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Master's thesis
Role of Education To Improve Motorcycle Helmet Use In Developing Countries Considering Children As Change Agents

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Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences
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PREFACE

The Master Thesis is a very rigorous learning study that sharpens the analytical and research skills of a student. I had put my best effort to justify the topic. The learning in this endeavor has been extraordinary. I had learned new skills in this process that I was previously oblivious. Furthermore, I had learnt to distinguish various kind of data and apply the necessary statistics which I had not used before. The experience has elevated my skills and abilities to a completely new level.

I would like to thank all the people involved in my Master Thesis. I would specially like to acknowledge the support of my Co-promoter Miss Caroline Arien and my Promotor Mr. Geert Wets who had been a source of guidance and support whenever I was entangled in a problematic situation.

Finally, I would like to thank my family who had been a source of motivation throughout the ups and downs in this study. Last but not least, I would appreciate the hard work put by my sister Paras Zaman and brother Zain-ul-abidin conducting the experiment in Pakistan according to my instructions.

Sarmad Zaman Rajper

6th Aug, 2016
SUMMARY

The objective of the thesis is to find out the role of education to solve road safety issues. The problem of lack of motorcycle helmet use in developing country was chosen. The reason for choosing this problem is that motorcycle helmet is very less in developing countries. Resultantly, 90% of motorcycle fatalities are occurring in developing countries. This study focused specially on motorcycle helmet usage for children because parents are reluctant to buy and use motorcycle helmet for their children in developing countries. Therefore, it was decided to teach children the importance of motorcycle helmet use for their family. The children were given an easy and interesting lecture. The children were instructed to repeat the same lecture in front of the parents. They were provided with an attention-grabbing booklet that they could look at the content and repeat what they had learnt in class in front of their parents. The aim was to motivate the parents to buy motorcycle helmets for members of the family. Therefore, it was tested whether children can act as change agents to increase motorcycle helmet use. This study will help to find meaningful results that could realize the importance of solving traffic safety issue through education. The inspiration was taken from France and Uganda where children have acted as children agents improve to social issues as sanitation and health issues in their homes.

In this study, the opinion of the experts was also taken on role of education to improve motorcycle use considering children as change agents in developing countries. These experts belonged to different parts of the world. Majority of the experts belonged to developing countries. It was aimed that opinion of the experts from different parts of the world will create a holistic opinion for the subject of education to improve motorcycle helmet use in developing countries. Besides, barriers to implement the program in different societies could also be understand from the opinion of the experts. In this study, literature is also studied regarding different topics of role of education and children agents. This study comprises of different methods such as literature review, opinion of the experts and experiment considering children as change agents. Therefore, it was felt necessary to use similarities and difference considering different methods of study mentioned above. The triangulation is one method used in social science to find differences and similarities when one topic is studied using different methods. Lastly, triangulation is used to understand the main topic and other subtopics associated with role of education and children as change agents to increase motorcycle helmet use in developing countries.

To test children as change agents the experiment was performed in Hyderabad (Pakistan), which is a medium sized urban city. The participants of the experiment were children and parents, who belonged to middle and high income class of Pakistan. It is important to state that the males only drive motorcycle helmets in Pakistan. Due to cultural issues, women do not drive motorcycles. Therefore, in this study, a parent only refers to the father of the child. Two schools known as Bahria Foundation and City school were selected for the experiment. After the child’s lecture to increase motorcycle helmet, the parent filled the survey form in the end considering how much they were they influenced by the child. They were mainly asked whether children can act as change agents to increase motorcycle helmet and after the child’s lecture are they willing to buy motorcycle helmet for other members of the family. One hundred and six parents filled the forms who were given a lecture by their children. The response of the parents and acceptance of children as change agents by statistical analysis gives clear indication that the experiment was successful as parents accepted children as change agents to increase motorcycle helmet use. Unfortunately, the statistical analysis did not prove that parents will use motorcycle helmet for other members of the family. It must be kept in mind that the experiment had not the perfect sample size representing every strata of population in Pakistan. It
represented a particular middle to higher income people living in urban areas of Pakistan who have a liberal mindset. The success of experiment does not indicate that it will generate same results all over Pakistan. This claim needs further research with larger sample size that includes all strata of people.

Results of the experiment and the literature available supports the claim that children can influence their parents in social and health issues. However, the opinion of the experts remained divergent regarding the role of children as change agents to improve motorcycle helmet in developing countries. They felt that community leaders can play a good role as change agents. They believed that children can act as change agents if they are provided with extensive support using human and non-human resources. Besides, experts considered formal education through schools and universities as the best medium to transmit road safety education. For this study, it was also investigated to find the right age from which children should be taught road safety education. Most of the experts considered that children from 5 to 10 years should be taught about road safety education. The second majority of these experts believed the children from age 11 to 14 years should be taught with road safety education. (this age is also used in children as change agents). They experts advised that road safety education should be inculcated in curriculum of students. Some of the experts gave the opinion that education and enforcement should be jointly promulgated to produce the desired results. Experts were of the opinion that if community leaders are given education, they will influence the masses more. There were certain other results obtained from the opinion of the experts. Majority of the experts recognized that enforcement is more necessary to solve road safety issues than education.

From the literature review, opinion of the experts and results of experiment, it is inferred that this program should begin at a small level initially. In order to have practical experience children can teach their peers. Then at next level, they can teach their parents. There could be resistance from rural areas who may consider counselling of children as against their social norms. In order to solve the problem, there could be community counselling. Changing social norms is not easy and new trend of the children educating their elderly may take time.

Lastly, it may be concluded that road safety education can positively influence the attitude on sensitive issues such as motorcycle helmet use in developing countries. The unique concept of children educating their parents on social issues is also applicable for road safety issues. Formal road safety education in school is important because students can transfer their learning from the school in their homes. Implementing this unique concept of children teaching their elderly can meet social resistance. This social resistance can be alleviated by counselling of elderly and respected people in the conservative areas. Therefore, it is inferred that road safety education can produce a future generation, which is more responsible to drive vehicles safely and create awareness of road safety issues by educating their surrounding people.

**Key Words:** Children as change agents, role of education, motorcycle helmet use, barriers, opinion of experts.
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<th>Description</th>
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<tr>
<td>ITP</td>
<td>International Training Programme</td>
</tr>
<tr>
<td>KOI</td>
<td>Kort Opleidings Initiatie</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transportation System</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>YRSAP</td>
<td>Young Road Safety Advocate Program</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>NIC</td>
<td>National Identity Card</td>
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INTRODUCTION

In today’s era, education can play a pivotal role to improve the social and economic situation of societies. The education can also address social evils such as smoking and drinking. In this study, it is researched how education can also play a significant role to improve road safety situation in developing countries. Road safety is a growing health issue in developing countries due to alarming rate of road accidents. It is leading factor behind injuries and deaths in developing countries. There are also economic and social cost associated with traffic accidents. The main topic of this study is the influence of road safety education for motorcycle helmet users in developing countries. This topic is chosen due to distressing rate of nonuse of motorcycle helmet in developing countries. This research will include opinion of the experts regarding role of education to improve motorcycle helmet use and the barriers to implement an education method. The experts in the field are recognized as transportation professionals with adequate experience. These experts are previous participants from the International Training Programme (ITP) and Short Training Initiative also known as Kort OpleidingsInitiatie (KOI) conducted in Hasselt University. For the practical aspect, an experiment will be conducted in which children will teach their parents considering importance of a motorcycle helmet. For that purpose, two schools from the city of Hyderabad, Pakistan are selected. Additional insight will be taken from available literature in the subjects of children as change agents, role of education to improve motorcycle helmet use and barriers to implement the educational program. Lastly, triangulation method will be used to consolidate the ideas acquired through this research. The study will also involve how the education strategy can be successfully implemented in a developing country. It is also aimed that the study will pave the way for more detailed investigation considering advantages and disadvantages from this study. The main objective of the study is to focus how a future generation of responsible drivers can be produced. It will also try to alter the current detrimental behavior of nonuse of motorcycle helmets by parents. This behavior will be changed by counselling from their own children who will act as change agents to increase motorcycle helmets. Additionally, it will be searched whether parents agree to buy motorcycle for other members of the family and wear motorcycle helmets properly. In this study, light will be shed on the limitations to perform this study, thereby, the future work in this regard could be performed easily. It is hoped that future studies could be initiated considering education as a pillar to improve road safety by considering unique concepts such as children as change agents.
2 PROBLEM DEFINITION

Road Traffic accidents related deaths are accounted for 11th leading cause of deaths worldwide and 23% of injury related deaths are due to traffic accidents. However, 90% of motorcycle related deaths only occur in developing countries (low and middle income) which bear only 54% of the world’s registered vehicles (World Health Organization, 2015) (Li, Li, Cai, Zhang, & Lo, 2008). Therefore, it is the need of the time to assess factors responsible for such accidents. Furthermore, remedies or solutions should be identified to counter such negative effects in developing countries. One of the most reliable, easy and cost effective method to address traffic safety issues in developing countries is education (Birdsall, 1996). So in this study, it will be analyzed how education can improve road safety conditions in developing countries.

Road safety education can be taught from school to every maturing stage of life (Brake Organization, 2010). Education campaigns can be done through government efforts and media. Resultantly, there will be law-abiding citizens who will reduce the chances of accidents due to education. One such method can also be to teach students about exigencies of traffic related problems. On a broader level, this could be taught in school and universities as a course. Resultantly, the education would develop useful insight for students who would act as responsible and cautious citizens when they will driving vehicles. The question then arises how road safety programs can be implemented in developing countries. Therefore, a practical experiment was needed to explain this situation. An experiment will be conducted getting inspiration of the idea from a developed country that children can act as a change agent for road safety. The pros and cons of this experiment will be discussed in later chapters.

2.1 Objective

In developing countries, road accidents are leading cause of deaths and injuries. There are also high number of motorcycle related deaths of two wheelers in developing countries. In India 27% road related deaths are due to motorized two wheelers (WHO, 2013). Due to lack of resources, education is the foremost way to improve road safety issues. Lack of motorcycle helmet education results of non-use and improper use of motorcycle helmet (WHO, 2013). The concern how education can improve road safety particularly motorcycle helmet use will be searched in this thesis in a developing country like Pakistan. In this thesis, children will be used as a change agent for increasing road safety by giving them a message about motorcycle helmet use in school. The inspiration is taken from the example of France and Philippines where children have been counselling their elders to improve societal problems {Juco de la Fuente, 2015} (Basdevant, Boute, & Borys, 1999). Hence, there are significant improvements in societal problems as sanitation and smoking {Onyango-Ouma, Aagaard-Hansen, & Jensen, 2005}. In the study, it is aimed to bring a future generation who is more responsible for road safety issues. The study also aims to improve the habits and behavior of negligent parents considering the issue of motorcycle helmet. It is hoped that it will change the current habits of parents who do not use motorcycle helmets for their family members. In the long term it is aimed that these children will wear motorcycle helmets when they have a valid driving license and act as responsible motorcycle drivers.

2.2 Research And Development

If one takes education as a method/framework to improve road safety in developing countries, many questions are going to arise. For example, which specific road safety problem to select while considering education to solve it. The problem of motorcycle helmet use is picked because motorcycle helmet it is not commonly used in developing countries such as Pakistan (Khan, Khan, Aziz, Islam, & Shafqat, 2008). Therefore, focus of this research will be how education can improve motorcycle helmet
use in developing countries. In order to understand how road safety educational program can be practically implemented in developing countries, the case of children as change agents is used. Schools will be used as the platform and teachers will act as a catalyst to enshrine the minds of young ones. An online survey will be conducted from experts in field of Transportation Science. The opinions of the experts will be taken to understand the barriers of implementing educational programs like children as change agents in developing countries. These barriers will be analyzed in discussion section with the help of literature. In the discussion phase, recommendation for how education can improve motorcycle helmet use will be debated considering the results obtained from the experiment and online survey. One can evaluate from discussion, how educational campaigns can be directed towards school and university students who could be aware of exigency of transportation issues. Hence, the focus of the study will be how road safety education can positively influence students by making them judicious policy makers and responsible citizen in future.

2.3 Research Questions and Hypothesis

As said earlier, the study topic revolves around the understanding how education can improve road safety specifically helmet use. There are many research questions and hypothesis considering education for increasing motorcycle helmet use.

1. Can children act as change agents for road safety in developing countries?

The aim of this study is to analyze the idea whether children can act as change agents in conditions of a developing countries and lower income country. As this study is first of kind, the null hypothesis is that such studies will not prevail.

i. Can children influence their parents to wear motorcycle helmets?

- H1: Children as change agents can influence their parents to use motorcycle helmet

ii. Can children influence their parents to wear motorcycle helmet properly?

- H2: Children as change agents can influence their parents to wear motorcycle helmets properly.

iii. Can children influence their parents to wear motorcycle helmet for other members of the family?

- H3: Children as change agents can influence their parents to wear motorcycle helmet for other members of the family.
3 LITERATURE REVIEW

This section of paper is concerned with available scientific material regarding different concepts related with road safety education, motorcycle helmet use and children as change agent. However, one needs to understand the contemporary situation of road safety prevailing in developing countries. Therefore, one must have quickly over view of the challenges and solutions of road safety related aspects.

3.1 Problems, Solutions and Challenges of Road Safety in Developing Countries

The contemporary situation of road safety in developing countries is downtrodden. Asia pacific countries, which are mostly developing countries, have growing number of road related accidents and fatalities. Approximately, 0.5 million-road fatalities occur in the region (almost half) that cost $35 billion dollars annually. Pedestrian accounts for 45% traffic fatalities in India, and two wheelers account for 30% road fatalities (Jrai, 2003). Besides, 68 countries have seen rise in traffic fatalities since 2010 of which 84 % belong to low or middle income countries (World Health Organization, 2015).

In developed countries most of the road accidents involves non-vulnerable road users such as car users. Whereas, in developing countries the vulnerable road users are pedestrians, motorcyclist and bicyclists which considerably form the high portion in road accidents. According to a report of road safety in in European Union, mortality in vulnerable road users is 45% (European Commission Transportation, 2015). However, in Vietnam, over 70% of road accidents are caused by two wheel vehicles (Viet Hung & Huyen, 2011). Moreover, in developed countries, there is high proportion of cars on road, on the contrary, countries like Vietnam and Pakistan have high number of motorcyclists on the road (Viet Hung & Huyen, 2011). In developed countries, there are less number of pedestrians and bicyclists on highways and streets compared with developing countries. In developing countries, buses and trucks are involved in more crashes than developed countries (Mohan, 2002). In most developing countries, quality of road and its network is still poor. Density of roads is also low compared with population (Jrai, 2003) The behavior of road users in developing countries is also poor, the users are poorly informed about the road regulation, as some of the drivers get their license simply by bribe. The behavior of road users is also aggressive due to hot climate, congestion and inadequate infrastructure. Therefore, drivers feel they either break the rules or remain in lines, which also increase congestion. Hence, both situations cause chaos on the road (Mandar Khanal & Pradip Sarkar, 2014). Besides, Urban sprawl is one of the most arresting problems faced by developing countries. According to report of World Bank urban population in developing countries of Asia will be increased up to 50 % (currently 38 %) (Jrai, 2003). There is also trend of increasing motorization in developing countries. From 1991 to 2000, the vehicle population in Beijing grew, from 540,000 to, 157, 0000 vehicles. Moreover, cities like Chi Minh city in Vietnam and Panang in Malaysia have 300 motor cycles per 1000 people (Jrai, 2003) There is also rampant underreporting and lack of collection and retrieval of crash data in developing countries (Mehar & Agarwal, 2013). China has underreporting of traffic incidents up to 60%.

