CHAPTER 01

1.0 : Introduction and literature review of the study.

1.1: Introduction

Motor cycles are a most popular transportation method. And motor cycle riding is an accessible and cheap form of transport in many developing countries, particularly in Asia. However, when we compare with other vehicle drivers motor cyclists are more easily injured and are more often killed as a result of even minor collisions with other, larger vehicles (Yi Lee, H .,et al, 2010)

Motor bicycle became an affordable means for making money, especially among the low income and unemployed population .So there was an increasing in the use of motor cycles for the transportation of passengers & goods in the cities & rural areas .Motor cyclists are vulnerable road users. The structure of the motor cycle allows for only minimal protection when motor cyclists are involved in crashes with other vehicles.

1.1.1: Road traffic accidents

The first road accident took place about 150 years ago in Ireland, when a lady faced the irony of fate through an event of spot dead. Since then there has been a lot of road accidents all over the world. There many of reasons behind road accidents. Including increasing numbers of motor cycles on the road, more larger engine motor cycles, speeding, inconsistent helmet use, drink driving, adverse weather, distraction of drivers, driving errors, poor road design and increasing numbers of riders older than 40 years with increasing numbers of fatalities in that age group. Specially lack of attention at safety measures of motor cycle riding the rate of fatal accidents goes up. (Anon, n.d))

Worldwide it is estimated that, 1.2 million people are killed in road crashes each year and as many as 50 million are injured (Pedden, M. M., 2002). With increasing modernization in
many developing countries, road traffic deaths are increasing and traffic deaths are projected to become the third most important health problem by 2020. (Bryson, M. M. D., 2012)

According to UN ESCAPE (United Nation Economical and Social Commission for Asia and Pacific) Report road accidents are a growing worldwide problem - around 1 million deaths and over 23 million injuries per year, and around 85% of these deaths occur in developing countries. A solution to the problem is particularly urgent in developing countries as the Asia-Pacific region already contributes 44% of global road deaths although it currently has around 16% of the world's motorized vehicle fleet. (First United Nations Global Safety Week, 2007)

1.1.2: RTA in Sri Lanka

As a result of the two factors such as increases in number of vehicles and very poor development of road infrastructure, the traffic accidents in Sri Lanka shows an ever increasing trend and an alarming numbers of fatality. Police has increased from 26,196 in 1989 to 52,444 in 2005. In 1989 a total of 1,454 fatal accidents were reported and 2,141 were reported in 2005. However, it was based on the total accidents which were reported to the Police. But, normally most of the minor accidents are not reported to the police, and many of the accidents are settled amicably by both parties. (Anon, n.d)

Sri Lankan injury surveillance records determined 44.8% of the road injuries involved motor cycles. In collaboration with the Ministry of Health, an observational study of three cities was conducted to assess patterns of helmet usage among adults/children. Mandatory motor cycle helmet legislation for adults is present in Sri Lanka; should be noted that these figures. (Hilmi, L., et al, 2010)
1.1.3: Motor bicycle accidents

Vulnerable road users (pedestrians, motor cyclists and cyclists) make up almost three quarters of road traffic deaths in the South East Asia region (WHO, 2008).

In Sri Lanka, 51% of the total vehicles involved in road traffic collisions (RTCs) are motor cycles (WHO, 2009). The number and the percentage of motor cycles, out of the total vehicle population, have increased from 834,586 (48%) in the year 2000 to 1,422,140 (56%) by the year 2005, which is a 70% increase (Department of Motor Traffic, 2012). Consequent to this increase, Sri Lanka is facing the problem of rapidly rising motorized two wheeler crashes. It is estimated that 35% of fatal RTCs (Road traffic crashes) in Colombo, in 2002 occurred from motorized two-wheeler crashes (Sri Lanka Police, 2012).

A large proportion of deaths and severe injuries due to motor cycle crashes results from injury to the head (WHO, 2006; Servadei et al., 2003; Nixon et al., 1987; Norvel and Cummings, 2002). Usage of standard helmets is an effective way of preventing head injuries (WHO, 2009). It has been revealed that motorized two-wheeler users without wearing helmets are three times more likely to sustain head injuries than those who are wearing helmets (Norvel and Cummings, 2002). The motor cycle helmet use reduces the likelihood of crash fatality by 40%. (Samath, D., et al, 2013)

1.1.4: Safety measures and laws.

Because of increasing these type road accidents motor cycle accident laws and helmet laws are stated. Motor cycle Accident Laws are state and federal laws pertaining specifically to accidents involving motor cycles. Although motor cycles must follow all the same rule of the road as other vehicles, they are often subject to additional requirements, such as safety equipment, special licensing, and additional driving procedures.
To protect from motor cycle injuries there are top ten safety tips, Wear a Helmet, Look Twice, Educate Your Passengers, Watch the Weather, Leave Enough Space, Avoid Distraction, Ride within your skills, Protect your feet, Get the Right Gear, Take a Motor cycle Safety Course. (Motor cycle safety foundation, 2007)

1.1.5: Head injuries in motor cycle accidents

The main injury pattern of motor bike users is head injury. The most specific and most effective way of reducing head injuries and fatalities resulting from motor cycle crashes is the use of helmets. The wearing of a helmet may reduce crash-related head injury by 72%. (WHO, 2006)

As helmet users we should know about the injury patterns of the brain in a motor cycle crash. During a motor cycle accident 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 motor cycle is involved in a collision, the rider is often thrown from the bike. 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 in to 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. (WHO, 2006)

1.1.6: Standards for helmets

A quality 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, First one is 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.

Second one is it spreads the forces of the impact over a greater surface area so that they are not concentrated on particular areas of the skull.

Third one is 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.

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. (WHO, 2006).

Visor (face shield) is made by a strong and transparent material, e.g. polycarbonate, and is designed to protect the face of the rider from wind, dust and insects. In addition, the visor is equipped with a water- and scratch-proof coating. The visors are different types. 3D visors, double visors, single visors, outer & sun visors.

