ROAD SAFETY IMPROVEMENT MODEL FOR KARACHI

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ABSTRACT

Based on 2011 WHO data, Road Traffic Accidents Deaths in Pakistan reached 20,154 or 1.58% of total deaths. A death Rate of 15.55 per 100,000 of population ranks 94th country in the world. The reasons for the existing situation are lack of resources, willingness and awareness about the improvement and implementation of road safety interventions on government level, which is primarily due to less priority given to this problem over other equivalent issues. In this scenario, non-governmental organizations can play a vital role to significantly reduce the increasing rate of RTI. However, a sound operational model, which is developed in the context of working environment of developing countries, is required to get the desired results.

This paper reviews the effectiveness of approaches and models currently following by non-governmental organizations regarding improvement and implementation of road safety interventions at regional level in the developing countries like Pakistan, India and Bangladesh. In addition to this, the paper further presents a case study of the marginally successful operational model (functional in Karachi, a metropolitan city of Pakistan), which is based on public-private partnership and having its major funding from local vehicle manufacturer. The main feature of this model is that its decision making is entirely rests with the public sector, however, the forum comprises of local professionals that include road safety researchers from academia, practicing traffic and road safety engineers and relevant medical practitioners from major hospitals. Furthermore, majority of activities are monitored through a developed center comprises of various functional cells.

Keywords: Road Safety interventions, Governmental and Non-Governmental Organizations, Operational Models, Developing Countries

1. INTRODUCTION

Empirical evidences have shown that Road Traffic Injuries (RTI) contributed a significant share in overall morbidity, disability and mortality in developing countries. Out of the three factors contributing towards road traffic accidents, the drivers and other road users basically determine their movements on the road adapt their behaviour to existing traffic regulations and rules, to road surfaces, to traffic and weather conditions in accordance with their driving skills and health status. Furthermore. Human behaviour itself is influenced by a myriad of elements related to the individual and their ability, skill and experience, current physical and psychical state, and perception of the actual traffic and road conditions.

Based on the lessons learned from the existing operational models, the paper proposes an improved model that integrates various departments under regional government with a limited role on funding and functional aspects but gives high projection and recognition for any positive outcome that may occur from the overall road safety program. This is essential for reducing the barriers in affectivity and efficiency of non-governmental operational models. In addition to that, a key characteristic of the improved model is that it gives special emphasis on the development of accident databases and role of traffic injury research in regional context, as it has been found that solutions and preventive mechanisms suggested for the developed world are not appropriate without their comprehensive review. The paper illustrates few such examples to elaborate this point more clearly.

2. SITUATIONAL ANALYSIS

Currently, fatalities in Karachi experience 1200 fatalities per year due to road traffic accidents. Luby S, et.al, (1997), found buses and trucks were less than 4% of the registered vehicles in Karachi they were the striking vehicle among 49% of all injuries and 65% of the deaths. Road traffic accidents disproportionately affect wage earners. Specific interventions to improve the road safety of trucks and buses are needed. They concluded that as the city has a poor road infrastructure and public transport vehicles have been prone to frequent accidents.

According to WHO statistics report regarding road safety, around 1.3 million people on yearly basis die worldwide in road crashes and more than 50 million individual reported to have some type of injuries due to the same. Developing countries share the significant amount of the above presented numbers. It has been reported in the literature that in developing countries fatalities due to road crashes are three to four times more than in the developed world (Bener et al 2003, Mohan and Tiwari (2005)). Within the road users, pedestrians, motorcyclist, cyclists and users of public transport have been identified as vulnerable suggesting that their vulnerability is a great concern as economically these people are not well off. In many developing countries road safety has not given prime importance due to lack of political will. However, development of infrastructure and policies that suits motorized traffic has been given significant consideration in

almost all developing countries and due to this rapid increase in vehicle ownership has been observed. One such study reported that annual increase in vehicle ownership in developing nations of Asia is 12-18% which resulted in a dramatic increase in the number and rate of accidents. The situation in developing country like Pakistan is even worse as it has been reported that overall increase in motorization is about 410% between the years 2001 to 2005. This is because of the motorization friendly policies of the Pakistan Government that has allowed commercial banks to introduce car financing in almost all major urban areas in affordable terms to even those individuals whose income level lies in average category (Aizaz 2007). This heavy motorization resulted in serious deterioration of road safety conditions which is evident from various informal surveys. Aizaz (2007) reported that rate of RTI (fatal and serious injury) is 2.70 per 1000 persons based on the records collected from district hospitals as police record has been found significantly under reported. The situation in India is better compared to Pakistan based on the similar rate which was noted as 1.0 per 1000 persons in year 2006 (Sudhir and Sameera, 2006). These statistics demand serious endeavors for improvement of road safety conditions which has been realized strongly by WHO and other funding agencies i.e. Asian development Bank (ADB), and due to the lack of interest of the government functionary, these agencies have shifted their focus towards regional NGOs. This has been evident from the fact that between 1973 and 1988 only 6% of World bank-financed projects involved NGOs, however, from 1994 onwards this percentage has increased up to 50% (Ellevest, 1997). Furthermore, in 2009, WHO arranged a global meeting of NGO's advocating for road safety with a view point that these organizations have a key role to play in generating political commitment to addressing deaths and injuries on the world's roads. (Adnan,et.al. 2011)