It is not possible for developing countries to implement exact replica of standards adopted in developed countries. This is due to political, geographical, demographical, and socio-economic differences between developed and developing countries. The question remains how such standards could be modified and implemented in developing countries (Tsunokawa, Riaz-ul-Islam, & Chanyu, 2002). There needs a lot of research and development to implement judicious policies according to local needs of developing counties and this aspect requires substantial investment (Masood, Khan, & Naqvi, 2011). The data available regarding number of vehicles, distances driven or non-motorized transport is vague in developing countries. In India, vehicles are only counted once when they are registered but not
through yearly fees or census. Without such basic knowledge developing countries cannot understand the road safety problems exactly (Schipper, 2002). Due to low priority given to road safety in developing countries, meagre funds are allocated to improve road safety (Masood et al., 2011). This is visible in poor per capita yearly expenditure allocated for road safety in developing countries such as Pakistan; 0.07 and Uganda; 0.09 (Bishai, Hyder, Ghaffar, Morrow, & Kobusingye, 2003). Uganda and Pakistan fall low in Human Development Index in 164 and 146 position respectively (United Nations Development Programme, 2013). There is considerable political turmoil in developing countries. Road safety decision may be derived on personal or group interests (Mehar & Agarwal, 2013). Politicians ultimately satiate public demands taking cost ineffective decisions which are sometimes not feasible. In Lahore’s rapid bus transit, billions of rupees were spent in order to give them public transport, however, still it failed to counter transport problems (Javid, Okamura, Nakamura, Tanaka, & Wang, 2015). There is also social constraint as people are reluctant to acknowledge road accidents as error of driver in developing countries. People in developing countries have a strong belief that accidents are caused only by the will of God. Resultantly, their behavior is quite risky concerning road safety. This social attitude is quite challenging to change when education of road safety is imparted for common masses (Kayani, King, & Fleiter, 2011); (Wasim Hashmi Syed, Ansar Yasar, & Davy Janssens, 2014). There is absence of effective public and private sector coordination in transportation sector. To make the matters worse, preventive measures are nonexistent and health care system is least prepared to meet the challenge of curing road injuries effectively (Gosselin, Spiegel, Coughlin, & Zirkle, 2009). In Ghana, only 60% in towns and 38% in rural areas received hospitals services that were injured in road accidents (Nantulya & Reich, 2002).

Traffic safety problems can be organized in three broad categories, education, engineering, and enforcement (Jraiw, 2003). Firstly, the education aspect is considered which the cost effective and easy method developing countries are. For the thesis report, this aspect is also taken as the main point of discussion. This part will be discussed in detail in upcoming sections. The other two aspects are discussed in detail below.

3.1.1 Engineering

Poor engineering practices have led to poor infrastructure, which turn to be source of danger for road users in developing countries. Density of roads is low compared with population in low and middle income countries. There are 1100 kilometers of road per million inhabitants in China and 1800 kilometers in India which is very less compared to 25300 kilometers per million people in the United States (Jraiw, 2003). The facilities of infrastructure are inadequate in developing countries. In India, National Highways constitute 1.75 % of total roads. The National Highway carries 40 % of total traffic and 30 % total road accidents in India (Mandar Khanal & Pradip Sarkar, 2014). In developing countries, less amount is allocated for its maintenance of roads. Due to heavy traffic and weather, such roads are destroyed quickly. So sufficient budget maybe allocated for its maintenance (Tsunokawa et al., 2002). For such roads, performance monitoring can be done by formal, systematic and independent assessment of the potential problems existing on new or old roads. Performance monitoring is also a check to measure standards accordingly. It is carried out at discrete stage of road development projects (Vardaki, Papadimitriou, & Kopelias, 2014).

Intelligent Transportation System (ITS) can be helpful in developing country because it focuses on addressing problems as congestions, emissions, increasing mobility and improving infrastructure (Yokota, Weiland, & Yamagata, 2005). To extract maximum benefits the developing countries must find their own ITS ethos. According to the study of World Bank, instead of installing expensive infrastructure, government agencies can rely on electronic infrastructure which is far less expensive than
retrofitting existing physical infrastructure (Yokota et al., 2005). Rapidly increasing technology as internet and cellular phone can be easily installed. ITS related services can be installed which are already in their mature stage of working in developed countries. Hence, developing countries can leap frog towards technologies that are relatively less expensive and mature in their stage. To meet such technologies several methods could be devised such as, inexpensive ITS, reliability oriented ITS, deployment of step by step architecture, and the practice of public-private ventures (Yokota et al., 2005). Affordable ITS means that there are high returns and that application can be installed immediately. Examples of such ITS application are use of Global Positioning System (GPS) for geolocation and Global system for mobile communication phone networks for data communication. Such applications have widely been installed in Eastern European and East Asian countries. Reliability-oriented ITS focuses on reducing indecision and improving the safety of travel for people and freight by increasing efficiency and users and operators. Although, deployment of ITS architecture is desirable for any country, yet, it may be not affordable. So a country can implement a simple ITS architecture and modify it in timely manner, or, to adopt and modified version of ITS architecture installed in other countries. This way of deployment is known as step-by-step architecture. (Yokota et al., 2005). Public-private venture is instrumental for change because, ITS can help benefit innovation by private sector, while, public sector can provide better management (Yokota et al., 2005). Vehicle testing and inspection system should be increased in order to prevent defective vehicles entering the roads (Jraiw, 2003). Developing countries should ensure that auto manufacturers follow standards of vehicle safety laid down by United Nation’s World Forum on vehicle safety. Electronic stability control features should be installed in all vehicles including coaches, buses, and trucks. This feature has enormous lifesaving feature. Vehicles should also incorporate features to better protect pedestrians as 22% of all road traffic related deaths are by pedestrians (World Health Organization, 2015). This fatality happens, as pedestrians are hurt more by the vehicle than being thrown on road. The United Nations encourages forgiving car fronts as softer bumpers, better bonnet area clearance and removal of unnecessary hard structures. Moreover, use of efficient child restraint and seat belt should be incorporated as only 52 countries (overwhelming developed countries) of the world use that feature. Developing countries should enforce automobile users to implement seatbelts that can withstand impact of crash with minimum belt slippage and easy removal of passenger after a crash. Moreover, there should be Isofix child restraint anchorage to secure that restraint anchorage are directly secured with frame of the vehicle (World Health Organization, 2015).

3.1.2 Enforcement

Enforcement can play an important role to improve road safety in developing countries. Enforcement is poor in developing countries due to lack of strict laws and its enforcement. Law enforcement is also nonexistent due to less number of personnel on field to cover law evaders. Hence, according to many researchers road safety should be seen as a safety net (Mandar Khanal & Pradip Sarkar, 2014). Poor enforcement also results from corruption, inadequate resources, and administrative problems. In transparency International index, India, Pakistan and Vietnam have been ranked very low at 85, 126 and 119 place accordingly (Transparency International, 2015). Law evaders usually escape by small amount of bribe to law enforcement officials. Driving licenses are considerably easy to get by giving bribe, resultantly, such drivers act dangerously for other road users (Wasim Hashmi Syed et al., 2014). The trend of bribing is due to poor salary of government official that induce corrupt practices among individuals (Masood et al., 2011). Road safety audit is lethargically carried out in developing countries. Around 80%, of the developing countries have annual road safety audit, but, their quality is not ensured with caution (Beuran, Gachassin, & Raballand, 2015). The enforcement problem is increased due to lack of coordination from public itself. There is rampant underreporting and lack of
collection and retrieval of crash data in developing countries (Mehar & Agarwal, 2013). China has underreporting of traffic incidents until 60%. There is wide discrepancy between deaths reported by police and public.

The abovementioned data explains that reporting to the police has witnessed downward trend and it was 37% of the rate based on death registration data (Hu et al., 2011).

There are many methods by which traffic enforcement can be improved. Traffic police reforms can be introduced and their involvement in planning and designs of roads and traffic management schemes (Jraiw, 2003). A uniform Traffic monitoring should be formulated, which is agreed by all transport related agencies, to increase emergency response for crash victims. Moreover, crash data may be collected such as, vehicle registration, drivers’ license and accident information by considering latest application of Intelligent Transportation System (Jraiw, 2003). Make provision so that “Hit and run cases” are reported to the police. This could be done with awareness through media. Police officials should maintain transparency to present exact results. Most of the statistical reports of road accidents in Vietnam or other developing countries direct single effects of causal parameter of unsafe traffic situation. However in practice, impact of different parameters on road should be considered such as drunk driving , no use of seat belts or in vehicle distractions (Hu et al., 2011).

One can find many strategies adopted by developing countries to increase road safety enforcement. One such law was Operation dry law, which was vehemently enforced in Brazil. On daily basis, 140 officials check papers of drivers and perform breath analyzers test to ensure drivers are more alert. Law evaders are charged on the spot and their vehicles are confiscated. In Rio De Janeiro, where such law was enforced resulted in 32% decline in road accident compared to 6.2% decline when such law was not implemented. Therefore, developing countries should follow such footsteps by appointment of honest officials and applying effective laws to improve road enforcement (Jurberg, 2011).
3.2 Functions of Motorcycle Helmet

In order to begin discussion on use of motorcycle helmet, it is necessary to give a brief overview of use, advantage and functions of motorcycle helmets. Helmets are important because they act as an impediment against fatalities and injuries on the road. In developing countries, 88% of fatalities on road accidents from motorized two wheelers occur due to head injuries (WHO, 2013). The social cost is high because families have to spend hours in hospital because head injuries require long duration for recovery. The expenses incurred by the family on large hospital bills create economic restraint on society.

Head injuries occur due to contact or change in speed of the vehicle (acceleration/deceleration). The brain is enclosed in a skull. The brain can move back and front and it can lead to severe injuries. When a rider hits an object the head’s forward motion is stopped but the brain inside the skull can move. In severe injuries, brain can strike the front of the skull and then rebounds to strike the backside of the skull. Such movement can leads to a minor or a fatal injury (WHO, 2013). The head injuries maybe divided in open or closed head injuries. Most dangerous head injuries are closed head injuries. The types of head injuries are explained in the figures below.

![FIGURE 2 Type of head injuries (WHO, 2013).](image-url)
The Helmet disseminates the energy in an impact resulting in less or no injury to head and neck. It works in three main ways.

i. It reduces the movement of the brain. The soft material in the helmet incorporates some of the energy.

ii. The force of the impact is spread across to a greater radius, so point of impact does not lead to severe damage.

iii. It acts as a mechanic or physical barrier between the head and the object of collision.

There are four basic components of helmet that achieve the above-mentioned operation namely; rigid outer shell, impact observing liner, comfort padding and chain strap. The outer shell distributes the force incurred in an accident. It provides protection sharp and hard objects. Hence, the exterior must be hard with a smooth exterior finish. The impact absorbing line is made of expanded polystyrene. It is made to absorb the shock and prevent it moving towards the head. The comfort padding provides the required softness and fitness for the head. The chain strap holds the head and helmet connection firmly. These components are visually described below.

![Components of a motorcycle helmet](WHO, 2013)

#### FIGURE 3 Components of a motorcycle helmet (WHO, 2013).

### 3.3 Motorcycle Helmet Use in Developing Countries

In middle and low-income countries majority of the road users comprises motorcycle. For instance in India, 69% of total motorized vehicles are motorcycles (WHO, 2013). Besides, there is lack of motorcycle use found in Indonesia (45%), Malaysia (46%) and Thailand (31%). Motorcyclists often are in state of risk because they encounter fast moving and large vehicles. This state is also increased two folds when they are physically unprotected due to non-use of motorcycle helmets and protective clothing. In India, due fatalities related to motorcycle is 27% of total deaths on road. Motorcyclists who do not wear helmets are at increased danger level than users of helmets. Wearing a helmet decreases risk of injuries and fatalities by 72% and 39% respectively. Despite injuries and fatalities, there are other
losses associated as well such as hospital bills, loss of working capability and losing head of the family (WHO, 2013). One can understand importance of motorcycle helmet more clearly by analyzing the advantage and disadvantages of wearing a motorcycle helmet. Some of the important advantages and disadvantages are mentioned below.

**TABLE 1 Advantages of motorcycle helmet use and disadvantages of not using a motorcycle helmets (WHO, 2013)**

<table>
<thead>
<tr>
<th>Disadvantages Of Motorcycle Helmet Use</th>
<th>Advantages Of Motorcycle Helmet Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of head injury</td>
<td>Decrease risk of injury by 72%</td>
</tr>
<tr>
<td>Risk of time spent in hospital</td>
<td>Decrease risk of fatality by 39%</td>
</tr>
<tr>
<td>Risk of fatality</td>
<td>Decrease health cost related with crashes</td>
</tr>
</tbody>
</table>

Similarly, there is rapid motorization visible in India, registered vehicles increased from 30 million to 66 million in 2005 (Ponnaluri & Santhi, 2009).

**FIGURE 4 Mode of motorization in India (Mandar Khanal & Pradip Sarkar, 2014).**

Aforementioned chart describes that two wheelers have increased substantially in India. However, the overall percentage of cars decreases as the ratio of two wheelers increased and four wheelers were registered accordingly. It may be inferred that two wheelers have the most vulnerable road users and it needs substantial concentration to reduce its negative effects on road.
In Vietnam, there were stringent laws and campaigns introduced to make children wear motorcycle helmets but, parents remained ignorant to buy motorcycle helmets for their children (Kohoutkova et al., 2016). This shows parents are lethargic to use motorcycle helmets for their members because they are oblivious to perils of non-use of motorcycle helmet for other members of the family including children. Nonuse of motorcycle helmet for young children and adolescents is also high in developing countries Young adolescents count 26% of motorcycle injuries in Cambodia (Brijs et al., 2014). Use of motorcycle helmet for other members of the family especially children has been witnessed very low. In city of Luan Prabang from Lao People’s Democratic Republic, motorcycle helmet for children is less than 1% (Fong et al., 2015). In Hanoi, Vietnam use of motorcycle from the age of 8-14 years is only 23% (Pervin et al., 2009). In Sri Lanka, motorcycle helmet use in children has been only 12%. In Asia, families cannot afford cars and travel as families with children, women and infants on motorcycle. Unfortunately, no formal WHO recommendations have been issued regarding pediatric motorcycle helmet usage (Hilmi, Kottegoda, Jasinghe, Perera, & Wax, 2010).

3.3.1 Reasons for Not Wearing a Motorcycle Helmet

There are many reasons associated with non-use of helmet in developing countries. Helmet is expensive and beyond reach for low earning citizen. Middle and high income complain that it is too hot to wear a helmet. Some of the users feel that their hairs style maybe ruined if a helmet is worn. In Africa, some of the women cannot wear a helmet due to their distinct hairstyle. Some of traditional and religious obligation also refrain use of helmet due to their particular head wearing as Turbans in India. Passengers of motorcycle tax, avoid using the helmet as a risk of getting dirt, head lice or other transferable diseases. In developing countries young ones are influence d by their parents or older sibling for not wearing a helmet and same behavior is replicated by them. People in developing countries also do not feel any risk for smaller distances journey (Li et al., 2008); (Hung, Stevenson, & Ivers, 2008); (WHO, 2013). However, studies shows that high education and income motivates people to buy and use motorcycle helmets (Khan et al., 2008). Other study from Haqverdi suggests that motorcyclists avoid using helmet due to auditory and visual limitation, besides; some of them claim that weight of helmets demotivated them to use it. Such users also complained that risk of theft refrained them to buy helmet (Haqverdi, Seyedabrisami, & Groeger, 2015). From the same study of Haqverdi, it is claimed that in developing countries social norms for motorcycle use has not been established. People in these societies regard helmet as unnecessary and unusual activity. Helmet use should not be considered as a single predictor of risky behavior. Many psychological factors have to be considered such as mood of rider. The overall psychological characters of individuals should be considered prior labelling them as moody. From study of Haqverdi, it was confirmed that habit of non-using a helmet reduces the probability use of motorcycle helmet in future. In China by study of Li-Ping Li, it is found that people abstain from wearing motorcycle helmet due to lack of enforcement (Li et al., 2008).

