanes or no facilities at all. This led to the recommendation to terminate cycle paths some distance from an intersection.

In the early 1980s, Delft, a medium-sized town with a higher rate of bicycle use than in other Dutch towns of similar size, was one of the first cities in the world to introduce a dedicated bicycle route network, at a cost of 13 million Netherland Guilders. As a result of this network, cyclists in Delft gained more choice of cycle routes and could choose more direct routes. The average yearly distance cycled increased from 420 km to 620 km, while the number of crashes per bicycle kilometre decreased. Evaluation of the performance of the network, however, showed that the absolute numbers of cyclist casualties did not significantly improve as a result of the network measure.

Despite its safety-enhancing cycle facilities, Dutch crash and injury data indicate that cycling in the Netherlands is not without risk. This is especially the case for young children, whose basic motor skills are still developing. Children in the 4–8 years age group are particularly likely to be involved in bicycle crashes, and as a result to suffer head injuries requiring admission to hospital.

Since the mid-1990s, the proportion of Dutch children wearing a bicycle helmet has grown considerably. There are several reasons for this:

- Parents have become increasingly aware of the protective benefits of bicycle helmets for children.
- Retailers increasingly offer bicycle helmets when selling children's bicycles.
- Campaigns in schools and in the media, launched by the Dutch Traffic Safety Association, have promoted bicycle helmet use among children.
- Helmets have become increasingly popular among skaters and mountain bikers, and this has had a spin-off effect on their use in road traffic.

Research shows that Dutch children up to seven years old easily accept the wearing of a bicycle helmet, but that beyond this age the perception of wearing a bicycle helmet as something “cool” or fashionable diminishes. As a result, children over the age of eight years are less likely than younger children to use bicycle helmets.

On the use of bicycle helmets among adults, the Dutch government, private safety organizations and cyclists' groups all tend to agree on the following propositions:

- Promoting the use of bicycle helmets runs counter to present government policies that are aimed at the primary prevention of crashes (as opposed to secondary prevention) and at stimulating the use of the bicycle as a general health measure.
- Attempts to promote bicycle helmets should not have the negative effect of incorrectly linking cycling and danger. Nor should the promotion of helmets result in a decrease in bicycle use.

Because of these considerations, a mandatory law for bicycle helmet use has not been thought an acceptable or appropriate safety measure in the Netherlands.

1.4 Helmet programmes are effective at getting helmets on heads

Laws making helmet use compulsory are important in increasing the wearing of helmets, especially in low-income and middle-income countries where helmet-wearing rates are low, and where there are large numbers of users of motorized two-wheelers.

There have been many studies that have evaluated the impact of motorcycle helmet laws on helmet-wearing rates, head injury or death (see Box 1.4). When mandatory helmet laws are enforced, helmet-wearing rates have been found to increase to 90% or higher (17–19); when such laws are repealed, wearing rates fall back to generally less than 60% (20–22).

The pattern is similar with regard to the effects of such laws on head injuries. A number of studies have shown that the introduction of helmet laws reduce head injuries and death, while many studies demonstrate that an *increase* in head injuries and death results when helmet laws are repealed (see Box 1.5). For example, a number of studies in Texas, USA, have shown that introducing comprehensive motorcycle helmet legislation is associated with a decrease in injuries and fatalities. In one of these studies there was a decrease in injury rates of between 9–11% (23), while another showed more striking reductions of 52–59% in head injuries and fatalities (24). Conversely, repeal of helmet legislation in Florida led to increases of between 17.2%–20.5% in both fatalities and fatality rates (25, 26).

It is clear that introduction of full legislation (that is, applying to the whole population) is associated with a significant decrease in head injuries and deaths. There is a clear imperative for policymakers to legislate and enforce motorcycle helmet wearing at a population level. Weak or partial legislation that mandates helmet wearing for those less than 21 years, without medical insurance or only on certain types of roads does not effectively protect those at risk and should be upgraded to comprehensive coverage.

However, it is important to note that most studies that examine the impact of motorcycle helmet laws have been conducted in high-income countries where legislation when introduced is heavily enforced, and motorcycle helmet quality is high. Although it seems very likely that the introduction of motorcycle helmet-wearing legislation in low-income or middle-income countries will decrease fatality rates among motorcyclists at a population level if helmet-wearing rates are high, there are several unknown factors. Availability of high-quality helmets is not widespread across such countries and the effectiveness of the available helmets is also unknown. Enforcement is also a factor that must be considered. In low-income and middle-income countries where police resources are constrained and community attitudes to helmet wearing are not supportive of legislation, effective enforcement requires widespread government support.

Legislation is most likely to work where high-quality helmets are accessible and affordable, where enforcement is comprehensive and there is widespread community education on the benefits of helmet use.

It is therefore important that when motorcycle helmet wearing legislation is introduced in low-income and middle-income countries, there is effective enforcement, a ready supply of affordable helmets of appropriate quality (which meet international or country standards), and widespread education campaigns for both community and police. It is also imperative that the evaluation of such legislation is planned prior to implementation, so that evaluation of the effectiveness of the intervention may be carried out.

BOX 1.4: Italy's motorcycle helmet law and traumatic brain injury

Until 2000, Italian laws on the use of helmets applied only to drivers of motorcycles, while moped drivers over the age of 18 were exempt from wearing a helmet. In 2000, Italy adopted a much more comprehensive law aimed at reducing the effects of motorcycle crashes, requiring the use of helmets for all motorcycle and moped drivers and their passengers, irrespective of age.

A study carried out to assess the impact of the new law looked at: the effect on rates of helmet wearing; changes in the number of hospital admissions of traumatic brain injury; and the type of brain injuries admitted to hospital as a result of motorcycle crashes. The assessment revealed:

- a considerable rise in helmet-wearing rates across the country, by up to 95% in some regions;
- the highest increase in wearing rates occurring in areas where the adoption of the law was combined

with a public media campaign and strong police enforcement;

- no decrease in the number of two-wheeled motorized vehicles in use throughout the country;
- a 66% decrease in admissions of traumatic brain injury for motorcycle and moped crashes;
- a 31% decrease in traumatic brain injury admissions to neurosurgical hospital units;
- a fall, to almost zero, in the number of blunt impact head injuries (epidural haematomas) among injured moped riders admitted to hospital.

The study demonstrates the effect of police enforcement of helmet use for all riders of two-wheeled motorized vehicles. It underlines the fact that mandatory helmet use is an effective measure to prevent traumatic brain injury.

Source: 19



International support for helmet wearing

International recommendations provide strong support for countries to implement programmes that legislate for mandatory helmet use. Some countries may use the international policy environment and international law as a means of providing the necessary impetus for developing national policies on helmet use. International agreements can also be used by civil societies to advocate for helmet law reform in their own countries.

The *World report on road traffic injury prevention* recommends that all countries, regardless of their level of income, follow several good practices, including “setting and enforcing laws requiring riders of bicycles and motorized two-wheelers to wear helmets” (1).

In 2004, the World Health Assembly adopted Resolution WHA 57.10, which recommends Member States “especially developing countries, to legislate and strictly enforce wearing of crash helmets by motorcyclists and pillion riders” (27). The World Health Assembly resolution is an international agreement that can be used by those wishing to influence policy on helmet use as a basis for obtaining political support for this measure. In particular, such a resolution has direct relevance for ministries of health, who, by adopting WHA resolutions undertake to support the principles enshrined in them.

United Nations General Assembly Resolution A60/5 (2005) “Invites Member States to implement the recommendations of the *World report on road traffic injury prevention* including those related to the five main risk factors, namely the non-use of safety belts and child restraints, the non-use of helmets, drinking and driving, inappropriate and excessive speed, as well as the lack of appropriate infrastructure” (28).

BOX 1.5: Helmet laws: the effect of repeal

In the United States, the enactment of motorcycle helmet laws is under the jurisdiction of individual states, and has been the subject of ongoing debate on the balance between personal freedom and public health. Those opposed to mandatory helmet laws argue that such laws infringe upon their individual rights. On the other hand, those who support them argue that since society bears the burden of the financial costs of motorcycle crashes, there is a public interest in – and a justification for – legislating for helmet use. Over the years, states have variously enacted, repealed, and re-enacted “universal” motorcycle helmet laws – laws applying to all riders of motorcycles.

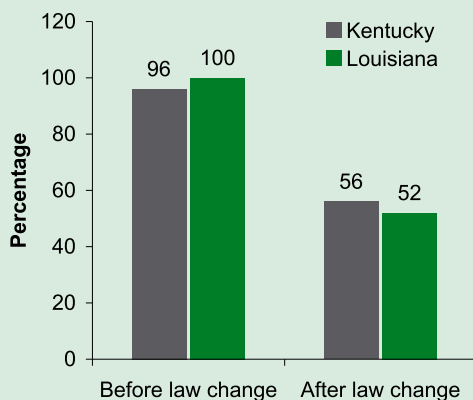
In 1996, a federal policy tying motorcycle helmet laws to the receipt of government funding led to 47 states enacting universal helmet laws. After this policy was withdrawn the following year, though, many states quickly repealed their helmet laws, or amended them so that they applied only to young riders.

The consequences of these repeals of helmet laws have been as follows:

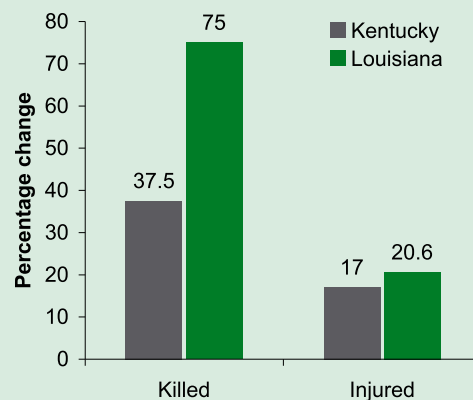
- Observed helmet use in a number of states dropped from nearly full compliance while the law existed, to around 50% after repeal.

- In several states, there were immediate and dramatic increases in the numbers of motorcyclists without helmets who were involved in crashes.
- Deaths of riders under the age of 21 increased even though the law still applies to these users. In Florida, deaths to these young riders increased by 188 percent.
- Increases were recorded in head injuries and fatalities among motorcycle users. For example, the rate of motorcyclist fatalities rose by 37% and 75% in Kentucky and Louisiana, respectively, following the repeal of their mandatory laws.
- Associated with the increase in severity of head injuries was an increase in the costs of treating them. For example, in Florida the total gross acute care costs charged to hospital-admitted motorcyclists with head, brain or skull injury more than doubled, from US\$ 21 million to US\$ 41 million, adjusted for inflation. The average costs per case rose from US\$ 34 518 to US\$ 39 877 in the 30 months after the law change.

The pattern of evidence from the states that have altered their laws on helmet use indicates that motorcycle helmets reduce the severity of injuries incurred in a crash; that the repeal of helmet laws decreases helmet use; and that states that repeal universal helmet laws experience an increase in motorcycle fatalities and injuries.



Observed helmet use before and after repeal of helmet law in Kentucky and Louisiana



Change in fatality and injury rates two years after helmet law repeal in Kentucky and Louisiana

Source: 26, 29

Summary

- The risk of being injured or killed in a traffic collision is much higher for motorcycle users than for users of four-wheeled vehicles.
- Motorcycle users make up a high proportion of overall traffic injuries and death, particularly in low-income and middle-income countries, where motorcycle ownership is high.
- Injuries to the head and neck are the main causes of death, severe injury and disability among users of motorcycles and bicycles. In some countries head injuries are estimated to account for up to 88% of such fatalities.
- Helmets aim to reduce the risk of serious head and brain injuries by reducing the impact of a force or collision to the head.
- The correct use of a helmet considerably decreases the risk and severity of head injuries.
- Programmes that set and enforce mandatory helmet legislation are effective increasing helmet-wearing rates and thus reducing head injuries and fatalities.
- There is strong international support for helmet-wearing programmes.

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2

**How to assess the situation
in your country**

How to assess the situation in your country

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MODULE 1 EXPLAINED WHY helmets are needed to reduce the fatalities and injuries that are associated with motorcycle and bicycle use. However, before designing and implementing a strong helmet safety programme in your country or region, it is important to assess the situation. Many of the steps that you will need to take for this process will also be necessary when you monitor the helmet programme, once you have it in place. The sections in this Module are structured as follows:

- **2.1 Why do you need to assess the situation?** An effective helmet programme will be based on an understanding of the extent of the problem in a country or region. This information can also be used in support of establishing a programme.
- **2.2 How widespread is the problem of non-use of helmets?** This section describes how to assess the extent of the problem of non-use of helmets among motorcycle users in the project region. It begins with guidance on assessing the extent of the problem of head injuries that result from motorcycle crashes. It then provides a detailed explanation of how to conduct a study to determine what the helmet-wearing rate is in the project area. Finally it provides advice on examining why people do not wear helmets.
- **2.3 How to assess what is in place already:** This section describes the questions that need to be asked in order to collect information on what national processes are underway in the country or region with regard to helmet use. To do this, you will need to find out who is responsible for road safety, and consider all those who may have an interest in a helmet programme. The module guides you on how to collect comprehensive information on the institutional and legislative structures that are in place that might have an impact on your programme, as well as the need to find out about any existing or previous helmet programmes in the project area, in order to learn from these experiences, and to identify the potential resources (financial, personnel, and institutional) for future helmet programmes.

2.1 Why do you need to assess the situation?

Those planning a helmet programme may already have an understanding of some of the information and issues around helmet use in their country or region, and thus may feel they do not need to conduct a situational assessment. Nonetheless, conducting a well-planned and thorough situational assessment is strongly advised prior to starting any new helmet use programme. This does not necessarily imply a prolonged and complicated process, but can mean simply taking the time to search for and compile all the existing relevant information. There are three main reasons for assessing the situation before starting a helmet programme.

- To *identify the problem of lack of helmet use among motorcyclists* and to depict *the scale of the problem*. The information gathered will illustrate how important head injuries are among motorcycle users in the project area; where the greatest need

for helmets is; the cost of motorcyclists not wearing helmets; and the reasons why motorcyclists do not wear helmets. This in turn helps set priorities for action. Similar evidence would be required if you were contemplating putting a bicycle helmet programme in place.

- To provide *evidence* for arguments on why helmet use is essential and why it should be supported. A helmet programme, in order to be successful, needs the backing of both policy-makers and the public. Accurate data – on factors such as helmet use and head injuries among motorcyclists in the project area – will help to show what can be gained by implementing a programme, and provide arguments to convince policy-makers and the general public of the need for a comprehensive helmet-use programme. Module 1 provided background data on the evidence for the effectiveness of helmets in reducing head injuries that can also be used in support of setting up a local programme.
- To provide *baseline indicators* that can be used for monitoring and evaluating a programme. This may include quantitative information such as helmet-wearing rates, as well as qualitative information, such as public opinion on helmet use, or information on compliance with legislation.

2.1.1 The quality of the data

Good data are important in assessing the situation. This means data that are appropriate, accurate, complete, and reliable. In collecting data, one can also identify problems in the data system itself. For example, in collecting data on helmet use in your region, it may become clear that the data on helmet wearing rates are incomplete. Knowledge of such shortcomings in the data can help set realistic objectives as part of your programme.

Nonetheless, in many countries, where reporting systems are not well established or coordinated, some of the necessary data will not be available. Lack of data should not be used as an excuse for inaction or ignoring a county's problem of motorcycle-related head injuries. Some country-level data are always available, no matter how rudimentary these may be, and these can be used as a starting point to develop a strategy for increasing helmet use.

Methods for collecting data will vary and the data obtained will probably also depend on the source. Hospital data on crashes and injuries incurred, for instance, may be biased because they only take into account cases that are actually brought to the hospital. Similarly, police data on crashes will only record those cases the police investigate. However, either of these two sources is a good starting point.

Data collection should ideally be led by a person who has experience in epidemiology. Module 3 discusses the establishment of a working group to develop a helmet programme. The public health expert in the working group is probably the most suited person to take charge of this task.

2.2 How widespread is the problem of non-use of helmets?

The next two sections guide users on how to gather the information needed for assessing the situation. Collecting such detailed data on some of these issues will be an essential part of any helmet use intervention, both as a component of the programme itself, and for the purpose of monitoring and evaluation.

2.2.1 How big is the motorcycle injury problem?

This assessment involves examining data on road traffic crashes – in order to gauge the extent of the problem with regards to motorcyclists, and collecting information on head injuries among motorcycle users.

Collecting data on road traffic crashes

Developing appropriate measures to address a road safety problem requires accurate data on the extent of the problem of road traffic crashes, and in particular, on motorcycle crashes and the head injuries that result. The data should be used to point to the dangers facing motorcyclists, and to emphasize the need for an action programme.

Information will be needed on the incidence, severity and types of crashes, while a thorough understanding of the causes of crashes is also important. The data will also give information on locations with an increased risk for motorcyclists, as well as on riders at increased risk. Such information will be valuable for targeting the programme. For instance, it may turn out that busy urban roads are a high-risk area, or rural roads; young males may be the group found to be at special risk, or self-employed delivery riders.

To collect these data, the following questions need to be asked:

- How many injuries and deaths are there as a result of road traffic crashes in the project region? Note that it is important for the working group to predefine the unit of assessment (see Module 3). For example, this may be the entire country, or it may be a particular province/state, or town or community.
- What is the scale of the problem of motorcycle crashes – in terms of the number of crashes and the number of fatalities? What proportion of the overall road traffic crashes does this make up?
- How does this problem compare, in terms of its scale and the burden on society, with other local public health problems?
- Who are those most likely to be involved in motorcycle crashes?

The indicators to be used here include:

- the number of registered motorcycles as a proportion of all motorized vehicles;
- the rate of motorcycle crashes (per 10 000 vehicles, or per 100 000 people);
- the distribution of motorcycle crashes across different road types;
- the age and gender of riders and passengers involved in these crashes.

Who will have this kind of information?

The traffic police are the most likely source for data on traffic crashes. Such data will probably also be handled by the country's traffic safety agency or transportation department, so that information from these bodies should also be considered "official data".

In practice, full information on these factors is rarely available, as data may not be complete. Issues of underreporting in police records exist even in those countries with a good road safety record.

Other sources of data of this kind might be nongovernmental organizations, universities, research organizations, or insurance companies.

NOTE

Although no two countries or regions will be identical in the circumstances and conditions with regard to motorcycle crashes and head injuries, where data from a country are lacking, it can be helpful to examine what data are available from similar or neighbouring countries. Such data can be used in support of a helmet programme in the country of interest, providing that a clear statement is made that this assumption has been made (that the two countries are similar with respect to certain factors).

BOX 2.1: Preventing motorcycle deaths in Cali, Colombia

Motorcyclist deaths have been a significant public health problem in Cali for many years. Vehicle-related injury is the fifth leading cause of death in the Colombian city, with vulnerable road users – pedestrians and motorcyclists – the most affected. In 1993–94, motorcyclists accounted for 30% (1393 cases) of all motor vehicle-related deaths in Cali. Of these, 85% were men, though the passengers injured in these motorcycle crashes were predominantly women. Alcohol consumption was a contributing factor among a large proportion of those injured. Over 40% of casualties occurred on weekends, when there are fewer patrols on the streets.

In 1993, a Fatal Injury Surveillance System was set up through the mayor's office. This has helped not only surveillance efforts, but also the identification of prevention strategies and the assessment of their impact.

Since then, various other steps have been taken. In 1996, a mandatory helmet law for drivers of motor-

cyclists was introduced, resulting in a decrease in motorcyclist deaths. The following year, the law was extended to include motorcycle passengers as well.

In 2001, three strategies were introduced to reduce motorcycle crashes: a regulation requiring the wearing of reflective vests, obligatory attendance at a driving school following a traffic violation, and a weekend ban on motorcyclists. As a result, the number of motorcyclist fatalities decreased considerably. The reflective vest requirement was withdrawn, for no apparent reason, the following year, but reinstated a year later, along with a new national road code.

An analysis of the trends in motorcycle fatalities since 1996 shows that motorcycle death rates have fallen from 9.7 to 5.2 per 100 000 population, a decrease of 46%. The data suggest that strict enforcement of laws on helmet use has been an important factor contributing to this decrease.

Collecting data on head injuries

Data on head injuries caused by motorcycle crashes can be used to describe the health and socioeconomic impacts of motorcycle-related head injuries to society, and therefore can be useful in making a persuasive argument in support of a helmet use programme. They can also be used as indicators when monitoring a helmet programme. However, it is important to note that there may be a number of other factors outside of the influence of the helmet programme that affect motorcycle-related head injuries. For example, a sudden increase in the number of two-wheelers on the roads may lead to an increase in the overall number of head injuries, such that their usefulness as an indicator of project success may be restricted.

To collect these data, the following questions need to be asked:

- What proportion of motorcycle crashes involve head injuries? Are there data available on the number of motorcycle head injuries, and deaths from such injuries, that can be used?
- What are the economic and social impacts of these crashes and injuries on the country's resources?
- What is the geographic distribution of motorcycle-related head injuries within the region?
- Are there particular population groups in the region that are at increased risk of head injuries resulting from motorcycle crashes – for instance, men, women, young people, or ethnic minorities, a particular occupation?
- What other information is collected on those suffering head injuries as a result of motorcycle crashes? For example, are those injured generally the riders or passengers of two-wheeled vehicles, and do they usually own the vehicle?
- Is there information on helmet use among motorcycle crash victims? If available, this will allow a comparison of outcome of crashes involving motorcyclists with and without helmets.

NOTE

Data collection may itself become a component of your helmet programme. If this is the case, the following are examples of questions that you may want to incorporate into your health facility injury surveillance system, to allow you to get more detailed information on injuries to motorcycle users.

Class: MODE OF TRANSPORT

Definition: How was the injured person travelling at the time of the injury event?

Code choices:

- 1 Pedestrian
- 2 Non-motorized vehicle (i.e. cart, bicycle)
- 3 Motorcycle
- 4 Car
- 5 Pickup, van, jeep, minibus (i.e. bus seating less than 10 persons)
- 6 Truck
- 7 Bus (seating 10 or more persons)
- 8 Train
- 89 Other, including boat and airplane
- 99 Unknown

Class: ROAD USER

Definition: What was the role of the injured person?

Code choices:

- 1 Pedestrian
- 2 Driver or operator of the transport, including bicyclists and motorcyclists
- 3 Passenger, including motorcycle passengers
- 8 Other
- 9 Unknown

Source: This information is extracted from the *Injury Surveillance Guidelines (1)*

Where will these data come from?

Gathering these data will require examining any crash and injury data systems that may exist, including:

- high-quality, national data collection systems on road traffic deaths, injuries and disabilities.

This might include:

- Data from death certificates (usually collected by the Ministry of Health)
- Transport-related death data (through traffic police)
- fatality reports (available from traffic police or justice authorities)
- reports on serious injury (usually available from local hospitals or health professionals). There may be records of injuries to patients and of cases receiving treatment. It is useful to make periodic studies of such data, either from a single hospital or a group of hospitals in an area. By extrapolating a sample of data, an order of magnitude estimate can be obtained of the scale of the problem nationally or provincially. These studies should extract information on:
 - the type of injury – for instance, whether a head injury or body injury;
 - the nature of the motorcycle crash;
 - the types of injuries that most frequently result in death;
 - information on those involved in crashes – such as gender, age and occupation.

Traffic police may also collect some of this information, but generally such data collection results from a collaboration between the police and the transport and health departments.

Although traffic crash data systems usually lack much detail on the injuries sustained, asking the questions may help to either find where this information is available, or at least show that particular data are lacking.

The following table indicates some of the more commonly used sources of data for injuries:

Table 2.1 Possible sources of data on injuries, according to severity of injury

	No injury	Mild	Moderate	Severe	Fatal
Household (community) surveys					
Health clinic records					
Family doctors' records					
Emergency room records					
Ward admission records					
Intensive care unit admission records					
Death certificates					

Other potential sources of data on fatal and severe injuries are listed below.

- For fatal injuries:
 - Autopsy/pathology reports
 - Police reports
- For severe non-fatal injuries:
 - Hospital in-patient records
 - Trauma registries
 - Ambulance or Emergency Medical Technician records

Additional sources of data on specific types of injury are:

- For motor vehicle injuries:
 - Automobile insurance company records
 - Police traffic “accident” reports
 - Department of transport reports
- For occupational (on-the-job) injuries:
 - Workplace records
 - Labour inspector or national safety records
 - National insurance schemes/workers’ compensation bureau
 - Rehabilitation centres

Source: This information is extracted from the *Injury Surveillance Guidelines (1)*

NOTE

A rapid way of getting data can be to request hospitals to provide data over a certain time period. In 2001, for example, the Ministry of Public Health in Thailand asked all hospitals in the country to submit data on the road traffic injury patients admitted to hospital every day during the nine-day festival for the Thai New Year (Box 2.2). This task could be carried out by the hospitals without their having to allocate too many resources, since it was just for a short time period. The data collected were used in campaigns to alert the public to the problem of helmets not being used and of the consequent injuries among users of two-wheeled vehicles.

BOX 2.2: Establishing a motorcycle helmet law in Thailand

Like many of its neighbours, Thailand has a large and growing population of motorcycle users, with 80% of its registered 20 million motorized vehicles being motorcycles.

In 1992, when helmet use was not mandatory, 90% of deaths resulting from traffic injuries in Thailand were among motorcycle drivers or passengers. Almost all the fatalities were due to head injuries, and very few of the victims had been wearing helmets. That year, data collected on the lack of helmet use and motorcycle fatalities at the Regional Hospital in the north-eastern province of Khon Kaen were used to support a new campaign on helmet use. Initially, the campaign – focused on a limited area around the hospital – involving about 1000 hospital staff who used motorcycles on a daily basis. By the following year, the success of the pilot project led to its expansion to all health departments, and by 1994 to all government departments in Khon Kaen province.

In 1995, discussions by the Khon Kaen campaigners with the Minister of Public Health led to the issue being placed on agenda of the cabinet. The following year, the government passed legislation making motorcycle helmet use mandatory.

The Khon Kaen Provincial Safety Committee, having achieved its prime objective of national legislation, then moved into a second phase. Conducting intensive public education on helmet use and the new law, it also set up an injury surveillance network, providing information to the public and to government on motorcycle crashes and head injuries. In the first year of the new law, the rate of helmet use

increased to over 90%. There was a 40% reduction in head injuries among motorcyclists and a 24% fall in motorcyclist deaths.