Ventilation System, The system ensures fresh air is ducted into the helmet and exhaled air and humidity are vented out.

Other important part is the sun cap. In open face and half face there are no visors. To protect heavy sun light the sun cap is very important part for that type of helmets. (Liu, B. et al., 2005)

1.1.7: Basic types of helmets

There are four basic types of helmets intended for motor cycling which are used by most of the riders. They are Full face helmets, Open face helmets; half face helmets, flip up helmets. (Liu, B. et al., 2005)

Full-face 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 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-face 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-face helmet may or may not have ear flaps attached to the retention system. These are helmets specifically designed for South Asian and South-East Asian countries with extremely hot and humid climates. They are actually half-face 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 (poly vinyl chloride) material. (Liu, B. et al., 2005)

In addition to meeting the previously described functions and conforming to standards, 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 fiber 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.

Half-face 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. (WHO, 2006)
World health organization mentioned, if not wearing helmet Increase the risk of sustaining a head injury, Increase the severity of head injuries, Increase the time spent in hospital, Increase the likelihood of dying from a head injury. When we wearing a helmet, decrease the likelihood of death by up to 39% with the probability depending on the speed of the motor cycle involved, decrease the cost of health care association with crashes. (WHO, 2006)

1.1.8: safety measures

To prevent from fatal injuries it is not enough to wearing a helmet. Apart from helmet, there are many safety measures which should consider by road users. Important safety measures for motor cyclists are mentioned below.

They are effective turning techniques, special riding situations, protective gear, effective braking techniques, traffic strategies, evasive maneuvers. When you are riding, you should wear jacket, boots, goggles, high visibility gear and practice with the turn signals, correct side of the road.

In this study, data collection done at Veyangoda area in Sri Lanka. So here it is mentioned main safety measures which are caused to motor bicycle accidents in both miner and major collisions. They are described below.

Braking is to use that front brake every single time you want to slow down. Always apply both the front and the rear break at the same time. If necessary, apply them hard, but not so hard that you lock up either wheel. And also the brake light of your motor cycle should function properly.

To get the motor cycle to lean in a normal turn, press the right hand grip to go right; press the left hand grip to go left. Then slow down before enter the turn; keep feet on the pegs, lean with the motor cycle. The turn carefully always signal intentions. Change lanes or make a
turn using turn signals. And also, increase visibility to others, wear bright clothing, wear highly visible helmets (WHO, 2006). When carrying a passenger the recommended numbers of passengers for motor bike are two. When get passengers with bike they also should follow protective methods. As well as every passenger should seated behind the motor cyclist.

And also when riding a bicycle drinking alcohol should be avoided. (Motor cycle safety foundation, 2007). Drinking and driving increases both risk of a crash and likelihood that death and serious injury will result. As well as motor cyclists should go on their correct side of the road is left side.

**1.1.9: Importance of the study**

This is no published data or previous studies on the helmet usage and safety measures among motor cyclists at Veyangoda area in this country. The purpose of this study to describe the usage of helmets; quality of those helmets; and safety measures among motor cyclists in Veyangoda area. And also identify some associated factors to motor cycle crash injuries by using reports from Veyangoda police station. These information will also be useful in identify of helmet usage, usage of quality helmets and safety measures among people in Veyangoda area. As well as, it is prohibited the usage of full-face helmets in Sri Lanka, because of difficulties to identify the motor bicycle riders. This law established after the CHOGM in 2013 *. So there is a risk to increase head injury rate in Sri Lanka , because of full-face helmets are the most protective helmets which can minimize the head injury by covering large area of the rider’s head. So it is important to study about the helmet usage and quality of the helmets.

*Available at : <https://secure. avaaz.org /en/petition /Law_makers_in_Sri_ Lankan_ government_must_withdraw_the_decision_to_ban_FullFace_Helmet_usage_in_the_country_ 1/?dVROcgb&pv=1>[Accessed on 5 April]
CHAPTER 02

2.0: Literature Review

Motor cycles are one of the most popular transportation in the world. Because of this the increase number of accidents related to motor cyclists has become a problem of public health concern. Therefore so many studies have been done in worldwide in order to identify preventive measures. The most recommended safety measure in preventing injuries following a motor cycle accident is proper usage of helmets. However the worldwide literature shows that proper usage of helmet is not been practiced by a significant proportion motor cyclists. Even though the quality of the helmet is substandard in most of the instances.

2.1: Quality of the helmet of motor cyclists.

Many characteristics determine the quality of a helmet. Normally they are colour, comfort ability, chin strap, visor, lining…etc.

According to a research in New Zealand has examined that the colour of the helmet affect the risk of the crash. The results show that higher proportion of the drivers who had been involved in crashes reported wearing black helmets. While fewer reported white helmets. Compared with wearing black helmet, use of a white helmet was associated with a 24% lower risk of crash. The research 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”. (Wells, S., et al, 2004)

Another study done in Iran, this study aimed to empirically explore reactions of motor cyclists to the safety helmet laws, in Iran. Qualitative data were collected via four focus groups and 11 in-depth interviews. Participants were 28 male motor cyclists who never used a safety helmet during rides, and 4 male police officers. (Fereshteh Zamani-Alavijeh, et al, 2009)
There is another recent study. Helmets are available in different styles, including half coverage, open face, & full face. This study evaluated the effectiveness of these different styles & found that crash involved riders wearing half coverage helmets were twice as likely to suffer traumatic brain injuries than riders wearing open face or full face helmet (Yu, W., et al, 2011)

In Jamaica, although the road traffic act mandates motor cycle riders to wear approved helmets still it has been found that, only 34.3% of motor cycle crash injury victims wore a helmet at the time of a collision. On the other hand it was found that in California as many as 48% of observed motor cyclists used non-standard helmets. As a result, head injuries were found to be more frequent and of greater severity among those wearing non-standard helmets than among those wearing standard helmets or even those wearing no helmets at all. (Peek-Asa, C, M.D., 1999)