3.3.2 Improper Use of Motorcycle Helmet in Developing Countries

In Thailand, one fourth of motorcycle came off during accidents (Li et al., 2008). Improper use of motorcycle appears to be more serious in small cities and provincial areas where motorcycle helmet use is higher. A study was conducted by Li in China’s two mid-sized cities, improper use of motorcycle helmet use was found to be 14%. The study revealed that improper use of motorcycle helmet was high among males and youngsters. Improper motorcycle helmet was also high during the evening and weekends. Besides, improper motorcycle helmet was found more on secondary roads. There were three main reasons identified of improper use of motorcycle helmet by respondents in the study, which are comfort problem, vision problem and lack of enforcement (Li et al., 2008).
3.3.3 Mandatory Helmet Programs in Developing Countries

Mandatory helmet programs can produce useful result as witnessed in many countries. By mandatory laws, motorcycle helmets use can increase up to 90%. In Texas when mandatory law was practiced it reduced injuries from 9 to 11% (WHO, 2013). However, mandatory laws are not effective in developing countries unless it is attached with other important factor such as wide spread education, effective enforcement and abundant supply of cheap helmets. In Pakistan there is mandatory motorcycle helmet, but due to weak enforcement and education among people, only 10% people wear motorcycle helmets (World Health Organization, 2015).

3.4 Role of Education to Improve Helmet Use in Developing Countries

According to a study in China, 43% drivers reported that they have never come across any message that emphasize on use of motorcycle helmet. In the study, 31% drivers said that they have not received any education for proper use of motorcycle helmets (Li et al., 2008). Education plays a pivotal role to reduce traffic accidents by educating masses. Education is a strategy that has long-term influence in any society. Building roundabout and increasing enforcement for road safety bring rapid improvement, on the contrary, education slowly improves societal behaviors which have long term affects. Due to limited resources, one cannot build roundabouts or high enforcement in every nook and corner of the country (Kar & Datta, 2009). Therefore, education is a policy every society must incorporate to improve behavior of driver. When interviews were conducted from International Training Program (ITP) attendants of Hasselt University in November 2015, almost all indicated education as a vital factor to address traffic safety issue for developing countries. Drive education and training plays a pivotal role in transportation infrastructure and safety culture in a country. Therefore, research and education must be focused on significant operational factors and safety bounds that exists in developing countries reflecting its local conditions (Kar & Datta, 2009). The timing of education is very important. From studies it is proved that optimum results of education of motorcycle helmet has been witnessed where it was implemented in the right time (Gall, Legros, & Newman, 2006). This indicates that it is effective before promulgation of a law. The quality and the price of helmet should also be affordable otherwise; the message of the education of education will not be influential. It is necessary to first define education of road safety. Road safety of education covers, promotion of knowledge regarding road safety and under standing of traffic rules and situations. Besides, it covers enhancing skills through training and experience and changing lethargic attitude towards road safety (Assailly, 2015). Besides, curriculum in schools and colleges can be modified considering road safety as a subject (Jraiw, 2003).

3.4.1 Educating Young People

Educating young ones is an important consideration successful implementation of motorcycle helmet program. Education of children should not be focused on only facts as it would create boredom and divert their interest. Apart from education from seniors, peer education is also instrumental as children are more interactive in this discussion. Social facilitation is also important for young one’s education. When children are physically drawn to wear a helmet or perform an exercise, results are practically more rich (WHO, 2013).

3.4.2 Role of Schools in Promoting Education

Schools are community organizations that provide the right environment for learning. This can act as a platform where parents, sponsors and teachers can collaborate to implement programs as helmet use. Many successful campaigns have been concluded in schools such as Polio drives and hand
washed schemes (WHO, 2013). In America, Head start program aimed at young pupils to wear helmets. This program through different activities as rodeos, games, and classroom instruction increased helmet use among school going children from 43% to 89%. In India, the NGO Friends for Life launched similar helmet increasing program through internet targeting youth and achieved positive results. In 2000 in city of Ho Chi Minh of Vietnam, the NGO Asia Injury Prevention Foundation took the initiative of “Helmets for Kids” for increasing education among children for helmet use. This campaign launched a curriculum for primary school children. The objective was that children learn about the laws, transport and acquire the necessary skills for safe behavior. After success of the pilot scheme, this scheme is launched nationwide. This initiative had another aspect that it also launched awareness of public using celebrities to influence young people.

3.4.3 How to Implement Successful Educational Program

There are certain features one has to adopt implement a successful educational program.

1. The road safety education must be designed according to maturity level of a pupil.
2. The mechanism of accident must be clear, such as who is at risk and how accident happens.
3. The interaction between individual factors(genetic, social) and impact of prevention actions(match type of program/type of person)
4. Reach the real target group as parents in our case and avoid the “Saint Thomas paradox”.
5. Adapt education according to social and cultural predictors of traffic accidents. However, in the experiment conducted it challenge this claim. In Asian developing countries, society is dominated by elderly males. The say of children and women is less important. Therefore, it is to be tested whether successful practice of children educating elderly can also be implemented in developing country such as Pakistan.
6. Need of integrated approach to reduce risk because road users are not only affected by factors present on the road. These road users are also affected by social complexes, drug usage, breakups and education. Therefore, road safety education should be in alignment with health prevention programs such as alcohol or smoking (WHO, 2013).

3.4.4 Awareness

According to Cambridge Dictionary, there is a slight difference between education and awareness. Education focuses on a formal process to grow knowledge beyond the base concept from an institution such as school, college or university. Awareness is the understanding of a subject or situation based on information and experience. It refers to all education at publicizing road safety education as through enactment of new or increased enforcement focusing on the importance of head injuries associated with helmet use. Transport related agencies could collaborate and initiate mass awareness about road safety. Besides, communities can be involved to raise awareness of road safety problems (Jraiw, 2003). In the case of helmet use, it may shows its benefits and provide reasons to incorporate helmet use in one’s daily life. Education on helmet use can:

i. Ignite behavior change
ii. Public will more supporting for road safety issues
iii. Helmet use will become more acceptable in society; hence, social norms will be altered.

New laws and practices for helmet use can be created after public sentiment in favor of helmet use (WHO, 2013). Awareness helps one to understand the consequences. Laws remain futile unless there is sufficient awareness among masses. For instance, Helmet Law was introduced in December 2007 in Hanoi, apart from the city, the adjacent areas were oblivious of such a law and violation of
traffic laws was growing. Hence, such negative behavior can only be controlled by awareness of cause and consequences of Traffic education (Viet Hung & Huyen, 2011). In India, several private organizations are helping state governments to increase awareness. In the Indian city of Hyderabad, regular campaigns to improve driving behavior are conducted by such private organizations. A key intuitive by such campaigns is introduction of fourth E of etiquette, apart from 3 E’s (education, engineering, and enforcement). This is done for making a better driving culture, and valuing alternative mode of transport as motorized two vehicles, pedestrians and bicyclists (Ponnaluri & Santhi, 2009).

3.4.5 Education and Enforcement

In the Indian state of Kerala, the traffic police has launched project of “Subhayatra” which focus on combine use of education and enforcement to make roads safer (State Crimes Report Bureau Kerala, 2016). To increase traffic safety, the Indian police has launched educational scheme as release of monthly magazine. In each district of the state, police has made traffic parks where young and elderly take different rides built like road users as cars and bicycle. The useful information is displayed with traffic parks where education and entertainment activities are organized hand in hand. There are plenty of rides that display road safety messages with it. Moreover, with the initiative of police in every school there is introduction of traffic clubs. The club members meet once in a week to discuss road safety issues. There is also strict enforcement introduced in the program by installing more speed cameras, strict fines, zero tolerance against drunk driving, and speed radars. After this initiative there is considerable reduction of accidents on the roads of Kerala (Sreedharan, Muttappillymyalil, Divakaran, & Haran, 2010).

3.4.6 Role of Media in Awareness

In recent the role of media to promote education-based activity had been widely recognized. The case of France where children were used in advertising to increase seat belts directs that media can positively play its role to reduce social evils (Basdevant et al., 1999). In order for media’s message to be effective, the message should be designed in a way that reflects cultural, linguistic and educational ethos of the society the issue of breast cancer was addressed through media campaigns in Vietnam. Resultantly, there was increase in routine checkups and precautionary steps from women regarding breast cancer proving that electronic media can play a pivotal role to increase awareness. Therefore, if media gives awareness on sensitive issues as road safety it must consider local factors such as culture, mindset and language of the common people (Jenkins et al., 1999). In American state of Nevada, use of enforcement was promulgated with awareness through media. A comparison of before and after scheme shows that seat belt usage had increased when there was combination of enforcement and awareness scheme promulgated together (Vasudevan, Nambisan, Singh, & Pearl, 2009).

3.5 Children as Agents

According to United Nation’s Convention on the rights of the child, someone under the age of 18 years is described as a child. However, most national road traffic accident databases define children as younger than 15 years old. In the thesis study, the age of children from 11 to 14 years is considered to conduct experiment due to considerable mature stage as they are in their teens and they have substantial influence on their parents. (Christie, Towner, Cairns, & Ward, 2004).

From studies it has proven that children’s viewpoint can play an important part to influence the decision of their parents (Wingert, Zachary, Fox, Gittelsohn, & Surkan, 2014). Parents keenly listen to polite appeals by their children and considerably take their suggestions (Ebster, Wagner, & Neumueeller,
Studies have shown that children have played an important part to promote healthy behavior in society. There are successful campaigns when child pressure is used to prohibit a parent from smoking. Considering the case of road safety, children have been used in advertising campaigns to change habits of parents and induce them to use seatbelts (Basdevant et al., 1999). This study also shows parents acknowledge the fact that they keenly tilted toward learning new skills from their children. Hence, children in the experiment are not receiving the message of healthy activity but also act as partners promoting a healthy behavior. The schools are considered as the ideal platform where children listen to their children and consider them their role models (Basdevant et al., 1999).

Children as change agents maybe defined as one young age people who can make changes in their social environment. Children can make strategies and manipulate resources and constraints when the given the role of change agents. Children are not passive respondents when imparted the duty to make a change. From the study conducted by Ouma in Kenya, it suggests that children can take active role as health agents for their families. There are examples in Kenya and Uganda where children are self-treating their illness due to unavailability of state’s medical treatment (Onyango-Ouma et al., 2005). However, agents of society requires children to interact with their social surroundings. There are many limitations imposed by society on children as naive to make a change. Some primitive societies consider children counselling their elders as disrespectful. Hence, children have to act as change agents have to deal with large societal structures having power and knowledge hierarchies (Onyango-Ouma et al., 2005).

3.5.1 Action Oriented and Participatory Health Education

It strives that children aim at changing real life problem as a part of its learning method. It differs considerably from traditional approach to health education as health belief model. These can be societal issues related to their families. The action oriented and participatory health education is focused on action instrumental to bring a change. Active involvement in the learning process is known as participation. It helps students learn action-competence to make the desired change in the society. The active participation of students does not dim the role of teachers in this program. Teachers must be active, critical and suggestive for actions that can bring a change in society (Mwebi, 2012).

3.5.2 Child To Child Approach

Originally, this concept was coined for communication among children. However, it has grown into child’s communication with family members. It is associated with action oriented and participatory health education. The child-to-child approach involves dialogues between the teacher and children. Children present their opinion and share experiences on social issues such as smoking or obesity. Teachers also learn from the experiences of children. In this approach, children learn more to act as teachers as they elevate their confidence to speak in public. This takes into account the participation and active learning considering experience of everyday life. The child-to-child approach relied on the fact to give value and appreciation to the child for making a change in society. This concept of children influencing their parents for cleaning their hands, house and localities has been practiced through child-to-child approach. Children have considerably made changes in society such as India, Botswana and India. In Uganda, this approach improved the environmental health of school. In Botswana, primary students prepared pre-school children for entrée into primary school. Hence, child-to-child approach is focused on children to work with communities to solve health related problems. It should be taken into account the child-to-child initiative depends on the context of the problem. It can face success or failure depending on the nature of the problem (Mwebi, 2012).


3.5.3 *Examples of Children as Change Agents in Social Issues*

There is some scientific literature available on the fact that children acting as change agents have improved societal evils such as obesity and smoking. Therefore, in this section relevant social problems are observed where children have played important role. In Kenya and Uganda, boiling of drinking water and cleaning of utensils had increased to 70% and 31% respectively in houses where children acted as change agents (Onyango-Ouma et al., 2005). In France, there was a project in school where students made breakfast for them by use of healthy food. The student went to the fields, factories and markets by looking for healthy mix of ingredients. Children used clinical data such as body mass to analyze what their body mass and how should they plan their diets. The results showed multifocal program improved the nutrition knowledge of children compared to the control group (Basdevant et al., 1999).

3.5.4 *Examples of Children as Change Agents in Road Safety*

According to police reports in Indonesian city of Bandung, students are second highest number of groups who face road injuries. Considering this fact, in Bandung children are used as change agents of road safety by performing in a one week program organized by the non-governmental organization (NGO) Save the Children. The children emphasize the importance road safety programs such as helmet use through participation in games, music and plays. These activities are performed in front of parents and authoritative heads such as traffic police and city administration so these societal heads can work for road safety of children (save the children, 2015).

The concept of children as change agent is also being used in Philippines. According to a study in Philippines, road accidents are second largest cause deaths from age of 0 to 17 followed by drowning. The concept of children as change agents was recognised by Safe Kids Worldwide Philippines (SKWP) and FedEx which launched the program of “Walk This Way”. This programs taught basic road safety concepts to students and also practically educated students to walk safely towards school. The students from class 5 were used as advocates to promote road safety. In 11 years this program was implemented in 6 cities. In 2014, this program was modified and renamed as Young Road Safety Advocate Program (YRSAP). Earlier in this program peer to peer education approach was used, some 900 outstanding students taught road safety programs to 100,000 junior students. The second phase is in its rudimentary phase, where it is being planned that the children will teach road safety concepts to their parents. (Juco de la Fuente, 2015).
Another example of successful changing behavior of parents was observed in France. In France, children appear to be an important element to motivate parents to use seatbelt. Children were used in television advertising to emphasize the importance of seatbelt (Basdevant et al., 1999). Parents agree to the fact that they can learn a lot from their children and are influenced by children’s words and actions. Therefore, children as change agents are not only receiving the message but also quite successfully instilling good habits in their family.

3.5.5 Ego Factor of Parents

The parent’s voice in a house is that of authority in the house. The parents ideas transform or reinforces the attitude and thinking of child in an early age (Kenward, 2013). There could be friction in the family when such kind of authority is challenged by the child even though the message has been very politely transmitted. In the experiment to be performed in Pakistan for this study, the communication is only between the children and the father in this case (females do not drive motorcycle in Pakistan) If the parents accept children as change agents and tend to change their behavior that means ego of parent is not violated.

3.5.6 Barriers: Children Counselling Elderly

Pakistan is a patriarchal society in general. The rural areas are dominated by elderly male. The notion of children teaching elderly may not be welcome. It could be the case for developing countries of Africa or Asia in which such type of education may not be welcomed. There is no direct literature supporting or disapproving this claim. Therefore, this social constraint can be analyzed by looking at relevant literature. The study conducted by Jamal for girls’ education is taken as reference study. Girls’ education, is still considered inappropriate in rural areas of Pakistan. This study is useful investigation where patriarchal norms are challenged Aamir Jamal in his article, Engaging men for gender justice, has devised certain methods in which girls education can be improved in such patriarchal societies. It is suggested in the study that gender parity in education could be achieved by making allies of powerful
communities. These relations can be developed by involving religious leaders, using existing institutions such as mosque, Jirga and important men’s guesthouse to advocate girl’s education. Such relation to promote girls education should be built on mutual respect and inclusiveness (Jamal, 2015). By this study once can understand that such methods may be applied in a situation where children can educate and create awareness in a polite manner for their elders to solve health issues as increasing motorcycle helmet use.