In 2001, the Ministry of Public Health collected detailed data from every hospital in the country on road traffic crashes during the Thai New Year holiday, a period of national festivities. In this way, it was able to show that the majority of injuries to motorcyclists over the holiday period occurred to those not using helmets. The serious implications of this were widely publicized in the media, a strategy that greatly raised public sensitivity to the issue.

In 2003, the government proclaimed road safety a major item on the national agenda. A national centre for road safety was set up, charged with formulating and implementing the country's master plan on road safety, a key objective of which is the promotion of motorcycle helmet use. Under a recent directive from the government, the governors of all provinces are required to take steps towards implementing the national road safety plan.

Thailand now has a clear national policy on helmet use. Its origins lay in the dedicated local data collection and documentation on head injuries among motorcycle users in a single province, which led to a vigorous and expanding national campaign on helmet use. This, in turn, persuaded other sectors of government to act, with the result that the annual death toll among motorcycle users in Thailand has fallen considerably.

Source : 2, 3

2.2.2 What is the helmet-wearing rate in the area being considered?

Assessing the proportion of motorcycle users wearing helmets correctly will be an important factor to consider in arguing for a helmet use programme. This means asking the following questions:

- What is the proportion of helmet use among the general population (or in the project area)? This rate (per 100 000 population) should also be used as a baseline indicator, against which to evaluate the programme's effectiveness.
- What sort of people are not wearing helmets? Can a breakdown be arrived at in terms of age, gender, whether the person is a rider or passenger, and purpose of the motorcycle trip?
- What is the cost of the non-use of helmets – in terms of injuries sustained by motorcycle users involved in crashes?
- What proportion of those wearing helmets are doing so correctly – in terms of properly fastening the helmets, and using the correct size helmet? The most common forms of incorrect helmet wearing are not properly buckling the helmet, not buckling the helmet at all, and wearing the helmet backwards. The data collected can be used to assess patterns of incorrect helmet use before and after a programme is implemented.

Where will these data come from?

Data on helmet use may be available from the following sources:

- police records;
- records of national or local health authorities;



A hospital-based study conducted in two teaching hospitals in south-west Nigeria revealed that none of the 254 motorcycle crash victims admitted to the hospitals were wearing a helmet at the time of their collision.

Source: 4

- national transportation agency records;
- research studies and surveys (Box 2.3);
- records of vehicle registrations – though this source will probably be of limited use here;
- sales records of helmet manufacturers.



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Assessing the extent of the problem of non-use of helmets is a first step towards designing a helmet programme.

NOTE

A study conducted in Londrina, a southern Brazilian city, examined helmet use among motorcycle users who received pre-hospital care following involvement in a crash. The researchers found that helmet use among those affected was 63%. However, there were a number of factors associated with not using a helmet: those younger than 18 were less likely to wear a helmet; alcohol use was associated with not wearing a helmet; and crashes taking place over the weekend were less likely to involve helmeted riders. The researchers concluded that interventions aimed at improving road safety must take into consideration the overall social context in which driving behaviours occur.

Source: 5



Asking questions on helmet use

The following are general questions about helmet wearing that can be asked in a community survey:

In the past 30 days how often did you wear a helmet when you drove a motorcycle or motor-scooter?

Coding instructions:

- 01 All the time
- 02 Sometimes
- 03 Never
- 04 Have not been on a motorcycle or motor-scooter in the past 30 days
- 05 Do not own a helmet
- 06 Refused
- 07 Don't know/unsure

In the past 30 days how often did you wear a helmet when you were a passenger on a motorcycle or motor-scooter?

Coding instructions:

- 01 All the time
- 02 Sometimes
- 03 Never
- 04 Have not been on a motorcycle or motor-scooter in the past 30 days
- 05 Do not own a helmet
- 06 Refused
- 07 Don't know/unsure

These questions are used to find out how often the respondent uses a helmet when driving or riding as a passenger on a motorcycle. Combined with information on respondent (for example, age group, gender) this information can help identify who does and who does not wear helmets, as well as the extent of non-use of helmets. This in turn is useful in planning a helmet programme and knowing where to most effectively target the programme.

Source: This information is extracted from the *Guidelines for conducting community surveys on injuries and violence (6)*.

BOX 2.3: Measuring helmet-wearing rates: an observational study

Even if detailed and comprehensive data are lacking, it should be possible to conduct a simple observational study to obtain a good estimate of helmet use. Simple counts of riders and passengers using helmets, at particular locations and at different times of the day, will provide a rough estimate of how many motorcyclists are using helmets and will later be of use in developing actions to be taken.

Because of cost, this type of study is often done on a small scale. If it is already known that a high proportion of crashes and injuries occur on particular roads or in particular areas, it is recommended that the study be carried out in those high-risk locations.

This observation method for calculating helmet-wearing rates in a population could be used for data collection in situational assessment, as well as in an experimental or quasi experimental evaluation design (see Module 4).

Planning period: Before conducting an observational survey, the target population should be clearly defined in terms of who they are, where they live and over what period of time data will be collected. Detailed road maps and data on traffic volume and estimated population prevalence of helmet use from other sources should be collected for the area of interest.

Develop a data collection protocol: This is a detailed written document describing the approach that will be used to collect data. It includes what will be done, how it will be done, who will do it, when it will be done.

Develop data-collection instruments: These include a form or set of forms used to collect information for data collection (e.g. questionnaires, interview schedules) (see Box 2.4). Training material should also be developed for staff carrying out roadside observations.

Sampling: The observed population should be representative of the population of interest in the target area. This means that a random sample of the population should be observed. Although non-random samples may be more feasible in certain situations, for example, observations made at petrol stations, or outside schools, consideration should be given to how generalizable or representative the results from such selective samples would be.

If the aim of the study is to document helmet wearing in a particular geographic area, then all road types should be included in the design of the study. Helmet wearing may differ across different road types, for example, riders may be more likely to wear helmets on highways than local roads. The sampling frame should therefore be designed such that it ensures adequate counts to enable estimate of helmet use across different road types, and also ensures a mix of roadway types, volumes and locations (urban, suburban and rural).

All possible roadway segments should theoretically be eligible for sampling. Depending on the size of the target area, the sampling frame may be divided into 2 or 3 stages. For example, to measure helmet use in a province, 3 stages may be employed:

1. Random selection of *primary sampling units* (e.g. the district or equivalent). The number of selected primary sampling units should be calculated in proportion to the estimated Vehicle Kilometres Traveled (VKT) for each sampling unit. For example, if the VKT is low in one district, then proportionally fewer sampling units would be selected from that district than for one with higher VKT. If VKT is not available by district, the primary sampling units may be selected using district population;
2. Random selection of *roads* within each primary sampling unit, ensuring all road types are represented; and
3. Random selection of *observational sites* on the selected roads.

Number of sites: The actual number of observational sites will depend largely on the funding and other logistical issues. If funding is limited it may be more practical to make a greater number of observations from a smaller number of sites. However, consulting a statistician to help determine the appropriate number of sites to give a statistically precise estimate is recommended.

Site selection: Ensure that observational sites are selected randomly from all available sites. This may be done by creating a numbered grid, overlaying it on a map then randomly selecting sites from the grid. Exact observation sites should be determined according to the planned protocol before conducting the observations.

Whenever possible, the observation sites should be near intersections where motorcycles slow down, preferably in the absence of a police officer. For example, sites may be selected at signalised intersections where cyclists are stationary and observations of helmet fastening are easier to conduct.

Narrow roads are better for observing passing traffic; on wider roads, observations may be taken on one side of the road only, for traffic passing in one direction.

The pre-determined protocol should allow for variations in methods for observations and/or site selection. If traffic volume is too heavy at a particular site to accurately record information, the protocol may state that one observer should observe motorcycles with drivers only, while the other observes motorcycles with passengers (and records whether the passenger is wearing a helmet or not). Along with direct observations recorded by observers, a video camera may be used to record traffic flow at sites with extensive traffic flows and where traffic travels at high speeds.

Each site that does not satisfy the selection criteria should have another alternative site on the same road, for example, if the original site or time selected is unsuitable due to inclement weather (e.g. heavy rain), if police are in attendance at a particular site, or if observations may not be made safely at a site (e.g. due to road works).

Helmet observations:

- Project leaders should take safety into account when planning observational work and seek to minimise any likely measurement error.
- Observers should be trained beforehand to remove any possible bias. Consider where/how/who conducts training. Produce a written guideline for observers and others involved in the evaluation and ensure that protocols are adhered to.
- Observations may be made by two or more trained observers. Observations may then be later compared to assess level of agreement between observers.
- Identify a safe, convenient location from which to make observations. For safety and security reasons, observers should work in pairs and they should wear reflective vests.



A helmet chin strap that is loosely fastened is recorded as “incorrect use” when observations of helmet use are being assessed.

- Observations should be made for a predetermined period of time. Time periods should be the same at each site to be able to make comparisons between sites.
- Observations of helmet use may include such categories as helmet use, non-use, incorrect use, and helmet present but not worn. The “incorrect use” category would be recorded where the chin strap is not fastened or loosely fastened. Clearly, depending on the volume and speed of traffic at observation sites it may not be practical to observe and record more information than whether a helmet is worn or not worn (e.g. estimation of age of riders may be too difficult unless this information is gathered through reviewing video footage).

Repeating measurements after the intervention:

Repeat observations should be made by the original observers using the same protocol on the same days/times and at the same sites as measurements made before the programme.

BOX 2.4: Example of a helmet survey questionnaire

OBSERVATIONAL STUDY

Date: Day: _____ Month: _____ Year: _____

Time: _____:_____ A.M _____:_____ P.M.

Place: _____

Observer: _____

Number of people on motorbike: 1 2 3 4 more (specify) _____

DRIVER	
Sex	Male Female
Wearing protective clothing?	Yes No
Wearing a helmet?	Yes No
Type of helmet *	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> other (specify) _____
Helmet buckled correctly?	Yes No
Motorcycle lights on?	Yes No
Engine capacity of the motorcycle	<100cc 100–200cc >200cc
License plate number	

PASSENGER 1	
Sex	Male Female
Wearing protective clothing?	Yes No
Wearing a helmet?	Yes No
Type of helmet *	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> other (specify) _____
Helmet buckled correctly?	Yes No

PASSENGER 2	
Sex	Male Female
Wearing protective clothing?	Yes No
Wearing a helmet?	Yes No
Type of helmet *	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> other (specify) _____
Helmet buckled correctly?	Yes No

PASSENGER 3	
Sex	Male Female
Wearing protective clothing?	Yes No
Wearing a helmet?	Yes No
Type of helmet *	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> other (specify) _____
Helmet buckled correctly?	Yes No

* 1. Full face (with chin guard) 2. Open-face (covers ears and neck) 3. Half-face (above ears)
4. Other (e.g. bicycle helmet, construction hat, horse-riding hat, etc.)

Source: Adapted from the Prevalence of safety countermeasures among motorcyclists in the city of Cali study.

2.2.3 Why don't people wear helmets?

A helmet law is unlikely to be successful if people do not obey it, or understand the reason for it, or are unaware of it. Similarly, if helmets are not readily available, or if they are too expensive for most people to afford, helmet-wearing rates are likely to remain low.

Public attitudes to helmet use

It is useful to know how people regard road safety generally, and their attitudes to helmet wearing in particular. This information can help shape a helmet use programme and decide how much should be invested in raising public awareness about the benefits of helmets. The goals of a programme will determine which groups should be surveyed and the questions to be asked. They may include asking the following questions:

- What are people's attitudes to road safety generally?
- Do people understand the benefits of wearing a helmet? Public attitudes on helmet use and helmets laws can therefore also serve as a baseline indicator.
- What is the level of public awareness of the benefits of helmets?
- Why don't people wear helmets? For example, if it is found that motorcycle riders have a negative attitude towards wearing a helmet, or if they are unaware of the laws or of the effectiveness of helmets against injury, then the programme needs to address these issues.
- Who are those most resistant to using helmets? Apart from gauging the public's knowledge and attitudes, this type of information can also help identify which groups are most resistant to using helmets – so that the programme can target them to change their attitudes and behaviour. Information on variables such as age, gender, occupation, ethnicity, etc., would therefore need to be collected.

Where will these data come from?

Data of this type may have been collected as part of a previous helmet programme (see section 2.3.5). There may also be studies conducted:

- by market research firms
- by universities, nongovernment organizations, other agencies working in road safety.

If such data are not available, it might be useful to conduct a public opinion survey to collect this information. If the programme is still being developed, there are likely to be time and budget constraints. Therefore, only a preliminary survey is suggested at this stage, and a more detailed one can be undertaken later. In a preliminary survey, it is most useful to focus just on the geographic area and population group estimated to have the highest risk.

NOTE**Some reasons why people do not wear helmets**

© D. Mohan

Difficulties fitting a helmet over certain headgear means that in some places, Sikhs are exempt from the mandatory helmet laws.

The following are examples of reasons for non-use of helmets that have been collected from studies conducted in different countries:

- Young children worry that if they wear a helmet they will be mocked by their peers.
- Motorcyclists feel that they are less likely to have a crash when travelling short distances and they therefore do not need to wear a helmet for such trips.
- Helmets are considered hot and uncomfortable.
- Helmets cannot be worn over some traditional or religious headgear (for example, turbans worn by Sikhs).
- Helmets mess up one's hair or, in some parts of Africa, may not fit over women's often elaborate hairstyles.
- Workers who ride their motorcycles to work worry that if there is no place to store their helmets when they park, they may be stolen if left with the motorcycle.
- Passengers of motorcycle taxis may be reluctant to wear the helmets provided to them by the drivers, due to concern over their cleanliness or infections that might be transmitted through helmet use (for example, head lice).
- In some countries there is a strong social influence of peers and parents on helmet use among adolescents. For example, use of helmets may be influenced by adolescents' beliefs about whether or not their fathers wear a helmet while riding a motorcycle.



© G. Macfarlayen

Scorching heat is one reason that motorcyclists often give for not wearing helmets.

Data on availability and cost

The cost and availability of helmets in the area must be assessed to understand if these factors influence people's decision to wear a helmet. The following questions can be used to gather information on these issues:

- How many helmets are made and sold in the region over a specific time period?
- Who sells helmets, and where are these distributors located? Is supply sufficient to meet current demand?
- What are the main brands of helmets sold?
- What is the average retail cost of a helmet of the main brands sold?

Typical indicators on helmets that researchers examine include:

- the number and geographic distribution of helmet manufacturers;
- the number and type of retail brands of helmet;
- the average retail cost of a helmet;
- annual total sales of helmets.

Where will these data come from?

- from helmet manufacturers;
- helmet distributors or suppliers;
- from government department responsible for road safety;
- from those involved in previous helmet programmes.

If these data are not available, and if the budget allows, the most effective method is to contract a market research firm to gather these data. Alternatively, a helmet maker – preferably one serving in the working group – might be able to provide much of this information.

BOX 2.5: Some common myths about helmets

Myth: Helmets cause neck or spinal cord injuries.

Fact: Research has proved that helmets conforming to standards and correctly worn do not cause neck or spinal cord injuries.

Myth: Helmets impair hearing and sight.

Fact: Helmets do not affect peripheral vision or contribute to crashes. Helmets may reduce the loudness of noises, but do not affect the ability of a rider to distinguish between sounds. Some studies have indicated that properly fitted helmets can actually improve the ability to hear by reducing the noise of the wind.

Myth: Motorcycle helmet laws violate individual rights.

Fact: All road safety laws require some action from individuals – such as wearing seat-belts, not driving while impaired, strapping a child into a car seat, or stopping at a stop sign. These traffic rules are accepted, because all motorists recognize that failing to obey them could create a serious danger to themselves and others. Motorcycle helmet laws are exactly the same.

Myth: Fatality rates are lower in places without helmet laws.

Fact: Studies in two states in the United States that recently repealed their motorcycle helmet laws showed that deaths from head injuries actually increased following the repeal of the law (see Module 1).

Myth: There is no need to make helmet use mandatory for all: age-specific motorcycle helmet laws are effective/sufficient.

Fact: Age-specific helmet laws are more difficult to enforce, because it is difficult for the enforcement community to single out how old a child is when he or she is riding past on a motorcycle. Consequently, age-specific laws are less effective than those which are related to society as a whole.

Myth: Motorcycles are a small percentage of registered vehicles, thus motorcycle crashes represent a minor burden to society.

Fact: Whether motorcycles make up a small proportion of vehicles (as in some high-income countries) or the bulk of vehicle fleets (as in many Asian countries), the fact that motorcyclists are about 27 times as likely as passenger car occupants to die in a traffic crash and about 6 times as likely to be injured, means that they are a significant problem in all societies where their use is common (7).

The data collected will be used for baseline indicators, against which the effectiveness of the programme can be monitored. For example, data on sales can be used to demonstrate the success of a programme. The availability of helmets will also be a factor in deciding how quickly to phase in enforcement of helmet-use laws, if this is one of the objectives of the programme (see Module 3)



Research has shown that, on average, factory workers in low-income countries have to work 11 times as long to earn enough money to buy a motorcycle helmet as their counterparts in high-income countries (8). One way to overcome this is to reduce the cost of helmets to the consumer. This approach has been successfully introduced in Viet Nam by the nongovernmental organization, Asia Injury Prevention Foundation. The Foundation's helmet programme distributes tropical motorcycle helmets free to school-age children, so that they can ride safely as passengers on their parents' motorbikes. To date, over 165 000 helmets have been distributed through the programme to children across the country (9).



© Asia Injury Prevention Foundation, 2004

The price of helmets may be a deterrent for families with children. Providing free children's helmets is one way of ensuring that all members of the family ride with a helmet on.

2.3 How to assess what is already in place

It is important to assess what laws and regulations on helmet use exist in the project area, how they are implemented, and whether or not any laws and regulations are enforced. For example, if despite a law mandating helmet use among motorcycle users and a defined national helmet standard – the helmet-wearing rate is low and many helmets that are used are substandard, it would be a fair indication that the laws and regulations are not working, or that the enforcement of these laws and standards is inadequate.

Assessing what is in place in your country with regard to existing or previous helmet programmes will help identify the key organizations or people – within government, in the private sector and in civil society – that should be involved in a helmet programme. They will also point to the main sources of potential political and financial

support. As mentioned, this assessment can be conducted at different geographical levels (e.g. country, province/state, town or community) and this should be agreed upon before starting.

The following areas need to be examined:

2.3.1 Who is in charge of road safety, and what funds are there for it?

Describing the general situation in the country is a first step to assessing the situation and whether there is a place for a helmet programme. How such a programme is then implemented will depend on the country's political system. It is also important to consider whether existing laws encourage helmet use, and whether there are funds set aside for road safety programmes that could include helmet use initiatives. The following further list of questions will help formulate an overall picture of the situation.

- Is there a centralized or a regional or federal system of government? Is there provision in the constitution or in national laws for decentralization? If so, to what extent do local authorities engage in decision-making and the making available of funds?
- Which are the main government departments – such as those of transport, health, justice and the police – involved in road safety decision-making and what role does each department play?
- What is the current budget for road safety in your country? Are there priorities in the budget for future improvements in the field of road safety? Are there funds that might be accessed for a helmet programme?

Nongovernmental and private organizations that could contribute to a helmet programme include:

- international organizations and funding agencies – such as the World Health Organization, the World Bank, the Global Road Safety Partnership, the FIA Foundation, and other bodies with road safety expertise, as well as those with funding capabilities;
- private consulting firms;
- domestic nongovernmental organizations – including road safety groups and motorcycle rider groups;
- manufacturers and/or distributors of motorcycles;
- major employers, particularly where staff use motorcycles in their work, and on journeys to/from home.

2.3.2 Who are the stakeholders?

A stakeholder analysis sheds light on the social environment in which the policy will be developed and implemented. Its primary function is to identify all possible partners who might have an interest in addressing helmet use, including those who might initially oppose efforts to increase helmet use or to mandate helmet wearing in the region. Potential stakeholders include government departments, nongovernmental

organizations and institutions that will be affected (positively or negatively) by the new law or standards, local communities, formal or informal groups, as well as individuals (e.g. representatives of work forces, victims of motorcycle head injuries). Stakeholders might also include manufacturers of helmets who might be affected by a new law, regulators, industry bodies and associations, importers and exporters.

The second important function of the analysis is to examine the remit of all of the stakeholders, and to understand the relationships between them. A careful analysis should be made of the influence, importance, and interests of all major stakeholders, as this will facilitate the design of appropriate approaches for involving them. It is especially important to identify supporters and opponents and, moreover, to appreciate the reasons for their respective positions so as to be able to develop a marketable package that satisfies all parties concerned.

With these comments in mind, the key objectives of a stakeholder analysis are thus:

1. To identify key stakeholders, define their characteristics and examine how they will be affected by the policy (e.g. their specific interests, likely expectations in terms of benefits, changes and adverse outcomes).
2. To assess their potential influence on the development, approval and implementation of a helmet programme.
3. To understand the relationship between stakeholders and possible conflicts of interest that may arise.
4. To assess the capacity of different stakeholders to participate in developing a helmet programme and the likelihood of their contributing to the process.
5. To decide how they should be involved in the process to ensure the best possible quality and viability of the programme, in particular:
 - the nature of their participation (e.g. as advisers or consultants, or as collaborating partners);
 - the form of their participation (i.e. as a member of the working group, or as an advisor, or sponsor);
 - the mode of their participation (e.g. as an individual participant or as a representative of a group).

A more in-depth discussion on conducting a stakeholder analysis can be found in *Developing policies to prevent injuries and violence: guidelines for policy-makers and planners* (10).

NOTE**What opposition might you expect in putting in place a helmet programme?**

Anticipating opposition or constraints to establishing a helmet programme is useful to pre-empt these problems arising. Opposition might arise due to:

- competing priorities among policymakers
- lack of financial resources
- strong lobbying by groups opposed to increasing helmet use (for example, motorcycle groups).

2.3.3 Is there a helmet use law in place?

As already stated earlier in this section, it is important to know what road safety laws exist and whether they are adequately enforced. Experience has shown that road safety legislation without proper enforcement is unlikely to have the desired effect. In part, this is because road users do not always recognize the risks involved and the benefits to them of the protective measures contained in the legislation. For this reason, they do not always support laws designed to improve their own safety on the roads.

A helmet programme may require the creation of a new law or the modification of an existing one. On the other hand, the existing law may be satisfactory, but may not be properly enforced. Most countries today have some type of law on helmet use. It is therefore useful to begin by reviewing the current state of the laws, as shown in the following checklist:

- What current laws relate to road safety generally?
- Is there a specific law on helmet use? If so, does it apply nationally or locally? Is it up to date?
- To whom does the law apply – for example, to all motorcycle drivers and passengers, and all age groups? Are there specified exemptions?
- Does the law apply to all types of road?
- Does the law specify the type or standard of helmet that should be worn?
- What are the penalties for not complying with the law?
- Is the law enforced? Is it enforced everywhere, and among all groups of motorcyclists?
- How is a new law officially adopted by the government? What are the mechanisms of endorsement?

2.3.4 Is there a helmet standard in place?

It is also very important to know whether the helmets that are available meet approved standards. Such standards might be set by a national body or an international one (see Module 3). Helmets should be sold with evidence that they meet such standards and there should be an active process of checking helmets for compliance

with set standards. The following questions need to be asked:

- Is there a national or international helmet standard specified that helmets should meet?
- Do currently available helmets meet proper standards?
- Do helmet manufacturers abide by this standard?
- Do motorcycle users wear helmets that meet such a standard?
- Are these helmets suitable for local conditions of heat and humidity?
- What is the cost of a helmet that meets recommended standards?

2.3.5 Have any helmet programmes been attempted so far?

In most places where motorcycle use is high, some measures have already been taken to increase the level of helmet use among motorcyclists. Many countries have mandatory helmet laws and public awareness campaigns that promote helmet use. One should examine whether these programmes, laws and campaigns have been effective, and whether they could be improved.

Before launching a new programme, it is important to be aware of and examine the effectiveness of other current programmes, as well as of earlier interventions. Such a review can reduce costs and can suggest better ways to carry out future interventions.

The following checklist may be useful in finding out about what has already been implemented:

- Are there any other helmet programmes currently in place in your country, or a neighbouring country?
- Who are the stakeholders of these programmes?
- Are there helmet use programmes that have been conducted in the recent past?
- What were the outcomes of these programmes? Are the results available?
- What were the obstacles/constraints to these programmes? What lessons can be learnt?



In Punjab province, Pakistan, a new law on helmets was rigorously enforced very soon after the law was introduced. As a result of the penalties for non-use being increased and many enforcement points introduced, there was a sudden demand for helmets. Stocks of locally manufactured helmets quickly sold out, forcing motorcyclists to purchase the more expensive imported types. As a result, industrial helmets fetched up to twice their regular price, and there was popular criticism of the government for failing to control helmet prices. The case highlights the need to raise public awareness before beginning to enforce legislation, as well as the importance of consulting with suppliers about pending changes, to ensure that supply of helmets can meet demand.

Source: 11

BOX 2.6: Helmet legislation in Karnataka, India

In the state of Karnataka in southern India there are about 42 million registered vehicles, of which 71% are motorized two-wheelers. The state capital, Bangalore, has 2 million registered vehicles, 75% of which are two-wheelers. In 2004, over 6000 deaths and 50 000 injuries resulted from road crashes in Karnataka, of which around 40% were among riders and passengers of motorized two-wheelers. More than a third of the injuries recorded were brain injuries.