Over the years it has been seen that in developed part of the world, NGOs can initiate road safety activities which the public authorities have problem to address due to variety of reasons. For example, access to private funding or co-operation of communities and individuals etc. In developed world NGOs role can be defined as a supplement and extension of the government efforts. However, in developing countries their role is much critical; sometimes they are providing such essential services that in developed countries governmental agencies and institution would provide. Under these circumstances, NGOs in the developing world are acting as a main contributor to economic development, essential services, employment and the budget. It is therefore vital for the success and effectiveness of these NGOs that their operational/working methodology needs to be precisely developed. The objective of this paper is to critically review operational models followed by NGOs working in developing countries like India, Bangladesh and Pakistan and based on the understanding and experiences propose a model which improve the effectiveness of these NGOs that ultimately lead towards improvement in road safety conditions. The term operational model or working methodology encompasses various aspect of a NGO, this paper limits its focus on issues such as the source of funding and its mechanism to win, the

involved team and its experiences, the framework/setting that describes role and responsibilities of various members, type of work that need to be accomplished, involvement of government agencies and other stakeholders, element of community participation, and the mechanism for information or research dissemination.

The next section discusses operational models of NGOs working in developing countries, followed by a case study of road safety program fully functional in Karachi, Pakistan. Section four presents a proposed operational model based on experiences and understanding followed by concluding remarks.

3. OPERATIONAL MODELS OF ROAD SAFETY NGOs IN DEVELOPING COUNTRIES

There exist a variety of NGOs based on their working domain such as Community-based (working for a specific community or geographical area) or National (operating in a particular country) organizations but the common element between them is the principles of altruism and voluntarism . The World Bank defines NGOs as "private organizations that pursue activities to relieve sufferings, promote the interest of the poor, protect the environment, provide basic social services, or undertake community development" (Ellevest 1997). For an NGO to comply this definition, a sound operational model is a key requirement. This section focuses on critical discussion of operational models of few NGOs working in the area of road safety in countries like India, Bangladesh.

3.1 Road Safety NGOs in India

The major commonality between the developing countries regarding road accidents is a phenomenon of highly under reporting of accidents, and India is no exception. This is the main reason for significant differences in the figures and facts obtained from various sources. Despite of this fact, the available figures are already alarming. Civil Society and other stakeholders realized this situation, and as a result significant number of NGOs is listed who are working for the cause of improvement of road safety. However, it has been seen that majority of those NGOs has limited their focus only on awareness campaigns among different sectors of society through different means (Guler 2008). The reason behind this trend may be the scarce resources and unavailability of road safety professionals to properly channelize their activities. Additionally, Government functionaries in India have followed a positive approach to work with these NGOs. For example, in the city of Bangalore, road safety is very much led by the local Police. The Police are using the revenue from the traffic fines for road safety improvements and they are addressing a number of key issues with support from many responsible stakeholders (Sudhir and Sameera, 2006). Under these conditions there is much lesser burden on NGOs and therefore their role is quite similar to those working in developed countries. However, there exist some states within India, where government functionaries are completely idle regarding road safety conditions.

These are the regions where NGOs can play vital role with a larger responsibilities. Among the major road safety related NGOs working in India, ArriveSAFE, Headlight, International Road Federation (India Chapter), Foundation for Road safety, IRTE (Institute of Road Traffic Education) and GRSP (Global road safety partnership) are making a significant impact on improvement of road safety conditions. Below are some of key characteristics of the operational model followed in IRTE. This NGO through its work has gained good respect among the Government bodies and road safety professionals.