Considering the economic barrier, the private education in Pakistan is very expensive and people are in financial stress. The education system in developing countries like Pakistan is downtrodden. Government spending for education in Pakistan has been below 2% of Gross Domestic Product (GDP) in last five years (Rehman, Jingdong, & Du, 2014). Therefore, the notion of public funding for project such as children as change agents is distant dream. Nevertheless, in Philippines private companies such as FedEx sponsor project as road safety for children by making them active in field of road safety.
4 METHODOLOGY

The methodology will focus on use of education to improve traffic safety situation in developing countries. In this regard, the problem of motorcycle helmet use is considered. For the practical aspect of the program, the inspiration will be taken from a good practice in a developed country and replicate that in a developing country. As defined in literature section, children as change agents have improved social issues. An experiment using children as change agents to improve helmet use will be conducted in Pakistan. Moreover, opinion of the experts in the field of transportation science will be obtained to understand how education can improve road safety and what are the barriers for implementing this educational programs. For collecting opinion of the experts, two methods are devised as face-to-face interviews and online survey. In the end in the discussion section, the experiment conducted and viewpoints of experts will be analyzed with help of relevant scientific literature. In the end, this methodology is expected to help understand how education can improve road safety conditions in developing countries. By emphasizing use of motorcycle helmet issue and children as change agents.

4.1 Face To Face Interviews with Transportation Science Experts

In the face to face interview from transportation science experts, semi structured interviews were collected with the motive to extract an understanding of the problems of road safety and its solution in the context of developing countries. The importance of this type of interview is that one can ask prompt and responsive question on the spot. After discussion with the Co-promoter of the thesis, it was decided the respondents would be current attendants of ITP program in Hasselt University. These interviews were collected from October to December.

4.2 Experiment: Children as Change Agents

In order to find out how much parents are influenced from their children considering the aspect of road safety, an experiment was designed to be conducted in two schools. The first task was to select schools in Hyderabad, Pakistan. Different coordination with school was done which lasted from mid of April to 1st week of May. Three Schools showed significant interest, The Educators, The City School and Bahria Foundation School. In the end, the City School and Bahria Foundation School agreed to conduct the experiment. Two teachers were planned to give lecture in The City School and Bahria Foundation School separately. The teacher in City School is a female who has more than 3 years of experience in teaching with different certification in teaching field. The Teacher to give lecture in Bahria Foundation is a graduate from Hasselt University in Transportation Science. The Lecture was completely explained to both teachers. The underlying concept in presentation and aim of the survey were very clear for both teachers. There was no control group selected because the cost to establish a control was not necessary. This research realizes the influence of children on parents on health issues as use of motorcycle helmet for safety. According to report of United Nation, use of randomized control trial for health promotion is misleading and unnecessary (WHO IRIS, 1998).

4.2.1 Participants

In the first phase, children from 11 to 14 years were selected. The reason to select is that they are at a good age to convey the message effectively to their parents. According to study conducted by
Mooney, in this age students are highly motivated and energetic to conduct different activities (Amos & Reiss, 2006). According to Brake organization, children from age to 14 years should be taught about protective features in vehicles such as brakes, helmets and airbags. Besides, they should be taught the after math of accidents (Brake Organization, 2010). It was also kept in mind that after few years, they will be entering the age of driving a motorcycle so the lecture in school will give them the motivation to be responsible drivers. The children had to convey to their parents what they learned in class. The survey forms are to filled by the father of children.

4.2.2 Survey Design

This survey was prepared with coordination of Co-promoter of this Thesis. Some modification had to be made to match the mental level of schoolchildren. As educational level is very downtrodden in Pakistan, complicated question were made simple and survey was compiled to short version. Initially in survey, it was proposed to include copy of the National Identity Card (NIC) by the parent who fills the form. However, this was opposed by school authorities because the copy of NIC is used in transfer of property. So in the end personal cell phone and home address were used in the form as a proof of validity. This survey was designed in three parts. The first part was focused on obtained personal detail of the child and father. Name of parent and child, telephone, address, email and name of the school were asked in the first part. The second part was focused on asking the parent regarding use of motorcycle for self and family members. The questions asked in this part are mentioned below:

i. Do you have any vehicle/car at home?
ii. Do you wear a motorcycle?
iii. Do you wear a helmet while driving a motorcycle?
iv. Do you understand traffic signs on the roads?
v. Do you have a driving license?
vi. Do you have a motorcycle at home?
vi. Do you wear a motorcycle helmet properly?
viii. When riding a motorcycle, do you use a motorcycle helmet for other members of the family (wife, children)?

The third part of the survey form was about the result of the lecture from child to the parent regarding helmet use. Their viewpoint was collected, if children teaching importance of helmet use to their parents is successful or not. Three questions are asked in this regard, the last question was subjective and open-ended.

i. After the child’s lecture, are you willing to buy helmet for other members of the family?
ii. Do you think children can act as agents of change in road safety issues as increase of helmet use?
iii. Do you have some suggestion to improve the program of children as agents for road safety?

As the children are mostly from middle class families, they were provided with goody bag with chocolates inside it as an incentive. The incentive program is planned so children are interested to give lecture to their parents and motivate their parents to fill their forms. It has proven from studies that children are inclined and motivated to use products that offer incentive in these programs (Corsini, Slater, Harrison, Cooke, & Cox, 2013).

4.2.3 Designing Material for Presentation and Booklet

For designing the presentation and booklet, it was kept that in mind the intellectual level of students from class 6 to 9 class. In order to make the presentation and booklet appealing, instructions
were followed from the website of Carnegie Mellon University. It provided the necessary guidelines to carry out an interesting and interactive course material. Following recommendations were kept in mind prior designing the course material in the form of presentation and booklet. One should have prior knowledge of students’ knowledge, skills, and beliefs. To make the course material interesting one should consider who the students are, understand the intellectual level and cultural background of the student. Besides, understand what knowledge and skills would be acquired by the student after the lecture. Consider how this presentation and booklet design would fit in the overall goal of the course or topic of discussion. What technologies are installed in the room, how big the room is, what is the day and length of the course material that is to be taught? Assess the students by testing their analytical understanding of the subject during the class by performing different activities, it will also keep the attention of students intact. The course should be well designed in sequence and there should be appropriate teaching strategy. Provide with different activities and games in class, so there is more interaction (Eberly Center for Teaching Excellence & Educational Innovation, Carnegie Mellon University., 2015).

4.2.4 Presentation Design

The lecture to be given to children was prepared on power point slides. The power point was carefully made according to the mental understanding level of 11 to 14 years old. That is why many graphics and cartoons were used to grasp their attention. Two videos were also used to highlight the importance of motorcycle helmet use among children. It was planned that maximum interaction will be taken so students can get comfortable and ask different questions directly from the teacher. In this regard, consistent contact was made with teachers who were going to give the lecture.

4.2.5 Booklet Design

In the next phase, it was children’s responsibility to teach what they learnt in class. So it was decided to use some kind of booklet for reference of children. For that sample, booklets were searched online. Later the booklet was made on Microsoft word. Due to printing issues, some of the initial designs had to be modified. It was planned to handover the booklet to students on the same day the lecture was given so students could recall freshly what they learnt in school. The material in the lecture and booklet was same, so students could correlate with the material and act effectively when teaching their parents.

4.3 Conducting an Online Survey

The online survey was designed to obtain the opinion of experts in the field of transportation science regarding the role of education to improve road safety considering children as change agents. The survey was user friendly; the average time to fill was less than 15 minutes. The main advantages of an online survey are that respondents are not in a state of pressure to fill the form. They are also not disturbed by the presence of interviewee, which can generate mental pressure on interviewee. The respondents can take as much time as they want. The platform of Qualtrics was used as online tool to collect responses. The Qualtrics platform provides users to continue survey where they left. Moreover, complex questions can be added with graphics and randomization in the survey through Qualtrics.

4.3.1 Respondents

The respondents were participants of International Training Programme (ITP) and Short Training Initiative also known as Kort OpleidingsInitiatie (KOI) program in Hasselt University. The email was sent to 254 people of KOI and ITP participants. They were chosen because they were professionals with sufficient experience in departments related to transportation. Moreover, many of the
respondents were from developing countries, hence, the economic condition in their home countries are somewhat similar. The diverse demographic, political, social and environmental conditions would enable respondents to provide varying viewpoint on issues as role of education on road safety considering children as change agents. This will develop a holistic view for the subject. For additional opinions from the experts, this survey was emailed to different teachers and professors from Pakistani Universities who are related with Transportation field. Mostly teachers were from faculty of civil engineering. Prominent Pakistani Engineering university database was made and email was sent to fill the survey.

4.3.2 Survey Design

The survey was divided into three main sections. In the first section, five close-ended questions were formulated for basic details of the respondent such as name and date of birth. In the second section, four close-ended questions related to road safety and helmet use were formulated. In the third section, five close ended and three open ended question related to road safety education and children as change agents were included. Lastly, email addresses were asked from experts. The list of the questionnaire is attached in the annexure in the survey form. When the option of other was selected in closed ended questions, a small box would appear asking for subjective view of the responded for his/her choice. In the thirteenth question it was asked what will be the barriers if program of children teaching elderly was raised on national level. If respondents selected the option of social reason, another additional question pops out, considering how children’s view will be accepted in a rural society, which is dominated by males.

The list of objective type is mentioned below:

i. What is your name?
ii. Which country do you belong to?
iii. What is your date of birth?
iv. What is your gender?
v. What job are you doing there?
vi. Considering you home country, how driver behavior can be modified?
vii. Considering your home country, why are individuals not buying a helmet?
viii. Considering your home country, if individuals own helmets why do they not wear it?
ix. Considering your home country, what are the reasons for improper use of motorcycle helmet use?
x. Considering your home country, from which age should traffic safety education be taught?
xi. Considering your home country, which medium of education is important while educating for motorcycle helmet use?
xii. Considering your home country, who should be responsible to educate for helmet use?
xiii. Considering your home country, if the program of children teaching their elderly on road safety is raised national level, what barriers will it face?
xiv. In developing countries’ societies, rural areas may be dominated by male citizens, how children’s view on road safety maybe acceptable in such societies?

The open-ended questions are mentioned below.

i. How education can improve motorcycle helmet use? Any solution or suggestion in this regard. Any research conducted, paper written or recommendation for above-mentioned idea (attach if necessary)?
ii. How can the program of children teaching road safety to elderly in developing countries can be implemented successfully? Any research conducted, paper written or recommendation for above-mentioned idea (attach if necessary)?

4.3.3 Limitations

The formulation of survey took longer than expected because relevant scientific literature to back each question in the survey took longer than expected time. The formulation of survey question lasted from end of February to mid of April 2016. There was some technical issue in Qualtrics’ user identification of Hasselt University that postponed initiation of online survey week by almost 2 weeks. The survey was started on 10th May, 2016. The last date to fill the online form was 8th June, 2016.
5 RESULTS

This chapter covers the statistical results obtained from the Qualtrics survey and the experimented performed in Pakistan. The result of face-to-face interview and opinion of the expert does not require any statistical analysis. The results of the experiment performed in Pakistan is compared with current behavior of parents to use motorcycle helmet and influence of child’s lecture to influence parent’s behavior. On the other hand, questions asked from experts are actually important topics that will be mentioned by literature and results of experiment in Discussion section of this report.

5.1 Participants

In order to understand the response rate, for the participants from the experiment and online survey are defined below. The demography and geography of the participants is also mentioned briefly. Detail of face-to-face interviews is already provided so that it will not be repeated in upcoming sections.

5.1.1 Participants of Experiment in Pakistan

As mentioned before, the experiment was performed in two schools namely Bahria Foundation School and Beacon House in Hyderabad. The children of school belonged to middle and high-income families. Whereas, children of city school belonged to middle and low-income countries. 106 students emphasized their parents to fill the form by giving them lecture about importance of motorcycle helmet use. There were 16 students who filled the form from City School, whereas, there were 90 students who filled the form from Bahria Foundation School. There were 56 males from Bahria Foundation School and 12 from City School who had given the lecture at home. There were 4 females from City school and 34 from Bahria Foundation who had given lecture at their homes. The forms were filled by the male heads as their no culture for females to drive motorcycle in Pakistan.

5.1.2 Online Survey

There were 118 responded who completely or partially filled the online survey. There were 84 male and 34 female with percentage 71% and 29% respectively who filled the form. The mean age of participants was 37 years old. According to the survey, most of the respondents are working as lecturers in University. The country where the participants belonged to is mentioned by frequency and percentages in figures below.
5.2 Face To Face Interviews Of Experts On Road Safety Issues

It is necessary here to define that these face-to-face interviews were conducted prior selecting the main topic of education for this thesis. They were interviewed in order to understand the main problems of developing countries and opinion of the participants to solve the issue. The results of discussion are put to give the readers the output of an effort performed in the thesis work.

1. The ITP participants mentioned main causes of traffic issues congestion, traffic accidents, and mixed land use and infrastructure problems in their home countries.
2. According to ITP respondents, the behavior of road users was also problematic but it was due to less enforcement.
3. Almost all of the participants gave solution of education as top priority to improve road safety in developing countries. Some of the participants advocated that such education should begin from primary schooling of children to higher level. Educational campaigns should also be done with help of government, media and agencies.
4. There was also response from the participants that there should be autonomous road safety councils for rural and urban areas and they should be linked to central road safety councils. For creation of such centralized authorities, government should legislate and allocate separate funds for working of such organizations.
5. Most of the respondents said that environmental issue is not considered major problems as other problems as road accidents and congestion carry more importance in developed world.
6. All respondents agree that there is huge underreporting prevailing in developing countries. Besides, there was no synchronization in hospitals and police data resulting in ambiguous results.
7. Respondents also were of the view that there should be more taxes for road users buying new vehicles to control traffic on roads of developing countries. On person advised that if traffic can be controlled in urban areas it would eventually control congestion on highways.
8. All participants agreed that there are political, economic, social, and geographical complexities that restrain successful practices in developed countries to be replicated in developing countries.

9. Almost all participants were of the view that public transportation should be owned by government and effectively managed, as public transportation can drastically reduce congestion.

The general problems of road were successfully identified by the ITP respondents but not concrete solutions were provided by these respondents to improve contemporary situation in their home countries. These experts gave the unanimous decision that education should be primarily focused to solve road safety issues. The inspiration for the topic of education to improve road safety conditions in developing countries came from the opinion of the experts. No further added value for the specific topic was of thesis could be obtained from this method. Therefore, face to face interviews are not debated in the discussion phase.

5.3 Experiment of Children as Agents for Increasing Motorcycle Helmet Use Performed In Pakistan

As discussed earlier, a pilot study was done to understand how much children can influence their parents to change their behavior in this experiment performed in two schools of Pakistan. On 16 May, lecture was given to children of the City School. On 19 May, lecture was given to Bahria Foundation School. The lecture given in the City School was used with multimedia. However, same facility was not available in Bahria Foundation. A total of 106 parents filled the form. It may be understood that the small size of experiment and sample does not represent the whole children and parents’ perspective from Pakistan. The socio-economic conditions are middle class and high-class families mostly having their own private vehicles. Children first gave lecture to their fathers and later they were told to fill a questionnaire. Questions were asked about particular behavior from parents such as use of helmets for themselves and family. Their responses were then compared with question such as, does the parent consider their child as change a change agent to increase helmet. For the results of the experimented conducted, the software of SPSS 22 was used. Using SPSS, Cross tabulations and tests were done to achieve the required results because categorical questions were asked in the survey. Such test was done to assess if observed differences were significant at 95% confidence level. The main results that are going to be used in cross tabulation are described below.

i. Do you wear motorcycle helmet while riding a motorcycle?

A total of 105 parents answered the question. 70 people said that they do not wear a motorcycle helmet while riding. 35 people said that they do wear helmets motorcycle helmet while riding. This shows that majority of the people in experiment did not use motorcycle helmets. The percentage of motorcycle helmet users is defined in figure below.
ii. Do you wear a motorcycle helmet properly?

This question was answered by 103 parents. 42 people said that they never use motorcycle helmet properly, 42 people said that they sometimes use a motorcycle helmet properly, 9 people said that they always used motorcycle helmet properly and 3 people said that they used motorcycle helmet for half of the time they rode a motorcycle. Majority of the people said that they do not wear motorcycle helmet properly. The percentage of use of motorcycle helmet properly is shown in the figure below.

iii. When riding a motorcycle do you wear motorcycle for other members of the family?

A total of 100 parents answered this question. 78 people said that they do not use motorcycle helmet for other family members. 22 parents said that they used helmet for other family members.
Majority of people said that they do not use motorcycle helmet which is shown by the percentage in the figure below.