National mandatory helmet legislation is included in the Indian Motor Vehicles Act of 1988. However, implementing this law has been left to the individual states. Despite the proven effectiveness of helmets in protecting against head injuries, many states have yet to implement the legislation. Indeed, in 1995, lobbying by opposition groups in Karnataka led to the repeal of an existing helmet law. In the ten years since, a considerable amount of effort has gone into bringing back the helmet law, including the following activities:

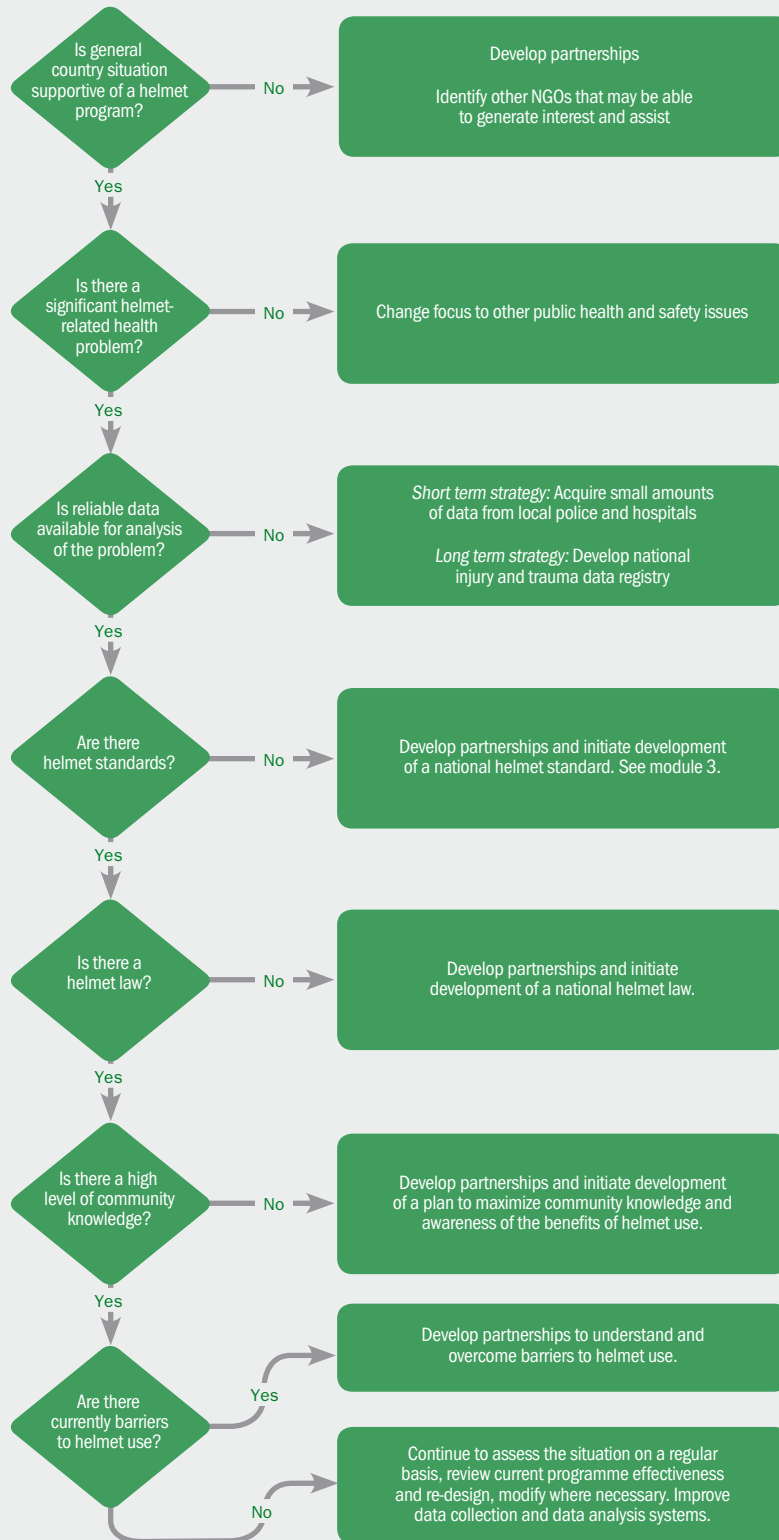
- Raising awareness of the problem. Data from police and hospital sources showed that between 1994 and 2004 the number of deaths and injuries among two-wheeler users rose steadily each year. Making such data publicly available was important in pressing for changes in the law.
- Raising awareness of the evidence. Evidence from around the world on the effectiveness of helmets was published in a report widely circulated among government departments. The report showed that a mandatory helmet law, properly implemented, would lead to fewer deaths and injuries among users of motorized two-wheelers.
- Campaigning by doctors. Many local medical specialists publicly endorsed the helmet legislation.
- Spreading information. The media were instrumental in disseminating information, highlighting the road safety situation in the state and the impact of road traffic injuries on human lives.
- Issuing legal directives. The High Court of Karnataka informed the state government of the need to increase road safety measures, quoting scientific research data in support of a mandatory helmet law. In 2002, the High Court directed the state government to reintroduce the helmet legislation.
- Using the law courts. Environmental and road safety activists used court cases to publicly question the absence of road safety measures, including the lack of a helmet law.
- Countering myths. Public discussion in the media tried to dispel misconceptions about helmets. It was commonly believed, for instance, that helmets were not necessary at low speeds or for travelling short distances, that riders wearing helmets were more careless, and that helmets caused neck injury.
- Moving towards legislation. With fatality rates among users of two-wheelers continuing to increase, policy-makers started to consider a strategy of helmet legislation and its enforcement, rather than rely solely on public education.

The combined effect of these efforts was a concerted move to tackle the lack of helmet use, and an increasing awareness among the public of road safety, and helmet use in particular. As a result, in 2004 the government proposed reintroducing the helmet law, setting a 45-day period for public consultation.

Guidelines are being produced to ensure the smooth implementation of the law, as well as mechanisms to evaluate its impact. Early results appear positive. Within a few days of the reintroduction of the law and its announcement in the media, rates of helmet use rose from a low of under 5% to 30%. It will be important for the government to ensure that enforcement of the law is both visible and non-aggressive.

Source: 12

Figure 2.1 Using the situational assessment to choose actions



2.3.6 Using the situational assessment to prioritise actions

Once the situation has been assessed, the process of prioritizing actions can begin. The flowchart in Figure 2.1 assumes that injury prevention and road safety are already recognised as major health and development issues that require political backing. In many countries, this will not be the case. In these places, a network of key groups with a common interest in road safety and the use of helmets first needs to be created. Research has shown that when many groups are involved in improving road safety, and successfully share the responsibilities, the effects are much greater (13, 14).

Summary

- Before designing and implementing a helmet use programme, a situational assessment must be conducted. Asking a number of the questions listed in this module can help identify the particular problems around helmet use in the country, make a strong argument in support of a helmet use programme, and provide indicators which can later be used to judge a programme's success.
- The extent of the problem of non-use of helmets needs to be assessed. This involves collecting data on road crashes and head injuries, as well as on helmet-wearing rates and why people don't wear helmets. This information can be used as baseline information and to identify the main needs of the programme. Some of this information may also be used in an evaluation of the project.
- An analysis of what is already in place with regard to helmet use needs to be conducted. This involves examining who is in charge of road safety in the country or area, the financial resources available for helmet use programmes, the legal instruments already in place, whether a helmet standard is specified, and what other programmes are in place already, or have been conducted in the region or country.

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3

**How to design
and implement
a helmet programme**

How to design and implement a helmet programme

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THE PREVIOUS MODULE described how to assess the helmet situation in a country. This module describes how to use this information to design and implement a programme to increase helmet use. It includes technical information, but also the practical information needed to manage such a project to ensure that implementation is smooth.

There are eight sections in this module. It is important, however, to note that the module is not intended to be prescriptive in terms of the order in which these sections are followed. That is, although in general it is advisable to have a working group set up and a plan of action developed as first steps, the sequence in which subsequent steps are taken (i.e. sections 3.3 – 3.8) by those involved in a helmet programme will depend on the circumstances, the resources available, and the broader context.

The sections cover:

- **3.1 How to establish a working group:** This is an essential step to ensure overall coordination of the programme with input from all the main groups and individuals involved.
- **3.2 How to prepare a plan of action:** Based on the assessment that was conducted in Module 2, this section explains how to set objectives, define targets, and decide on the activities to meet these targets, as well as estimating a budget for this plan, and defining a mechanism for monitoring and evaluation. The section also addresses the need to ensure the programme will be sustainable.
- **3.3 How to develop and implement a helmet law:** This section describes how to introduce or modify existing laws. This process will help with related activities, such as strengthening public consensus on the need for a helmet law and devising practical ways of enforcing such a law.
- **3.4 How to design and implement a helmet standard:** A helmet programme also needs to ensure that the helmets used will be of a sufficiently high quality. This section addresses the various considerations in developing or improving motorcycle helmet standards.
- **3.5 How to improve compliance with the law:** Enforcing legislation is essential in ensuring that laws are effective, and standards are adhered to. This section describes both mandatory and voluntary measures that can be introduced to improve compliance, outlining the various groups and individuals who may need to be involved in these measures, and the possible obstacles that may arise.
- **3.6 How to involve the public:** This section describes how to conduct a good communications campaign, which is essential to the success of a helmet use programme. It covers how to develop campaign objectives and a clearly defined target audience, how to work with the media to disseminate messages on helmet use, and how to evaluate the campaign.
- **3.7 Educating young people:** Education is an important element within a package of interventions to increase helmet use. Educational approaches that concentrate only on teaching facts are unlikely to be successful. Along with formal education in schools, peer education can also be effective.

- **3.8 Ensuring an appropriate medical response:** In planning a helmet programme it is also important to consider the ability to respond to crashes that involve motorcyclists. This means taking into consideration the capacity to provide an appropriate first aid response, and addressing the pre-hospital care and trauma care systems that are in place. Planners should also consider the rehabilitative services that exist to provide for motorcycle crash victims.

3.1 Establishing a working group

A working group should be set up to oversee and steer the action programme, to include legislation, standards, enforcement and promotion. This working group should be guided by a lead government agency in charge of overseeing road safety that will have the ultimate responsibility for the design of the programme, and the authority to act on recommendations. This group therefore must also ensure that the lead agency has the resources to carry out the programme, although this task could be built into the objectives of the programme itself.

3.1.1 Who to involve?

The overall assessment of the country situation (Module 2) included steps on how to conduct a stakeholder analysis. This should indicate who are the best people to approach – from within government bodies and other organizations – to participate in the helmet safety programme. In particular, it should identify the main political figures to be involved and the best way to mobilize financial support and community backing, as well as those with the relevant technical expertise.

The working group should draw on the expertise and experiences of a range of individuals, including:

- members of the lead agency;
- representatives from relevant government agencies, such as those of transportation, health, police, education, and law enforcement;
- public health and injury prevention specialists;
- health care professionals (Box 3.1);
- independent researchers;
- nongovernmental organizations, including those representing victims of road crashes;
- members of motorcycle and cycling associations;
- helmet and motorcycle manufacturers;
- engineers and other specialists;
- large employers and managers of large motorcycle fleets.

Figure 3.1 illustrates a list of potential partners in developing a helmet action plan. Each of these partners has an interest in the outcome of the helmet programme and each can help develop, implement and evaluate an action plan. Many of these partners will already be involved in road safety work and are therefore likely to be aware of at least some of the issues around helmets and helmet wearing.

Ideally, the working group should also include those who might be critical of a helmet programme. Their position needs to be understood as well, so that a programme is devised that addresses possible objections and is acceptable to the widest possible segment of society.

To work well, a multisectoral working group should have well-defined working procedures and a clear work plan – extending to the eventual implementation. It is important to have good communication within the group. To this end, there should be someone within the working group responsible for disseminating information among the various members.

Figure 3.1 Participants in a helmet programme



BOX 3.1: Surgeons and their role in motorcycle helmet laws

Surgeons who care for the injured have a responsibility to:

- be knowledgeable about the burden of mortality and morbidity associated with crashes involving unhelmeted motorcycle riders;
- help to dispel, on medical grounds, the arguments against universal helmet laws;
- campaign for the adoption of comprehensive and enforceable helmet laws;
- educate policy-makers about the effectiveness of providing financial incentives in places where helmet laws are adopted – something of added importance in low-income countries with transportation needs;
- gather data on and publicize the reduction in morbidity, mortality and medical costs following the adoption of helmet laws in a particular area.

The American College of Surgeons supports efforts to enact and sustain universal helmet laws for motorcycle riders. Its statement on this issue can be found at: www.facs.org/fellows_info/statements/st-35.html

Source: 1

3.1.2 Assigning roles to working group members

Certain functions will be common to all well-organized helmet programmes. These include the initiation of the programme – its conceptualization and launch, the operation itself, its coordination and the function of advocacy. Those who are specifically assigned to these functions are described here because of their special roles. Sometimes, one person or agency may fulfil more than one function.

The initiator

The person or agency initiating the activity does not need to be engaged in the way that others who are involved are. However, they must fit into the operation to ensure that the programme moves forward in a coordinated manner. Their enthusiasm should be harnessed to the benefit of the programme.

Operators

These are the people with the technical responsibility for carrying out various aspects of the programme. Frequently, they will be officials of the lead and subsidiary agencies involved – such as the department of transport, the ministry or department of legal affairs, and the police. They must be allowed to participate fully. For this reason, their regular work duties may have to be expanded to take in additional tasks created by the helmet use programme. Training and other resources may also be required here.

Operators need to be open to input from others involved in the programme. They should not be discouraging or dismissive of non-technical people, as can be the case with technical experts.

The coordinator

This person has overall responsibility for the execution of the programme and their role is critical to its success. The coordinator, whether paid or not, should have clearly defined responsibilities. These include overseeing the activities of the working groups, monitoring progress, and ensuring that all those involved, including the initiator and operators, are kept well informed. The coordinator should have full authority to carry out these functions, as well as the resources and the support needed to implement these tasks. For this reason, the role is best filled by someone whose work already includes some of these responsibilities. Such a person may be the chief technical officer within the transport department, the person in charge of the traffic police, or a high-ranking official in the health ministry.

The advocate(s)

The advocate champions the cause of helmet use. This is usually one or several influential people with good communications skills, who is well known and respected. The advocate and coordinator can have several qualities and tasks in common, and in some instances, they are the same person. Prominent people who have themselves been affected – generally adversely – by a lack of helmet use, usually make good advocates.

3.2 How to prepare a plan of action

Before a comprehensive helmet use programme can be implemented, a plan must be set up that lays out a clear strategy for how the objectives of the programme will be met. This plan must be backed up by data, as described in Module 2. The plan will identify the problem, state the objectives, select the dominant method for reaching objectives, describe in details the activities, and specify the timing. Based on the plan, a formal project proposal will be written. This proposal will detail the whole project cycle, what activities will be carried out at each stage, as well as including a detailed request that estimates the funding needed. The working group needs to manage this process.



A plan of action can be developed at a regional or national level. The photo shows the Asian Development Bank's regional road safety strategy.

Figure 3.2 shows the steps involved in developing an action plan (step 3) and how these fit in with other processes described in this manual. These steps may be undertaken consecutively or in parallel, depending on the circumstances. In practice, several activities may run well at the same time, for instance, the act of carrying out a situation assessment (described in Module 2) very often simultaneously does the job of raising awareness and arousing political interest, which may be one of the objectives described in the action plan. A more in-depth discussion on developing an action plan for a national policy is found in *Developing policies to prevent injuries and violence: guidelines for policy-makers and planners (2)*.

3.2.1 Setting the programme's objectives

Any helmet programme should contain specific, measurable, achievable and realistic objectives. The objectives are developed by examining the data collected in the situational assessment. This information must be analysed by the working group, to identify the problems to be addressed in the programme.

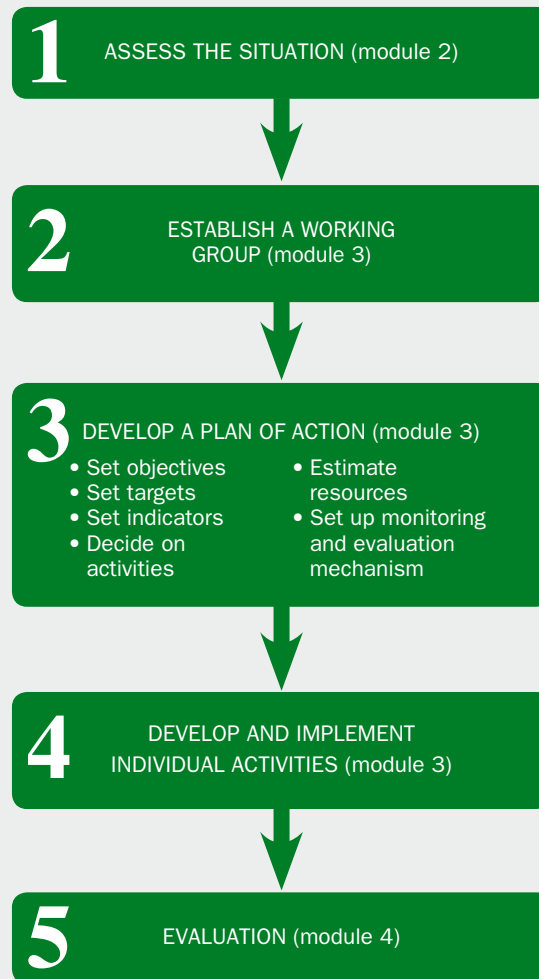
In considering appropriate solutions to the problems, the working group should follow a "systems approach". That is, one which considers understanding the system as a whole and identifying where there is potential for intervention (3). Solutions are thus likely to include factors that address the user, such as education, as well as enforcement of laws and regulations, design and standards for helmet, that are combined over a period of time.

The objectives will, in general terms, be one or more of the following:

- to increase awareness of road traffic safety, and helmet use in particular;
- to increase the rate of motorcycle helmet use;

- to improve the quality of helmets worn;
- to decrease the rate of head injuries, and deaths resulting from motorcycle crashes.

Figure 3.2 Steps in the programme: from assessment to evaluation



Adapted from reference 2.

NOTE**Using situational assessment to develop programme objectives**

In the northern region of Thailand, a situation analysis conducted in the late 1990s revealed an increase in head injuries and deaths resulting from motorcycle crashes. Motorcycles were found to contribute to around 40% of all traffic. Less than 10% of motorcyclists were observed to wear helmets. Those who didn't wear helmets were found particularly to be first-time owners of motorcycles, or members of ethnic minority groups. Analysis showed that they lacked awareness of the risks of riding without a helmet. In addition, there were few helmets available in the region, as potential retailers of helmets didn't see a market for them.

The solutions following from this analysis were:

- as regards *legislation*: to make helmet wearing compulsory;
- as regards *enforcement*: to enforce helmet laws in the north of Thailand;
- as regards *education*:
 - to inform people about the risks of head injury for motorcyclists;
 - to inform them of the effectiveness of helmets in preventing head injury;
 - to encourage helmet use;
 - to inform people about enforcement of the law, and the penalties for non-compliance.

3.2.2 Setting targets

Once identified, such general objectives should then be made more specific. The objective to increase the rate of helmet use, for instance, might be stated as “increasing the rate of helmet use by a specified amount, over a given time period”. It is generally preferable to set measurable, time-limited objectives; these can be expressed in terms of a *target*, for example, percentage reduction (or improvement) to be achieved by a certain date. Having targets generally results in more realistic road safety programmes, a better use of public funds and other resources, and greater credibility of those operating the programmes (4, 5).

Developing targets will require the use of the crash and injury baseline data in order to establish *measurable objectives*. For example, an activity might aim to achieve a 30% increase in helmet use, or a 50% reduction in head injuries over a specified time period. The experience of other initiatives in road safety suggests that targets should be both ambitious and carried out over a long time period (6). A longer timeframe also allows for programmes to be introduced step by step. The example from Hyderabad, India shown in Box 3.2 for instance, describes how a programme to reduce head injuries was accomplished in three stages. Each stage built on the work of the previous stage.

In some low-income and middle-income countries, however, relevant data may not be available, in which case it will be necessary to formulate a descriptive objective.

Table 3.1 provides an example of the possible stages in a hypothetical helmet programme, with realistic and achievable objectives.

BOX 3.2: Achieving helmet use in Hyderabad, India

The city of Hyderabad, in the southern Indian state of Andhra Pradesh, has 1.26 million motorcyclists on its 250 km of roads. Motorcyclists there had twice succeeded in persuading the state government not to implement a compulsory helmet law. In September 2004, though, a fresh initiative was launched with a new law mandating motorcycle helmets, preceded by a vigorous publicity campaign.

The campaign had three stages. The first aimed to create awareness of road safety. All cinemas in Hyderabad screened three short promotional films on motorcycle safety before the start of every feature film. Motorcycle riders were informed of the forthcoming law and the eight-week period for buying a helmet before strict enforcement of the law began. They were also warned of the dangers of wearing substandard helmets.

The second stage focused on ensuring sufficient helmet stocks in the run-up to “enforcement day”. This required persuading helmet makers to collaborate in a “helmet fair”, at which all brands of helmets went on sale. Any substandard helmets found were seized and their sellers prosecuted.

At the same time, the media publicized the fact that once enforcement of the compulsory helmet law began, failure to wear a helmet while riding a motorcycle would not only incur a minimum fine of Rs. 50 (US\$ 1.10) but would require attendance at a compulsory counselling session, to which participants would have to bring a helmet.

Other events included debates, seminars, drawing competitions and parades. Road safety material was widely distributed. As the deadline for enforcement approached, the campaign was stepped up. Well-known media personalities were invited to speak publicly on helmets and road safety. A speaker at one demonstration in the city was a popular film comedian whose son had been killed while riding a motorcycle without a helmet.

The campaign’s third stage was to ensure strict enforcement. After enforcement day, police officers stopped motorcyclists who were not wearing helmets, confiscated their driving licences and official motorcycle documents, and summoning them to a counselling session scheduled for the following day.

These counselling sessions included films on road safety and the importance of wearing a helmet. Following the screening, participants had to answer to a written questionnaire on what they had seen. They were then required to present their newly-acquired helmet together with their summons notice, and only then were they allowed to collect their driving licences and motorcycle documents. The inconvenience of attending this two-hour session was considered a stronger deterrent than the small fine, and there was a keen demand for helmets. At the helmet fair, riders could buy helmets at competitive prices, choosing from a range of designs and colours. The Andhra Pradesh government also waived the sales tax on helmets bought before a specified date.

Initial results have been impressive. The proportion of riders wearing helmets increased from around 10% on enforcement day, to close to 70% six weeks later, while six months after the law came into force some 200 000 motorcyclists had been counselled for non-compliance.



A publicity campaign was the first component of Hyderabad’s motorcycle helmet campaign

Table 3.1 Example of realistic and achievable objectives

	<i>STAGES OF THE PROGRAMME</i>		
	STAGE 1 Original introduction of helmets/laws	STAGE 2 Increasing helmet use to next level	STAGE 3 Strengthening and sustaining helmet use
Situation	Less than 10% of riders wearing helmets	30%–40% of riders wearing helmets	60%–70% of riders wearing helmets
Main problems identified	<p>Low awareness of helmets and high degree of resistance to helmets</p> <p>Affordable helmets not widely available</p> <p>A low standard of helmets</p> <p>Low enforcement</p>	<p>Compliance with the law on the decline (e.g. due to discontinuing promotional messages)</p> <p>Enforcement wearing off</p> <p>Poor practices of helmet wearing (such as unbuckled helmets)</p> <p>A low standard of helmets</p>	<p>Compliance decreasing</p> <p>Enforcement resources diverted to other traffic issues</p> <p>Compulsory law revoked</p>
General and specific objectives	<p>Increase helmet use to 30%–40%</p> <p>Significantly increase the number of helmets sold</p> <p>Increase enforcement for specific groups of riders</p> <p>Reduce head injuries among motorcyclists, as shown by hospital records</p>	<p>Increase helmet use to 60%–70%</p> <p>Increase general acceptance of helmets to 80%–90%</p> <p>Increase rate of helmets on market meeting standard to 80%–90%</p> <p>Reduce deaths caused by head injury by a specified amount</p>	<p>Increase helmet use to over 90%</p> <p>Campaign to have compulsory law reinstated</p> <p>Achieve a positive attitude towards helmet use</p> <p>Achieve near-universal correct wearing of helmets</p> <p>Have almost all helmets meeting standard</p> <p>Reduce head injuries and deaths by a specified amount</p>
Possible time period for this stage	From 4–5 years	2–3 years	<p>Dependent on the circumstances</p> <p>6 months to 1 year</p>

3.2.3 Setting performance indicators

Once targets are set by the working group, performance indicators that will measure the progress towards the target must be agreed upon. Performance indicators are measures that indicate changes and improvements in areas of concern such as:

- the extent of helmet awareness;
- the extent of helmet use compliance;
- the number of head injuries and resulting deaths.

In order to show changes and improvements, these data need to be compared to the baseline data.

Typical performance indicators include:

- annual helmet sales;
- the rate of helmet use (for example, as a proportion of the total number of riders, or per 100 000 population);
- the annual number of injuries and deaths from road crashes;
- the number of head injuries at selected hospitals;
- the proportion of deaths from head injuries out of deaths from all injuries, as recorded at selected hospitals (noting that this indicator can be affected by head injuries resulting from other causes, such as falls, firearms and other categories of road traffic victims);
- the extent of police enforcement of helmet laws;
- the extent of public awareness of helmets;
- public perception of helmet use.

Further measurement criteria may also be created, particularly for the purpose of monitoring the project. These new indicators may not be readily available, though they should not be difficult to set up. They include:

- the extent of correct helmet use in the programme area;
- the availability and affordability of helmets meeting national standards;
- police capacity;
- the frequency of public awareness campaigns.

For each indicator there should be a specific target. These targets will generally be quantifiable, though they may in some cases be qualitative. In any case, they should be realistic. Table 3.2 provides an example of setting targets for a hypothetical helmet programme.

Table 3.2 Example of performance indicators with realistic targets

Objective	Performance indicators	Initial value of indicator	Target value of indicator
To increase helmet awareness	<ul style="list-style-type: none"> the frequency of helmet publicity campaigns helmet sales public attitudes on helmet use 	<ul style="list-style-type: none"> 0 per month 200 month general disapproval 	<ul style="list-style-type: none"> 4 per month 1500 per month general acceptance
To increase helmet use	<ul style="list-style-type: none"> the number of helmet outlets the number of helmets sold the rate of helmet use 	<ul style="list-style-type: none"> 10 200 per month <10% 	<ul style="list-style-type: none"> 50 1500 per month 30%
To reduce head injury and death	<ul style="list-style-type: none"> the number of head injuries among motorcyclists admitted to the central hospital the number of motorcyclist deaths 	<ul style="list-style-type: none"> 10 per day 250 per year 	<ul style="list-style-type: none"> 8 per day a realistic target to be fixed

**UNESCAP defines its road safety goal**

The Draft Road Safety Goals developed by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), include a specific goal and target for increasing helmet use in the region, as well as the indicators by which the achievement of this goal can be measured.