A study done in Taiwan, (91%) full face helmets presented with good fixation with the head. 92.2% open face helmets had good fixation, 94.1% half face helmets had good fixation. And 8.5% full face helmets not presented with good fixation, 7.8% open face helmets hadn’t good fixation. 5.9% half face helmets also not having good fixation. 33.33% helmets not presented with visors. (Wen–Yu Yu, et al, 2011)

Many studies have shown that the proper use of safety helmets is an effective way to reduce the severity of injuries and fatalities among motor cyclists during collisions. (Mayrose. J, 2008)

According to seven studies that examined different helmet types, only one adjusted for confounders. Tsai found full-face helmets compared with no helmet significantly protective against head injury (adjusted OR0.26, 95%CI 0.14 to 0.47). However, helmets without a chin-bar and less head coverage (defined as full helmet or partial coverage helmet) compared
with no helmet were not significantly protective against head injury (adjusted OR 0.72, 95% CI 0.38 to 1.37).

Hurt 1981 found that full-face helmets and non full-face helmets compared with no helmet were both significantly protective against head injury (OR 0.29, 95% CI 0.17 to 0.49 and OR 0.24, 95% CI 0.16 to 0.36, respectively).

Both Cannell 1982 and Vaughan 1977 found full-face helmets compared with open faced helmets (or 'jet helmet') provided no significant advantage in relation to head injury (OR 1.13, 95% CI 0.34 to 3.76 and OR 0.88, 95% CI 0.58 to 1.32, respectively).

Vaughan 1977, Krantz 1985, O’Connor 2002 and O’Connor 2005 found that full-face helmets compared with open-faced helmets (or 'jet helmet') had no significant effect on neck injuries (OR 0.85, 95% CI 0.26 to 2.80, OR 0.84, 95% CI 0.07 to 9.56, OR 0.76, 95% CI 0.15 to 3.81 and OR 1.08, 95% CI 0.27 to 3.12, respectively).

Similarly Cannell 1982 found that full-face helmets compared with open-face helmets did not have a significant effect on facial injuries.

There is another study among 309 motorcyclists, 80% were less than 40 years of age, and only 24% were females. Among the total, only 31.4% used a helmet. (Sreedharan, J.,et al, 2009)

2.2: Usage of helmets among motor cyclists.

A recent review of traffic accidents involving motor cyclists, Concluded that if motor cyclists are wearing a helmet at the time of the crash, their risk of death is reduced by 42%, and their risk of head injury is reduced by 69%. Wearing a motor cycle helmet correctly can reduce the risk of death by almost 40% and the risk of severe injury by over 70%.(Liu BC, Ivers, R., Norton, R.,et al, 2008)

A report from WHO shows that almost 70% of motor cycle deaths in Iran are due to head injuries resulting from the non-use or improper use of helmets (WHO, 2005). A national
survey of motor cyclists in several cities in Iran indicated that of the 92% of the motor cyclists who owned a helmet, only 13% were using it. (Moghisi, A., 2005).

Eleven studies found motor cycle helmets compared with no helmets significantly protect against head injury in motor cyclists who crash. Only six studies gave estimates that could be combined in a meta-analysis: adjusted OR 0.41, 95% CI 0.21 to 0.81 Gabella 1995; adjusted OR 0.26, 95%CI 0.14 to 0.47 Tsai 1995; adjusted OR 0.26, 95%CI 0.18 to 0.40 Romano 1991; adjusted OR 0.32,95% CI 0.21 to 0.50 Rowland 1996; adjusted OR 0.23, 95% CI 0.14 to 0.53 Christian 2003; adjusted OR 0.43, 95% CI 0.30 to 0.67 Sauter 2005.(Liu BC, et al, 2008)

According to the study was done by prelaw and post law helmet use was observed in Howard County (with a pre-law police campaign) and two control counties: Montgomery (with a community education program) and Baltimore County (no helmet activities). Prelaw helmet use rates for children were 4% for Howard, 8% for Montgomery, and 19% for Baltimore. Post law rates were 47%, 19%, and 4%, respectively. (Thimothy, R., 1992)

A study done in Sri Lanka, 2194 motor cycles with 3309 riders were observed. Most riders were adults (86.97%) with 12.87% children. Adult helmet use was 97%, while child usage was 31%. The capital Colombo and Kurunegala had higher usage with 92% and 88%; Puttalama 70%. 81% wore open face helmets. Results were shared with the Trauma Secretariat for advocacy and public (Hilmi, L., et al, 2010).

Another study done in Sri Lanka, 883 motor cycles and 1,254 users were observed. Out of the 1,254 users, 1,140 (90.9%) used helmets. Except for 6 (0.5%), all the others used standard helmets. Out of the 883 riders, 863 (97.7%) used helmets. Helmet wearing rates among the motor cycle riders and passengers of the 883 observed motor cycles, 74 (8.6%) carried a third passenger and 14 (1.6%) carried a fourth passenger as well. All the 3rd and the 4th passengers were children. Among all the 1,254 passengers, 106 (8.5%) were children; of
them, only 25 (23.5%) were wearing a helmet at the time of observation. (Samath, D., et al, 2013)

Another study done in four cities in Viet Nam, about usage of helmets, Adults and children differed substantially in their use of helmets. On average, the greatest use among adults was seen in Da Nang (99%), followed by Can Tho (98%), Ho Chi Minh City (94%) and Hanoi (90%). The use of helmets among children ≤ 7 and 8–14 years of age was 34% and 23%, respectively, in Hanoi; 28% and 52%, respectively, in Ho Chi Minh City, and 53% and 54%, respectively, in Can Tho. In Da Nang, observations were made only for children who looked ≤ 14 years of age (30%). (Aaron, P., 2009).

According to above studies, it is clear that helmet use of motor cycle passengers, is poor while it figures become lowest among children.

2.3: Safety measures among motor cyclists.