**FIGURE 10 Percentage of motorcycle helmet use for other members of the family.**

iv. After the child’s lecture, are you willing to buy helmets for other members of the family?

A total of 100 parents answered this question. 60 parents said that they will definitely buy motorcycle helmet for other members of the family 28 parents said that they will probably buy motorcycle helmet, 9 parents said that they may or may not buy motorcycle helmet and 3 said that they will not buy motorcycle helmet for their family members. Majority of the parents agreed to buy motorcycle helmet for other members of the family. The percentage of parents’ response is shown below in the figure.

**FIGURE 11 Response of percentage of using motorcycle helmet for other members of the family.**
v. Do you think children can act change agents?

A total of 102 parents answered this question. 85 parents strongly agreed that their parents can become change agents to increase motorcycle helmet use for their family members. 11 of the respondents somewhat agreed, 11 people neither agreed nor disagreed, and 1 parent strongly disagreed that their children can become change agents. Majority of the parents strongly agreed that their children can become change agents which is shown from figure below.

![Figure 12](image)

**FIGURE 12** Percentage of parent who think their child can act as change agents to increase motorcycle helmet use.

5.3.1 Cross Tabulation between Variables of Use of Motorcycle Helmet by Parents and Role of Children as Change Agents

Cross tabulation between the variable of use of motorcycle helmet while riding and can children act as change agents is observed for statistically significant results. The results of cross tabulation of aforementioned variables are described below.

**TABLE 2** Exact test of significance between motorcycle helmet use by parent and children as change agents

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson chi-square</td>
<td>0.048</td>
</tr>
<tr>
<td>Fisher's exact test</td>
<td>.003</td>
</tr>
<tr>
<td>N of valid cases</td>
<td>100</td>
</tr>
</tbody>
</table>
FIGURE 13 Percentage of people who agreed children can act as change agents.

TABLE 3 Correlation between wearing a helmet while riding and children as change agents to increase motorcycle helmet

<table>
<thead>
<tr>
<th>CORRELATIONS</th>
<th>Do you wear a helmet while riding a motorcycle?</th>
<th>Do you think children can act as agents of change in road safety issues as increase of Helmet use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you wear a helmet while riding a motorcycle?</td>
<td>Pearson Correlation 1</td>
<td>.299**</td>
</tr>
<tr>
<td>Do you think children can act as agents of change in road safety issues as increase of helmet use?</td>
<td>Pearson Correlation .299**</td>
<td>1</td>
</tr>
</tbody>
</table>
**Correlation is significant at the 0.01 level (2-tailed).**

**Explanation & Interpretation**

A total of 100 parents answered the question, as there were six parents who did not answer the question of whether children can act as change agents. The people who did not have a motorcycle at home strongly agreed by 49% for children as change agents. Hence, 84% parents agreed that children can become change agents. Afterwards, through cross tabulation it was determined if there was any statistical significance between the parents who used or not used a motorcycle helmet and how they perceive children as change agents.

As more than 20% of cells have expected value less than 5, so Fisher’s Exact is taken for finding significant association. The Fisher’s exact shows a value of 0.003, which is less than 0.05 so the relation between the two variable is dependent and it is not established by chance. In order to have a clear interpretation between the two variables, categories of these variables needed to be studied which are defined in the percentage figure above. The percentages were made from categories of variable from cell count table using SPSS. If there is association found, one needs to find what kind of relationship existed between the two variables. In correlation table one may infers there was positive relation found of 0.299 found between two variables. It infers that they do not reduce each other affects as they do not have an inverse relationship.

a. As there is no 2x2 table, odds ratio cannot be performed, so percentages from the tables have been observed which derived cells count number of SPSS are. SPSS gives option not to include result that have a very small result such as one respondent. 1 parent disagreed that their children can become change agents, therefore, this option was not used in evaluation table (Mehta & Patel, 2011). From the figure above, one can understand that people who used a motorcycle helmet strongly agreed by 35% for children as change agents. People who did not use a motorcycle helmet were strongly influenced by 49% and somewhat agreed by 11%. Combining value of people who didn’t used a motorcycle helmet equals to 60%. It shows that people who do not wear a motorcycle helmet were more influenced by children as change agents than people who used motorcycle helmet.

**5.3.2 Cross Tabulation between Variables of Use of Motorcycle Helmet for Other Members of the Family and After Child’s Lecture Are They Willing to Buy Motorcycle Helmets for Other Members of the Family**

A total of Ninety two parents filled the questionnaire of considering the questions of wearing helmet for other members of the family and after the child’s lecture are they motivated to buy helmet for other members of the family. In order to find if there is any significance relationship between the variables, one looks at the p values which are defined below in the table.

**TABLE 4 Use of motorcycle for other members of the family and influence of child to buy motorcycle helmets for other members of the family**

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.860</td>
</tr>
</tbody>
</table>
Fisher’s Exact Test 0.866
N of Valid Cases 92

Explanation & Interpretation

As more than 20% of cells have expected value less than 5, so Fisher’s Exact is taken for finding significant association. Nonetheless, none of the results had p values less than 0.05. Therefore, we can infer that there is no association between the variable of parent having motorcycle helmets for other members of the family and after child’s lecture they are willing to buy motorcycle helmet for their family members. Further analysis cannot be made as there is no statistically significant relationship.

5.3.3 Cross Tabulation between Variables of Use of motorcycle helmet for other members of the family And Children as change agents

A total of 94 people filled the form for the variables of use of motorcycle helmet for other members of the family and children as change agents to increase motorcycle helmet use. The variable of helmet use for other members of the family was compared to children as change agent to increase helmet use. The result of Chi-square is described below.

TABLE 5 Cross tabulation between use of motorcycle for other members of the family and children as change to increase motorcycle helmet

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.285</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>0.432</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>94</td>
</tr>
</tbody>
</table>

As Pearson’s assumption were not met, Fishers’ Exact test was used, but it could not establish any association between children as change agents and motorcycle helmet for other members of the family. variables are independent. The Fisher’s Exact test had value of 0.432 which is larger than 0.05. Hence, it shows that aforementioned variables are independent and further analysis is not made.

5.3.4 Cross Tabulation between Variables of Improper Use of Motorcycle Helmet and Children as Change Agents

In order to understand if there is any significant association between the two questions, the Chi-square between the two variables was found. Below are the meaningful tables that are generated from the results.

TABLE 6 Cross tabulation between improper motorcycle helmet and children as change agent
**Explanation & Interpretation**

As there are cells with more than 20% value, less than 5 so Fisher’s exact test is considered to check the significance instead of Chi-Square. The p value for above-mentioned variable is 0.602, which is highly above 0.05. It can be understood that there is no significance association and variables of proper use of motorcycle helmet and children change agents are independent. Further analysis is not made in this regard.

### 5.3.5 Other Findings from Cross Tabulation Between Different Variables

Some other results can be generated apart from the main findings from the questionnaire. These results do not satisfy the hypothesis or research directly but could be used for future studies.

i. Cross Tabulation Between variables Use of motorcycle helmet while riding by parent And After child’s lecture are you willing to buy motorcycle helmet for other members of the family

A detailed description of association between the tables is defined below.

**TABLE 7** Cross tabulation between use of motorcycle helmet by parent while riding and after child’s lecture are they willing to buy motorcycle helmet for other family members

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th>Pearson Chi-Square</th>
<th>Fisher's Exact Test</th>
<th>N of Valid Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>0.602</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>98</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There were less than 20% cells which had value of 5, therefore, Pearson test was used which generated a Chi-square value of 0.140. It shows non-significant and independent association was found between the two variables. So further analysis will not be made for aforementioned variables.

ii. Cross Tabulation between variables do you have a motorcycle at home and do you think children can act as change agents

A detailed description of association between the tables is defined below.

**TABLE 8** Chi-square value between variables of motorcycle at home and children as change agents

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th>Pearson Chi-Square</th>
<th>Fisher's Exact Test</th>
<th>N of Valid Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-square</td>
<td>0.140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's exact test</td>
<td>0.151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of valid cases</td>
<td>97</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sarmad Zaman Rajper

### CHI-SQUARE TESTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson chi-square</td>
<td>0.00</td>
</tr>
<tr>
<td>Fisher's exact test</td>
<td>0.00</td>
</tr>
<tr>
<td>N of valid cases</td>
<td>98</td>
</tr>
</tbody>
</table>

**FIGURE 14** Results of children as change agents and wearing a helmet while riding.

**TABLE 9** Nature of relationship between the variables

<table>
<thead>
<tr>
<th>CORRELATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a motorcycle at home?</td>
</tr>
<tr>
<td>Do you think children can act as agents of change in road safety</td>
</tr>
</tbody>
</table>
**. Correlation is significant at the 0.01 level (2-tailed).

**Explanation & Interpretation**

A total of 98 parents filled these questions out of 106 respondents. The Fisher’s Exact test was used as the assumption of 20% of cells having value less than 5 was not met. The p value in Fisher’s exact test was found below 0.00 signalling that there is significant and dependent association between the variables of motorcycle at home and children as change agents. A detailed description of association between different categories is shown below. The relationship between the two variables is also positive (.345) and non-inverse. It means increase of one variable will not result in decrease of another variable.

a. Odds ratio could not be performed as this is not a 2x2 table. This results shows that people who have motorcycle at home strongly believe that their children can become change agents by 52% and somewhat agree by 1%. People who do not have motorcycle at home strongly agree their children can become change agents by 31% and somewhat agree by 10%. This shows that people who have motorcycle at home believe more that their children can become change agents (53%) than people who do not have motorcycle at home (47%).

iii. Cross Tabulation between variables of motorcycle at home and wearing a motorcycle helmet while riding by parent.

Below is description of tables generated from the results that gives overview of the Association through the two aforementioned variables obtained by using Chi-square.

**TABLE 10 Chi-square of motorcycle at home and use of motorcycle helmet while driving**

<table>
<thead>
<tr>
<th>CHI-SQUARE TESTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson chi-square</td>
<td>0.00</td>
</tr>
<tr>
<td>Fisher's exact test</td>
<td>0.00</td>
</tr>
<tr>
<td>N of valid cases</td>
<td>103</td>
</tr>
</tbody>
</table>
FIGURE 15 Motorcycle helmet usage with motorcycle at home.

TABLE 11 Odds ratio for variables

<table>
<thead>
<tr>
<th>Risk Estimate</th>
<th>Value</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds ratio for do you have a motorcycle at home? (yes / no)</td>
<td>20.667</td>
<td>5.709 74.811</td>
</tr>
<tr>
<td>N of valid cases</td>
<td>103</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 12 Nature of relationship between variable

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Do you have a motorcycle at home?</th>
<th>Do you wear a helmet while riding a motorcycle?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a motorcycle at home?</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
</tbody>
</table>
** Do you wear a helmet while riding a motorcycle?**

<table>
<thead>
<tr>
<th></th>
<th>Pearson Correlation</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>.545</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).**

**Explanation & Interpretation**

A total of 103 answered were given out of 106 from these questions. The assumption of there should be no more than 20% cells having value less than 5 was met so Pearson Chi-square test was used.

a. As this is a 2x2 table so odds ratio was performed. The odds of having a motorcycle and using a motorcycle helmet are 20.66 times greater than not having a motorcycle and using a motorcycle helmet. This suggests that people who have motorcycle at home also use motorcycle helmet. It may be inferred that as if there will be more motorcycles use, there will be increased use of motorcycle helmets.

iv. Cross tabulation between variables of wearing a Motorcycle helmet while driving and wearing a seat belt

The result of the variables by Chi-Square and percentage of distribution is mentioned below.

**TABLE 13 Chi-square test between seat belt and motorcycle helmet use**

<table>
<thead>
<tr>
<th>Chi-Square Tests</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.00</td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td>0.00</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>101</td>
</tr>
</tbody>
</table>
FIGURE 16 Usage of motorcycle helmet and seatbelt.

TABLE 14 Result of odd ratio between motorcycle helmet and wearing a seatbelt in car

<table>
<thead>
<tr>
<th>RISK ESTIMATE</th>
<th>Value</th>
<th>95% confidence interval</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odds ratio for do you wear a helmet while riding a motorcycle? (yes / no)</td>
<td>17.531</td>
<td>3.886</td>
<td>79.098</td>
<td></td>
</tr>
<tr>
<td>N of valid cases</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 15 Nature of relationship between motorcycle helmet use and seatbelt use

<table>
<thead>
<tr>
<th></th>
<th>Do you wear a helmet while riding a motorcycle?</th>
<th>Do you wear a seatbelt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you wear a helmet while riding a motorcycle?</td>
<td>Pearson Correlation: 1</td>
<td>Pearson Correlation: .455**</td>
</tr>
<tr>
<td>Do you wear a seatbelt?</td>
<td>Pearson Correlation: .455**</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Explanation & Interpretation

A total of 101 people answered these question. The Pearson assumption was met as there were 0% cells having expected count less than 5. The Chi-square value was below than 0.05 showing that there is significant association between the two aforementioned variables.

a. As this is a 2x2 table so odds ratio was performed. The odds of wearing a motorcycle helmet and seatbelt is 17.53 times greater than not using a motorcycle helmet and seat belt. Moreover, there is positive and non-inverse relationship between the two variables (0.455). It may be inferred that as there is increase of motorcycle helmet there will be increase of seat belt.

5.4 Opinion of the Experts Regarding Children As Change Agents And Role of Education To Improve Motorcycle Helmet Use In Developing Countries

The opinion of the experts was asked on different issues such as children as change agents and barriers to implement the program. This opinion would give a holistic view regarding role of education to increase motorcycle helmet use in developing countries. Besides, these opinions could generate a critical view for different topics while considering for role of education to increase motorcycle helmet use.

5.4.1 Opinion of Experts Regarding Children as Change Agents

Using the online survey by the platform of Qualtrics, opinions were asked from the ITP and KOI participants considering children as change agents in their respective countries. There were 55 responses in above mentioned issues. There were variating responses some suggesting positively and other outwardly rejected this suggestion. Out of the total participants 35 suggested that this program can be a successful if certain supportive measures are taken. On the contrary, 14 participant disapproved this idea to be implemented in their countries.

There were interesting arguments from the supported and antagonists on the issue of children as change agents. The supporters of the idea of children proposed many arguments that can be helpful for the success of the program. Six participants said that media can be effectively utilized. Six participants advocated that the material given to teach children should be interesting which can be in the form of cartoon books, attractive logos and free magazines. They also advised that children could be taught with video simulations, comparative studies, story and modelling. Three participants suggested that children should give presentation, dramas, play games with parents or perform in churches to effectively disseminate their message. Three participants suggested that this programs needs coordination from a government and non-governmental agency. Two participants suggested that
children as change agents should be incorporated on smaller scale as pilot projects as district level. To understand the importance of responses it may be devised in a graphical manner as below.

![Response Of Experts](image)

**FIGURE 17 Increasing efficiency for the program of children as change agents.**

The participants who opposed the idea of children as change agents argued that idea of children as change agents to address road safety issues would cause social and cultural discomfort, as it will hurt the pride and ego of the elderly. They believed that education should be given, but authorities such as government departments, and religious authorities can be the catalyst of change. One of the respondents said that it should be parents who should be teaching road safety to children. Besides, they proposed the parents should refrain children using motorcycle until they get licenses.

5.4.2 **Opinion of Experts Regarding Role of Education To Improve Motorcycle Helmet Use In Developing Countries**

In order to properly understand the role of education, it was decided to collect opinions of experts in the field of Transportation Science through the platform of the online survey.

The first question investigated in the survey regarding priority is given to education in comparison with engineering and enforcement. In the survey conducted from experts the majority of the respondents considered enforcement (49.56%), followed by education (33.63%) and engineering (5.31%) as the most important factor to consider traffic safety. The preference of enforcement over education will be discussed in later chapters.