Goal: To make the wearing of helmets the norm in order to reduce by one-third the death rate of motorcyclists.

Indicators:

- Motorcyclists death per number of motorcycles.
- Helmet use (percentage).

Source: UNESCAP: www.unescap.org/ttdw/common/TIS/AH/files/egm06/road_safety_goals.pdf

3.2.4 Deciding on activities

After specifying the indicators and targets, the working group must decide on and plan activities. As with any programme to reduce road traffic injuries, the approach must involve a wide range of disciplines. Those to be involved in each activity must be identified.

Activities will fall into the broad categories of education, legislation and enforcement. Education should always come before enforcement. Enforcement should be undertaken only where the infrastructure is in place (i.e. where there is legislation and the capacity for enforcement) and where the public has already been informed. Table 3.3 is an example of typical activities that may be carried out in the various stages of a helmet use programme.

Table 3.3 Typical activities for different stages of a helmet programme

	STAGES OF THE PROGRAMME		
	Initial introduction of helmets	Raising helmet use to next level	Further raising rate and sustaining helmet use
Objective	To increase rate of helmet use to 30%–40%, from less than 10%	To increase rate of helmet use to 60%–70%, from 30%–40%	To increase rate of helmet use to over 90%, from 60%–70%
Education	<ul style="list-style-type: none"> vigorous public awareness campaign on crashes and head injuries public awareness campaign on benefits of helmets publicity on legislation and penalties for non-compliance school education campaigns targeting of groups most receptive to helmet use promotion of helmet use by employers 	<ul style="list-style-type: none"> publicity on enforcement school education beginning at early age targeting of existing users to maintain their use targeting of groups more resistant to wearing helmets promoting helmet wearing as fashionable 	<ul style="list-style-type: none"> promotion of helmet use through connections with sport and fashion use of role models use of peer education strengthening education in schools
Legislation	<ul style="list-style-type: none"> Develop or amend an appropriate helmet law for motorcyclists or bicycles Pass the law through the appropriate legal channels 		
Enforcement	<ul style="list-style-type: none"> decision on type of penalty and process for extracting penalty increasing police capacity training of police designation of area of initial enforcement 	<ul style="list-style-type: none"> increasing enforcement, putting helmet use on a level with other traffic requirements, such as having a valid licence and observing speed limits 	<ul style="list-style-type: none"> tightening of enforcement

3.2.5 Setting a timeframe

An action programme to promote helmet use will include both “preparatory steps” – involving legislation, standards and design, and “launching steps” – ensuring compliance with the laws and regulations through incentives and enforcement. The timing of each step should be considered when planning the project.

The timeframe will depend on activities agreed upon. For example, if legislation is to be developed and implemented, it may be decided to phase in enforcement of this new law gradually in different areas (see section 3.3.2). However, clearly an overall timeline must be agreed upon at an early stage in the planning process, as this may be affected by resources.

3.2.6 Estimating resource needs

A helmet programme cannot be implemented without adequate financial and human resources. As part of designing the programme, it is therefore important that the following steps are taken:

- the human resource needs, including training, should be estimated.
- the costs of implementing the programme must be broken down by component and by activity chosen.
- national and international funding sources must be identified. Ideally, ministries who will be involved in implementing the programme should adjust their budgets to reflect the new activities. Alternatively, the working group can try to secure financial support from donors.

Failure to fully address resource needs for implementation during the planning stage can jeopardize the future success of the programme. Thus it is important that the working group is realistic in estimating the likelihood of being able to secure the funding needs of the programme.

Having worked out the programme’s activities in detail, the working group can now work out the cost of each of them and in the process draw up a budget, based on quotes from suppliers or on the cost of recent similar undertakings.

When formulating budgets, the following actions are recommended:

- estimating the funds available for the duration of the project;
- setting priorities, with activities phased if necessary to ensure that priority activities receive adequate funding;
- discussing with other government departments, non-profit-making organizations and private sector firms about similar projects already undertaken and their costs;
- estimating the likely administrative and operational expenses in implementing the programme;
- estimating the cost of monitoring and evaluation;
- planning for financial reports at regular intervals.

There are two methods for costing a programme:

- *Completed costs.* This involves the cost for each activity, plus the allocation of human resources and equipment used in the programme. If, for example, the traffic police have cars for highway patrols that are to be used for enforcing helmet use, then part of the cost of the police cars can be allocated to the programme.
- *Marginal costs.* This involves only costs directly related to the implementation of the programme, including new purchases.



Cost effectiveness of legislating for helmet use

Data from China have shown the cost effectiveness and economic benefits of bicycle and motorcycle helmets as follows:

- Motorcycle helmet legislation and enforcement costs are estimated at US\$ 437 per disability adjusted life year (DALY).
- For bicycle helmet legislation and enforcement, the cost effectiveness for going from 0 to 100% use would be US\$ 107 per DALY.

Source: 7

It is estimated that road traffic injuries and death cost developing countries US\$ 65 billion per year (3). An effective helmet-use programme that significantly reduces serious head trauma and deaths can make a major economic impact. It is essential, therefore, that the government has ownership of the programme and finance it. Table 3.4 provides some suggestions on how this might be done.

Table 3.4 Possible ways to fund a helmet-use campaign

Source of funding	Method of funding
Reinvestment	Some of the money from fines for non-compliance can be reinvested in a central fund to support public education and to help train the police to enforce the law. Similarly, funds from fuel tax, motorcycle licence and registration fees can be earmarked for particular purposes related to the helmet programme.
Sponsorship	Corporate groups often sponsor activities they see as worthwhile, and they may fund a helmet programme or specific components of it. Companies involved in manufacturing motorcycles or helmets, or those selling insurance, may benefit by being seen as a major sponsor of a helmet-use campaign.
Donor organizations	Development aid agencies and other charitable organizations are possible sources for funding a helmet programme. In a similar way, road safety organizations and educational bodies may provide funding or contribute technical expertise.

NOTE**Who pays? Investing in helmet programmes**

Governments and policy-makers must realise that a helmet programme requires considerable investment, but that there can be significant economic returns on investment and overall societal benefits, through reduced medical costs. Cost benefit analyses that quantitatively illustrate that financing a helmet programme provides “value for money” may be very useful in gaining political support for a helmet initiative. If such studies have not been conducted in a country, it may be necessary to rely on data or examples from similar countries, and to incorporate a cost benefit analysis into the evaluation of the planned helmet programme (see Module 4).

3.2.7 Setting up a monitoring mechanism

Monitoring the programme involves keeping a close check on all measurement indicators, to ensure the programme is on track towards the goals set out. Monitoring can be:

- *continuous*, with the lead agency of the working group overseeing the overall programme in case problems arise;
- *periodic*, with activities measured at the end of each stage of implementation.

Table 3.5 gives an example of what might be monitored during a typical helmet-use programme, and the possible actions to take if the indicators suggest that activities are missing their objectives. It is important to:

- Define resources for this task: human, as well as financial, should also be allocated at the outset of the process, to ensure that the monitoring and evaluation takes place at an appropriate time, and the results are disseminated.
- Define the mechanism for monitoring: setting out who will be responsible for monitoring progress, at what intervals progress should be reported and to whom, and how implementation can be enforced if needed, as early as possible. A feedback mechanism should be put in place to allow the regular revision of a programme, should it be necessary to improve its accuracy and relevance.
- Evaluate the programme periodically to determine its effectiveness. Evaluation methods are discussed in more detail in Module 4.

This section has described the steps to be taken in going from a situational assessment (Module 2), to developing an action plan for a helmet programme. The next sections go into more detail on the particular components of a helmet programme that one might include in the action plan. Firstly, however, Figure 3.3 outlines such a possible action programme.

Table 3.5 Defining indicators and actions for monitoring

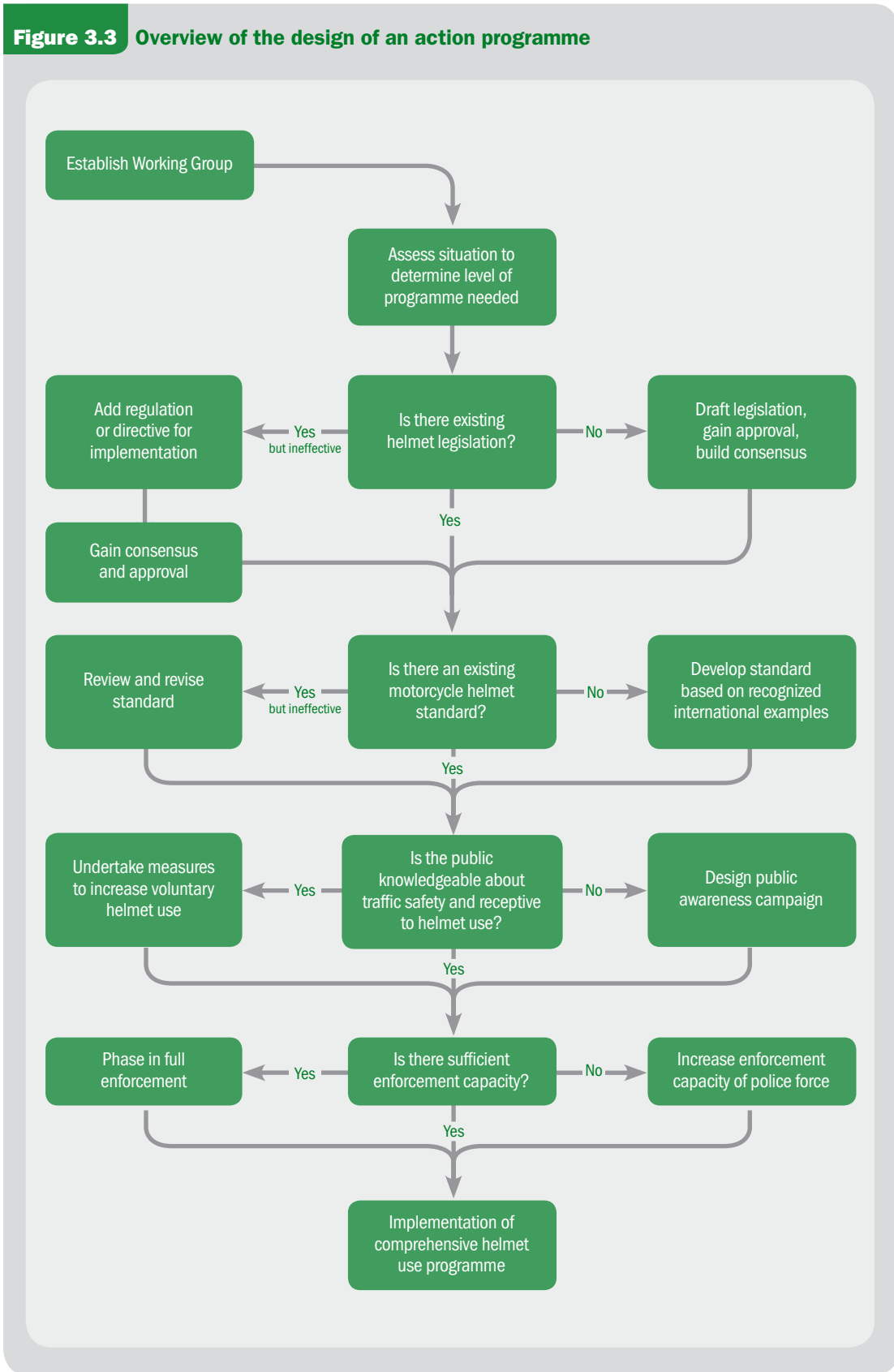
Activity	Indicator(s) for monitoring	Actions to take if monitoring suggests activity is below target
Increasing public awareness of helmet-use legislation	<ul style="list-style-type: none"> • number and frequency of publicity spots in the media • amount of feedback from target audience 	<ul style="list-style-type: none"> • improve persuasiveness of media stories and messages
Increasing capacity of police to enforce	<ul style="list-style-type: none"> • helmet-use rates • extent of area covered by enforcement • number of penalties issued • ratio of traffic police to motorcycle riders 	<ul style="list-style-type: none"> • increase size of traffic police force • change enforcement areas • improve system of issuing penalties and collecting fines
Designing awareness campaign on road safety and helmet use	<ul style="list-style-type: none"> • level of awareness of traffic safety • level of awareness of benefits of helmet use • level of knowledge of helmet laws and their enforcement • level of knowledge of helmet standards • observed (or self-reported) changes in behaviour 	<ul style="list-style-type: none"> • redefine target audience • redefine message(s) • evaluate the means of delivering the messages and change it if necessary

3.2.8 Ensuring sustainability of the programme

The sustainability of a helmet programme is essential to ensure that any benefits that result from the programme persist. In developing the action plan, it is therefore important to anticipate longer term funding requirements, and the possibility of reinforcement of any communications components of a helmet programme. Thus, for example, if improving enforcement of a helmet law is a project objective, the capacity for enforcement to be provided beyond a short campaign must be considered, and the strategy for enforcement must be made sustainable – with funds allocated on a yearly basis to support the operational capacity of the traffic police. What has been achieved must be maintained, with future programmes aiming at the next level of compliance.

Successfully sustaining a programme also requires that the components of the programme are evaluated to determine what worked and what did not work (see Module 4). The results of this evaluation should be fed back into the design and implementation of future activities.

Figure 3.3 Overview of the design of an action programme



3.3 How to develop and implement a helmet law

The overall objective of a law is to make helmet use universal. The process of developing a law, though, will also help with other activities, such as the practical issues around enforcing the law. In addition, the process should strengthen the public consensus on the need for a helmet law.

3.3.1 Developing the law

In most cases, a compulsory helmet law will involve adding a clause to a law already in existence – part of a health policy or a traffic code. Sometimes, though, a completely new piece of legislation will be necessary.

There are a number of steps that need to be taken in designing the legislation around compulsory helmet use. In particular, there should be assessment of the current legislation (see Module 2), and if this legislation is to be refined, it should be confirmed that the responsible authorities will be able to implement the new legislation effectively (see Figure 3.4).

In developing legislation on compulsory helmet use, the following checklist is a good guide:

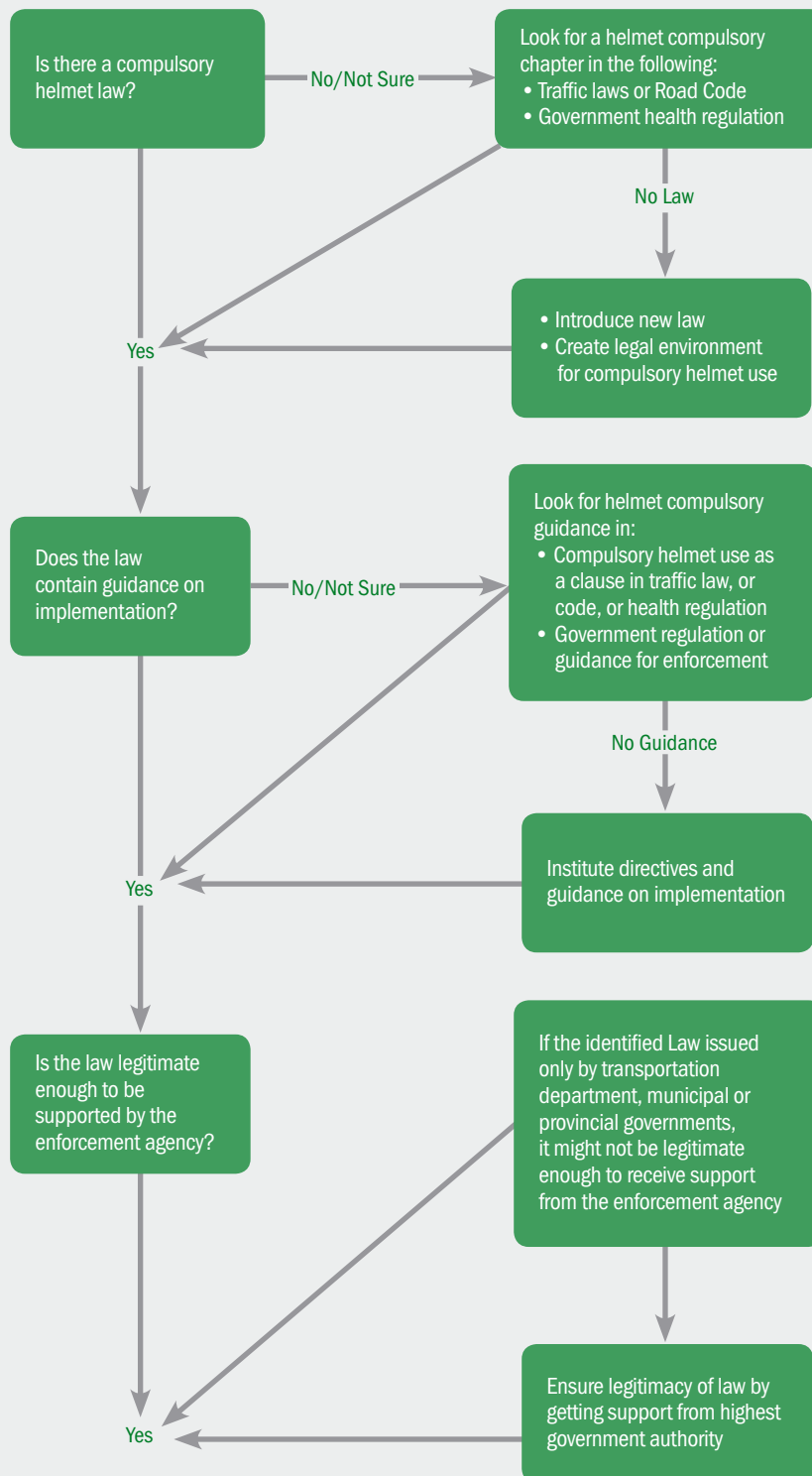
- Assess legislative situation to determine the scope of existing law, if any (Module 2).
- Determine if new legislation needs to be written or existing legislation revised.
- Decide the scope of legislation.
- Identify the government bodies that will be most involved in implementing the law.
- Ensure that government bodies have the capacity to implement and enforce legislation.

Once the current legislative situation has been assessed, the main purpose of developing the law should be determined. These are likely to include one of the following:

- address the absence of legislation;
- strengthen an existing law;
- offer further guidance and support to enforce legislation;
- provide greater legitimacy for the law, so that those responsible can enforce it more effectively.

Most high-income countries have compulsory helmet legislation. In some countries, individual states or provinces have the prerogative to decide on helmet legislation, such as in the United States of America and in India. Legislation on helmet use should be appropriate to a country's situation. Nonetheless, examining examples from other countries can be useful as a starting point. Table 3.6 provides examples of the actual text from legislation on helmet use in a number of countries.

Figure 3.4 Finding out about the legislative situation



3.3.2 Introducing and implementing legislation

The level of complexity involved in the passage of a compulsory helmet law depends on the legislative situation. For maximum effectiveness, legislation on helmet use needs strong support from the highest levels of government, thereby sending a message to society that helmet use and traffic safety are vital national issues.

To ensure that this support will be attainable, it is important that the working group has identified the key role players needed to endorse such legislation, as well as who will be needed in implementing such legislation. These factors should be articulated in the action plan.

The working group is an essential element in promoting and gaining approval for the legislation. Members of the group who are government officials, policy-makers, or injury prevention specialists will have the greatest influence in convincing others of the need for a law.

The following questions should be considered when introducing a new law:

- Which agencies will be most effective and influential in implementing legislation?
- Are the capabilities of the agencies adequately addressed in the legislation?
- Is the proposed legislation worded in an appropriate way, so as to gain support?
- What are the proposed penalties for motorcyclists disobeying the law? Are these penalties appropriate and are they likely to be effective?
- Is the law ethical? (see Box 3.3)

Implementing the law will often be a much greater hurdle than introducing it, particularly in low-income and middle-income countries. Guidance on implementation is therefore critical. It may be necessary to phase in the implementation of helmet legislation: in such a case, areas with low compliance and high rates of road traffic injuries should be the ones selected to implement first. For example, in Viet Nam, there is a national law mandating motorcycle helmet use. This was first introduced on highways, while urban roads were exempted. The implementation of the law on urban roads is decided by the local government of each city and province, such that helmet use is compulsory in some provinces and some urban roads, but not in others. In other countries, exemptions may be applied depending on the type of two-wheelers. In some Indian provinces, there is an exemption of the helmet law for users of low-powered scooters.

Table 3.6 Wording of legal texts pertaining to motorcycle helmets in various countries**BRAZIL***Text:*

- a) Drivers of motorcycles, scooters and motorized bicycles may only circulate on roads:
 - Wearing a safety helmet, with visor or protection glasses;
- b) Passengers of motorcycles, scooters and motorized bicycles may only be carried:
 - Wearing a safety helmet;
- c) To drive a motorcycle, scooter and motorized bicycle:
 - Without using safety helmet with visor or protection glasses and clothing according to the norms and specifications approved by the Brazilian Road Traffic Code (CONTRAN);
 - Carrying a passenger not wearing a safety helmet, as established in the previous paragraph, or outside the supplementary seat set behind the driver or on a lateral car;

Will incur:

- * Infraction – Very serious
- * Penalty – Fine and driving license suspension
- * Administrative step – Driving license withdrawal

Source

- a) Art.54, paragraph 1 of the Brazilian Road Traffic Code, 1997
- b) Art.55, paragraph 1 of the Brazilian Road Traffic Code, 1997
- c) Art.244, paragraphs 1 and 2 of the Brazilian Road Traffic Code, 1997

CHINA*Text:*

When motor vehicles are running, drivers and passengers shall tighten safety belts in conformity with provisions, and motor drivers and passengers shall wear safety helmets in conformity with provisions.

Source

Article 51. Road traffic safety Law of the People's Republic of China. Date of issuance 28/10/2003. Order of the People's Republic of China (no. 8)

INDIA*Text:*

Chapter VIII, section 129. Wearing of protective headgear

Every person driving or riding (otherwise than in a side car, on a motor cycle of any class or description) shall, while in a public place, wear¹ [protective headgear conforming to the standards of Bureau of Indian Standards]:

PROVIDED that the provisions of this subject shall not apply to a person who is a Sikh, if he is, while driving or riding on the motor cycle, in a public place, wearing a turban:

PROVIDED FURTHER that the State Government may, by such rules, provide for such exceptions as it may think fit.

Explanation: "Protective headgear" means a helmet which –

- (a) by virtue of its shape, material and construction, could reasonably be expected to afford to the person driving or riding on a motor cycle a degree of protection from injury in the event of an accident; and
- (b) is securely fastened to the head of the wearer by means of straps or other fastenings provided on the headgear.

COMMENTS

Wearing of a helmet compulsory to two wheeler riders is based on rational basis taking into consideration the alarming proportion of the road accidents involving two wheeler riders, such policy is not only rational but is also in the interest of larger public interest, since statistics reveal that more number of two wheelers are on the road having in view transport problems and economics of the cost. – *K. Veeresh Bahu v. UOI AIR 1994 Kar. 56.*

Source

The Indian Motor Vehicles Act, 1988. As amended by The Motor Vehicles (Amendment) act, 2001. Commercial law publishers (India) pvt. Ltd, New Delhi.

¹ Substituted by Act 54 of 1944, w.e.f.14–11 – 1944

NEPAL

Text:

130 Safety belt to be fastened and helmet to be worn while driving vehicle

- (1) While driving the prescribed categories of vehicles, both the driver and the person riding on the front seat must fasten safety belts.
- (2) The driver of a motorcycle and similar other two wheelers, as well as the person riding on such vehicle, must wear helmets.

Source

Annex 2 Excerpts of Vehicle and Transport Management Act, 1993² (Unofficial translation) in Sharma, GK. *Road Traffic Injuries in Nepal: current situation and an agenda for action*. 2005. NIIP-National Institute for Injury Prevention, Kathmandu, Nepal. *Primary source (in Nepali): Ministry of Law Justice and Parliamentary Affairs: Nepal Rajpatra Vol. 42 No. 52 (Extraordinary), Pousha 22, 2049 and , Nepal Rajpatra Vol. 43 No. 28 (Extraordinary), Bhadra 9, 2050. (First Amendment)*

QATAR

Text:

Drivers of motor bikes and bicycles and the people whom they carry should wear on their heads helmets designated for this purpose (the fine for “not covering the head with special helmet is 200 QR).

Source

Article 37, Qatar Road Traffic Law (13–1998). Qatari Traffic Directorate and Ministry of Interior. This law is applicable to other GCC Arabian Gulf Countries, Saudi, Kuwaiti, Bahraini, Oman.

² Regmi Research (Private) Ltd., Kathmandu April 15 1998

SOUTH AFRICA

Text:

Compulsory wearing of protective helmet

- (1) No person shall drive or be a passenger on a motor cycle, motor tricycle or motor quadrucycle, or be a passenger in the side-car attached to a motor cycle, on a public road, unless he or she is wearing a protective helmet –
 - (a) which is specially designed for use in conjunction with such cycle; and
 - (b) which fits him or her properly and of which the chin strap is properly fastened under the chin.
 Please note: a person may drive a motor cycle that is fitted with seat belts if the driver and passengers wear such belts, without wearing helmets. Sections (2), (3) and (4) have not been added here. These deal with passengers, pedal cycles and the introduction of motor cycles that do not require helmets.

Source

Regulation 207, National Road Traffic Act, Act 93 of 1996, as amended. The excerpt is from the regulations.

UNITED KINGDOM

Text:

67: On all journeys, the rider and pillion passenger on a motorcycle, scooter or moped MUST wear a protective helmet. Helmets MUST comply with the Regulations and they MUST be fastened securely. It is also advisable to wear eye protectors, which MUST comply with the Regulations. Consider wearing ear protection. Strong boots, gloves and suitable clothing may help to protect you if you fall off

Source

Laws RTA 1988 sects 16 &17 & MC(PH)R as amended reg 4, & RTA sect 18 & MC(EP)R as amended reg 4 (www.highwaycode.gov.uk/).

BOX 3.3: Ethical arguments around legislating for compulsory bicycle helmet use

As clearer evidence on the effectiveness of helmets emerges, attention is shifting to the merits of bicycle helmet legislation. Although legislation requiring cyclists to wear helmets exists in several countries, in some countries the issue is controversial. Four principles (those of beneficence, non-maleficence, autonomy and justice) provide a useful framework for considering the ethical issues involved (8).