According to a study of single surgical unit at the teaching hospital, Batticaloa, they says etiology for accidents are, driving under the influence of alcohol (25%), without wearing helmets (22%), helmet belts (17%), or helmet regularly (35%) are the main contributing factors to road traffic accidents. (Peethambaram, Selladhurai, 2011) Compared developments in injury rates in California after adoption of helmet legislation covering kids. Adult rates did not change, while traumatic brain injuries among child riders went down 18%. (Brian Ho-Yin Lee, 2005)

A study has been done in as Motor cycle Crash: Injuries pattern and associated factors among patients treated at Muhimbili Orthopaedic Institute (MOI) from March to September 2011 at Dar Es Salaam in Tanzania. It says the extremity injuries 520 (72.0%) and head injuries 246 (34.1%) were the commonest injuries. (Bryson, M. M. D., 2012)
From safety perspective a helmet is the most important part of a motor cycle. Its use has been shown to have a 72% effectiveness in reducing the incidence of head injuries on a crash. (Liu BC., 2008)

It has been shown that an unprotected rider is 40% more likely to die in a crash than a rider who is wearing a helmet. In Taiwan, after introducing a law which required mandatory wearing of helmet for the riders and their passengers the motor cycle crash fatalities decreased by 14% and head injury fatalities by 22%. (Tsai MC., et al, 1999)

According to notable findings in the Hurt report (quoted below) were: 75% of accidents were found to involve a motor cycle and a passenger vehicle, while the remaining 25% of accidents were single motor cycle accidents.

In the single vehicle accidents, motor cycle rider error was present as the accident precipitating factor in about two-thirds of the cases, with the typical error being a slide-out and fall due to over braking or running wide on a curve due to excess speed or under-cornering.

Almost half of the fatal accidents show alcohol involvement and injury severity increases with speed, alcohol involvement and motor cycle size. In the multiple vehicle accidents, the driver of the other vehicle violated the motor cycle right-of-way and caused the accident in two-thirds of those accidents.

The report's additional findings show that the wearing of appropriate gear, specifically, helmets and durable garment, mitigates crash injuries substantially. Vehicle failure accounted for less than 3% of these motor cycle accidents, and most of those were single vehicle accidents where control was lost due to a puncture flat and Weather is not a factor in 98% of motor cycle accidents.
The failure of motorists to detect and recognize motor cycles in traffic is the predominating cause of motor cycle accidents. Conspicuity of the motor cycle is a critical factor in the multiple vehicle accidents, and accident involvement is significantly reduced by the use of motor cycle headlamps-on In daylight and the wearing of high visibility yellow, orange or bright red jackets. (Wikipedia, 2013). Throughout the above studies indicated that helmet usage & safety measures among motor cyclists is relatively inadequate & not in a satisfactory level and it should assessed & give attention in a positive manner.

A cross-sectional, community-based study was carried out among commercial motor cyclists in Igboora. Information on the respondents' socio-demographic characteristics, and the practice of road safety measures was collected using an interviewer administered questionnaire. A total of 299 motor cyclists were interviewed. All (100%) of the respondents did not use any protective standard helmet. (Amoron, O. E., et al, 2006)

There was a statistically significant association between the use of helmet and gender, marital status, drunken driving, use of alcohol and attitude towards implementing legislative measures. Odds Ratios observed were 5.3 for female gender compared to male, 4.5 for those with a positive attitude towards the implementation of legislative measures on helmet use, 3.7 for those who were not drunk while driving and 2.3 for unmarried compared to married persons. (Shreedharan, J., et al, 2010)
CHAPTER 03

Materials and Methodology

3.1: Objectives

3.2. (1): General objective

➢ To describe the helmet usage among motor cyclists in Veyangoda area.

3.2. (2): Specific objectives

➢ To describe the quality of helmets in Veyangoda area.
➢ To describe some common safety measures among motor cyclists in Veyangoda area.
➢ To identify some associated factors for risk of motor cycle injuries from the Veyangoda police station.

3.3: Study design

➢ This is a cross sectional descriptive study.

3.4: Study settings

Study was carried out from the 2 petrol sheds at Veyangoda area in Gampaha district. These 2 petrol sheds are situated directly facing to Katunayeka airport road. It collected the data from these sheds for 2 days (14th November in 2013 - 15th November in 2013). On 1st day, 100 of motor cycles observed from Naiwala shed. On next day, observed another 100 motor cycles from Vataddara shed. 200 motor bicycles were observed with 261 passengers.
3.5: Study population

The study population comprised of both male & female motor bicycle riders who came to the petrol sheds in Veyangoda area.

3.6: Sample size

Sample size (21%) (Cavalcante, 2012) was determined according to the following formula,

\[ N = \frac{Z^2 \times p \times (1-p)}{E^2} \]

Where N is sample size

Z= 1.96 at 95% confidence interval

P= proportion of motorcycle crash injury victims which is 21%

E= is the margin error rate 5%

Substituting these values to the equation above; \( N = 1.96^2 \times 0.21(0.79)/ (0.05)^2; \)

N will be 254. Another 10% was added to the sample to minimize the bias. The final sample size was 279. Totally observed 200 motorcycles with 261 passengers. Including 33 pillion riders and 28 children.

3.7: Sampling plan

The study was commenced on 14th November 2013 and it was continued till the sample size is reached. Two petrol sheds were selected to get the sample in Veyangoda area. Subjects were selected from each petrol shed.

3.8: Sampling criteria

3.8. (1): Inclusion criteria

- Motor cyclists who came to relevant 2 petrol sheds by motor bikes to get the fuel.
Motor cyclists who were given permission to check their helmets.

3.8. (2): Exclusion criteria

Motor cyclists who were not given permission to check their helmets.
Motor cyclists who came for emergencies.

3.9: Data collection

3.9. (1): Data collection tool

A check list was used to collect data from the observations made on motor cycle riders and passengers. Pre test also done and check list was adjusted according to errors which found from pre test. After that edited check list used to collect data from proper sample.