Considering the main issue of education to increase motorcycle helmet, 66 respondents from the online survey gave their opinion. Below is mentioned preference of experts regarding role of education to increase motorcycle helmet use.
In the online survey, respondents agreed on issues such as education, awareness, use of media, enforcement, and use of education jointly with enforcement. The viewpoints of all the respondents were collected and listed. Hence, data was available for many important issues for role of education to improve motorcycle helmet use. The most important category recognized by respondents that people should be educated in a way that they are aware of the consequences. There was also suggestion put forward by respondents that education should be combined together with enforcement. Strangely, education was chosen again by experts, because they advised to use education single handedly to address motorcycle helmet use problem.

5.4.3 Opinion of Experts Regarding Medium of Education

It is necessary to understand what medium of education should be given to common people considering increase of motorcycle helmet use. There are many ways in which education can be given to common people such as formal education in schools, informal education provided to communities or in house education (children teaching their parents and vice versa). In contemporary era, masses are largely influenced by electronic, print or social media. In order to clearly understand which factor is most important, this question was asked from KOI and ITP participants. A total of 109 respondents answered this question.
FIGURE 19 Preferable medium of education.

It is clear from the figure above that formal education through school or college is widely important recognized by the professionals in the field (34%). The second most important medium of education recognized was in house education (29%). In this research work, in-house education is considered as the basis of research and its important was realized as the second most important factor-influencing medium of education. In the options of other, three of the participants considered combining in house and formal education together. Three participants were of the view that all factors should be combined to deliver an effective program.

5.4.4 Opinion of Experts Regarding Who Should Be Responsible For Road Safety Education

After a clear indication about the medium of education, it was considered who could educate the masses about motorcycle helmet use in developing countries. The prime idea to conduct this question was to gather information from experts regarding the idea that can children act as change agents to increase road safety by teaching advantages of motorcycle helmet use.
FIGURE 20 Percentage distribution of who should be responsible to educate.

The highest value is given to important person such as politician, elderly or celebrity (36%), this implies that society in developing consider such change agents as important. Though, the idea of in house education of parents teaching there is equally well-received (35%), yet, idea of children teaching their parents is poorly perceived (5%). In the option of other, four people said that a combination of all above-mentioned factors should be considered. Three people also suggested that teachers should play the role positively.

5.4.5 Opinion of Experts Regarding Age from Which Traffic Safety Education Should Be Taught

In order to have a holistic view that question was asked from experts in the field. Their answers are described below in the table.
FIGURE 21 Proper age for starting of traffic safety education.

It must be considered that the question is asked in the context from which age should traffic safety education should be started. From the results, one finds that highest preference is given from the age of 5 to 10 years old (42%). The second age group, which is given importance, is 11 to 14 years old (22%). This age is used to conduct the experiment whether they can act as change agents for traffic safety issues. In the option of other, it was suggested by three respondents that traffic safety for children should begin from primary school. Two respondents said that it should begin when the child is admitted and onwards till his completion of studies.

5.4.6 Opinion of Expert Regarding Barriers to Implement the Program of Children as Change Agents

To better understand the barriers of implementing the program of children as change agents. The question was asked from experts, if the program of children teaching their elderly will be implemented on a national level what would be its impact. It was kept in mind that the response generated will be mainly from the variating people of the developing country, which will in turn develop a holistic approach of the barriers of the program. The result though the online survey is described below.
A total of 109 respondents answered this question, more than half of the respondents emphasized social barriers (55%) will be an impediment to implement children as change agents on social level. The second most important barrier identified was economic causes (22.94%). The option of other in the question developed varying answers from the respondents. Four respondents in the other option concentrated that elderly would not listen to their young ones because they consider the opinion of children poorly.

The response of social problems and poor perception of children’s voice was forecasted due to familiarity with local conditions in a developing country. In the online questionnaire, another question was attached if the respondents selected the option of social barriers. As discussed earlier, children’s voice is given little consideration due to patriarchal society dominated by males. Therefore, the barriers of male dominated society were visible. This led to the questionnaire of how such society will accept children’s emphasizes on road safety. The result from the online survey is described below.
Total 57 respondents answered this question. Almost half of the people (50.88%) said that children’s view could be accepted in a male dominated society through community education. Second most instrumental factor identified was media. Two people in the “other” option responded that children’s views could be accepted through plays, dramas or other performance.

5.4.7 Opinion of Experts Regarding Trend of Motorcycle Helmet Use in Developing Countries

The results from the online survey for not buying a motorcycle helmet use are listed below. These results can help develop a holistic approach towards the problem of lack of motorcycle helmet use.

i. Tendency Of Not Buying A Motorcycle Helmets
FIGURE 24 Expert’s view of reasons of not buying a motorcycle helmet.

From the online survey, it is clear that more than half of the respondents agreed that enforcement plays a pivotal role when people do not buy a motorcycle helmet. Almost 30% of respondents chose the option of other. In the other section, six respondents said that people in their country have behavior problem such as being lazy or negligent towards law. Four respondents identified enforcement a necessary tool to reduce accidents; four respondents were of the view that there should be combined strategy of enforcement and education. Three replied that they are not well aware and one respondent emphasized that education should be taught to improve helmet use in their home country.

ii. If Individuals Own A Motorcycle Helmet Why They Do Not Wear It

In the study, it was necessary that what are the reasons that discourage people to use motorcycle helmet usage. Some of the factors were grasped through literature review, others were found through general observation.
Total 110 respondents answered this question. From the achieved results, it is clear that lack of enforcement was identified as one of the prime reasons of not wearing a motorcycle helmet (40.91%). Hence according to the survey, it is clear that not buying and not wearing a motorcycle helmet is primarily due lack of enforcement in developing country. According to the respondents, the second most important reason for people not to wear a motorcycle helmet is that people have physical inconvenience (25.45%) such as heat, weight, auditory and vision problems. The third most important reason identified was personal characteristics or grooming such as makeup and hairstyle. In other options, there were fifteen repliers. Three people identified lack of motorcycle helmet usage is due to lack enforcement combined with other factors such as personal characteristics and physical inconvenience. Three people from the option of other said it was due to short distance and two people said it was lack of risk perception from drivers.

iii. Why Individuals Do Not Wear A Motorcycle Helmet Properly

It is evident from literature that improper motorcycle helmet has been source of increasing severity of accidents. In order to have a holistic understanding that why individuals in developing countries do not wear a motorcycle helmet properly, this question was asked from experts from the field who mainly belonged to developing countries themselves.
The highest percentage of answer was provided from the option of other (37.27%). The second and third reason had almost similar percentage meaning almost equal weightage was given to these factors. The second and third selected important factor are wearing improper size of motorcycle helmet (31.82%) and poor buckling of motorcycle helmet (30.91%) respectively. Considering the option of ‘other’ the main issues are described as, 7 people said it was due to personal characteristics such as lazy behavior and irresponsible behavior, 6 people said it was due to lack of education, 6 people said it was due to enforcement, and 3 people stated weather as the main problem.
6 DISCUSSION

In this section the major findings will be dissected in detail, every topic will involve a critical analysis and personal reflection that will be presented with an aim to improve the results of research work. Furthermore, more light will be shed again on results from previous sections in order to make this section appear rational; these results are achieved from the opinion of the experts, literature review and the experiment. The triangulation is one of the foremost method which captures similarity and differences when data is collected is over from two or more sources for one topic (Hussein, 2015). In this section, triangulation will be used to refine the research topic and other sub topics associated with main study.

6.1 Role of Children as Change Agents to Increase Motorcycle Helmet Use in Developing Countries

In this section, role of children as change agents is discussed through triangulation method. Critical analysis of the situation will be done to identify weakness in the study. A personal reflection on each topic will provide useful suggestions on concerned topics.

6.1.1 Research Question and Hypothesis

The experiment of children as change agent to improve road safety (increase helmet use) was kept in mind to answer the questions of the research question of this thesis. The first question of the thesis work was whether children can act as change agents in developing countries. The question of hypothesis that children can act as change agents to influence their parents was accepted as more than 90% of the parents agreed than children can act as change to increase motorcycle helmet use. There was also statistical significant relationship found between do you use motorcycle helmet while riding and do you think children can act as change agents Hence, in socio-economic condition of middle and high-income households parents are largely influenced by the message of their children when they are given a small lecture to increase motorcycle helmet use. Therefore, children successfully have acted as change agents to increase motorcycle helmet in this condition.

The answers to the questions of whether children influence their parents to use motorcycle helmet for other members of the family and can children influence their parents to properly use motorcycle helmets were compared to before the scenario of do you use a motorcycle helmet for other members of the family respectively. There was no significance association found in abovementioned variables due to the involvement of chance factor. However, most of the parents established that they are positively influenced by child’s lecture to use motorcycle helmet for other members of the family too, but, no statistically evident relationship with before scenario which resulted in not accepting the hypothesis question. Summary of the hypothesis questions is described below. Apart from the cross tabulation, the two variables were also tested in correlation but no significant relationship was found.

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>HYPOTHESIS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Children as change agents can influence their parents to use motorcycle helmet</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2</td>
<td>Children as change agents can influence their parents to wear motorcycle helmets properly</td>
<td>Results not credible</td>
</tr>
</tbody>
</table>
Children as change agents can influence their parents to wear motorcycle helmet for other members of the family. Results not credible.

**Personal Reflection**

It may be concluded that children can act as change agents when parents are not wearing motorcycle helmets but not in the case of wearing motorcycle helmets properly and using motorcycle helmets for other members of the family. There could have been a larger sample so that a significant relationship could have been derived.

6.1.2 **Triangulation: Who Should Be Made Responsible To Educate Masses**

TABLE 17 Triangulation who should be made responsible to educate masses

<table>
<thead>
<tr>
<th>WHO SHOULD BE MADE RESPONSIBLE TO EDUCATE MASSES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPINION OF THE EXPERTS</strong></td>
</tr>
<tr>
<td>Community leaders</td>
</tr>
<tr>
<td>Parents teaching their children (paragraph 4.4.3)</td>
</tr>
</tbody>
</table>

**Personal Reflection**

The experts believe that community leaders should teach other members of the society. However, I believe that experts have this view due to the prevailing social norms which puts elderly at more respected positions and their counselling will be taken seriously. Experts also considered parents teaching their young ones more important. In this case the ego of the parents will also be not hurt. The literature also supports that there are societies in developing countries that are not liberal and also intolerant to an alien idea that children can teach the young ones. However, in our experiment performed in urban area of Hyderabad, the parents are more liberal and take the advice of their young ones seriously. So my advice in this case is that programs like this should be implemented in urban cities of developing countries. The results of this experiment will help to define how this program can be accepted in other areas of the country.

6.1.3 **Triangulation: What Should Be the Medium of Education**

TABLE 18 Triangulation medium of education
WHAT SHOULD THE MEDIUM OF EDUCATION

<table>
<thead>
<tr>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• First priority is given to formal education, which is in schools and universities.</td>
<td>• The lecture given to children was through formal medium of education in school. Children seem to understand the lecture and deliver the lecture in homes. This is also example of in house education. Parents tend to agree that children can act as change agents.</td>
<td>• In the literature, there are examples when children have successfully implemented good social habits of boiling water acquired from formal education in school (Mwebi, 2012) (Onyango-Ouma et al., 2005).</td>
</tr>
<tr>
<td>• In house teaching; parents teaching their children (paragraph 4.4.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Personal Reflection

The experts consider formal education in schools important. They also felt in house education is important where parents teach their children. The experiment and literature suggests otherwise, children successfully delivered their message to their parents in in-house education. The literature suggest that social initiative such as boiling water and cleaning utensils are successfully implemented when children teach their parents. I personally feel that formal education and in-house education are both important. I feel that children should be taught road safety concepts in schools. There should be a systematic program when children can transform their learning from school to their houses for health issues such as using of protective helmet for other members of the family.

6.1.4 Triangulation: Age from Which Traffic Safety Education Should Be Taught

TABLE 19 Triangulation age from which traffic safety education should be taught to children

<table>
<thead>
<tr>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Majority of the experts responded 5 to 10 years old.</td>
<td>• Children from age 11 to 14 years understood the message and plainly conveyed the message to their parents.</td>
<td>• In the literature no particular age is defined where children should be taught traffic safety (Brake Organization, 2010).</td>
</tr>
<tr>
<td>• The second majority of the people said 11 to 14 years old</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Personal Reflection

The majority of the experts in the field suggested traffic safety education should be started to be taught from 5 to 10 years old. Literature was not available regarding a particular age to initiate and end traffic safety education. Road safety week organization suggests traffic safety can be taught from five years to onwards. Age of maturity. (Brake Organization, 2010). Besides, it was not clear from literature that which age should traffic safety education needs to be stopped. I personally believe that basic traffic safety education should be taught from 5 years to onwards. Then more complex term of traffic safety should be taught as the age of pupil matures. Traffic safety education should not be stopped at a particular age because there are new trends of road safety introduced every day. New trends could be taught to elderly people through in-house or community education. Moreover, the proper age for children to teach elderly can be from 11 to 14 years old because parents tend to accept children’s knowledge as proved in the experiment.

6.1.5 Triangulation: Children as Change Agents to Increase Motorcycle Helmet Use

TABLE 20 Triangulation children as change agents

<table>
<thead>
<tr>
<th>CAN CHILDREN BE CHANGE AGENTS TO INCREASE MOTORCYCLE HELMET</th>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gave preference that parents or community leaders should be made responsible to educate masses instead of children (paragraph 4.4.3)</td>
<td>• Parents agreed that children can become change to increase motorcycle helmet use.</td>
<td>• Different schemes in France and Philippines successfully showed that children could become change agents in social fields (Juco de la Fuente, 2015).</td>
<td></td>
</tr>
<tr>
<td>• Agreed that children can be change agents if support is provided through human and non-human resources (quality material for education), support of media, government support, community awareness, storytelling, modelling etc (paragraph 4.4.1).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Personal Reflection

When it was asked from experts how children can be accepted as change agents, majority of them agreed that they could become change if they are supported through human and non-human resources. The experiment and literature also supports the idea. I personally feel that children can become change agents, but they should be taught in a well manner. There was sufficient effort to make
the booklet and presentation easy and attractive for the students. The children in the class also appeared sharp. Hence, opinion of the experts is seems correct because attractive course material motivated students to perform better in front of their parents. In developing countries classes are large and the teachers are demotivated to transfer knowledge such a program may not produce the intended results. Teachers may be equipped with high quality skills, road safety related knowledge and pedagogical competencies to motivate students to take action in the road safety arena.

6.1.6 Critical Analysis

There were no records when parents signaled that children could not become children as change agents. It gives direction to the phenomenon that parents when filling the survey might be under the influence of a child. The influence could have been sympathy, love or pressure from the child. Hence, the parent might had not written anything that may have offended the children. Moreover, parents in Pakistan are not highly educated and consider children having more exposure, they might say yes even they have not meant it. The socio-economic conditions are pluralistic and complex, so one feels this sample size would not reflect all strata of people. According to one respondent in online survey, this program also tends to change behavior that is not currently practiced by children themselves. It is hard for parent to see any role models in children. A large sample with all strata of people may solve the problem. But, further research is required to prove this claim.

6.1.7 Other Relevant Research

Some interesting findings were found in the research that is not directly related but maybe useful for future studies in similar ambit. This research can be used to analyze the psychology of male head of family in developing countries. The attitude towards of his family for road safety can be understood by the results. These results shows that people who have motorcycle at home believe more that children can become change agents than people who do not have motorcycle at home.