When evaluating the ethics of a health promotion programme, it is important to ask certain questions, such as: “is the programme’s goal good?”, “does the programme achieve its goal effectively?” and “does it do so in a manner consistent with the values of the target population?”

Clearly, the aim of reducing head injury is good, and is consistent with promoting cycling as an activity beneficial to health. With a health promotion scheme such as legislating cycle helmet use, there may be a benefit to the individual, but the main aim is usually to lower population risk for a particular health issue. The individual may actually be slightly worse off in the short term (as with vaccination campaigns, for example). So while society gains an overall benefit, and some individuals also benefit (by not suffering head injury), most individuals are trading off a moderate inconvenience, possibly including some expense, against a reduced risk of an already unlikely event. It can be argued that there are good, but somewhat paternalistic, grounds on the basis of justice for making this choice collectively, rather than individually.

Critics of legislation, though, have pointed out that reducing absolute numbers of cycling fatalities and serious head injuries can be at least partially explained by a decrease in cycling *per se*. Given that good evidence exists that regular cycling is associated with considerable health benefit, and that the benefits heavily outweigh the risk of injury, there is understandable concern about legislation resulting in a reduction of cycling levels. Similar concerns, though, were expressed before motorcycle helmets were made compulsory. Despite being initially unpopular, legislation is unlikely to have had any long-term impact on motorcycle use. Available evidence suggests that legislation requiring bicycle helmet use will similarly not lead to any sustained reduction in bicycle use, and hence the legislative intervention is likely to be effective in achieving its aims.

Autonomy: One of the strongest arguments against legislation is that it constitutes an unwarranted

infringement of the civil liberties of cyclists. While admitting that legislation will of necessity restrict autonomy, proponents point to the precedents of vehicle lights, speed limits, motorcycle helmets and seat-belt legislation that exist in many countries, stressing that any infringement of autonomy is minimal.

In addition, there is an argument that, given the evidence, most people would rationally choose to wear a helmet, and would agree that there are proper social grounds for encouraging bicycle helmets. But equally, people know that doing what is in their own interest can often be hard to achieve without external encouragement. It is therefore appropriate, in democratic societies, to recommend legislation as a collective autonomous choice in favour of one kind of external encouragement.

Justice: It is important to consider both *procedural* and *substantive* justice. From a procedural point of view, there are three important principles:

- The law should be consistent. If a principle is applied in one area, then it should be applied in all equivalent areas in an equivalent way.
- The legislation should be enacted in a fair way – that it is, after full public consultation and full debate in the country’s parliament or other legislative body.
- The legislation should be applied fairly – that is, not in an arbitrary way, and with penalties for “offenders” in accordance with the merits of the case.

Substantively, it is necessary to consider whether the overall collective benefits, and the local benefits to other road users, outweigh the strong claims of individual autonomy. Principally the benefit is a social one – reduced cost to the health service or to purchasers of insurance. It is arguable that individuals have some sort of duty to their fellow citizens to take responsibility for their own health, and that sometimes this duty can be an enforceable one.

Conclusion: In summary, there is a strong case for making the wearing of bicycle helmets legally compulsory wherever possible. The argument is weakly paternalistic, in that it gives priority to social costs and individual risks over individual autonomy, but it is consistent with much other injury prevention legislation currently in place.

Acknowledgement: This contribution draws on a previous co-authored publication by Sheikh and colleagues (9).

NOTE**Viet Nam brings stakeholders on board**

In 1993, the municipal government of Ho Chi Minh City, Viet Nam passed a directive making helmet use compulsory in the city. At the time, there was no compulsory helmet law in the Road Code. In trying to enforce it, the municipal government ran into opposition from the local People's Committee, who challenged their authority to enforce the directive. Additionally, the municipal government lacked the support of the police, necessary for enforcing the law. This initial attempt to increase helmet use therefore failed because of a lack of commitment from the highest levels of government, the enforcement authorities and the general public.

As a result, the Ministry of Transport consulted interested parties and proposed a "helmet clause" to be inserted into the 2001 Road Code. When it came to being adopted by the National Assembly, it already had a broad base of support. From there, it was much more straightforward to implement the policy.

It may be necessary to introduce certain exemptions to helmet laws, on reasonable grounds of age or culture. Young children, for instance, might need to be exempt if there are not suitable helmets available for them. Similarly, members of particular religious groups that wear traditional head coverings that do not allow helmets might also be considered for exemption, depending on the circumstances.

Moving from the introduction of a new law to its full enforcement is usually a lengthy process. Compliance with the law should be built up gradually, and in planned stages.

However, it must be noted that phasing in legislation, and allowing certain exemptions from laws are steps that themselves introduce a set of concerns with regards to enforcement. Enforcement may be more time consuming and more difficult if there are differences in where the law applies, or if there are people who are exempt from the law.



In Delhi, India, women pillion passengers are exempt from the law, as are Sikhs.

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NOTE**Whether or not to make bicycle helmet use mandatory**

Whether or not to introduce legislation on bicycle helmet use is a topic that has split the public health community as well as those involved in implementing road safety programmes. Briefly, the pro-bicycle helmet group base their argument overwhelmingly on one major point: that there is scientific evidence that, in the event of a fall, helmets substantially reduce head injury (see Module 1). The anti-helmet group base their argument on a wider range of issues, on which there is conflicting evidence. These include: that compulsory helmet wearing leads to a decline in bicycling, risk compensation theory negates health gains, scientific studies are defective, and the overall road environment needs to be improved (see Box 3.3).

3.3.3 Developing a timeframe for implementation of a law

It is important that an appropriate timeframe be developed for the implementation of the law. Adequate public awareness must be ensured in order to optimise the success of the law. The timeframe from implementation of the law to full enforcement and penalty for non-compliance can be anything from a couple of months to several years. This will depend on the circumstances, and must be articulated in the overall action plan. Similarly, the indicators by which this component of the programme will be measured must be included in the plan.

NOTE**Phasing in a helmet law**

In Thailand, the Helmet Act of 1994 was enforced in Bangkok 90 days after legislation had been passed. In outlying provinces, the delay was 180 days. In the time between passage and enforcement, education on the issue was carried out so that the public was informed about the impending change in the law and the penalties for non-compliance.

NOTE**Preparing for implementation and enforcement of a helmet law**

In Viet Nam, the authorities gradually introduced implementation over a three-year period after helmet laws were passed by the National Assembly in June 2001, as part of the Road Code. Regulations for penalties and the method of collecting fines were issued during 2002 and 2003, during which period the size of the traffic police force was increased. In 2004, a comprehensive enforcement plan was implemented in selected areas.

3.4 How to design and implement a helmet standard

This section is for practitioners and campaigners who are responsible for the overall design and implementation of a helmet programme. It therefore aims to introduce helmet standards from a general point of view. A more detailed and technical examination of helmet standards should be undertaken by technical specialists.

3.4.1 Adopting a standard

One of the objectives of a helmet programme is usually to raise the quality of the helmets being used. This is best achieved by ensuring that all helmets meet a recognized safety standard – one that has been demonstrated as being effective in reducing head injuries. The standard should also provide quality assurances for the user. It must, of course, be suitable for the traffic and other conditions of the country, and it should be flexible enough to enable manufacturers to produce a range of approved models and styles.



Wearing substandard helmets

In some countries, although helmet use may be mandatory and the law may be enforced, the lack of a helmet standard means that motorcycle users who use construction helmets, horse riding hats, or other inappropriate forms of head protection might technically be within the limits of the law.

In many countries, the proportion of motorcycle users wearing substandard helmets is high. For example, in a study carried out in the Guangxi region of China, two thirds of nearly 5000 motorcyclists observed were wearing helmets that were substandard (10).



Module 2 described the need to assess whether or not there is a standard that is applicable to the project region, and whether this standard is abided by. A few questions to ask when adopting, developing, or revising a helmet standard include:

- Does a national standard exist?
- Does the national standard meeting international standards?
- Is the standard enforced and is it adhered to by helmet manufacturers and distributors?
- Are consumers aware of the standard?

- Do consumers favour certified helmets?

Based on the responses to the questions posed, a number of different actions are possible:

- **If a standard does not exist**, existing international and regional standards should be used as guides for new standards. These include UNECE Regulation No. 22, (see Box 3.4) as well as other standards from the more highly-motorized countries. If a standard is to be developed or adopted, it should take into account the traffic situation in the particular country – for example, traffic mix, whether two-wheelers share road space with four-wheelers, and the number of non-motorized vehicles. The technical aspects should be assigned to professionals with specialized expertise, but at the same time the working group should look at other existing standards and adopt components that are suitable for their country. In any case, input should be sought from researchers and technical experts in the field of helmet design.
- **If the existing standard is only in the form of an industry standard**, then it should be upgraded to an official national standard and approved by the government. The standard should also be reviewed to determine if it properly reflects the current traffic situation. There should be consultation with helmet manufacturers to make sure they are aware of the revised standard and to seek their support in producing a range of helmet designs that meet the standard.
- **If a national standard exists but is not apparently effective**, it should be examined. This should involve checking whether the standard is being properly regulated, whether it takes into account risks to motorcyclists, whether it acts as a stimulus to improve helmet quality, and whether it is understood by consumers. If the standard lacks effectiveness in any of these areas, then prompt measures need to be taken. Either the standard should be revised, or there needs to be better collaboration between the authorities and helmet manufacturers, or else there should be more public education on the types of helmet that are the most protective.



Examples of motorcycle helmet standards

AS 1698 (Australia)	DOT FMVSS 218 (USA)
CSA CAN3-D230-M85 (Canada)	TCVN 5756:2001 (Viet Nam)
UN/ECE Regulation No. 22 (Europe)	TIS369-2539 (Thailand)
JIS T8133 (Japan)	MS1-1996 (Malaysia)
NZ 5430 (New Zealand)	SABS 799 or VC 8016 (South Africa)
BS 6658 (United Kingdom)	

BOX 3.4: Helmet use in Europe: an international standard for helmets and visors

The Transport Division of the United Nations Economic Commission for Europe (UNECE) is responsible for updating internationally agreed safety rules and regulations on all aspects of road traffic, for implementation by its Member States. UNECE Regulation No. 22 – annexed to the 1958 Agreement on type approval of vehicles, equipment and parts – provides uniform conditions for the approval of protective helmets for drivers and passengers of motorcycles and mopeds. [In the “type approval” method, a sample of a product is submitted to a designated approval department for independent testing and authorization.] The latest revision of this regulation came into force in February 2002, and is applied by 36 UNECE Member States as well as New Zealand.

Helmets approved under the regulation must have undergone prescribed tests and carry an approval mark, fixed to the protective helmet to show that it conforms to Regulation No. 22. A helmet may be fitted with ear flaps and a neck



curtain. It may also have a detachable peak, a visor and a lower face cover. If it is fitted with a non-protective lower face cover, the outer surface of this cover should either be marked “Does not protect chin from impacts” or carry the symbol shown here, indicating that the lower face cover does not offer any protection against impacts to the chin.

The UNECE regulation states that a helmet must not significantly affect the wearer’s ability to hear, and that the temperature in the space between the head and the shell should not increase unduly. To prevent a rise in temperature, there may be ventilation holes in the shell. In addition, the regulation stipulates that every protective helmet placed on the market must bear a clearly visible label with an inscription in the national language of the destination country – or at least one national language if there are more than one. The label should read: “For adequate protection, this helmet must fit closely and be securely attached. Any helmet that has sustained a violent impact should be replaced.”

Source: UNECE Regulation No. 22 can be downloaded from the internet at www.unece.org/trans/main/wp29/wp29regs/22rv4e.pdf

3.4.2 Key considerations when setting standards

Although details of motorcycle helmet standards are highly technical, and should be developed by professional experts in the field, the working group should play both an advisory and supporting role.

When setting a motorcycle helmet standard, it is important to take into account the local cultural, climatic and traffic conditions, since these factors will affect the willingness of motorcyclists to wear helmets. In newly-motorized countries, there is usually an environment of mixed traffic. Motorcyclists must share the roads with pedestrians and an array of vehicles, including animal-driven carts, cars, buses and trucks. These various forms of transport all present risks to those on motorcycles and should be borne in mind when working on a standard.

There should also be consultation with helmet manufacturers and distributors to ensure that a standard is not so stringent as to restrict production and availability. Their views should be reflected in a standard that leads to affordable helmets

providing good protection and available in a range of designs. A standard, of course, should also take into account the preferences of riders. One that allows only full-face helmets to be made, for example, will be unpopular with motorcyclists in tropical and subtropical countries.

In a number of countries, counterfeit – or “fake” – helmets are common on the market. As well as the risk of injury to users of these helmets, their production means that manufacturers who do meet helmet standards feel a financial loss as a result of these sales. However, if a helmet law and standard are in place, then the standard can be used to improve helmet quality among good, or compliant, manufacturers. Tightening quality control of helmets and providing incentives for manufacturers to produce higher quality and more affordable helmets is therefore a step that will benefit both the motorcycle user, and good manufacturers.

When developing the timeframe within an action plan, it is important to consider the optimal timing for adopting and enforcing a helmet standard. For example, a working group may decide to develop a culture of helmet usage *before* adding components for imposing standards of helmets. If a standard is specified too early, then the campaigns to promote helmet use will not be able to occur in many situations, due to lack of specific standards across countries, and the absence of a mechanism to check these standards. In addition, many Motor Vehicle Acts by transport departments specify a helmet law and do not mention standards.



Viet Nam and helmet standards

The case of Viet Nam shows how a country can devise a motorcycle helmet standard specifically tailored to meet specific climatic and traffic conditions while adhering to international standards. Viet Nam’s original helmet standard TCVN 5756:1993 restricted certification to only full-face helmets. This standard was inappropriate given the consistent levels of heat and humidity in the country. Helmets that would be more suitable, like the half-head model, were unable to meet standard specifications. This made people reluctant to wear helmets, which prevented a helmet use programme from getting off the ground. In 2001, the standard was revised. Standard TCVN 5756:2001 now allows the more suitable partial-coverage helmets. Importantly, the standard allows for ventilation holes in the helmet. Certified helmets can therefore be lighter in weight and have more ventilation, and as a result be cooler for wearers – an important consideration in hot climates. The new standard is also in line with UNECE Regulation No. 22 (see earlier Box 3.4) in terms of general specifications, testing and labelling.

NOTE**Cycling in New Zealand**

It is compulsory to wear a bicycle helmet when cycling in New Zealand. Helmets must meet one of a set of helmet standards. Helmets should fit snugly and squarely on the head, be brightly coloured or covered with reflective material, and be strapped firmly under the chin. Failure to wear a helmet, wearing a non-approved helmet, or wearing a helmet incorrectly risks a fine of up to NZ\$55.

NOTE**Thai Industrial Standard TIS 369-1995 (2538)
PROTECTIVE HELMETS FOR VEHICLE USERS**

This standard can also be used as a reference point. It covers the following topics:

- Scope
- Definitions
- Components
- Requirements (Testing)
 - Shock absorption
 - Penetration resistance
 - Rigidity
 - Strength of chinstrap and fastening device
 - Flexibility of peak
 - Marking and labelling
 - Sampling and criteria for conformity

3.4.3 General specifications for helmets

International helmet standards often define a helmet as consisting of a hard outer liner and crushable inner liner. However, it is not necessary for a standard to stipulate that a helmet be made this way. An effective helmet standard can simply define a helmet as *a protective device designed to protect the head in the event of an impact*. It is important for a standard to be as inclusive as possible and to avoid restricting the design or the materials used.

The materials of a helmet should not undergo significant changes with age or normal use. Nor should materials experience degradation from exposure to weather conditions – such as sun, rain or extreme heat or cold. Materials that come into contact with the human body should not be affected by exposure to hair, skin or perspiration. The materials should also be non-toxic and not cause allergic reactions.

Helmets may be fitted with ear flaps or neck curtains. They may also have a detachable peak, a visor and a lower face cover.

Helmets should be designed so that they do not dangerously affect the wearer's ability to hear or see. The helmet's design should not cause the temperature in the space

between the head and the shell to rise inordinately. To prevent this, ventilation holes can be inserted into the helmet.

The helmet should be kept in place by a retention system that is placed under the lower jaw. All parts of this system should be permanently secured to the helmet. The chin strap should be adjustable and be fitted with a retention system.

Testing

Proper testing of all the principal components of the helmet will ensure that products meet minimum safety and quality standards (Box 3.4). The following are examples of testing procedures used to determine the protective capabilities of a helmet. The relevant section to consult from UNECE Regulation No. 22 is given in brackets for each case.

- *Conditioning testing* exposes helmets and components to both high and low temperatures so as to determine the integrity of the product [UNECE Regulation 22, Section 7.2].
- *Impact-absorption tests* determine the capacity of a helmet to absorb impact when dropped from a guided free-fall onto a fixed steel anvil. An impact absorption test is absolutely necessary [UNECE Regulation 22, Section 7.3].
- *Tests for projection and surface friction* are done to assess the way in which an outer shell will shear away, become detached, or slide off when impacted [UNECE Regulation 22, Section 7.4].
- *Rigidity tests* determine the strength of a helmet when weight is applied to each side of the helmet [UNECE Regulation 22, Section 7.5].
- *Dynamic strength tests* are done on the retention system of the helmet. In this type of test, it is acceptable for the retention system to be damaged, as long as it is still possible to remove the helmet from the headform [UNECE Regulation 22, Sections 7.6 and 7.7].

An effective standard does not have to include all of these tests but can be limited to those ensuring the most effective helmet for the particular situation and the particular risks faced by motorcyclists in a given place. An appropriate standard will also take into account the testing capabilities of a country.

If a helmet type contains a *visor*, the visor should undergo testing. A metal punch should be used to determine if the visor will shatter or produce any sharp splinters when forcibly contacted [UNECE Regulation 22, Section 7.8].

The *chin-strap* should be tested for slippage, resistance to abrasion, inadvertent release by pressure, ease of release, and durability of the quick-release mechanisms [UNECE Regulation 22, Sections 7.9–7.11].

NOTE**Adapting or adopting a helmet standard**

As described in Box 3.4, UNECE's helmet standard can be used as a starting point for a helmet standard by other countries. Regulation No.22 provides an overview of the tests that helmets and their components must all undergo and meet. However, the testing of helmets as specified in this standard is rigorous, but it also has drawbacks. Because a triaxial accelerometer must be used for the UNECE standard, the testing methods described are technically challenging and expensive to operate. Some countries, including Thailand and Viet Nam, have developed standards that use monorail test equipment that is easier to operate and less expensive.

The regulation imposes certain responsibilities on manufacturers, such as for notification of the administration department in the case a product is changed, and sets out penalties for non-compliance. According to the regulation, wearers have to be provided with standard information and warnings on labels inside the helmets.



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All motorcycle helmets should comply with international or national standards.

BOX 3.5: How helmet tests should be improved: oblique impact tests

Head injuries are the most frequent type of severe injuries which result from motorcycle crashes. The most common impact to the head in a motorcycle crash is what is called an “oblique impact condition”, where the force from a hard surface hits the head tangentially. This is more common than a “pure radial impact”, where the surface hits the head directly, at a 90° angle. A force that hits a helmet obliquely will result in a strain, or deformation, to the brain tissue that is six times the magnitude of the strain that results when that same force hits a helmet directly.

Subdural haematomas and diffuse axonal injuries are the most frequent severe brain injuries arising from motorcycle crashes. These two types of injury arise from tangential forces hitting the skull, and are directly related to the rotational acceleration in the brain.

Most safety helmets used by motorcyclists are developed to meet the requirements of tests for controlling standards. In existing tests, known as “drop tests”, the helmet is generally dropped onto a flat or curved surface tangential to the helmet surface,

and this results in a radial impact to the head (diagram a). However, as already mentioned, this type of direct impact is seen in only a minority of cases of injury, whereas about 90% of motorcyclists’ head injuries result from an oblique impact to the head. Most tests for regulating helmet standards do not take into account a fall from a motorcycle that is followed by an oblique impact to the head. This has resulted in helmets that provide good protection against radial impacts, while their protection against oblique impacts remains untested.

Recent research in this field has led to the development of an oblique impact test. In this test, a dummy helmeted head is dropped onto an angled surface, instead of a flat surface (diagram b). Compared with the conventional drop test, this new test shows substantially increased strain deformation of the brain tissue. All existing helmet tests should therefore be extended to include standards for both conventional drop tests as well as oblique impact tests. This would reflect most real-life impacts that occur in motorcycle crashes, and would therefore lead to improved helmet standards.

Source: 11, 12

Diagram a:
radial impact

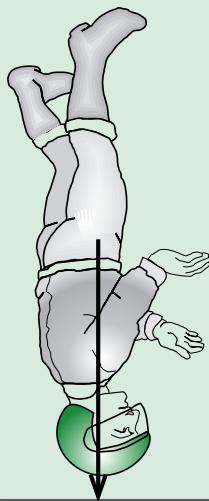
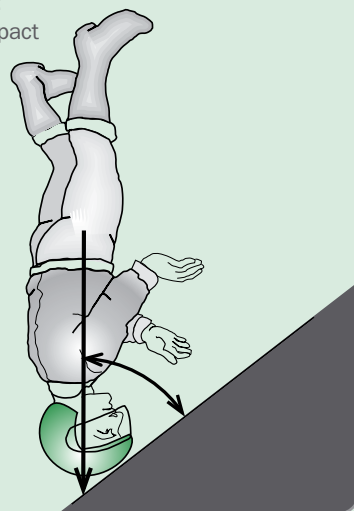


Diagram b:
oblique impact



Certification

The certification process is employed to enforce standards. It is recommended that the “type approval” method be used to ensure uniformity. In this method, a sample product is submitted to the designated approval department for independent testing and authorization. If a standard has been newly introduced, the procedures for testing a helmet will probably be carried out by an existing approval department. The most likely department will be a centre for standards in the ministry of science, or a testing centre in the department of standards or the vehicle registration office.

Type approval is recommended over self-certification because it allows for more stringent adherence to uniform standards. Apart from that, self-certification offers greater scope for dishonesty by unprincipled manufacturers.

In summary, when developing a motorcycle helmet standard, the following is a useful checklist:

- Examine the existing motorcycle standard, if any.
- Determine whether an existing standard needs revision or a new standard has to be developed.
- Consider the prevailing obstacles to helmet usage.
- Develop a standard that will ensure a reduction in head injuries.
- Decide on a standard and include the standard in national legislation.
- Establish a procedure for inspection by a regulatory agency and for enforcement of the new standard.
- Produce and disseminate information on the new standard to manufacturers, retailers and the public.
- Establish a timescale for manufacturers and retailers to conform to new standards.

Motorcycle helmet design

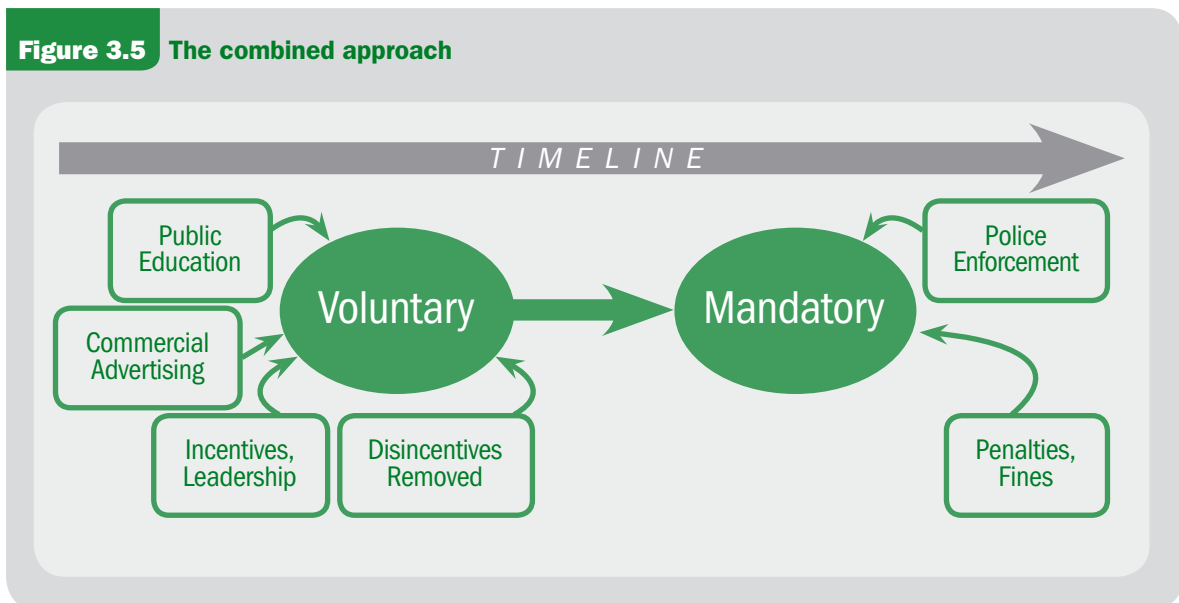
If part of the helmet programme is to manufacture helmets, it is important that the helmets are designed to meet the latest standards, and to suit local conditions. Module 1 described the considerations that must be borne in mind when designing a helmet.

3.5 How to improve compliance with the law

Numerous studies have shown that helmet use is the most effective way to reduce fatalities and severity of head injuries among motorcycle riders. To achieve increased helmet use, however, calls for a combined approach involving a range of sectors and disciplines (see Figure 3.5). Efforts to get motorcyclists to wear helmets should be directed both at *voluntary* use as well as *compulsory* use.

It is a good idea to have a programme promoting voluntary measures to increase helmet use before mandatory measures are brought in. Figure 3.5 illustrates how public education campaigns, commercial advertising by helmet companies, role model initiatives (leadership) and both government and employee incentive schemes are all means of encouraging voluntary helmet use. Following on from these measures, activities should concentrate on informing the public of forthcoming legislation on helmet use, ensuring the police are equipped to effectively enforce new laws, and setting up a penalty system for those who do not comply.

Figure 3.5 The combined approach



3.5.1 Voluntary measures to increase helmet use

The following are measures that can be used to encourage helmet use:

Public education

Public education refers to all activities aimed at publicizing issues such as helmet standards, new legislation on helmets and the enforcement of helmet laws, as well as the scale of serious road traffic injuries among motorcyclists. It also includes information on the benefits of helmets and why wearing them should be a natural part of a motorcyclist's lifestyle. Ways of disseminating such information are described in more detail in section 3.6.