3.9. (2): Data collection method

The principle investigator made observations on following in order to collect data

- The behavior of the motor cyclists at the time of turning to the petrol shed.
  
  Ex: - Speeding / slowing.
  
  Signal lights on / off.

- The quality of the helmets of riders & passengers.

- Number of passengers.

- Information of motor cycle accidents in Veyangoda police area was obtained from police reports. The police reports used to collect following data.

ii. Whether the passengers and riders were wearing the helmets at the time of accident.

iii. Whether the accident was fatal or non-fatal.

iv. Whether the rider alcoholic or not at the time of accident.

3.9. (3): Data collectors

Only the principle investigator collected data.

3.10: Data analysis

Data collected and entered in to a excel spread sheet (2007) and after cleaning each results Data was presented by percentages as well as by appropriate diagrams (bar charts).

3.11: Ethical consideration

The approval for research was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna. When collecting data, participants were fully informed about the purpose of the study, their part in it. When getting the records from the police station, it was done after the getting permission from the relevant police officers. As well as got permission from the managers of both petrol sheds to collect data for using those places.
CHAPTER 04

4.1: Results

This chapter describes about final results of this research which were collected by people. This chapter presented by using tables and bar charts which help to understand easily.

Table 1: Distribution of the characteristics of helmets

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full face</td>
<td>19</td>
<td>7.27</td>
</tr>
<tr>
<td>Flip up open face</td>
<td>156</td>
<td>59.77</td>
</tr>
<tr>
<td>Half face</td>
<td>12</td>
<td>4.59</td>
</tr>
<tr>
<td>Open face</td>
<td>70</td>
<td>26.81</td>
</tr>
<tr>
<td>No helmet</td>
<td>4</td>
<td>1.53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>261</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

According to this table, it describes distribution of the characteristics of helmets. Usage of flip up open face helmet 59.77%. Usage of half face helmet 4.59%. According to these results 1.53% people not used helmets.
Table 2.1: Distribution of quick release helmet belts

<table>
<thead>
<tr>
<th>Quick release belt</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>257</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

This table describes distribution of quick release belt with helmets. 100% people used helmets, without quick release belts.

Table 2.2: Connecting condition of the helmet belt with the shell of the helmet

<table>
<thead>
<tr>
<th>Helmet belt connected with each side of the shell</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>257</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

According to this table, it describes connecting condition of the helmet belt with the shell. 100% motorcyclists used the helmets which the belt connected with each side of the helmet shell.
Table 3: Distribution of visors in the helmets

<table>
<thead>
<tr>
<th>Visors</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D visors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>7</td>
<td>2.72</td>
</tr>
<tr>
<td>Absent</td>
<td>250</td>
<td>97.27</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Double visor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>16</td>
<td>6.22</td>
</tr>
<tr>
<td>Absent</td>
<td>241</td>
<td>93.77</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Outer &amp; sun visor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>48</td>
<td>18.67</td>
</tr>
<tr>
<td>Absent</td>
<td>209</td>
<td>81.32</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Single Visor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>114</td>
<td>44.35</td>
</tr>
<tr>
<td>Absent</td>
<td>143</td>
<td>55.64</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>No visors</td>
<td>72</td>
<td>28.01</td>
</tr>
<tr>
<td>All visors</td>
<td>185</td>
<td>71.98</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes, distribution of visors in the helmets. 44.35% helmets presented with single visors. Only 2.72% helmets presented with 3D visors. 72% helmets hadn’t visors.
Table 4: Common material type in the helmet designing

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Present</td>
<td>90</td>
<td>35.01</td>
</tr>
<tr>
<td>Fiber Absent</td>
<td>167</td>
<td>64.98</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Glass fiber Present</td>
<td>14</td>
<td>5.44</td>
</tr>
<tr>
<td>Glass fiber Absent</td>
<td>243</td>
<td>94.55</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Plastic Present</td>
<td>153</td>
<td>59.53</td>
</tr>
<tr>
<td>Plastic Absent</td>
<td>104</td>
<td>40.46</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes common material type of the helmet designing. (59.53%) helmets made by plastic material. (5.44%) helmets made by glass fiber material.

Table 5.1: Condition of inner impact absorbing liner of helmets

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft</td>
<td>81</td>
<td>31.51</td>
</tr>
<tr>
<td>Rough</td>
<td>176</td>
<td>68.48</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes condition of inner impact absorbing liner of the helmets. 31.51% helmets presented with soft impact absorbing liners. 68.48% helmets presented with rough impact absorbing liners.
Table 5.2: Common Styrofoam material type of helmets

<table>
<thead>
<tr>
<th>Styrofoam material</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polystyrene</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2</td>
<td>0.77</td>
</tr>
<tr>
<td>No</td>
<td>255</td>
<td>99.22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

| **Regifoam**       |        |      |
| Yes                | 255    | 99.22|
| No                 | 2      | 0.77 |
| **Total**          | 257    | 100  |

This table describes common Styrofoam material type of helmets. 0.77% helmets presented with polystyrene material. 99.22% helmets presented with regifoam material.

Table 5.3: Distribution of the condition of inner Styrofoam layer of the helmets.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comfortable</strong></td>
<td>68</td>
<td>26.45</td>
</tr>
<tr>
<td><strong>Uncomfortable</strong></td>
<td>189</td>
<td>73.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes, comfort ability of the inner Styrofoam layer of the helmets, 26.45% helmets presented with comfortable inner Styrofoam layers. 73.54% helmets presented with uncomfortable inner Styrofoam layers.
Table 6: Determining the fixation of the helmet with head.

<table>
<thead>
<tr>
<th>Fixation of the helmet</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good fit</td>
<td>152</td>
<td>59.14</td>
</tr>
<tr>
<td>Not good fit</td>
<td>105</td>
<td>40.85</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes the fixation of the helmet with head. 59.14% helmets had good fit with the head. 40.85% helmets had not good fit with the head.