6.2 Opinion of the Experts Regarding Role of Education to Increase Motorcycle Helmet Use

The education factor was isolated and asked from experts in the field using the online survey. Majority of the respondents The experts did not entirely supported education to solve motorcycle helmet use as majority of the respondents still considered enforcement more important to address motorcycle helmet use. Other topics were also discussed such as role models, training benefits, national policies and political involvement. The summary of their responses is described below.

i. Education on motorized vehicle is necessary because it carries goods and people in developing countries. Education helps one to understand the protective features of a motorcycle helmet. This knowledge can be transmitted both by formal and informal education systems. There should also be education on understanding of the vehicle and its safety features and how one can be safe in a dangerous situation. Besides, schools children should be taught the physics of dissemination of force, so they can understand how it could damage the skull and cause injuries or death. Most importantly, how the circumferential area of helmet reduces such energy. Peer education can also be used as children are largely influenced by their peers, younger children can be taught by older students. One of the respondents suggested that education for motorcycle helmet use should be imparted to students first and then later broader aspect such as parents and community education should be covered. The component of road safety education should also put in the curriculum. One of the respondents suggested that children should be involved in competition and games and they should be rewarded for their learning. For children it is necessary that examples from everyday life should be presented.
Involvement of parents in education process also affects students. Schools should ensure that children should be educated in a way that it becomes their habit to be concerned for road safety. Schools should ensure that children who use bicycle should also wear helmets. Two of the respondents suggested that instead of targeting children as change agents, communities overall should be taken into consideration. Cultural issues should also be considered into account prior to implementing an education plan. Education through media is also vital these days. Many NGOs are working in India, but their performance is not influential. Therefore, it is necessary the media should be involved so the message could be reached in far-flung areas. Education can also increase awareness. Road safety agencies can organize seminars for masses to enhance awareness for public on important issues like motorcycle helmet. In Indonesia police also played a vital role for generating awareness among people as it distributed free helmets in year 1990 is which was known as ‘Sympathetic Operation’. Helmet use has hugely improved in Indonesia after that.

ii. Moreover, role models in the society can be identified and their behavior can be use as the ideal behavior. Parents can be the best role models for children because children are largely influenced from their parents.

iii. In Indonesia people do not wear helmets due to lack of enforcement. There should be better traffic management schemes. Law enforcement can be coupled with public awareness through social media or FM service. In Nepal, there is strict enforcement nevertheless; education is still required at school level for creating responsible driver for future. Many of the respondents are of the view that education or law enforcement cannot make a difference and they should be implemented together. In the Indian city of Kerala, education and enforcement are implemented together. In education, all categories of road users should be involved so a sustainable behavior change communication process can be established.

iv. National Policy: There should be joint national policy to mandate to wear helmet for other members of the family including children.

v. One of the respondents suggested that there is lack of training before obtaining licenses in his country. He suggested that drivers should also be made aware of consequences of perils of driving riskily.

vi. It was suggested by the respondents that use of private vehicle should be discarded instead of promoting young ones to use motorcycle helmets.

vii. In developing countries, there is lack of accessibility for transportation so parents allow their children to travel by motorcycle to schools. This behavior needs to be changed.

viii. One of the respondents suggested that in Taiwan, political commitment coupled with education produced significant results. Such systems can also be influential in developing country.

6.2.1 Triangulation: Role of Education to Improve Motorcycle Helmet Use

TABLE 21 Triangulation role of education to improve motorcycle helmet use

<table>
<thead>
<tr>
<th>ROLE OF EDUCATION TO IMPROVE MOTORCYCLE HELMET USE</th>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
</table>


- People should be made aware of the consequences of non-use of motorcycle helmet use.
- Education should be combined with enforcement in order to improve road safety (paragraph 4.4.2).
- Parents accepted children’s view as they can become change agents to increase motorcycle helmet use.
- Kerala Police, has introduced strict enforcement by installing latest technology. They have also used education by having mandatory traffic safety clubs in schools (State Crimes Report Bureau Kerala, 2016).

**Personal Reflection:**

Opinion of the experts said that people should be made aware of the consequences of non-use of motorcycle helmets. They also suggested that there should be a joint mechanism where education should be combined with enforcement. There is also literature available where education and enforcement are implemented together as in the case of Kerala in India. I feel that developing countries like Pakistan, which have fewer resources to increase personnel or improve technology, should focus only on education. Quality education is not an expensive option because there is some infrastructure of education in Pakistan where road safety can be taught by help of government and other non-government organizations.

### 6.2.2 Critical Analysis

Experts in the field considered enforcement more important than education. There is a need for further future studies which can delineate either people should be educated or enforced by law to improve road safety. Each developing country has different socio-cultural conditions. Therefore, sufficient amount of studies are needed to conclude whether education, enforcement or engineering is more important considering the scenario of road safety.

### 6.3 Opinion of the Experts Regarding Barriers to Implement the Program of Children as Change Agents for Road Safety in Developing Countries

Experts in the field were asked about the barriers, in case the program of children as change agents to increase helmet use is implemented on national level. This was intended so a holistic opinion can be achieved as the experts belonged to different parts of the developing world. The majority of the experts identified social barriers in implementing children as change agents program. The experts believed that this program would hurt the ego of elderly male. This question was anticipated and placed in the online survey. When experts clicked the option of social problems, another question popped up which asked how such program will be successful in a male dominated society. Almost half of the experts chose the option of community education to accept the program of children as change agents. There were two sets of responses from recipients, one supporting and other opposing the idea of children as change agents for road safety in their home country. As discussed in previous sections, the protagonist believed such ideas could be successful with help of different supporting factors such as media, attractive course material, coordination among government and non-government agencies,
interactive activities of children as dramas and games. It was advised by one expert to test children as change agents program on a small level such as small city or town and then proceed to higher level. On the other hand, the antagonist believed that such kind of activity would hurt the ego of the elderly. These experts advised that parents should be teaching their young ones or there could be religious authorities who can also counsel the people. Further analysis of the barriers to implement the program of children as change agents can be understood by the triangulation method.

6.3.1 Triangulation: Children Teaching their Elderly Raised On a National Level

TABLE 22 Triangulation program of children teaching their elderly raised on national level

| IF THE PROGRAM OF CHILDREN TEACHING THEIR ELDERLY IS RAISED ON NATIONAL LEVEL, WHAT BARRIERS IT WILL FACE? |
|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| **OPINION OF THE EXPERTS**                                   | **EXPERIMENT**                                               | **LITERATURE**                                               |
| • Social impediment (paragraph 4.4.6)                       | • The sample size does not reflect the scenario of the whole country. | • Literature does not give evidence those children as change agents have been implemented on national level. |

Personal Reflection

In the results section it is understood that parents widely accept the notion of children as change agents to increase motorcycle helmet use. That means they have formed a positive attitude towards the subject of motorcycle helmet use. Therefore, this program does not hurt the ego of the parent. If the kind of program on national level or large scale, ego and pride of communities will be hurt. It is because communities consider opinion of children as inferior. However, this also needs further research. From this small level experiment it shows that middle and high income families of urban areas of Pakistan are liberal enough to consider and accept the voice of their children for a social issue. The majority of the experts said if the program of children teaching their elderly is raised on national level then there are going to be social barriers. Literature was not found regarding implementation of program of children as change agents for social or road safety issues on national level. The small sample size of the experiment does not justify any results for forecasting it on a national level. Personally, I think that this program needs to be systematically implemented. It should be implemented in medium sized urban area where people are tolerant and liberal. In order to enrich the experience of young children, the program can be initiated with peer to peer teaching. The 11 to 14 years children can teach same age and junior students about importance of road safety in other schools. The results of this program should be analyzed and weaknesses should be overcome. When the program is successful, it could than transformed to a broader level, such as implementing in small cities and rural areas where there is conservative thinking. The last stage should involve implementing such program on a national level.

6.3.2 Triangulation: How Children’s View Maybe Accepted In Rural Areas

TABLE 23 Triangulation how children's view may be accepted in rural areas dominated by male heads
RURAL AREAS MAY BE DOMINATED BY MALE CITIZEN, HOW CHILDREN’S VIEW MAYBE BE ACCEPTED IN SUCH SOCIETIES?

<table>
<thead>
<tr>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Community Education (paragraph 4.4.6)</td>
<td>• The sample size does not reflect the scenario of the rural areas.</td>
<td>• No direct literature supporting the question. A reference scenario is taken in this case. It is suggested by one author of article that Community leaders can be motivated through meetings and counselling to accept changing trends of education as in the case of girls’ education in tribal areas (Jamal, 2015). Community leaders can be motivated by meetings of important figures of community, politicians, and religious scholars at one place to discuss advantages of education. They should be taught that such programs would not hurt the pride factor of parents nor any respect of family heads can be lowered.</td>
</tr>
</tbody>
</table>

Personal Reflection:

There must be support from government or other corporate giant because the support required for such project on national level requires substantial investment. It should be started from small cities, look at its success and failing rates, cover its limitation and implement on higher level than. Community education may be time taking process because social norms are challenged. If religion scholars are involved to teach the community leaders, there is a chance of this message to reach effectively in the community because respect for religion is high in the rural areas.

6.3.3 Critical Analysis

When such a program will be adopted on a larger scale, in rural or backward areas parents may feel that such kind of behavior is a revolt to their authoritative position in the society. As discussed earlier it will hurt the ego of the community. Friction may arise among family members who will not accept children as role models. Educating communities is a time taking process because social norms will be changed as children will challenge the authoritative position of elderly male in society.

6.4 Opinion of the Experts Regarding Trend of Motorcycle Helmet In Developing Countries

In this section, nonuse of motorcycle helmet is understood in a meaningful way. Considerable emphasize is also done on improper use of motorcycle helmet. Triangulation method is used to find the similarities and dissimilarities among experts’ opinion, experiment and literature.
6.4.1 Triangulation: Reasons of Individual not wearing a motorcycle helmet

TABLE 24 Triangulation individuals not wearing a motorcycle helmet

<table>
<thead>
<tr>
<th>WHY INDIVIDUALS ARE NOT WEARING A MOTORCYCLE HELMET?</th>
<th>EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of enforcement (paragraph 4.4.7)</td>
<td></td>
<td>Results not related</td>
<td>• Many reasons, physical discomfort. Vision problems, social norms, economic problems and lack of enforcement. (paragraph 2.3.1)</td>
</tr>
</tbody>
</table>

Personal Reflection

The majority of the experts are of the opinion that not wearing a helmet is mainly related to lack of enforcement. On the other hand, the available literature reveals that there are many other reasons for non-use of motorcycle helmet such as lack of vision or physical discomfort. Personally, I feel that in Pakistan people do not know the consequences of head injuries and take it lightly. They consider accidents as rare events decided by God. If people are taught people they will tend to wear motorcycle helmets more. Nevertheless, the education should be continuous; it should not be a short campaign because helmet use should be made a habit. There is lack of enforcement and rampant corruption in Pakistan. Thereby, education can also enlighten minds of people.

TABLE 25 Triangulation individual not wearing a motorcycle helmet properly

<table>
<thead>
<tr>
<th>WHY INDIVIDUAL ARE NOT WEARING A MOTORCYCLE PROPERLY</th>
<th>EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• poor buckling and improper size of motorcycle helmet (paragraph 4.4.7)</td>
<td></td>
<td>Research focus not on this aspect.</td>
<td>• 3 main reasons found lack of enforcement, vision problem and comfort issue (paragraph 2.3.2).</td>
</tr>
</tbody>
</table>

Personal Reflection

Majority of the experts responded that improper use is due to poor buckling and improper size of motorcycle helmet. The literature suggests otherwise, as there is lack of enforcement, vision problem and personal discomfort. I believe that such a situation can be improved by education, if people know what the benefits of wearing a motorcycle helmet are.

TABLE 26 Triangulation to improve behaviour
## HOW DRIVER BEHAVIOR CAN BE CHANGED

<table>
<thead>
<tr>
<th>OPINION OF THE EXPERTS</th>
<th>EXPERIMENT</th>
<th>LITERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enforcement (paragraph 4.4.7)</td>
<td>Education can play a positive role to modify behavior of parents.</td>
<td>Different literature available supporting education, enforcement and engineering methods to improve behavior (Jraiw, 2003).</td>
</tr>
</tbody>
</table>

### Personal Reflection

The majority of the respondents suggest enforcement as the main idea to improve road safety situation. The experiment and literature suggests otherwise. The socio-economic conditions are different in every country. Therefore, strategy of improving road safety by education, enforcement or engineering should be based in context of the local condition of that country.

### 6.5 Suggestions for Improvement

There are some areas of improvement, which can enhance the results of this kind of experiment. In order to reduce the children’s influence on parents, such type of experiment can be performed where parents are invited to a school. In the school, children could teach their parents. Later, the survey form could be filled by parents on the spot privately in a separate room. In these conditions, parents and children could have a zero influence on each other. Filling the form privately would give parents more liberty and independence. The option of unanimous identity could also be experimented, so parents feel more comfortable answering the questions. If such programs are arranged in schools, parent’s identity is not disclosed, and children do not see what their parents have wrote, there could be honest answers from parents. The survey form could have been simpler with answers in yes or no, so parents do not feel burdened or ambiguous in choices, as not all parents are well educated. In order to induce parents to fill the forms and listen to lectures of children, there could be incentive-based program. One feels that coordination of conducting an experiment also needs high and effective communication. Sometimes authority as school heads does not allow smooth operations of experiment. In this experiment, the identity card numbers to put in survey were not allowed as school authority felt that it was not necessary to disclose private information of parents. Therefore, researchers should keep in mind that there could be unexpected problem to impede smooth operational activities. There is also shortage of human and non-human resources in developing countries. In this experiment, Bahria Foundation School could not provide projectors to give presentation. Therefore it is suggested that large manual posters should also be carried in case electronic presentation is not possible. In rural areas of Pakistan, large paper posters could really work in schools, which are devoid of electricity. Moreover, when children can influence their parents they also could disseminate the same message to their peers, which is evident from the case of Philippine where children are successfully actively involved in carrying road safety message. Therefore, it may be inferred that peer education is also possible by children who can act as change agents for road safety. One feels the survey size should increase, as there was no significant association found in do you use motorcycle helmet for other members of the family, and after child’s lecture are you willing to buy motorcycle helmet for other members of the family. Similarly, significant association was also not found in variable of do you motorcycle helmet properly and do you think child can act as change agents to increase motorcycle helmet use. Hence, one feels the sample size could have been increased and there should be simple choices so that parents
are comfortable to answer. Increase of sample size could also reduce biasness in survey. One feels that in rural areas this kind of survey should be in local languages such as Sindhi and Punjabi. This local language will make the parent more independent meaning they will be less influenced by their children. Lastly, it may be summed that better design of the experiment, making contingency plans, increasing resources, enhanced course for students, making better surveys and skilled teachers could address shortcomings that is learned from this study. Furthermore, research can be designed in a way that parents answers to question in a more honest way.

6.6 How International Students of Hasselt University Can Be Change Agents to Improve Traffic Safety

After the learning from the university, students realize the importance of motorcycle helmet use, protective gears, active and passive safety features in cars. From the experiment conducted, one can understand that there is lack of resources and coordination issues to create awareness of traffic safety related issues in developing countries. What the students, can do is to individually monitor the practices of traffic safety in their homes, neighborhood or workplaces. They should tell their family members, colleagues and friends to wear seat belts, motorcycle helmets and other passive features to ensure their lives are saved. Hence, each student will be a change agent if he takes the responsibility to transform their learning for welfare activities such as educating road safety aspects to people who are unaware of perils of accidents.

6.7 Implementation

The opinion of experts regarding children as change agents is positive, whereas, the results also show that parents are willing to buy motorcycle helmet after child’s lecture. This shows that children in Pakistan belonging to middle and high-income families can generally influence their parents on social and health issues. The reasons of accepting of children’s views maybe that these families are liberal and attentive towards their children’s concerns. On the other hand, Pakistan is a pluralistic society having groups of people who are even opposing to girls education. For such societies to be more tolerant there must be communication among tribal leaders, religious scholars and government official so, the rigid views of the community regarding education can be modified. One feels that changing views of elderly is time taking process in developing countries. Government may launch incentive-based program so community can hear and learn from their children what they are taught in schools. In order to accept programs which challenge the norms of the society, the results maybe favorable after sufficient time is passed.

This is also quite common knowledge that children are comfortable and confident in front of their parents who are ready to listen their advice. Nevertheless, the question remains, do the children have enough experience of counselling or giving lectures.. First children should give lecture to their junior students or peers in other schools. This could take six months and then they could give lecture or counsel their parents. Such type of program is also being worked out in Philippines known as “Walk this way”.