Education and public information programmes to encourage motorcycle and bicycle helmet use can:

- stimulate and reinforce behavioural change;
- increase public support;
- influence social norms, making helmet use more socially acceptable;
- create a supportive environment for the passage of laws and policies that increase helmet use.

Commercial marketing

Commercial marketing by helmet manufacturers and retailers can play an important role in increasing voluntary helmet use. Consumer behaviour studies have also shown that awareness of helmets can spread through word of mouth, and as helmet use becomes more common in a society.

Role model initiatives

Using selected role models can influence people to wear helmets before legislation is introduced. The particular role models chosen will depend on the group being targeted in the campaign. The target group could be young people – who usually make up a significant proportion of motorcycle riders and passengers. In this case, the role models publicly seen wearing fashionable motorcycle helmets might be well-known singers, film or television stars or sports stars. For a different target group, the role models could be prominent professionals, doctors or successful business people.

Employee incentive schemes

Employers in the public and private sectors can play a major role in promoting the use of helmets by arranging for their employees to be seen wearing helmets to and from work (see Note on page 95). Apart from the public benefit, it is beneficial for companies to be seen to be “good employers” for having introduced helmet use programmes for their staff. Such a scheme can be especially effective in countries where most employees travel to and from work on motorcycles.

Employers can offer the following incentives to their staff to wear helmets:

- subsidized helmets for employees and their family members;
- a mention of the employee in the company newsletter;
- promotional items from the company, and other gifts and prizes;
- entries into special lotteries. For example, those who use helmets can enter a lottery
- some companies consider regular use of helmets as a plus point when conducting end of year reviews and allocating bonuses;
- condition of employment (written in company regulations): this can be considered a semi-voluntary situation, since a person can choose not to work for a company stipulating these regulations.



Private sector companies take on helmet wearing

Realizing the importance of a healthy workforce and the potentially lost productivity of employees involved in road crashes, many companies in Viet Nam have begun to implement policies to increase motorcycle helmet use among their staff. These include a mix of voluntary and compulsory measures. For example, some companies provide helmets for all their staff, where others may extend this by supplying helmets that meet national standards to the family members of their employees. In addition to “carrots”, companies provide the appropriate “sticks” to increase helmet use. Those employees who fail to wear helmets on the way to or from work receive a verbal warning initially and written warnings for further offences. In some instances, the importance of this company policy is reinforced by a system which penalizes supervisors more than junior staff for not wearing helmets.

Government schemes: providing incentives and reducing disincentives

The establishment of government schemes can be an important mechanism to improve helmet wearing. This may be by providing incentives to helmet manufacturers, or users of helmets, or by reducing existing disincentives. For example, a government in a country where many children ride as passengers on their parents motorcycles, as in many Asian countries, could establish a scheme which subsidises the cost of motorcycle helmets for school children. The Note on page 96 shows an example of government incentives used to increase bicycle helmet use.

NOTE**Victoria's incentives to increase bike helmet use**

Between 1984 and 1989 the Australian State government jurisdiction of Victoria conducted a Helmet Rebate Scheme on seven occasions. On each occasion a rebate of AUD \$10 was paid to purchasers of Australian-made and standards-approved bicycle helmets. Approximately 180 000 rebate claims were paid by the Government at a cost of AUD\$1.8 million. The helmet rebate scheme was an important component of a very successful programme that led to a dramatic increase in the rate of bicycle helmet usage and a corresponding decline in head injury and fatalities.

Financial disincentives to wear helmets faced by consumers generally manifest themselves through higher costs of a helmet. Typically, disincentives are “hidden” from the consumer and incorporated into various kinds of taxes and duties (e.g. sales tax, value added tax, import duties), and their outcome in terms of their impact on helmet wearing is not usually deliberate. Other disincentives may include the costs borne by consumers in terms of the time and money required to reach shops and garages selling helmets.

Addressing disincentives as part of a helmet campaign through lobbying for the specific exemption of helmets from taxes, or increasing the number of locations at which helmets can be purchased, can have a major impact on helmet use, particularly through the reduction of end prices of helmets charged to the consumer.

An assessment of the cost and requirements of providing helmets to the market is a good way of revealing any disincentives, and thus identifying actions needed to reduce their impact.

3.5.2 Compulsory measures to increase helmet use

Government agencies, especially those participating in the working group, should take the lead and make helmet use compulsory for their own staff under their contracts of employment. Agencies here include the departments of transportation and health as well as the police department.

Publicizing the law on helmets

Motorcyclists should be given ample notice of forthcoming legislation, and information on how the laws are to be enforced, and the penalties for non-compliance. Dissemination of this information can be carried out through the print and broadcast media and on advertisement boards.

BOX 3.6: Work-related helmet use policy in Cambodia

Although motorcycles make up more than 75% of the vehicle fleet in Cambodia and about 90% in the city of Phnom Penh, few people who ride on these motorcycles wear helmets. Since 2002, the World Health Organization (WHO) has supported a helmet-wearing initiative in Phnom Penh. This collaborative effort involves a number of ministries in the country, the police, as well as some nongovernmental organizations. The project is jointly coordinated by Handicap International and the Cambodian Ministry of Health, and incorporates a media campaign, helmet legislation, as well as policies to promote helmet wearing to prevent work-related injuries.

The work-related helmet wearing component of the project is an initiative which encourages staff from governmental and nongovernmental organizations and United Nations agencies to lead by example by adopting, enforcing and monitoring policies that

require helmet wearing for their employees when driving motorcycles. The WHO office in Cambodia contracted Handicap International to visit several institutions to promote road safety and develop organization-wide road safety policies.



Handicap International motorcycle riders in Phnom Penh wearing regulation helmets

© Handicap International, 2004

Enforcing the law and involving the police

If a compulsory helmet law is to be effective, traffic police must be properly committed to enforcing it. While public education campaigns can raise awareness, enforcement of the law is essential to achieve widespread compliance. People must be made aware that the law will be enforced and that those ignoring it will incur monetary fines or – in the case of repeated offences – more severe penalties.

Enforcing a helmet law creates an extra burden on the police. It is useful in advance to examine the capacity of the police force, and to determine whether additional recruits are needed. In any case, traffic police will need training in the new law and how best to enforce it.

How well the police can cope will help decide whether to introduce a blanket enforcement of the law or to take a phased approach (see Box 3.7). If enforcement is to be phased in, those areas where few riders wear helmets and where casualty rates among motorcyclists are high should be the first to be targeted.

What are the aims of enforcement?

The *objective* of a pro-active, helmet law enforcement intervention is to ensure that helmets are worn by all motorcyclists on all roads at all times.

BOX 3.7: Enforcing motorcycle helmet use in Nepal

Motorcycle use has increased more than six-fold in Nepal since 1993. A government law passed the previous year had stipulated the mandatory use of helmets by motorcycle drivers, though enforcement was poor and passengers were exempt from using helmets on most roads in the capital, Kathmandu. However, since January 2003, the compulsory helmet law has been strictly enforced for all motorcycle riders in the capital. The tightening of the law had strong political support from the then minister of health, a neurosurgeon acutely aware of the growing numbers of head injuries admitted to trauma clinics.

The helmet law has resulted in a significant decline in head injuries among motorcycle riders in the capital, as recorded by the main hospitals, autopsy reports, and the traffic police's national database. A decline in fatalities has been observed primarily among motorcycle riders in the Kathmandu Valley, where enforcement of the law has improved since

2003. However, other serious injuries appear to have increased over the same period. This may have resulted from a substantial rise in drink-driving rates recorded among motorcycle riders, contributing to an increase in the overall number of motorcycle crashes. It is also possible that a proportion of the head injuries suffered since the law was passed have been as a result of improper use of helmets or substandard helmets. Despite the success in reducing motorcycle fatalities in the capital, enforcement is poor in many other urban areas, with correspondingly low rates of helmet use.

Nepal's rapid motorization and in particular the sharp growth in motorcycle use mean that helmet use is an extremely important intervention for reducing fatalities. While political commitment exists, for such commitment to translate into concrete results, efforts including the enforcement of helmet use need to be sustained in the capital and expanded to cover all roads in the country.

The *outcome* sought is an increase in helmet wearing, which will lead to a reduction in head injuries, road trauma and deaths. Political support is fundamental to sustained outcomes. Scarce police resources must be used effectively and efficiently to maximize the value of law enforcement operations.

Strategic law enforcement integrates four fundamental principles of policing in a multi-dimensional intervention. Enforcement practices must ensure:

- a) **Increased visibility of enforcement.** This includes highly visible, publicly observable and strategically located checkpoints and roadblocks. These must be varied in location, intensity, time of day and night. There should be many police officers in each working team. Visibility includes signage about the enforcement activity, safety vests for police and adequate lighting at night.
- b) **Repetition of enforcement campaigns.** This indicates to the motorcyclists that the risks of being caught are high – anywhere, anytime.
- c) **Strict and consistent enforcement.** After an initial public warning period, police enforcement should be strict, non-discriminatory, fair and consistent. This will lead to a permanent change in motorcycle rider habits – not just short-term, on highways or where police enforcement can be anticipated. If there is no enforcement, there will be limited or no compliance.
- d) **Well-publicised enforcement.** To achieve maximum effectiveness, compliance driven enforcement must be combined with coordinated education and publicity

campaigns involving the continuous engagement of government, local government, the mass media and other agencies. This means conducting publicity campaigns before, during and after policing activities with reinforced safety messages. Safety brochures on correct helmet wearing may be handed out with a warning as an alternative to issuing a fine. Education and instruction can include reminders for riders to buy and wear helmets and the constant promotion of safety messages.

Target operations should be well planned with all traffic officers being appropriately trained and briefed. Safety should be paramount with considerations for the safety of the interception officers and the driving public, the safe use of equipment and the selection of checkpoint sites.

Police commanders must appreciate the cost of enforcement compared with the cost of rescue operations, medical treatment and rehabilitation of the injured.

Strategic enforcement can achieve sustainable results by raising the percentage of riders and passengers wearing helmets. The aim is to create the perception that the risk of being caught and fined is greater than the cost of buying or the inconvenience of wearing a helmet.

Training of police officers. Police officers must be trained in effective strategies and tactics to achieve maximum success. This includes:

- knowledge of the law;
- understanding how helmet wearing reduces the risks of head, brain and facial injuries (even in low speed crashes);
- police officers on motorcycle duty and on private motorcycles must obey the law and must set the example;
- understanding how to set up safe and effective road blocks and check points for maximum “on-road” public exposure and enforcement. This will include signage or large banners indicating to all the driving population what enforcement is being undertaken e.g. “Helmet checkpoint” or “Helmets saves lives”;
- how to target areas with high rates of non-compliance;
- how to provide effective advice and education to motorcycle users;
- understanding the impact of motorcycle crashes on the financial and human resources; to the community as well as the resource savings to police and emergency rescue services when an effective law enforcement programme is undertaken;
- understanding other aspects of motorcycle safety including safe and defensive riding, motorcycle rider visibility as well as the use of protective clothing and footwear;
- understanding the best ways to measure the effectiveness of the law enforcement intervention. Success is indicated by the level of compliance observable in the riding community and not by the number of infringements or warnings given. Compliance is measured by the percentage increase in helmet wearing rates. Other performance measures are the number of checkpoint operations, target operations, educational lectures as well as individual and media warnings. There must also be positive reinforcement to reward and encourage rider safety.

Strategic traffic enforcement can and does make a difference. For effective implementation of helmet law enforcement:

- enforcement must provide a meaningful and deterrent threat to non-helmet wearing motorcycle users, and
- the perceived risk of apprehension must be high.

Table 3.7 shows some of the obstacles that can arise in trying to implement a helmet law, as well as possible actions to take to overcome these obstacles.

Table 3.7 Overcoming barriers or obstacles to effective implementation of the law

Barriers	Remedial Actions
Limited police resources	<ul style="list-style-type: none"> • Strategic planning for intensive high profile, high visibility, enforcement activity – resource deployment and coordination • Combining education & enforcement • Strong media campaigns • Community support campaigns • Allocation of additional traffic officers
Competing police priorities	<ul style="list-style-type: none"> • Government and senior police officers understanding the real economic and human costs of road trauma compared with the relatively lower costs of enforcement • Appreciating the cost-savings which can be achieved by strategic traffic enforcement
Complacency in enforcement	<ul style="list-style-type: none"> • Enhanced training of police officers, supervisors and police management with emphasis on the risks to riders, their passengers and the community
Police officer sympathy in favour of the rider: <ul style="list-style-type: none"> • Helmets stated to be hot, uncomfortable, inconvenient or muffling the warnings of car horns • Cost of helmet to the rider • Cost of cumulative fines e.g. several family members on one motorcycle 	<ul style="list-style-type: none"> • Education of the police officers about the associated risks of not wearing helmets • Community education • Introduction of government subsidies for the purchase of helmets • Helmet purchase recommended before a licence or registration is issued or renewed
Inadequate or ineffective policing capability or strategies and the perception that enforcement is too difficult with such extensive non-compliance	<ul style="list-style-type: none"> • Development of an integrated law enforcement strategy • Identification and publication of minor successes • Modeling on “good practice” examples of success • Targeted helmet law enforcement
Corruption including: <ul style="list-style-type: none"> • Police officers collecting fines and not passing them on to Government authorities • Illegal and unethical receipt of monies as payment to overlook an offence (bribery) 	<ul style="list-style-type: none"> • Anti-corruption measures • An appreciation that corruption undermines any road safety intervention • Enhanced education and training of officers • Salary reviews of traffic officers after appropriate training • Promotion of a code of ethics/behaviour

BOX 3.8: **Passing a bicycle helmet law: what else is needed to get helmets on heads?**

In October 2004, the South African government passed a law making it compulsory for all cyclists to wear helmets. The regulation requires the use of a protective helmet that is properly fastened and fitted while riding a bicycle or being carried as a passenger. According to national road traffic data in South Africa, 270 cyclists were killed during 2004.

Some South African bicycle manufacturers actively promote the use of a helmet through stickers on new bicycles, with messages such as “Use your head, wear a helmet!” Others give their sales representatives short training sessions on the different types of products sold alongside bicycles, including helmets. Sales representatives are also trained to encourage new bicycle owners to buy safety equipment such as helmets. Even before the law was passed, the South African Federation had been following international rules about helmet use in bicycle races, and preventing cyclists from racing without a properly-fitted helmet.

Despite this, however, less than a year after the law was passed, most South African cyclists are still not wearing helmets. Although there was considerable media coverage at the time the law was passed, there is still little awareness about it. This is the case even among some cycling associations – clubs mainly for ordinary cyclists, though they also organize races.



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Enforcement of the law is poor – a reflection of the difficulties in applying the national legislation at the local level. Some traffic officials, interviewed about the new law, did not even know it had been introduced. Others stated that the legislation was not being enforced because there was a lack of public knowledge of the issue, and that they were still considering what the appropriate fine for an offence should be. Although in certain areas traffic officers are actively involved in promoting awareness of the benefits of cycle helmets and the new legislation, this is not the case across the whole country. As a result, some officials are urging that the national traffic department provide clear guidance on how the legislation should be implemented at the local level.

Penalties for non-compliance

Various methods can be used to enforce the law:

- *Warning notices* can be issued in the time between the law being passed and its full implementation. These notices inform motorcyclists that there has been a change in the law and that in the future a penalty will be imposed for breaking it.
- *Fixed penalties* can be issued with a written ticket handed out on the spot, requiring the offending rider to pay a fine to a given department by a specified date. To operate this method effectively, a computerized database should be set up to record all offences. During an introductory period, payment of fines could be waived if, for example, offenders can produce a helmet and a receipt of purchase dated after the offence.
- *On-the-spot fines* are levied in some countries whereby motorcyclists caught riding without helmets have to pay a fine directly to the police officer. The money is then passed on to the transportation authority. However, it must be noted that in many instances, particularly where salaries for the police officers are low, such measures are ineffective and may result in corruption and bribery. Such systems should be upgraded immediately to ensure that no money transactions occur at the interception point and a full audit of any financial transactions is maintained.
- *Confiscation of licences or of motorcycles* can be applied as a blanket rule, or to repeat offenders. However, such measures are usually implemented only after other measures have been tried.

3.6 How to involve the public

Conducting a campaign to involve the public will require expertise in marketing or advertising, development of specific campaign objectives, articulation of the campaign messages and the target audience, specifying a timeframe for implementation, and a methodology for evaluating this initiative.

3.6.1 Selecting an agency for the campaign

A successful marketing campaign may be carried out by qualified personnel within a government department, but usually needs the expertise of a professional marketing or advertising agency. Overall control of the campaign should, however, stay with the government agency responsible. The campaign may also require the services of a public relations agency and a research agency, unless the government agency can provide these services itself.

The first step in selecting an advertising agency is to issue a tendering document, outlining the overall aims and objectives of the campaign, the time schedule and the budget. The purpose of this tendering document is to assess the ability of responding agencies to do the work. From their initial applications, a shortlist of agencies should be drawn up, based on:

- the agencies' previous experience with social marketing campaigns;
- their creative ability;
- their physical location;
- their media purchasing ability;
- their size.

The shortlisted agencies are then asked to tender for the work, by providing creative ideas, plans for media work and budgets.

3.6.2 Objectives of the campaign

The most important aspect of any campaign is to have a clear idea of what the campaign is meant to achieve. The objectives may be stated in quantifiable terms. For instance, the public might be told that "By December 2006 it will be required by law that all motorcycle riders and passengers wear a helmet". However, there may be an *internal* target that is less ambitious. For example, the internal target that is not communicated to the public may be that by December 2006, 75% of motorcycle riders and passengers should be using helmets.

The assumptions for the campaign are that helmet use, if it exists at all, is very limited, that there are few legal requirements to use helmets, and that there is little or no enforcement.

Various objectives are possible, depending on the existing legislation and rate of helmet use. They include:

- to increase public awareness that helmets can prevent serious injury;
- to increase awareness that *every* rider and passenger is safer with a helmet;
- to encourage people to purchase and use helmets;
- to convey the message that use of a helmet is now mandatory;
- to inform people that helmet use is now being enforced, and to explain the penalties;
- to promote enforcement of the helmet laws by the police.

Each of these objectives should be quantifiable. It is therefore necessary first to ascertain:

- the current level of awareness of the safety value of helmets, their availability and cost, and the legal requirements for helmets;
- the current level of helmet use, by both riders and passengers, in urban and rural areas;
- the current level of enforcement.

3.6.3 Changing knowledge and attitudes on helmet use

The most effective road safety campaigns have been those that achieve a change in behaviour. It is of course also important to increase awareness and improve attitudes, but lives are actually saved when the desired behaviour patterns are adopted.

New forms of behaviour can often be achieved by regulatory interventions backed up by information and enforcement. When helmet use is made compulsory, it is much easier to persuade people of the value of wearing helmets. Issuing penalties can even be held back in the early stages while people realize that the rules are being enforced.

In rural areas of some countries, where enforcement may be very limited, a campaign based solely on publicity and persuasion in these places is unlikely to be successful in the long term. In the absence of police, local enforcement may be carried out by village councils, community elders or even parents. These alternative enforcers will need to be sufficiently persuaded by the campaign to influence others to wear helmets.

3.6.4 Working with the media

The media – including the printed media, the broadcast media and the Internet – serve various functions in any public education campaign. They will be interested in and will cover the campaign itself – its objectives, contents and progress. They may support it, but they may equally be critical, to the extent even of running a counter-campaign. It is therefore important that the reasons for the campaign are set out clearly and strongly. It could be stressed, for example, that helmets cost very little compared to the costs of injuries, or that the number of head injuries is unacceptably high and could easily be significantly reduced if more motorcyclists wore helmets.

BOX 3.9: Enforcing motorcycle helmet law in Iran

Iran has one of the highest rates of traffic-related deaths in the world, and spends approximately US\$ 6 billion a year on traffic injuries. Motorcycles make up an increasing proportion of the country's registered vehicles – about 40% in 2005. Over half of road traffic crashes involve motorcyclists, for whom the risk of incurring a severe injury or fatality is 10 times higher than for users of four-wheeled vehicles. Almost 70% of motorcycle deaths are from head injuries, frequently as a result of the non-use or improper use of helmets.

Although there has been a law for many years in Iran stipulating that motorcycle users must wear helmets, it was not until 2003 that it was seriously enforced. Beginning with the main roads of Tehran, the capital city, traffic officials stepped up enforcement, increasing by a factor of ten the penalty for non-compliance of helmet use. At the same time, the Tehran municipal council launched a television campaign to raise awareness of the helmet law. As a result, helmet use increased from under 2% in 2003 to around 60% in 2004, and over 95% in 2005. The initiative was then taken to the country's other five major cities, with similar results.

However, in Iran's many small towns the situation was different. Here, about half of all motorists drive unregistered vehicles, and many motorcyclists lack a licence. In order to increase helmet use in these places, research was first undertaken to study motorcyclists and their socioeconomic situation.

The study found significant differences between motorcyclists in small towns and those in the large cities. For some 85% of the population of the smaller towns, the motorcycle is the single family vehicle, and 52% of motorcyclists rely on their vehicle to transport goods. Although 92% of motorcyclists surveyed owned a helmet, only 13% were willing to wear it, reflecting the high proportion – around 72% – who held a negative image of helmet use.

Following this research, a three-year programme has been established between the government and



Promoting helmet usage in the city of Arsanjan, Iran

the Karolinska Institute in Sweden. The *Safe Community Programme on Helmet Use* will use various approaches to increase helmet use in urban areas in Iran. In order to evaluate the programme, intervention cities will be compared to control group cities receiving no intervention. Cities in the intervention group will receive the following:

- an improved system of motorcycle registration, along with increased enforcement of motorcycle registration and driving licences;
- incentives for helmet use, for example, by providing helmets free or at discounted prices;
- strict enforcement of the helmet law;
- identification and banning of defective motorcycles, along with special incentives to repair motorcycles;
- public education on local helmet programmes;
- exhibitions and street carnivals to encourage helmet use;
- safety education for children;
- the active collaboration of driving schools;

Five case cities will be compared with nine control cities. The study's results will help formulate interventions to increase helmet use in all parts of Iran, tailored to the particular needs of individual towns.

Source: 13

If the media are supportive, then they should be used to promote the campaign message. The media are frequently keen to publicize statements from medical personalities, political leaders or the police on the value of helmets and on traffic safety issues in general. The local media can play an equally important role.

An ongoing part of the campaign should be to keep the media regularly informed about its progress and how it is meeting its targets. This can be done either by the government agency or by an external public relations agency.

3.6.5 Creating campaign messages

Before developing the communication messages for a helmet use campaign, the factors restricting helmet use need to be identified, through both local knowledge and market research. The key target groups also need to be determined.

BOX 3.10: The WHO Helmet Initiative: a global resource

Created in 1991, the World Health Organization's Helmet Initiative promotes the use of motorcycle and bicycle helmets worldwide and serves as a resource for those wishing to learn more about them or to promote their use. The Helmet Initiative serves and links public health agencies, safety organizations, nongovernmental organizations and other groups.

The Initiative's most visible feature is its Internet web site, which is primarily a means of communication. It contains *Headlines*, a quarterly magazine with news on helmet research and programmes, innovative strategies for promoting helmets, and helmet laws. There are links to a network of helmet programmes and to other relevant web-based groups and resources. Helmet promotion programmes not already part of this internationally-linked network are invited to join.

Through its web site, WHO's Helmet Initiative provides technical assistance to community programmes and public health agencies seeking information on helmets.

The Initiative also maintains an online database of published articles relating to the design and effectiveness of helmets and strategies for their



promotion. This database, compiled from a comprehensive search of over 500 journals and reports, is regularly updated to incorporate the latest information on helmets.

The improvement of helmet design through research is an activity encouraged by the Helmet Initiative. WHO is particularly interested in the development and promotion of motorcycle and bicycle helmets for use in tropical countries.

WHO's Helmet Initiative is available on the Internet at www.whohelmets.org. Further information can be obtained from this web site, or by e-mail at info@whohelmets.org, or from the local office of the WHO Country Representative.

The principal audience will be *non-users*, and any campaign should attempt to reach the majority of these. An important *secondary* audience is those close to the non-users – such as parents, other family members, employers and teachers – who might influence the non-users and, in any case, want to see them living safely.

The campaign message should:

- be simple, consistent and memorable;
- be appropriate to the conditions of the particular country, including its social and cultural standards;
- not cause offence to any group;
- be relevant to the target group chosen – and not necessarily aim to apply to the whole population.

It is useful to make the message itself the “brand” for the campaign. The product being sold is “Wear a helmet”, not the government agency responsible for the campaign.

While keeping its message consistent, the campaign should adapt its approach for changing audiences. The campaign, for instance, may initially operate in urban areas, or among younger people. Different approaches would then be needed to convey the same message to rural or older audiences.

3.6.6 Setting a campaign schedule

A campaign will usually have a number of stages. These should include some or all of the following, depending on the current situation of helmet legislation and enforcement:

- a *public education* stage to encourage voluntary helmet use by:
 - ▷ explaining why wearing helmets is beneficial;
 - ▷ informing potential wearers about their availability and cost;
 - ▷ giving information on when helmet use will become compulsory.
- an *advisory* stage as the date for the new regulation approaches to:
 - ▷ reinforce the importance of wearing helmets;
 - ▷ explain the penalties for failing to comply with the new regulations.
- a *marketing* stage – probably the single most important stage – that should:
 - ▷ continue to explain why wearing helmets is beneficial;
 - ▷ give further details on the consequences of not wearing helmets, both from the point of view of possible injury as well as from penalty fines;
 - ▷ reinforce the message for those who wear helmets only irregularly.
- a *maintenance* stage to:
 - ▷ reinforce the message for those who wear helmets;
 - ▷ remind those who have become lax in wearing helmets;
 - ▷ continue to explain the consequences of not wearing helmets.

The initial public education stage, before regulation sets in, should be no more than six months to one year in duration, since the initial impact of a campaign that goes on any longer will begin to fade.

The date set for the introduction of the new regulations should be one that is easily remembered.