Table 7: Usage of sun caps in the helmets

In this table, it is considered, the helmets which are presented with outer and sun visors having sun caps apart from open face and half face helmets.

<table>
<thead>
<tr>
<th>Sun cap</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>174</td>
<td>67.70</td>
</tr>
<tr>
<td>Absent</td>
<td>83</td>
<td>32.29</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes usage of sun caps in the helmets. 67.70% helmets presented with sun caps. 32.29% helmets not presented with sun caps.
Table 8: Determining sizes of the helmets

<table>
<thead>
<tr>
<th>Size of the helmet</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper size</td>
<td>Yes 135</td>
</tr>
<tr>
<td></td>
<td>No 122</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
</tr>
</tbody>
</table>

This table describes the size of the helmets according to the rider’s head. 52.51% helmets had proper size according to the rider’s head. 47.47% helmets had not proper size according to the rider’s head.

Table 9: determining the conspicuity of the helmets

<table>
<thead>
<tr>
<th>Conspicuity of Helmet</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High visibility</td>
<td>Yes 49</td>
</tr>
<tr>
<td></td>
<td>No 208</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
</tr>
</tbody>
</table>

This table describes the conspicuity of the helmets. 19.06% helmets had high visibility. 80.93% helmets had not high visibility.
Table 10: Determining the shell condition of the helmets

<table>
<thead>
<tr>
<th>Shell condition</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tough</td>
<td>104</td>
<td>40.46</td>
</tr>
<tr>
<td>Not tough</td>
<td>153</td>
<td>59.53</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes the shell condition of the helmets. 40.46% helmets presented with tough shell condition. 59.53% helmets presented with not tough shell conditions.

Table 11: Distribution of other characteristics of helmets

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounder helmet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>225</td>
<td>87.54</td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td>12.45</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Chin bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>19</td>
<td>7.39</td>
</tr>
<tr>
<td>Absent</td>
<td>238</td>
<td>92.60</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
<tr>
<td>Smooth outer surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>125</td>
<td>48.63</td>
</tr>
<tr>
<td>Absent</td>
<td>132</td>
<td>51.36</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>100</td>
</tr>
</tbody>
</table>
This table describes distribution of other characteristics of the helmets (shape of the helmets, chin bar, having smooth outer surface). 87.54% presented with rounder helmets. 12.45% helmets were not rounder helmets. 7.39% helmets presented with chin bar. 92.6% helmets not presented with chin bar. 48.63% helmets presented with smooth outer surface. 51.36% helmets not presented with smooth outer surface.

**Table 12: Determining the number of passengers traveled on the motor cycle**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of passengers</td>
<td>1-2</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>&gt;2</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>261</td>
</tr>
</tbody>
</table>

This table describes the number of passengers traveled on the motor bike. 91.95% motor cycles presented with 1-2 number of passengers. 8.45% motor cycles presented with more than 2 passengers.

**Table 12.1: Usage of helmets of motor cyclists.**

<table>
<thead>
<tr>
<th>Helmet usage</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor cyclist</td>
<td>Yes</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>

This table describes the usage of helmets of motor cyclists. 98% motor cyclists wore helmets at the time. 2% motor cyclists not wore helmets.
Table 12.2: Usage of helmets of children

<table>
<thead>
<tr>
<th>Helmet usage</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>46.42</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>53.57</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes the usage of helmets of children. 46.42% children wore helmets. 53.57% children not wore helmets.

Table 12.3: Usage of helmets of pillion riders

<table>
<thead>
<tr>
<th>Helmet usage</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pillion rider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>19</td>
<td>57.57</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>42.42</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes the usage of helmets of other pillion riders. 57.57% pillion riders wore helmets. 42.42% pillion riders not wore helmets.
Table 13: Usage of signal lights among motor cyclists.

<table>
<thead>
<tr>
<th>Signal usage</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96</td>
<td>48</td>
</tr>
<tr>
<td>No</td>
<td>104</td>
<td>52</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>Leaving signal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>79</td>
<td>39.5</td>
</tr>
<tr>
<td>No</td>
<td>121</td>
<td>60.5</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>

This table describes the usage of signal lights among motor cyclists. 48% motor cyclists used signal lights when turn to the shed. 52% riders not used signal lights when turn to the shed. 39.5% riders used signal lights when leave from the shed. 60.5% riders not used the signal lights when leave from the shed.

Table 14: Determining the speed of the motor bicycle

It was measured the speed of motor bike by, observing the turning method of the rider to the petrol shed. When turn the bike to the shed, some riders came and slow the bike on center line (White line) of the road then turn to the shed. It was considered them as lower speed bikes. Some riders came very high speed then without slowing, they turn the bike to the petrol shed suddenly. It was considered them as high speed motor bikes. If available any speed measuring machine then could measure the speeds accurately. Because of my economical problems, I used this method.
This table describes the speed of the motor cycles. 82% motor cycles came high speed. 18% motor cycles came low speed.

**Table 15: Usage of brake lights among motor cyclists**

<table>
<thead>
<tr>
<th>Brake lights</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functioning</td>
<td>132</td>
<td>66</td>
</tr>
<tr>
<td>Not functioning</td>
<td>68</td>
<td>34</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

This table describes usage of brake lights among motor cyclists. 66% of motor cycle riders used brake lights. 34% of motor cycle riders not used brake lights.