It is suggested that such program should not be implemented on a national or higher level in initial phase. There must be a systematic implementation on small scale, look at the results, understand the shortcomings and improve this system. The program should be implemented systematically, first by cities, later regions, and provinces and lastly nationwide. From the experiment, that there are plentiful of errors identified such as bias, children’s influence, parent’s reliance on young one to fill the form, lack of coordination and lack of resources. If these shortcomings are addressed a more
systematic approach can be developed. This could also be implemented to address other social issues such as boiling of drinking water or cleaning hand before eating.

6.8 Future Research And Development

In this research through the experiment, parents seem to be motivated to listen their children. However, there could be financial and social constraint that may disallow their parents to buy and use motorcycle helmets. For instance, they could not have the money to buy them. Moreover, they may not be motivated to use motorcycle helmets in short trips or in hotter weather. Besides, a parent may not wanted to use a motorcycle helmet and he had just halfheartedly wrote on the survey form that he would use a motorcycle helmet for other members of the family. Parents may had halfheartedly filled the form not to his hurt feelings of his child that he or she cannot act as change agents. Likewise, parents had just filled the form to save his child from public embarrassed that he could not act as change agent. Therefore, further research needs to be carried that after child’s lecture, how many people actually bought motorcycle helmet. It can be studied, which factors induced the parents for not buying a motorcycle helmets and how such situation can be improved. Uncovering the practical aspect of the survey will clear the chance of bias in this survey and pave the way for future studies. Many psychological concepts can be challenged as the attitude of parent and social norms in society by pressure of children. When this program is implemented on large scale, impact on the ego of community can also be studied. The concept of role models can also be challenged if parents are actually influenced by their children.

The experts view can also be used to devise future studies. The experts had presented holistic opinions of motorcycle helmet related problems in developing countries. Moreover, they had also presented solution to overcome such situation. Enforcement has been identified by majority of respondents as the solution to solve motorcycle helmet in developing countries. So further research can be carried on how much influence enforcement has on use of motorcycle helmet users in developing countries. Further studies could also be carried out on the combined effect on education and enforcement on changing road safety related behavior of people.
7 Conclusion

In this study, the research is done on the role of education in improvement motorcycle helmet use considering children as change agents. From the literature, it is found the children in developed and developing countries have motivated their parents to improve social problems such as smoking or boiling drinking water. In this research, the scenario with children as change agents improving motorcycle helmet is tested. The medium of in-house education with age of children from 11 to 14 years was considered in the experiment. Besides, the valuable opinions from experts of transport safety was obtained regarding role of road safety education and children as change agents to increase motorcycle helmet use. Lastly, a triangulation study was done to understand the similarities and differences acquired with the help of literature, opinions of experts, and experiment conducted. After the child’s lecture in the experiment, most of the parents agreed that their child can act as change agents to increase motorcycle helmet and they will use motorcycle helmets for other members of the family. The program of children as change agents to increase motorcycle helmet was highly accepted by parents as significant association was found with before scenario. However, no statistically significant association was found for the variable of after child’s lecture would they use motorcycle helmet for other members of the family with before scenario. Similarly, no statistically significant variable of improper use of motorcycle helmet was found with before scenario. On the other hand, experts believed that community leaders should be responsible for education of masses. The concept children as change agents was not out rightly dejected by the experts. The experts believed that such program needs sufficient support of human and non-human resources to be successful. Literature also supports the claim that children can become change agents to influence their parents. Hence, it may be concluded that children can become change agents to increase motorcycle helmets. In order to find the shortcomings in this program, it can be implemented on small scale first. In the beginning, children could start teaching their peers to acquire adequate experience. From the literature and opinion of the expert, one understands that if educational program are implemented on higher level such as province or state, it could see resistance from backward societies. This friction can be reduced by imparting education to the target community. The elders can be involved and counselled to accept such an idea. Similar campaigns can be made in rural areas to accept the opinion of children. Considering road safety education, experts provided useful insight that media should be used to promote road safety education. Moreover, license should be not be issued unless prospective drivers are made to the perils of driving unsafe. Awareness campaigns should also be vehemently launched so people can understand the consequences of driving dangerously.

From this study, one can conclude that, road safety education can be taught in both formal and informal ways. Students were taught in a formal medium of school and they successfully delivered the same knowledge in their homes, which is regarded as informal education. Moreover, it may be inferred form the research that road safety education should be made compulsory in schools. In schools, the physics of protective features of the vehicle should be taught. The students should be provided road safety knowledge by everyday life examples. It is also suggested that learning road safety education should be interactive. Student should be engaged in dramas, plays and games so that they feel connected to the cause and do not lose interest. Moreover, schools should make it compulsory that students who ride a bike to school should wear a helmet. A good habit of wearing helmet on a bike will ensure that these children will also use motorcycle helmet when riding a motorcycle in future. Some of the respondents and the literature also support the claim that education and enforcement should be jointly implemented. The claim of joint adoption of education and enforcement needs further research. From the study, one understands road safety education has enough merit to be implemented single handedly. If developing countries with scarce resources improve their education regarding road safety, it could have a future generation of people who are more responsible in road safety.
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http://doi.org/10.3141/2114-08


http://doi.org/10.3141/1792-02


Presented at the The 5th International Conference on Ambient Systems, Networks and Technologies.


ANNEXURES

ANNEXURE A: Qualtrics survey sent to Experts
Role Of Education For Helmet Use In Developing Countries

Q1 What is your name?

Q2 Which country do you belong to?

Q3 What is your date of Birth?

Q4 What is your gender?
   - Male
   - Female

Q5 What job are you doing now?

Q6 Considering your home country, how driver behavior can be modified?
   - Education
   - Engineering
   - Enforcement
   - Other _________________

Q7 Considering your home country, why are individuals not buying a helmet? <
   - Price
   - Poor quality of helmets (easily damageable etc) in market
   - Absence of law enforcement
   - Theft
   - Other _________________

Q8 Considering your home country, if individuals own helmet why do they not wear it?
   - Physical inconvenience (lack of vision, weight, hearing problem etc)
   - Theft
   - Lack of enforcement
   - Personal characteristics (spoiling grooming as hair style or make up)
   - Other _________________
Q9 Considering your home country, what are the reasons for improper use of motorcycle helmet?
- Poor buckling of motorcycle
- Wearing improper size of motorcycle helmet
- Other ____________________

Q10 Considering your home country, from which age should traffic safety education be taught?
- 5 to 10 years old
- 11 to 14 years old
- 15 to 18 years
- Above 18 years
- To be taught in driving schools or driving issuing license schools
- Other ____________________

Q11 Considering your home country, which medium of education is important while educating for motorcycle helmet use?
- In house education (Parents teach their children etc)
- Formal education (schools, colleges, universities)
- Educating through media (T.V, Internet)
- Educating through community campaigns (Senior and respectable citizens teaching community members)
- Other ____________________

Q12 Considering your home country, who should be responsible to educate for helmet use?
- Young people teaching their elderly (children teaching their parents or seniors of family)
- Education done by important person in society (elderly tribal head, politician, religious scholar, celebrity)
- Parents teaching their children
- Non-Governmental Organization (NGO)
- Other ____________________

Q13 Considering your home country, if the program of children teaching their elderly on road safety is raised on national level, what barriers it will face?
- Economic
- Social
- Political
- Religious
- Other ____________________
Answer If Considering your home country, if the program of children teaching their elderly on road safety is raised on national level, what barriers it will face? Social Isa Selected

Q14 In developing countries' societies, rural areas maybe dominated by male citizens, how children’s view on road safety maybe acceptable in such societies?

- Financial incentives for elderly listening to such lectures by children
- Community education
- Media awareness
- Government interference through legislation
- No this is not a case in my country
- Other ____________________

Q15 How education can improve motorcycle helmet (road safety) use? Any useful solution or suggestion in this regard. Any research conducted, paper written or recommendation for above mentioned idea (write link or source if necessary)?

Q16 How can the program of children teaching road safety to elderly in developing countries can be implemented successfully? Any useful suggestion or solution in this regard. Any research conducted, paper written or recommendation for above mentioned idea (attach if necessary)?

Q17 Do you permit to be coordinated further regarding transportation related issues from University of Hasselt through your email id (Yes or No)?

- Yes (enter your email current email address below) ____________________
- No
ANNEXURE B: Power point presentation given in school

Children As Change Agents For Helmet Use
Road Safety Awareness in Children

Accident Mechanism (Haddon Matrix)

Vector:
- VEMs
- lights
- brakes

Person:
- alcohol use
- driving speeds
- protective equipment

Environment:
- street lighting
- paved roads
- road barriers
Accident Mechanism (Haddon Matrix)

- **Pre-Crash**
  - Intervention can prevent:
    - death
    - injury
    - property damage

- **Crash**
  - Intervention can prevent:
    - death
    - injury

- **Post-Crash**
  - Intervention can reduce the chances of:
    - death
    - injury

---

**Hands up if...**
- Knows how to drive a motorcycle
- Have a motor cycle at home
- Thought about road safety the whole day
Road accidents will become third leading cause of global disease burden by 2020.


Consider these facts:

More than one 1.2 million deaths occur worldwide due to road accidents & 85% occur in middle and low income countries.

In low and middle income countries head injuries account for 88% of fatalities!!!

PRECAUTION is better than CURE as 100% accidents are preventable
Taiwan witnessed 14% reduction in road fatalities and 22% reduction in road injuries related to head after introduction of Laws that increased proper usage of Helmets.

Road Accidents In Pakistan

- 60000 people have died in road accidents in Pakistan. If accidents are properly reported, it can increase to more than 100000.
- Road accidents are 15 per 1000 thousand people.
- 80% do not wear helmets.
Why Fatal Motorcycle Accidents Happen In Pakistan

Do not own a helmet
Improper wearing of helmet
If owns one helmet does not use properly
No use of helmets on small distance

What Should we do

• Why Helmets are use, its importance will be realized
• Consequences of non use of motorcycle Helmet use
• Remedies to overcome non use of motorcycle helmet
Importance Of Helmets

- 88% of deaths occur to head injuries on roads (WHO)
- Helmets save lives and avoids injuries

Helmets Save Lives!
Why To Wear Helmets

- It can protect our head
- It prevents neck and head injuries
- Prevents the direct contact between the head and the object
- It reduces the deceleration of head
- It spreads the force of impact to a greater area
- Myths that helmets break necks, blocks vision, impairs hearing or suffocating are incorrect.
Other Advantages Of Motorcycle Helmet Use

- Cuts down wind noise for your ears
- Protects wind blast on your face and ears
- Deflects bugs and objects
- Deflects bugs and other objects
- Contributes to comfort from changing weather conditions
- Projects a positive image of your personality

Videos Regarding Importance Of Helmet Use
Videos Regarding Importance Of Helmet Use

Activity: What do you think would have happened in aforementioned situation if helmet was not used?

Write your views in the paper...
Hands Up If You...

Witnessed an accident live in your whole life
Witnessed an accident in her previous year
Witnessed an accident an accident, this month or this week
Witnessed an accident in the previous day or today

Activity 1.1

Think how you can improve road safety:

Paper & pencil is provided write your preference in boxes in question paper from 1 to 5

Examples:
Improve roads
Improve road safety laws
Improve policing system
Provide education
Activity 1.2

Think how you can improve road safety:

Paper & pencil is provided write your preference in boxes in question paper from 1 to 5

Examples:
Reduce price of helmet
Make laws compulsory to wear helmets
Make enforcement through police stricts
Provide education to young ones like you so they can be better drivers in future

Consequences...

• Increases the risk of sustaining a head injury
• Increases the severity of head injuries
• Increases the time spent in hospital
• Increases the likelihood of dying from a head injury
• Increases the likelihood of long-term disability
• Head of the family or bread earners lost causing family issues
**Remedies**

**INDIVIDUAL LEVEL**

- Buy a new helmet
- Wear the helmet properly
- Use helmet even in small distances
- Select the proper size of helmet
- Buy helmet for other riders on the motorcycle

**GOVERNMENTAL LEVEL**

- Introduce compulsory motorcycle helmet use
- Introducing effective enforcement (reforming police system)
- Educate masses
- Improving infrastructure and road (engineering)

**Social Level**

- Social campaigns for urban and rural areas
- Teaching in schools
- Children teach their parents (new concept)!!!
Conclusion: What You Can Do

- Teach your parents/elderly about road safety particularly helmet
- Teach what you have learnt in the class
- Act like your teacher & lets see how much you can influence your elders/parents to buy and properly use Helmets
- Motivate your parents to buy helmets for other members of the family
- You are agents of change in society
- You are the Hero and be the change maker in society
- We are counting on you
ANNEXURE C: Survey Form Filled by Parents

Road Safety
Survey Form

<table>
<thead>
<tr>
<th>Contact Information</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s name</td>
<td>Zara Mughal</td>
<td></td>
</tr>
<tr>
<td>Parent’s name</td>
<td>Wajid Ali Mughal</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>03332634254</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>File: A16 daeshan plaza Hyderbad</td>
<td></td>
</tr>
<tr>
<td>Name of School</td>
<td>B. F. C, Quimabed Hyd</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Do you drive any vehicle car/motorcycle? **YES □ NO ☐**

2. Do you wear a seatbelt? **YES ☑ NO □**

3. Do you wear a Helmet while riding a motorcycle? **YES □ NO ☐**

4. Do you understand traffic signs on roads? **YES ☑ NO □**

5. Do you have a driving license? **YES □ NO ☐**
Q7. Do you have a motorcycle helmet at home? YES □ NO ☑

Q8. Do you wear a motorcycle helmet properly?
   □ Always
   □ Most of the time
   □ About half the time
   □ Sometimes
   ☑ Never

Q9. When riding a motorcycle, do you use motorcycle helmet for other members of family (wife, children)?
   □ If Yes, How many Helmets do you have and for whom?  
   ☑ No

Q10. After child’s lecture, are you willing to buy helmet for other members of the family?
    ☑ Definitely will
    □ Probably will
    □ Might or might not
    □ Probably will not
    □ Definitely will not

Q11. Do you think children can act as agents of change in road safety issues as increase of Helmet use?
    ☑ Strongly agree
    □ Somewhat agree
    □ Neither agree nor disagree
    □ Somewhat disagree
    □ Strongly disagree

Q12. Do you have some suggestion to improve the program of children as change agent for road safety?
    • Did not ride on the roads under 18 years age and without license.
    • To obey the rules of road.
    • Education instruction should be provided to students of roads.
    • During the driving in city speed should be under 20 to 40
ANNEXURE D Booklet handed out to children

Children
Teaching
Elderly the
Importance
of Motorcycle
Helmet

What Children Will Teach.
Road Accidents & Disadvantage
of Not Using Motorcycle Helmets

Road Accidents!!

- Road accidents will become
  third leading cause of global
disease burden by 2020

- More Than One 1.2 Million
  Deaths Occur World Wide

Due To Road Accidents & 85%
Occur in Middle And Low
Income Countries

- In low and middle income
countries head injuries
account for 88% of
fatalities!!!
Road Accidents & Disadvantage of Not Using Motorcycle Helmets

- 80% deaths in road accidents are not wearing helmets
- Increases the risk of sustaining a head injury
- Increases the severity of head injuries
- Increases the likelihood of dying from a head injury
- Increases the likelihood of long-term disability

Head of the family or bread earners lost causing family issues

Advantages of Wearing Motorcycle Helmet

- The myths that helmet break necks, blocks vision, impairs hearing or suffocating are incorrect
- Prevents neck & head injuries
- Prevents direct contact between the head and object
- Spreads the force to a greater area
- Cuts down wind noise for your ears
- Protects wind blast on your face and ears
- Deflects bugs and objects
- Deflects bugs and other objects
- Contributes to comfort from changing weather conditions
- Projects a positive image of your personality

Children Can Be Agents of Change in Society

What to Do Now?
Buy a new helmet
Buy the helmet according to your head size
Buckle up the helmet each time
Buckle up and tightly wear helmet each time
Wear helmets each time you ride on the motorcycle
Wear helmets even for small distances
Buy helmets for each member of the family
Motivate your family and friends to buy motorcycle helmets for themselves and their family members
ANNEXURE E Pictures of experiment in Pakistan
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