The marketing stage will have the greatest effect on behaviour, and needs to be continued until its planned outcomes are achieved. However, marketing efforts need not be continuous – periodic marketing will reinforce a message, and is more cost-effective than continuous marketing. Such outcomes, of course, should be realistic and achievable. During this stage, it may be best to enforce the regulations with warnings only at first, though the campaign will become most effective when the regulations are fully enforced.

3.6.7 Carrying out and evaluating the campaign

Depending upon the budget, objectives and target audiences for the campaign, a range of media will usually be employed to convey its messages. Some media are more appropriate than others for a particular target group; newspapers may be better for middle-aged people, for example, cinema films for younger people and radio for those in rural areas. A competent advertising agency will be able to advise on the best way to reach different target groups.

The primary outcome of a helmet campaign is *helmets on people's heads*. This outcome is best measured by regular, independently conducted, observational surveys – before, during and after the campaign. Ideally, surveys should take place at six-monthly intervals during the campaign, and annually once the campaign has reached its maintenance stage. The cost of surveys should be built into the overall cost of the programme.

The survey should be sufficiently large to identify significant differences between different age groups, between men and women, motorcycle riders and motorcycle passengers, cities and smaller towns, urban roads and highways, and different regions of the country. As differences are found in surveys, it may be necessary to adjust the campaign focus more towards those groups with lower helmet-wearing rates.

Other less direct outcomes may also be measurable. These include knowledge and attitudes about helmet wearing, police ticketing rates and – where crash statistics are available – deaths and injuries among riders and passengers of two-wheeled vehicles. Knowledge and attitudes are often slower to change, but can be measured by regular, possibly annual, surveys conducted by interview. As with the observational surveys, these interview surveys should be able to detect differences between population groups. Police and casualty data can also be useful, but they are subject to numerous external influences and may not accurately reflect the effect of the campaign.

BOX 3.11: Campaigning for bicycle helmets

Many of the considerations regarding increased helmet wearing among riders and passengers of motorized two-wheelers also apply to bicycle riders. A campaign promoting bicycle helmet use can generally follow the same processes as outlined in this module. However, there are some special aspects for bicycles that may be incorporated into the campaign.

In most countries, bicycle helmet use is likely to be at a lower level than helmet use on mopeds, motor scooters and motorcycles. For good reasons, the risk for riders of motorized two-wheelers will be perceived as much greater than that for bicycle riders. If the more at-risk group is not seen to be using helmets, it is unlikely that the less at-risk group will adopt them. Therefore widespread use of helmets on motorized two-wheelers is likely to be a precondition for any attempt to increase bicycle helmet use.

The cost of a bicycle helmet may be comparable to that of the bicycle itself. This could make the bicycle helmet appear expensive, if the target group came from a poor segment of the population. Alternatively, the cost could be seen as fairly cheap, if the target

group was relatively well off. Campaign messages should take account of such differing perceptions.

In rural areas with little fast-moving traffic, it will be hard to persuade people that there is much of a risk in not wearing a bicycle helmet. The main danger to cyclists in these areas will generally be from other slow-moving traffic, resulting in falls, rather than from collisions with faster-moving cars, motorcycles, buses and trucks. The message for bicycle helmets should therefore stress the use of helmets in preventing head injuries from falling off a bicycle – the most common means of receiving such injuries – as well as from collisions with other vehicles.

Bicycles are often the main form of transportation for children, especially when they travel on their own. Parents and schools can usefully influence children to wear helmets. A campaign on bicycle helmets can therefore aim to persuade parents to look after their children's safety, and – as role models – to begin wearing helmets themselves. Alternatively, a school might make it mandatory for children to wear helmets when riding to and from school.



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As bicycles are a primary form of transportation in many countries, campaigns that involve schools and parents are important in changing children's helmet wearing behaviour.

3.7 Educating young people

The education of children and young people is an important ingredient within a package of interventions to increase helmet use. While the research on the effectiveness of road safety education in changing behaviour has been inconclusive, what has become clear is that educational approaches that concentrate only on teaching facts are unlikely to be successful. As the examples below illustrate, there has to be a comprehensive package containing several approaches.



NOTE

Increasing helmet use through health counselling

More successful educational approaches include health counselling by trusted professionals such as doctors, nurses or law enforcement officers. In the United Kingdom, one hospital-led promotion campaign resulted in an increase in bicycle helmet use among teens from 11% to 31% self-reported use following the intervention. Hospital casualty figures in the campaign area for bicycle related injuries fell from 112 per 100 000 population to 60 per 100 000 population.

Source: 14

Alongside formal education in schools, peer education is also often effective. One study, using children as educators of their peers, found that persuasive arguments given by older children can significantly influence the behaviour of younger children (15). In another study of factors affecting bicycle helmet use by secondary school students, encouragement by parents and close friends was the factor most likely to induce the correct behaviour (16). Other research has also shown the importance of parental involvement in motivating children to use bicycle helmets (17).

The timing of education campaigns is important to consider. For example, it may be useful to initiate public education around helmet use before new legislation is enforced. Similarly, prior to initiating such campaigns, it must be verified that helmets are available, affordable and convenient and comfortable to use.



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Social facilitation is a powerful technique for moulding behaviour. When children are taught physical or social skills that enable them correctly to carry out a protective action (such as putting on a helmet), they are more likely to perform the correct behaviour later.

The examples in the Boxes and Notes show that campaigns that use education to increase helmet use among children and young people are often combined with other measures, in order to be effective.

The role of schools in promoting helmet use

As community organizations, schools have an important role to play in promoting helmet use. As the examples from Viet Nam and the USA below illustrate, schools are environments in which helmet wearing can be implemented, parents can be persuaded to be supportive, sponsors are often keen to support financially, and that are generally well covered by the media. Programme planners should consider the possibility of the school environment as one to promote helmet use and assist in raising public awareness of the issue.



Bicycle helmet campaigns



A bicycle helmet educational campaign was initiated for children from low-income families in the state of Washington, United States of America (16). The federal-funded *Head Start* programme, that offers health, education and social support, was used to provide free bicycle helmets to young people and to educate both parents and children.

(Continued next page)

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The programme included:

- providing classroom instruction to children on the need to wear helmets;
- educating parents about the risks of head injuries from bicycle crashes, the effectiveness of helmets, and ways to encourage helmet use while children were still young;
- obtaining and fitting a helmet for each child;
- conducting bicycle “rodeo” events, so that children could see other children wearing helmets and practice safe riding skills;
- making bicycle helmet wearing compulsory on school grounds.

Education materials included activity books, posters, games and stories geared to the appropriate age group, as well as multilingual flyers.

An evaluation of the programme showed more than doubling of observed rates of helmet use, from 43% to 89%. Although the risk of bicycle-related injuries was low in this age group, a part of the educational objective was to encourage longer-term use of helmets, through to ages where the risks increased considerably.

NOTE

Educational initiative to increase helmet use in Bangalore, India

The Bangalore-based NGO *Friends for Life*, launched a public road safety awareness campaign to promote the wearing of helmets among riders of motorcycles. The campaign, entitled “Keep your head, Wear your helmet” relied on the internet to create awareness, increase interaction and foster behaviour change. In addition to targeting the public, the campaign used corporate managers to reach their employees. Physicians were also used by posting advocacy materials in their offices and in employee newsletters. Bangalore traffic police placed signs strategically at prominent traffic points and advocates persuaded helmet manufacturers to host music concerts. Although the immediate aim of this programme was to increase helmet use, it has a wider goal of fostering a critical mass of people to influence policy-makers to build safer roads and to develop education schemes for riders and drivers.

Education materials include posters and stickers, logos and computer “wallpaper”. Advice was provided to help independent campaign organisations. Surveys were undertaken before the campaign started to assess the reasons for not wearing helmets. Cost of helmets, poor ventilation of helmets in a hot climate and fashion were all factors to be addressed.

BOX 3.12: Educating children on motorcycle helmet use



Copyright, Asia Injury Prevention Foundation 2004

The Helmets for Kids programme has provided helmets to thousands of Viet Nameese children.

Children in Viet Nam frequently bear the brunt of road traffic injuries. In a society where the motorcycle is the main means of road transport, children are the most vulnerable passengers while riding with their parents. In response, the nongovernmental organization *Asia Injury Prevention Foundation* undertook a safety campaign entitled “Helmets for Kids”. The scheme was launched in 2000 in Ho Chi Minh City by former United States President Bill Clinton.

The campaign includes a comprehensive curriculum on traffic safety for primary schools. The objectives are to ensure that children have a deeply ingrained understanding of safe behaviour in their daily activities and travel, that they understand traffic laws

and transport systems, and that they acquire the necessary skills and attitudes for safe behaviour when later they ride motorcycles themselves. In collaboration with the Ministry of Education and Training, books for pupils and teacher manuals have been produced that are used together with models of streets set up in the classrooms. Each school also has a “traffic corner”, built to provide a realistic setting for practical learning and training. After an initial pilot scheme that produced a positive evaluation, the scheme is being gradually introduced across the country.

Another strand of the campaign consists of raising public awareness, using posters and media publicity. This is aimed at older children and young people. Newspapers feature prominent personalities wearing helmets, and on national television helmets are selectively placed in television dramas and entertainment shows.



3.8 Ensuring an appropriate medical response

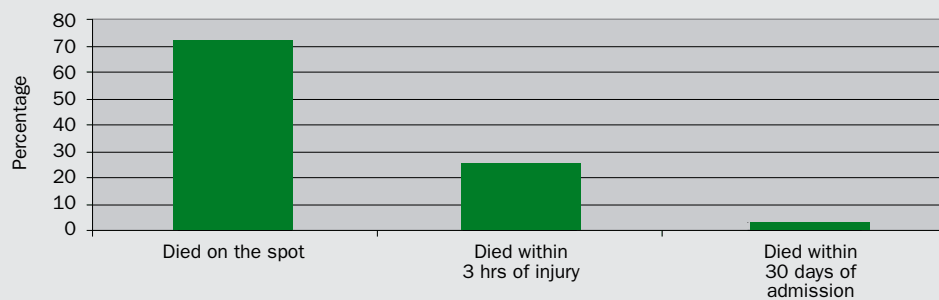
While the primary aim of a helmet programme will be to increase helmet use, it is also important for those planning the programme to consider the response provided in the event of a motorcycle crash (whether or not a helmet is worn by the motorcycle user). A quick and appropriate medical response to the victim of a crash may prevent a fatality, or reduce the severity of the injury suffered. Thus, those designing a programme may want to consider both the first aid response that is likely to be given at the scene of the crash, as well as the preparedness of the formal medical services that will deal with victims of motorcycle crashes.



The importance of a quick response

Research in Malaysia found that the few hours that follow an injury are crucial in determining a victim's outcome. Of the 186 fatally injured motorcyclists included in the study, it was found that 71% of these deaths occurred on the spot, while 25% of the fatalities had occurred less than 3 hours after the occurrence of the crash. Implementing effective pre-hospital and emergency medical service treatment would reduce these deaths.

Death profiles of motorcyclists in Malaysia (data from 2000)



Source: 18

First aid for motorcycle and bicycle crash victims

Riding a motorcycle or a bicycle and being involved in a crash can result in life-threatening injuries – including severe wounds to the head, neck and back which might also lead to unconsciousness and heavy blood loss. Following a crash, a skilled first aid provider can make the difference between the crash victim's survival or death, and can help reduce the consequences of injuries. Immediate on-the scene assistance

is of major importance, especially if the emergency services are absent or delayed, and can be encouraged in various ways.

Legal efforts

Laws and regulations should be introduced promoting good quality first aid, including the following:

- a law removing the threat of litigation against those giving first aid. Many countries provide legal immunity from charges of negligence against a bystander attempting, in good faith, to help a victim (good Samaritan law);
- the mandatory inclusion of first aid knowledge and skills in the requirements for obtaining a two-wheeler driving licence or certificate;
- a requirement for certain vehicles to carry a first-aid kit;
- an incentive for manufacturers or salespeople of two-wheeled vehicles to also provide a first-aid kit, or to support the participation of the buyer in a first aid training course.

First-aid education programmes

First aid education programmes should deliver knowledge and practical skills, as well as a confidence to act. They should teach:

- how to act safely and protect the scene, to prevent further crashes and minimize the risk for those giving assistance;
- how to summon help, report the crash and give relevant information;
- how to make an emergency removal of an injured person from the scene, where this is necessary and possible;
- how to assess the physical state of an injured person, by checking vital functions;
- how to deal with visible bleeding, unconsciousness, breathing problems, wounds and bone trauma;
- how to give psychological support to victims and others who are affected.



Appropriate first aid response can greatly improve the consequences of a motorcycle crash.

Specific first aid for motorcycle and bicycle crash victims

- *Motorcyclists wearing full-face helmets.* A full-face helmet should only be removed if the injured rider does not have a clear airway or cannot breathe. The casualty's head and neck must be stabilized at all times.
- *Cyclists wearing skull helmets* (equivalent to half-head motorcycle helmets). If the face is severely injured, threatening the airway, the casualty should be sat up and bent forward. Stabilizing the head and neck is still essential.
- *Casualties encased in leather.* Bleeding wounds can be hidden from view or disguised by leather garments. If bleeding is suspected, expose the area and apply direct pressure .
- *Head trauma.* If the casualty is unconscious, clear the airway, roll onto a side, keeping the head, neck and body as one unit. This technique should also be performed on conscious casualties who are vomiting or suffering from a face injury.
- *Burns.* In a crash, a rider trapped under the bike may be burnt by extreme heat from the exhaust and engine parts. For all burns it is essential to expose the wound and cool it with clean running water.

BOX 3.13: Ensuring that the emergency medical services are prepared

The primary prevention of any disease or injury is an overriding priority. However, many lives can also be saved following an injury through proper trauma care. This is especially the case in developing countries, where there are high fatality rates from potentially non-life-threatening injuries.

Trauma care, in both prehospital and hospital settings, requires speedy and appropriate action by trained personnel, with proper supplies and equipment. Improving trauma systems has been shown to lower the mortality in all treated trauma patients by between 15% and 20% and to cut the number of preventable deaths by over 50%.

Several recent publications provide technical details of on how to improve trauma care. Two, published by WHO, that are strongly recommended are the *Guidelines for essential trauma care (19)* and *Prehospital trauma care systems (20)*.

Prehospital care

The prehospital stage is an important one to target in efforts to cut the number of road traffic deaths. The care given will depend on the services that exist

1. Situations where no formal Emergency Medical Service exists

A “formal” system of emergency medical services (EMS) is usually one with ambulances and trained personnel, who work in an agency with some supervision and with a network of communications. Where no formal EMS exists, governments should make alternative arrangements to provide prehospital care. Ways can be found to build on existing, informal systems and harness community resources, such as training members of the public in basic first aid. Setting up formal EMS systems in urban areas and along major inter-urban roadways should also be explored. Cost should be one consideration, given the high cost of these systems.

2. Strengthening existing EMS systems

Many EMS systems could be strengthened in a number of ways, for example, by establishing a regulatory agency to promote minimum standards for the delivery of prompt, quality and equitable prehospital care; or by streamlining communication between sites where calls are received (such as alarm centres) and the sites of ambulance dispatch, as well as between different ambulance services; and by keeping good records on people

cared for by the EMS, so as to monitor and improve the quality of care.

Essential trauma care

Improvements in trauma care need not necessarily involve high-cost, high-technology equipment. Much can be accomplished in an affordable and sustainable way through better planning and organization.

The essential trauma care services and the resources required for them can be promoted in several ways, including through needs assessments of trauma care requirements, through training in trauma care provided in appropriate educational settings, through quality improvement programmes that consider the entire trauma facility setting; and through the inspection of trauma facilities (19).

Rehabilitation

Many of those who survive injury go on to develop physical disabilities that limit their physical functions. Tragically, many of these consequences are avoidable and can be reduced by improving rehabilitation services. Rehabilitation services are an essential element of trauma care, and can be improved by conducting more in-depth needs assessments for injury-related rehabilitation, by strengthening the capabilities of national rehabilitation programmes, and by implementing the recommendations of World Health Assembly Resolution WHA58.23 and the recommendations on rehabilitation in the *Guidelines for Essential Trauma Care (19)* into a country's health policy.



Setting up an EMS system may not be feasible for many countries, but alternative prehospital care arrangements can be developed.

Summary

- This module provides an overview of the steps necessary to design an effective programme aimed at increasing helmet use –in turn decreasing motorcycle-related head injuries and fatalities. As stressed throughout the module, an effective programme depends on a combined approach using legislation, standards, education and enforcement.
- A working group should be set up to oversee the formation of a helmet use programme. Consisting of individuals from a range of relevant backgrounds and disciplines, this working group will advise on all matters of the programme and ensure the necessary coordination between its different activities. The group should have the authority to carry out the programme.
- Once a working group is established, the results of the situational analysis can be used to plan the programme. Activities can then be defined, in the areas of legislation, enforcement and education. Alongside each activity, programme goals and objectives should be set.
- Funding needs to be secured for the programme so that it can be effectively implemented. Monitoring the programme throughout its various stages is essential, to identify shortcomings and correct them. Finally, an outcome evaluation should be carried out to determine whether the programme has been effective. Based on this, future programmes can be built, sustaining the impact of the initial programme.
- Appropriate legislation is an important step to increasing helmet use. An initial assessment of the current legislative situation will help decide whether a new law is needed or simply a revision to an existing law. It is important to identify how, when and where the new law will be implemented. Legislation should be promoted by the highest levels of government to ensure that it has the support of enforcement agencies and a proper legitimacy among the public.
- Standards for motorcycle helmets should be developed to ensure access to quality safety equipment. Standards – of design and materials used – should be set so as to give motorcyclists a high level of protection in the event of a crash. They should also be set in such a way that manufacturers have the flexibility to produce a range of helmet designs that will appeal to the public and help encourage their use.
- Both voluntary and compulsory measures can be used to increase compliance with a helmet law. Indeed, continuous and fair enforcement of the law are essential for raising rates to a significant level. This calls for a strong commitment from both the government and the enforcement agency. Existing enforcement agencies should be evaluated, to see if their capacity needs to be increased. A plan for penalizing motorcyclists who break the law on helmet use should be devised. Penalties can take the form of warnings, fines or the confiscation of licences or of motorcycles.

- Together with legislation and enforcement, a well-designed marketing and publicity campaign is essential for the success of a helmet use programme. To meet these objectives, a good marketing or advertising agency may need to be taken on to create an effective communication campaign. Communication should be aimed at motorcyclists not using helmets, as well as a secondary audience with the potential to influence the non-users. The messages should be simple, consistent and memorable – and appropriate to the social and cultural standards of a particular country.
- There is an important role for school education and peer education among young people. Educational programmes, combined with other activities, can help shift behavioural norms towards making helmet use more acceptable.
- When designing a helmet use programme, practitioners should consider the post-crash response to motorcycle injuries. This involves addressing the appropriateness of first aid services, and examining the capacity for provision of pre-hospital care, essential trauma care, and rehabilitation services to provide for motorcycle crash victims.

Table 3.8 summarizes the main steps in the process of implementing a helmet programme.

Table 3.8 Checklist for designing and implementing a helmet programme

Activity	Steps in design and implementation
Establishing a working group	<ul style="list-style-type: none"> • Ensuring all those with an interest are represented • Assigning roles to members
Developing an action plan	<ul style="list-style-type: none"> • Defining objectives • Setting targets • Articulating activities for each objective • Defining performance indicators for activities • Estimating resources • Setting a timeframe • Articulating how the programme will be monitored and evaluated. • To ensure sustainability of the programme, include at least a 5 year timeframe in overall planning and a plan for longer term funding
Developing legislation	<ul style="list-style-type: none"> • Consideration of institutional or cultural constraints • Selection of objectives • Drafting of legislation • Approval of legislation • Implementation of legislation
Developing enforcement strategy	<ul style="list-style-type: none"> • Assessment of capacity to enforce • Increasing policy capacity if necessary • Training police in enforcement • Creating a penalty system
Developing public awareness campaign	<ul style="list-style-type: none"> • Choice of communication agency • Selection of campaign objectives • Selection of campaign message • Delivery of campaign • Evaluation of campaign
Implementing overall helmet-use programme	<ul style="list-style-type: none"> • Assessment of helmet use • Identification of problem • Selection of objectives • Selection of corresponding activities • Launch of programme • Monitoring of programme • Evaluation of programme's effectiveness • Planning of future programmes
Ensure appropriate response at and after scene of the crash	<ul style="list-style-type: none"> • Encourage appropriate first aid to victims of motorcycle and bicycle crashes through appropriate legal framework and delivery of first aid education programmes. • Consider the prehospital care, essential trauma care, and rehabilitation services that are required and existing capacity to respond to these needs.

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4

**How to evaluate
the programme**

How to evaluate the programme

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MONITORING AND EVALUATION of any programme or intervention is vital to determine whether it works, to help refine programme delivery, and to provide evidence for continuing support of the programme. Evaluation will not only provide feedback on the effectiveness of a programme but will also help to determine whether the programme is appropriate for the target population, whether there are any problems with its implementation and support, and whether there are any ongoing concerns that need to be resolved as the programme is implemented.

This module describes the process of developing and conducting an evaluation of a helmet programme. It is divided into three key sections:

- **4.1 Planning the evaluation:** This important initial stage involves collecting data, in a baseline study, to assess the situation before going on to develop the programme. Based on the information collected, it is then necessary to define the aims of an evaluation, and to consider the different types of evaluation methods that could be used for your evaluation.
- **4.2 Choosing the evaluation methods:** Once the type of evaluation has been determined, there are different methods that can be applied to carry out an evaluation. This section describes the different study types possible, explaining the advantages and disadvantages of each type of method. It outlines the types of performance indicators that can be used to measure the success of a programme. This section also briefly describes how to conduct an economic evaluation, and provides guidance on calculating sample size.
- **4.3 Dissemination and feedback:** This section describes how to feed the result of an evaluation back into the planning and implementation stages, as well as ways that the results of an evaluation can be shared with different interested parties.

4.1 Planning the evaluation

The process of designing and implementing a helmet programme was covered in Module 3. Work carried out prior to implementation should ensure that the programme is clearly defined and that it is implemented in a consistent and standardized way. It is far easier to evaluate the impact of a complete, well-planned and executed programme than one that is implemented in an inconsistent way.

It is essential that the evaluation framework is developed and implemented alongside the proposed programme. Thus, this work would be carried out by the working group as they develop the action plan for the programme (see Module 3). Baseline measures need to be collected *before* the intervention is put in place so that change in such measures over time may be gauged.

The type of evaluation to be conducted will depend on a number of factors. These include the aims of the evaluation itself, as well as the objectives of the programme being evaluated. The type of methodology chosen may also depend on resource constraints.

4.1.1 Aims of evaluation

Determining the aims of the evaluation will help to determine how best to carry out the evaluation. The evaluation may have one or more aims. For example, an evaluation of helmet legislation and increased enforcement programme may primarily be aimed at determining whether helmet-wearing rates have gone up as a result of the programme. However, secondary aims may include determining whether the enforcement has increased, whether training of police is effective, and whether the programme is acceptable to the stakeholders. The evaluation in this case needs to be multifaceted.

The breadth of an evaluation will always be limited by the resources available and a well designed simple evaluation can be as powerful as a more complex one.

4.1.2 Types of evaluation

Evaluation may take several forms, and one or more may be appropriate, depending on the aims of the specific programme to be evaluated.

Process evaluation

Rather than measuring change in outcomes this aspect of evaluation examines whether the programme was carried out as planned. This involves creating a list of indicators that need to be measured, depending on the aims of the programme. The results will help to identify the strengths and weaknesses of the programme, and where improvements may be made.

For example, in a media campaign designed to increase voluntary use of helmets, a process evaluation may ask these sorts of questions:

- Have the campaign products (posters, billboard, radio and television spots) been pre-tested?
- How often were the campaign advertisements run?
- How many people saw them?
- Was the target group being reached?
- Are high-quality helmets available and affordable in local shops?
- If the intervention involves enforcement of helmet legislation:
 - ▷ Is there noticeable enforcement by police?
 - ▷ Are the police supportive of the campaign?
 - ▷ Is the penalty sufficient to change behaviour?

- ▷ Are people able to circumvent the process (for example, using bribery)?

Process evaluations are what are known as “formative”. That is, the enquiries carried out are designed to provide information to guide programme improvement (*I*). For example, it may be considered important to determine whether the TV adverts shown as part of a helmet programme are appropriate – do they adequately address the issue, are the helmets advertised actually available for purchase in the region where the adverts will be seen?

Impact assessment

This will determine whether the advertisements have brought about a change. The impact, or programme effect, refers to a change in the target population that has been brought about by the programme – that is, a change that would not have occurred if the programme had not happened (*I*). For example, if the helmet programme involved airing television advertisements on helmet use, the impact assessment might examine whether people who had seen the advertisements believe that there is a good chance that they will be fined by the police if they do not wear a helmet. Unlike a process evaluation, this would tend to take place at the end of a programme, as the focus would be on the outcome.

Outcome evaluation

This is where the outcomes are measured to see if the programme was successful. Are more people now wearing helmets than before? Have head injuries been reduced? Are more children wearing helmets to school? Measuring a change in outcomes is probably the most common form of evaluation as it provides information as to whether the programme or intervention has actually made a difference.

4.2 Choosing the evaluation methods

The methods used for each type of evaluation will vary. Both qualitative and quantitative methods can be used within the design of an evaluation. Qualitative methods may be employed for the formative, and process evaluations, e.g. focus groups, short-answer or open-ended questionnaires.

Impact and outcome evaluations may be carried out using a variety of quantitative methods. Using an experimental or quasi-experimental design to demonstrate a change (or not) is the most powerful programme evaluation for detecting changes in outcome. The type of methods used will depend on the aim and the budget for the evaluation.

4.2.1 Study types for formative and process evaluations

Qualitative studies

Qualitative research tends to involve detailed, verbal descriptions of characteristics, cases, and settings to explain reasons underlying various behavioural patterns. Specific techniques include using focus groups, in-depth interviews, or surveys with short answers or open-ended questions (2, 3). For example, a question in a formative evaluation of a media campaign aimed at increasing helmet use may be whether the television advertisements address the question. Focus groups may be set up to determine whether the audience believes that the message from the television advertisements is appropriate. Feedback will further enhance the development of the advertisement.