**Table 16: Usage of correct side of the road by motor cyclists**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct side</td>
<td>180</td>
<td>90</td>
</tr>
<tr>
<td>Wrong side</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

This table describes usage of correct side of the road by motor cyclists. 90% riders used correct side of the road. 10% riders used wrong side of the road.
This chart describes the annual police reports about motor cycle accidents in Veyangoda area. In 2010 (92.18%) accidents reported as none helmeted motor cycle accidents. In 2010 (57.81%) accidents reported as alcoholic riding.
CHAPTER 05

5.1: Discussion

Motor cycles are the most common transportation method in many developing countries as well as Sri Lanka. So it increases the number of motor cycle accidents in Sri Lanka. Although Veyangoda is becoming a highly urbanized city. Veyangoda is a main city in Gampaha district in Sri Lanka. Because of newly opened Katunayeka highway road has opened to Veyangoda area. Veyangoda has a land area of 7.15 kilometers latitude and 80.05 kilometers longitude with a population of approximately 16,189. This study carried out from 200 motor cycles in Veyangoda area by observing 200 motor cyclists and 61 pillion riders as well.

In this study majority of the riders (98%) used helmets in the time of observation which is very close to helmet wearing rates of Kandy area (97.7%).(Hilmi L., 2010).As well as this finding is higher than Iran which (13%).(WHO, 2005)

Several other high income, low and middle income countries have achieved helmet wearing rates over (90%) upon enforcement of helmet lows.(WHO, 2006).Although helmet usage among children was (46.42%) in this study which is higher than Kandy area (23.5%).(Samath, D., 2013).As well as this research finding higher than Colombo, Putthalam and Kandy cities which (31%).(Hilmi, L., 2010).As well as higher than which 4% for Howard, 8% for Montgomery, and 19% for Baltimore. Post law rates were 47%, 19%, and 4 %.(Thimothy, R., 1992)

Apart from riders and children, this study describes about pillion riders. (57.57%) pillion riders wore helmets in the time of observation. This proportion is lower than Kandy area in Sri Lanka which (84.1%). (Hilmi. L, et al, 2010)
In this study assessed the quality standards of the helmets also. Flip up open face helmet usage was (59.77%). It was the most frequently used helmet type in Veyangoda area. Rarely used helmet type was half-face helmets which (4.59%). But (81%) riders used open face helmets in Kurunagala, Kandy, & Puththalama. (Hilmi, L., et al, 2010).

In this study one of significant findings was usage of helmets without quick release chin strap which was (100%). Quick release chin strap is a good feature of a quality helmet. But in Veyangoda area these types of helmets couldn’t found in the time of observation.

Another good finding was visor conditions. Most frequently used visor condition was single visors which (44.35%). And also 3D visors usage (2.72%). It was very poor value, because of 3D visor increases the quality of a helmet by providing four benefits as sun protection, wind protection, water proof coverage and visibility of large area through the visor.

The proportion of helmets which are without visors (28.01%). This value is very close to the Thaiwan which (33.33%). (Wen –Yu Yu, et al, 2011). Although common material type of the helmet designing was plastic which is (60.67%). Glass fiber material was (4.36%). It is close to Thailand which (6.6%). (Wen –Yu Yu, et al, 2011)

Another specific finding related to fixation of the helmet with head of the wearer. (74.27%) people not used helmets which are having good fixation with the head. In Thailand it was (13.39%), this result is higher than Thailand. This study conducted to assess safety measures also. In here number of passengers traveled on the bike was assessed. (8.45%) motor cycles presented with more than two pillon riders. It is very close to Kandy area which (8.6%). (Samath, D., 2013)
As well as speed of the bike was assessed. (80%) motor cycles came high speed. It is (27%) in Washington. This study’s finding was very higher than Washington. (Insurance institute for high way safety, 2010)

Another specific finding in this study that police reports in Veyangoda area in 2008-2012 was estimated that (92.18%) accidents reported in 2010 due to non- helmeted riders. It’s higher than Tanzania which is (55.1%). (Bryson, M. M. D., 2012)

Another specific finding was drink driving. It was (57.81%) in 2010 at Veyangoda area. It was the highest rate according to related years. But in Batticaloa it was lower than Veyangoda area which (25%). (Peethambaram and Selladhurai, 2011)

5.2: Conclusion and recommendation

Motor cycle crash is a major cause of road traffic injury. The majority of the injuries involved the extremity and head. To prevent from these type injuries and to minimize the severity of head injury which is using standard quality helmets is most effective method. As well as prevent from road traffic accidents, it is very effective to use safety measures.

This study mentioned that higher proportion of the riders used helmets, and usage of helmets among pillion riders and children partially reduced It may cause high cost of helmets and poor knowledge about safety measures.

Usage of quality standard helmets was not in satisfactory level. Usage of quality full-face helmet was very poor. It may cause due to new regulations for Common Wealth Heads of Government Meeting (CHOGAM) in 2013, there was prohibited wearing full-face helmets because of identification problems. As well as other quality standard levels of helmet were not in satisfactory level. Highlighted standard levels of a quality helmet are quick release chin strap; visor condition, material type of the helmet, condition of the impact absorbing liner,
outer surface of the shell. It may cause cost and poor knowledge about quality standard helmets.

As well as safety measures were assessed. Speeding was not in satisfactory level among motor cyclists. Most of cyclists were used high speeding levels for their riding.

According to police reports in Veyangoda area, it is mentioned that higher proportion of motor cycle accidents were reported in 2010 more than other compared years. Higher amount of accidents reported with non-helmeted motor cyclists at the time of crash. When compare about motor cycle rates in Veyangoda area in 2008-2012, larger proportion of accidents occurred due to non-helmeted motor cyclists.

In this study we used a check list to collect data. According to results of this study, the quality standard of helmets was very poor. So it is a risk that enhances the number of motor cycle accidents and the severity of injuries. Therefore it is necessary to introduce following new strategies to improve the quality of helmets.

- Establish new laws in importing and selling of helmets.
- Make awareness among motor cycle users, about good quality helmets.
- Organize health camp about road traffic accidents and about quality standard safety measures among motor cyclists annually in the every hospital.
- Government can make a policy to every motor cycle riders, to wear quality standard helmets.
- Decrease the cost of quality standard helmets.
- Prohibit wearing cheap, unsafe helmets in the society.
- When issuing driving license for motor cyclists, assess the rider’s knowledge on safety measures on the road.