Researchers in Ghana evaluated the effectiveness of televised road safety messages on speeding and alcohol impaired driving (4). Focus groups were conducted with 50 commercial drivers and addressed coverage, clarity and appropriateness of messages, including suggestions for improvements. The advertisements reached, and were understood by most of the target audience, although some participants were unclear on the behaviour that the advertisements were telling viewers to take. Opportunities for strengthening the messages included using other media, increasing the number of languages, and stressing the change in behaviour being recommended.

4.2.2 Study types for impact and outcome evaluations

There is a well defined hierarchy of study designs for examining the effectiveness of interventions. These range from randomised control trials, which provide a high level of evidence, to uncontrolled before–after studies which provide very weak evidence about the effectiveness of an intervention.

Randomised control trial (RCT)

The gold standard of evaluation, the randomised control trial will provide the highest quality level of evidence that an intervention or programme is successful. A RCT design means that individuals or groups of individuals (e.g. a school, or village, known as a cluster randomised trial) are randomly allocated to either receive, or not receive, the programme. As participants (or groups of participants) are randomly assigned to one group or another, other factors that may influence the outcome – measured and unmeasured – are more likely to be balanced between the intervention and non-intervention group. However, although RCT designs should always be considered when evaluating effectiveness of an intervention, they do

require significant resources and may be difficult to conduct with a limited budget. There may also be ethical considerations in randomising an intervention with known benefits (that is, in denying an effective intervention to those participants who will be in the non-intervention group).

It is important to note that there is no need to conduct a randomised controlled trial on the effectiveness of helmets themselves as part of your helmet programme. There is sufficient evidence from a number of studies that clearly demonstrate that helmets are effective at reducing the head injuries and fatalities that result during motorcycle crashes (see Module 1).

NOTE**Evaluation using a randomised controlled trial**

A randomized control trial was conducted in 27 schools in Western Australia to assess the effectiveness of a whole-school intervention to increase the correct wearing of bicycle helmets by primary school children (5). Schools were randomly allocated to either intervention or control conditions; the main component of the programme was peer-led classroom curriculum for 10–12 year old children. Helmet use was observed at baseline, and at one and two years following the intervention. Observed wearing rates declined by 13% in the control group compared to 5% in the intervention group ($p=0.185$), suggesting that while school-based activities may not increase helmet use, they may arrest the rate of decline in helmet use in children.

Quasi experimental designs

These study designs, while not as rigorous as randomised trials, if well conducted, may also be used to establish the effectiveness of an intervention. That is, using the information collected on trends of the indicators measured, these studies allow conclusions to be drawn as to whether or not the intervention (the programme) is associated with change in the outcome.

Controlled before-after study

This is often the most practical design for programme evaluation. Randomisation is not always feasible, for example where some areas have already adopted an intervention. The controlled before–after study design involves observing the outcome of interest (e.g. helmet-wearing rates) before and after the programme in both the people who receive the programme, and those in a control group. The control group should be as similar as possible to the programme group and any important differences between the groups need to be taken into account. Having a

control group means that trends that may have been occurring in the population aside from what was happening due to the programme are taken into account.



Evaluation using a controlled before-after study

A controlled before-and-after study was used to evaluate a subsidy programme to increase bicycle helmet use by children of low-income families (6). The population included were bicycling children 5 to 14 years of age from areas of low average family income in a defined geographic community within a large urban Canadian city. Students in three schools located in the area of lowest average family income were offered helmets at \$10 each, and were provided with an educational programme; three other low-income areas served as control areas. Helmet use was measured by direct observation of more than 1800 bicycling children. Results from the study showed that although 910 helmets were sold to a school population of 1415 (64%), and reported helmet ownership increased from 10% to 47%, observed helmet use in the low-income intervention area was no different from the rate in the three low-income control areas (18% versus 19%). The authors concluded that the results do not support the efficacy of a helmet subsidy programme in increasing helmet use in children residing in areas of low average family income and that developing other strategies to increase helmet use in children of low average family income should be a priority.

Interrupted time series design

It is possible to assess the effect of a programme by using multiple measures of the outcome of interest before and after the programme. There are a number of different variations on this design, some involving control groups. Studies that have used these designs generally use routinely collected measures such as death rates, as multiple measures are required for appropriate analysis. This study design is, however, subject to time related challenges to its validity: the possibility that other factors occurring simultaneously to the programme actually led to the observed effect. However, statistical analysis of such data can take into account any such secular trends, meaning that it is possible to establish whether the intervention or programme was responsible for the change in outcome.

Before–after study (no control group)

The before–after study without a control group is often used to evaluate the impact of a programme, but provides the weakest evidence for the effectiveness of a programme. This design involves measuring the outcome of interest before and after the programme has been run. This study design is simple, and may be

conducted relatively cheaply as all that is needed is a sampling frame and research assistants to conduct observations at various sites. However, without a control group, the scientific merit of these study types is relatively limited as it is often difficult to attribute with any certainty the change in outcome to the introduction of the programme.

NOTE**Evaluating a poster and TV helmet campaign in Cambodia**

In 2004 Handicap International launched a series of helmet-use awareness campaigns, in collaboration with the Cambodian Ministry of Health, the World Health Organization, UNICEF, UNESCO and the Belgian Cooperation. The main campaign featured international film star Jackie Chan. The campaign targeted young people, who represent 50% of road traffic casualties in the country's capital, Phnom Penh, and used television spots and posters to illustrate Chan's use of a motorcycle helmet. Several helmet-wearing surveys conducted before and after the campaign allowed the organisers to evaluate the campaign's success. Prior to the campaign, the average helmet wearing rate, assessed at 20 locations over a 4-day period in the city, was 8%. Following the campaign's implementation, a year and a half later, this level had risen to 14.7%.



Jackie Chan, goodwill ambassador for UNICEF, promotes helmet use in Cambodia.

Source: 7

Table 4.1 Study types and their advantages and disadvantages*

	Formative and process evaluation	Impact and outcome evaluation	Pros and cons
QUALITATIVE			
Focus groups/in-depth interviews	✓ – formative – process	✓ – outcome	– Can provide information on why intervention may or may not have worked – Cheap – Sample (participants) are not random sample – Results are not generalisable
QUANTITATIVE			
Randomised controlled trials		✓ – impact ✓ – outcome	– Most rigorous evidence – Expensive – Randomisation not always feasible
Controlled before–after study		✓ – impact ✓ – outcome	– Most practical design – Must have comparable control group
Interrupted time series design		✓ – impact ✓ – outcome	– Practical design if sufficient numbers of events and accurate surveillance systems in place
Before–after study (no control group)		✓ – impact ✓ – outcome	– Cheap – Low level of evidence

* Further detail about study types is available in references 8 and 9. There is also a useful online glossary of epidemiological terms at www.cochrane.org/resources/glossary.htm

4.2.3 Choosing the performance indicators

Performance indicators (or outcome measures) are a measure of how successful the programme has been. Choice of performance indicators will be determined by the aims of the evaluation, the study type used, the resources available and, to a certain extent, the requirements of the funding agency. For instance, government funding agencies may require certain information to ensure support for increased enforcement or for further roll-out of a programme.

Injury and death outcomes

The effectiveness of both motorcycle and bicycle helmets in reducing crash-related head injury and death has been well documented in many studies including two Cochrane systematic reviews (see Module 1) (10,11) and there may be no need to replicate these findings in a large scale (and possibly expensive) piece of experimental research. However, much of this effectiveness research has been conducted in high-income countries (predominantly the USA) where high-quality helmets are

common. There is very little published research examining the effectiveness of light weight or locally developed helmets in reducing injury and death in low- and middle-income countries, particularly with regard to motorcycle helmets. Further research in this area is important as use of such helmets is increasing.

It is possible to use routinely collected data to calculate head injury and death rates. However, the efficiency with which such rates can be calculated depends on the accuracy of local surveillance. If there is a uniform capture, coding and reporting system already set up in hospitals and/or health departments there may be aggregated data available on head injury, serious head injury or motorcycle crash-related head injury. Otherwise this may need to be abstracted from local data sources. Similarly, motorcycle crash and/or death data may be routinely collected from police or transport authorities.

As quality may be variable, completeness and accuracy of these data sources should be carefully checked before use.

Helmet-wearing rates

Another appropriate performance indicator is the proportion of riders wearing helmets. Observations of riders may be made at a number of sites before and after a programme to document whether helmet-wearing rates have changed.

Calculating rates

Comparing changes in absolute numbers in injury and death outcomes, or in riders wearing helmets, before and after a programme is not useful, as absolute numbers may change due to an increase or decrease in the numbers of riders, registered or otherwise. It is therefore important that rates be calculated. Denominators may include number of riders, registered bikes, or kilometres travelled. For example, for injury outcomes a rate may be number of injuries per licensed riders, or number of injuries per 100 000 km ridden. For helmet use, the appropriate rate would be the proportion of helmeted riders over total riders observed. Note that it is preferable to use a population denominator (e.g. per 100 000 population), rather than the number of motorcycles as a denominator. This is because the rapidly increasing use of motorcycles in many countries may distort the results of an evaluation, if this latter measure is used.

Module 2 includes a detailed section on how to measure helmet-wearing rates.

4.2.4 Conducting an economic evaluation of a programme

It may also be necessary to conduct an economic evaluation to demonstrate 'value for money' and possible cost savings for government by investing in prevention. Economic evaluation addresses the question of whether one intervention represents a better use of resources than another. In other words, does spending \$x on programme A represent a better investment than \$y on programme B? To address this sort of

question, it is apparent therefore that a comparison of two or more options is needed (sometimes this comparison is with a 'do nothing' or 'status quo' alternative).

Economic evaluation is based on the comparison of alternatives in terms of their costs and consequences (12). The term 'consequences' is used here to represent an outcome of value. There are various forms of economic evaluation that can be conducted – each differing in terms of scope, i.e. the range of variables included in the analysis. Importantly, each form of economic evaluation typically entails a set of starting assumptions; recognition of these is necessary for the policy-maker to make appropriate use of the evidence from such studies.

A common element across all forms of economic evaluation is that they involve measuring costs. Costs usually comprise, at least in part, the direct programme costs – the resources that are used to run the programme (e.g. equipment, staff, consumables). However, in principle, other costs may also be relevant such as those incurred by patients, carers and the wider community. Furthermore, there are 'downstream' costs and cost savings that may enter into consideration e.g. a programme may result in reduced hospitalisations and these savings in resources may be deemed relevant. The type of costs selected generally depends on the perspective taken in the evaluation and the nature of the resource allocation problem being addressed.

Methods used in economic evaluation

The most common form of economic evaluation is **cost effectiveness analysis** (CEA). This entails the total cost of programmes alongside a defined outcome to produce a 'cost-effectiveness ratio' (e.g. cost per life saved, cost per life year saved or cost per case prevented). The assumption in CEA is that the objectives of interventions being compared are adequately captured in the measure of outcome used (13). One modification to conventional cost effectiveness analysis is cost-utility analysis which is based on an outcome measure, Quality Adjusted Life Year (QALY), that incorporates change in survival and quality of life and thereby enables a wider set of interventions to be legitimately compared than would be possible with CEA.

Another form of economic evaluation is **cost-benefit analysis** (CBA) which seeks to evaluate interventions in terms of total costs and total benefits – both dimensions being valued in monetary terms (e.g. dollars). Therefore if benefits are greater than costs, the decision would be to fund the programme. Valuation of health benefits in this way can be challenging, but one approach would be to elicit from beneficiaries of programs their maximum willingness to pay for these benefits (i.e. if they had to pay for it in a hypothetical market place). The idea behind this approach is to derive a valuation for an intervention akin to the way in which consumers value goods and services in markets.

Choosing the appropriate type of economic analysis for the needs of the particular programme will depend on resources available (both economic and human resources), and the aims of the evaluation. Taking quality of life into account is a powerful

measure for evaluations of motorcycle crashes where lifelong disability resulting from serious head injury is an outcome.

4.2.5 Determining sample size

For all quantitative study types it is important to have sufficiently large numbers in the study to be sure that if an effect exists it is detectable. The rarer the event, the greater the sample size needs to be in order to detect a difference. Serious injuries from motorcycle crashes are relatively rare events and a study using serious injury or death as an outcome would involve a large sample size. Measuring helmet-wearing rates requires a smaller number of participants.

Factors that must be taken into consideration in determining the sample size are the expected size of the effect to be detected, variability in the measures, and the prevalence of the variable of interest. For a cluster randomised trial, sample size calculations will also take the size of the cluster and correlation within clusters into account. For further information on sample size calculations for cluster randomised trials see reference 14.

Sample size calculators are freely available on the internet*, but it is wise to consult a statistician regarding such estimates, particularly where cluster randomised trials or random and/or stratified samples are necessary.



Economic evaluation

A study was carried out to compare cost effectiveness for three different programmes aimed at increasing bicycle helmet use in children between the ages of 5 and 16 (a legislative programme, a community-based programme and a school-based programme). Over a four-year period, it took account of the direct costs of the programme (costs of helmets and other programmatic costs) and the savings in health care expenditures due to prevention of bicycle-related head injury. The outcomes were head injuries prevented, deaths averted and years of life saved and were modelled on the basis of avoided cases, expected cases, increased risk of bicycle-related head injury from not wearing a bicycle helmet during a crash, and the pre- and post-intervention prevalence of not wearing a helmet. Overall, the legislative programme appeared to be the most cost effective, followed by the community-based programme and then the school-based programme (15).

* Links to online sample size calculators may be found at <http://calculators.stat.ucla.edu/sampsize/php> or alternatively the statistical package Epi Info™ may be downloaded at <http://www.cdc.gov/epiinfo/>. A sample size calculator for cluster randomised trials may be found at www.abdn.ac.uk/hsru/epp/cluster.shtml

Statistical Analysis

For quantitative study designs data will require statistical analysis. For more advice on how to go about this refer to reference 8, or see the relevant lectures in the basic methods and injury sections at www.pitt.edu/~super1.

4.3 Dissemination and feedback

Once an evaluation is complete it is important to provide feedback to the stakeholders involved in the programme. Dissemination of the results will help to garner further support for the programme if it is successful, and help others gain support for the introduction of similar programmes. Publicity from dissemination activities may also increase the impact of the programme. If the programme has not been successful it is important to share this with others so that weaknesses or relevant issues are considered in other similar interventions, including whether or not to introduce such interventions.

Dissemination may involve presenting the results at public meetings, using the media to publicise the outcomes of the programme, or publishing reports and papers in the scientific literature.

Checklist

- Start evaluation process at the beginning of programme implementation.
- Determine aim of evaluation and develop evaluation framework.
- Clearly define target population, place and time.
- Develop and test instruments for data collection, ensuring consistency in training and measurement.
- Collect and analyse data.
- Write and disseminate evaluation report, feeding back into various aspects of programme.

Using evaluation results to feed back into new planning cycle

Consider whether the evaluation demonstrated any tangible benefits – should the programme be continued, or does it require disbanding or modification? Can the existing programme be improved on the basis of the evaluation? Have there been any unexpected side effects of the programme?

The results of the evaluation should be fed back into the planning cycle and the appropriate modifications to the programme made before it is further expanded (Box 4.1).

BOX 4.1: Increasing bicycle helmet use in schools in Malaysia

Bicycle fatalities constitute about 4% of all road traffic fatalities in Malaysia. The majority of these deaths result from head injuries and tend to occur in rural areas. Until the 1990s, the use of bicycle helmets was rare in Malaysia. The first bicycle helmet programme was launched in 1995 by the Malaysian Helmet Initiative, a consortium of university, governmental and nongovernmental organizations that promotes the use of motorcycle and bicycle helmets. With support from corporate funders, the programme is a model of how different sectors can work together to prevent head injuries.

The bicycle helmet programme was a multisectoral initiative carried out by the country's Road Safety Council at both state and district levels, and targeting rural children through local schools.

Children who cycled to school were trained in the proper use of helmets, which were provided free to those in the programme. With their parents also consenting, the children promised to use their helmets at all times when cycling. Their compliance in helmet use was assessed by the students themselves, through questionnaires on the use of the helmets, and through their reports on any crashes they were involved in while cycling. Compliance was also confirmed by the school authorities and by the programme organizers, who made unannounced monthly "spot checks" on children cycling to or from school.

The results showed that compliance among the students involved ranged from 31% to 98% across the various schools. The commitment of school authorities to the programme was considered a vital ingredient for sustaining the commitment of the children involved. When asked why they didn't use helmets, children reported pressure not to do so



Students are shown how to fit their bicycle helmets as part of this broad campaign to increase helmet use in Malaysian schools.

© Malaysian Helmet Initiative 2005

from their peers, a lack of storage space at school for the helmets, and their unappealing colour.

The lessons learnt from these early programmes were incorporated into subsequent ones. Children were charged a small fee for their helmets (rather than receiving them free of charge), there was an expanded choice of colour and design of the helmets, and suitable storage places for helmets were arranged in schools. Community partners have been brought into the programmes and strenuous efforts made to ensure that the school authorities sustain their commitment to the initiative.

Since the initial programme was launched in 1995, many of the schools involved have expanded their programmes, and at least one bicycle helmet programme is now running in each state of Malaysia. In total, about 4000 students in 50 schools and about 200 teachers have been involved in these efforts aimed at reducing head injuries among children using bicycles.

Summary

- Evaluation should be seen as an integral component of any helmet programme. An evaluation needs to be determined at the beginning of a programme development, such that the plan for data collection for this purpose is built into project implementation. As well as providing information on the effectiveness of a programme, evaluation will help identify if there are any problems in running a programme.
- Determining the aims of the evaluation will help to decide how best to carry out the evaluation. There are a number of different methods that can be used to evaluate a helmet programme. Each method has various advantages and disadvantages, and the choice of which to use will depend on the aims of the helmet programme, and the resources available.
- It is important that the results of the evaluation are shared with the appropriate parties, and that they are used in planning of the programme.

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Glossary of terms

Acceleration–deceleration injuries: injuries that occur when a person's head is moving, and then hits an object, such as the ground, as in a motorcycle crash. The head's forward motion is stopped, but the brain, having its own mass, continues to move forward until it strikes the inside of the skull. It then rebounds striking the opposite side of the skull.

Bicycle helmet: A bicycle helmet is specifically designed to provide head protection for cyclists when the cyclist falls off the bike and hits the ground. They are not designed to provide adequate protection for a collision involving another moving vehicle (e.g. a car) or a collision at high speed, although they do provide some protection. A cycle helmet should not be too heavy and should provide adequate ventilation, because cycling can be an intense aerobic form of exercise which significantly raises body temperature. Thus, most helmets are constructed from lightweight materials pierced by strategically placed ventilation holes.

Brain contusion: damage to the nerves or blood vessels of the brain.

Closed head injury: injury where there is no open wound to the brain, often resulting from an impact which jars the brain in the skull. The movement of the brain within the skull may result in bruising, swelling, tearing of the brain tissues, nerves or blood vessels.

Cost: Use of resources that have alternative uses. Costs are generally measured in monetary terms, but the concept of cost includes any use of resources, not just direct out-of-pocket expenses (1).

Cost-benefit analysis: A formal analysis of costs and benefits of a programme, in which all relevant impacts are converted to monetary terms (1).

Cycle: A road vehicle which has two or more wheels and is propelled solely by the muscular energy of the persons on that vehicle, in particular by means of a pedal system, lever or handle (e.g. bicycles, tricycles, quadricycles and invalid carriages) (2).

Concussion: a head-trauma-induced alteration in mental status that may or may not involve loss of consciousness.

Diffuse axonal injury: injury to the axons in the brain that can have serious long term consequences.

Disability: any restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being.

Emergency medical services (EMS): the services provided by trained personnel using adequate equipment soon after an emergency. EMS services for injuries aim to reduce the rates of death from potentially life-threatening injuries. These services include the care provided before the person reaches the hospital (prehospital EMS, such care delivered in the field and transport to a fixed site of definitive care), and the medical care provided in a hospital-based setting.

Evaluation: an on-going process to assess the effectiveness of a programme in achieving its objectives. Evaluation also aims to identify problems that may arise with the implementation of a programme, so that concerns are fed back into the planning process and modifications can be carried out during the implementation. An evaluation is usually designed to try to distinguish the effect of a programme from those of other factors.

First aid: emergency treatment administered to an injured person at or near the injury site, prior to receiving professional medical care.

Head injury: injury to the head that may damage the scalp, skull or brain. Head injury may occur either as a closed head injury (e.g. the head hitting a car's wind-shield) or as a penetrating head injury (e.g. when a bullet pierces the skull).

High-income country: For the purpose of this document the World Bank classification has been used to classify countries, based on Gross National Income (GNI) per capita. A high-income country is one whose GNI is US\$ 9076 or more (3).

Intracranial haemorrhages: internal bleeding, which can occur in different areas of the head or brain.

Legislation: Acts or provisions that have the force of law, i.e. that give the police the right to enforce and courts of law the right to impose penalties (1).

Low-income country: For the purpose of this document the World Bank classification has been used to classify countries, based on Gross National Income (GNI) per capita. A low-income country is one whose GNI is US\$ 735 or less (3).

Middle-income country: For the purpose of this document the World Bank classification has been used to classify countries, based on Gross National Income (GNI) per capita. A middle-income country is one whose GNI is between US\$ 736 and US\$9075 (3).

Motorcycle helmet: A motorcycle helmet is a type of protective headgear used by motorcycle riders. Helmets are usually made of a hard substance (usually a type of plastic) that will afford protection from high speed collisions and falling objects. The primary goal of a motorcycle helmet is to protect the rider's head during impact, although many helmets provide additional conveniences, such as face shields, ear protection. Motorcycle helmets are generally designed to break in a crash (thus expending the energy otherwise destined for the wearer's skull), so they provide little or no protection after their first impact

Motorized two-wheelers: a two-wheeled vehicle powered by a motor engine – such as a motorcycle or moped.

Open head injury: injury which involves a fracture or penetration of the skull. May result in brain injuries.

Prehospital care: The care provided to reduce the effects of trauma or injury before the injured person reaches a hospital-based setting (see EMS). This includes the formal response provided by trained and equipped personnel, as well as the bystanders' response provided by lay people.

Risk: The possibility of an unwanted event occurring.

Risk factor: A factor which affects the probability of a crash or collision occurring or influences the severity of the consequences which arise as a result of the event.

Road traffic accident: a collision involving at least one vehicle in motion on a public or private road, that results in at least one person being injured or killed (2).

Road traffic crash or collision: an incident, involving at least one moving vehicle, that may or may not lead to injury, which occurs on a public road.

Road traffic fatality: a death occurring within 30 days of the road traffic crash (2).

Road traffic injuries: fatal or non-fatal injuries incurred as a result of a road traffic crash.

Road user: a person using any part of the road system as a non-motorized or motorized transport user.

Surveillance: systematic ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken.

Traumatic brain injury: any injury to the brain resulting from the application of external forces to the skull. Traumatic brain injury can lead to a spectrum of problems including concussion, contusion (haemorrhage within the brain), or diffuse injuries that cause more severe neurological damage.

Vulnerable road users: road users most at risk in traffic – such as pedestrians, cyclists and public transport passengers. Children, older people and disabled people may also be included in this category.

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Partner organizations in the development of the manual

World Health Organization (WHO)

As the United Nations specialized agency for health, the World Health Organization aims to integrate road safety into public health programmes around the world in order to reduce the unacceptably high levels of road traffic injuries. A public health approach is used, combining epidemiology, prevention and advocacy. Special emphasis is given to low- and middle-income countries where most road traffic crashes occur. In recent years WHO has focused its efforts on the implementation of the recommendations contained in the *World report of road traffic injury prevention*, which it co-produced with the World Bank, and in particular on addressing the main risk factors for road traffic injuries. Following a United Nations General Assembly resolution on road safety, adopted in 2004, WHO acts as a coordinator for road safety initiatives within the United Nations system, and to this end has facilitated the development of the United Nations Road Safety Collaboration – a group of over international road safety organizations, including many United Nations agencies. This coordinating role was further endorsed by a fourth UN General Assembly resolution, adopted in 2005.

Address: World Health Organization, 20 Avenue Appia, CH-1211 Geneva 27, Switzerland

URL: www.who.int/violence_injury_prevention/en/

Contact person: Margie Peden, Coordinator, Unintentional Injury Prevention, Department of Injuries and Violence Prevention

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World Bank

The World Bank promotes the improvement of road safety outcomes in low- and middle-income countries as a global development priority. It provides financial and technical support to countries, working through government agencies, nongovernmental organizations, and the private sector to formulate strategies to improve road safety. The World Bank's mission is to assist countries accelerate their implementation of the recommendations of the *World report on road traffic injury prevention* which it developed jointly with the World Health Organization in 2004. To achieve

this, it emphasizes country capacity-building, and the development of global partnerships, with a focus on the achievement of measurable road safety results.

Address: World Bank, 1818 H Street, NW, Washington DC 20433, USA

URL: www.worldbank.org/transport/roads/safety.htm

Contact person: Anthony Bliss, Lead Road Safety Specialist, Transport and Urban Development Department.

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Global Road Safety Partnership (GRSP)

The Global Road Safety Partnership is a partnership between business, civil society and government dedicated to the sustainable reduction of death and injury on the roads in developing and transition countries. By creating and strengthening links between partners, GRSP aims to increase awareness of road safety as an issue affecting all sectors of society. GRSP seeks to establish sustainable partnerships and to deliver road safety interventions through increased resources, better coordination, management, greater innovation, and knowledge sharing both globally and locally.

GRSP is a hosted programme of the International Federation of Red Cross and Red Crescent Societies.

Address: Global Road Safety Partnership, c/o International Federation of Red Cross and Red Crescent Societies, P. O. Box 372, 17 chemin des Crêts, CH-1211 Genève 19, Switzerland

URL: www.grsproadsafety.org/

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FIA Foundation for the Automobile and Society

The FIA Foundation for the Automobile and Society is a registered UK charity with the objectives of promoting public safety and public health, the protection and preservation of human life, and the conservation, protection and improvement of the physical and natural environment. Since its establishment in 2001, the FIA Foundation has become a prominent player in promoting road safety around the world. It conducts advocacy to raise awareness about the growing epidemic of road traffic injuries and place road safety on the international political agenda. It promotes research

and the dissemination of results to encourage best practice in road safety policy, and offers financial support to third party projects through a grants programme.

Address: FIA Foundation, 60 Trafalgar Square, London, WC2N 5DS, United Kingdom

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