As safety measures to motor cycle users, some of measures are suggested. They are strict enforcement of road laws.

- Instructs the riders to undergo comprehensive pre-riding course and be tested by traffic police before possessing a riding license. That instructs the use of helmet during riding.

- Teaching the subject of Road safety in school curriculum and launched some workshops and awareness programme related to the road safety.

- Further studies are needed to establish to detect new trends related to the RTA and safety measures. The role of using motor cycle in public transport ,The mechanisms of motor cycle crashes and ways they can be prevented, Why helmet has not been widely used despite the fact that it has been proven effective in reducing morbidity and mortality resulting from motor cycle crashes.

5.3: Limitations.

In this study we assessed only the quality of helmets, usage of helmets and safety measures among motor cyclists by filling a check list. So it prevents the discussion with riders about their knowledge, information sources about helmets and riding methods and practices. Because of increase the traffic in the petrol shed those opportunities lost.

And also I could not found the all accidents reported to the Veyangoda police station in 2005, 2006, 2007. As well as the busy life of despondence ware also affect to reduce the responding rate. Sample size had been to limit because of time for this research was limited with the final clinical appointments and conducted area was far from Galle district.


Bryson, M. M. D., 2012. Motorcycle crash: inuries pattern and associated factors among patients treated at Muhambili Orthopidic institute (MOI).[pdf] Available at:


Kirby, T., 2013. USA reviews motorcycle safety laws as crash deaths increase. The Lancet; 381(9873):1171-1172.


Annexure

Annexure 01- The selected petrol sheds at Veyangoda area in Gampaha District for the study.

<table>
<thead>
<tr>
<th>Name of the petrol shed</th>
<th>Number of motorcycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naiwala petrol shed</td>
<td>100</td>
</tr>
<tr>
<td>Wataddara petrol shed</td>
<td>100</td>
</tr>
</tbody>
</table>

Annexure 03- Check list which was use to this study

University of Ruhuna, 
Faculty of medicine, 
B.Sc.Nursing programe, 
Miss .W.J.J. Fernando. 
MD/BN/2009/055.

Helmet usage & motor bicycle safety measures among bicyclist.

Check list

1) Petrol shed – 2) Date –
3) Time – 4) No; -

Quality of the helmet

1) Kind of the helmet
   - full face helmet
   - flip up open face helmet
   - half face helmet
   - open face-helmet

2) Quality of the belt
   - Quick release belt- Yes
   - Connected to each side of the shelf – Yes

3) Visor condition
   - 3D visor
   - Double visors
   - Outer visor & sun visor
   - single visor
   - No visor

No
No-
4) Material of the helmet
   - Fiber
   - Glass fiber
   - Plastic

5) The impact absorbing liner (styrofoam)
   - Soft -
   - Rough –
   - Styrofoam Made by – polystyrene
   - regifoam
   - Condition of the Styrofoam- Comfortable
   - un comfortable

6) Sun cap
   - Have
   - don’t have

7) Fixation of the helmet
   - Have a good fit
   - not good fit

8) Size of the helmet
   - Proper size According to the head size- Yes
   - No

9) Conspicuity
   - Highly visible
   - Not highly visible

10) Condition of the shell
    - Tough -
    - not tough -

11) Other features
    - Rounder helmet- Yes
    - no
    - Chin bar- have
    - don’t have
    - Condition of the outside surface of the helmet- smooth
    - rough

   **Safety measures among bicyclists**
   1) Number of passengers on the motorcycle?
   2) Wearing a helmet
      - Cyclists- Yes
      - No
      - children- Yes
      - No
      - Others - Yes
      - No
   3) Usage of signal lights
      - When turn to the shed- Yes
      - No
      - When leave from the shed- Yes
      - No
   4) Speed of the motor bicycle when come to the shed.
      - Slow
      - high sped
   5) Usage of brake lights
      - when use break paddle , break lights are lightning or not-
      - Functioning
      - Not functioning
   6) Usage of correct side of the road by motorcyclists.
      - Correct side
      - Wrong side
Permission letter to Veyangoda police station

Through co-ordinator of Allied Health Science degree programme,

W.J.J. Fernando,

Allied Health Science degree programme,

Faculty of medicine, University of Ruhuna,

Karapitiya.

Dear sir,

Request to obtain police reports from Veyangoda police station.

I am an undergraduate of B.Sc (Nursing) in Allied Health Science degree programme at faculty of medicine, University of Ruhuna. As a part of my degree I have to conduct a research study & I am planning to assess Helmet usage & motorcycle safety measures among motorcyclists in Veyangoda area. The proposal study has been granted ethical clearance from the ethical review committee, F/M, Galle.

I hope to obtain motorcycle accident reports from 2005-2012 from your police station. Getting data will be done in a manner which will not disturb the activities of the police station. The confidentiality of the obtained information will be ensured optimum manner.

I kindly request you to grant me the permission to obtain these reports from your police station.

Thank you.

Yours sincerely,

(W.J.J. Fernando),

B.Sc (Nursing) student.
Permission letter to the manager of Petrol shed

Through co-ordinater of Allied Health Science degree programme,

W.J.J. Fernando,

Allied Health Science degree programme,

Faculty of medicine, University of Ruhuna,

Karatapitiya.

Dear sir,

Request to obtain permission from petrol shed.

I am an undergraduate of B.Sc (Nursing) in Allied Health Science degree programme at faculty of medicine, University of Ruhuna. As a part of my degree I have to conduct a research study & I am planing to assess Helmet usage & motorbicycle safety measures among motorcyclists in Veyangoda area.

I hope to collect data from motorcyclists from motorcyclists who are coming to get fuel from your petrol shed. Data collection will be done in a manner which will not disturb the activities of the petrol shed.

I kindly request you to grant me the permission to conduct this survey at your petrol shed.

Thank you.

Yours sincerely,

……………………

(W.J.J. Fernando)

B.Sc (Nursing) student.