- ***Influential and Visionary Founder:*** IRTE, which has been established since 1991, is running under the command of Mr. Rohit Blauja (currently president of the NGO). It is because of his visionary approach and leadership qualities this NGO has gained a good status all over India and have attracted significant amount of national and international funding for the cause of road safety improvements. In developing countries, for successful operations of NGOs it is necessary that a key figure of the society is running its affairs or at least strongly associated. Sometimes, influential character of this figure help out in removing hindrances and obstacles for carrying out key tasks to suffice the goals of the program/project. However, in a long run of any NGO this may have a negative impact as in less developed countries it is often seen that NGOs are suffering from the leadership bailout and staff turnover as a result of the lack of institutionalization and overdependence on the founder (Guler 2008).
- ***Skilled Staff, Task Teams and Panelists:*** This has been the key characteristics of the operational model, without the availability of skilled and professional staff it is almost impossible to carry out project activities in an effective manner. IRTE governing board comprises of members from interdisciplinary group that includes educationists, doctors, journalists, engineers, ex-servicemen, architects, automobile experts and members from police. This wide range of board members mean that any project or program is supported with relevant experts which can clearly elaborate and illustrate the task teams and staff what needs to done and how it can be accomplished.
- ***Positive Relationship with Government Bodies and Stakeholders:*** This is vital for a sound operational model of an NGO working in the area of road safety. The nature of road safety interventions are such that without the support of government functionaries and relevant stakeholders it is difficult to implement intervention strategies as often roads are under the authority of civic agencies. Therefore, positive relationship or even involvement of government functionaries in basic decision making is entirely necessary for successful implementation of interventions. IRTE has placed special emphasis on this, as it not only involving government functionaries in its project but also provide advisory service and member of various government institutions. This warm relationship means that government functionaries and IRTE go along hand to hand and support positively each other in their activities.

- ***Wide variety of Offered Services:*** IRTE has focused itself entirely on road safety issues; however, within this they are offering wide range of services e.g. Drivers training programs, traffic enforcement, road safety education, community participation in traffic management, and consultancy services to various stakeholders. This wide range of services ensures the self sustainability, and in periods of scarce funding the NGO can survive easily.
- ***Sound Approach of Dissemination:*** This is another important element of a good operational model for a road safety NGO. In the process of accomplishing various tasks related to road safety program significant amount of analytical and practical findings are produced. The key is to document these findings and learned lessons and disseminate them to the larger audience. This can be done through organizing workshops, seminars and conferences. IRTE always give high value to these activities and organized series of conferences on road safety research.

3.2 Road Safety NGOs in Bangladesh

Bangladesh is a South Asian country that ranks one of the poorest in the world in terms of per capita income. In Bangladesh fatality rates per 10,000 vehicles are about 86 persons (Ross, 1998), which is 33% higher than India. About 20 percent of road accident occurred in metropolitan cities viz. Dhaka, Chittagong, Khulna and Rajshahi (Hoque, 1991). According to Hoque (2004) road safety improvement efforts in Bangladesh seriously suffer from several serious drawbacks. Among the various problems; lack of funding and other resources, unwillingness of the government authorities, unavailability of professional agency, insufficient inter-agency coordination, inadequate personnel, lack of trained traffic police for effective enforcement and traffic regulations, absence and inadequate dissemination of road safety research are the prominent reasons for road safety conditions. Having the realization of the state of the problems, NGOs are becoming active in the area of road safety in Bangladesh. Bangladesh Rural Advancement Committee (BRAC) and Centre for Rehabilitation of the Paralyzed (CRP) are two leading NGOs working towards betterment of road safety; however, their focus is very wide as they tackle many other issues such as economic development, injustice in the society, Gender issues, environment and health etc.

It has been seen that BRAC has done a significant amount of work on various aspects of road safety such as from Research to community awareness projects. Operational model of the BRAC is having all the key ingredients describe in section 2.1, and it has been observed that it is significantly dependent on its visionary and influential leadership, and based on that, this NGO has now performing its activities outside the country as well such as Africa, Asia and South America. However, it has been seen that this NGO is following a norms common in professional NGOs of the developed world. Governing board comprises of many key individuals from national and international organizations (such as Amnesty International). It can be easily asserts from the setting of the organization that in terms of leadership availability BRAC is sustainable and will continue to grow its activities further. Additional feature of the operational model of this institute is

its special emphasis on transparency and accountability. Clear policies and procedures which are well documented, transparent definition of various levels of authorities and proper staff supervision have made this organization distinct from the others. This is evident from the fact that in 2007, for the third consecutive years, BRAC was awarded the Financial Transparency Award by the consultative Group to assist the Poor (CGAP) in recognition of its full compliance with international disclosure. This quality in the operational model ensures the sense of credibility which helps generate more finance for the institution activities. In addition to all above, the information dissemination process within BRAC have been found very aggressive, there are media managers who are constantly communicating with print and electronic media about activities and events carried out by BRAC and their positive impact on the society development. Of course, this has strong connection with in-hand finances but this component is correlated well with the overall image of an NGO and often ignored by small scale NGOs.

4. ROAD TRAFFIC INJURY RESEARCH AND PREVENTION CENTER KARACHI, PAKISTAN – A SUCCESSFUL MODEL

In Pakistan, like many developing countries, issue of road safety has not been the prime agenda or priority of the government. International donor agencies such as World Bank and ADB have provided funding for various country-wide transportation projects but there is no exclusive project for road safety issue despite the current demanding situation. In year 2006, Government of Pakistan has established a National Road Safety Secretariat (NRSS) to improve road safety situation, however, the impact of this institute has been quite low because of lack of funding and professional manpower, unavailability of true records of road accidents and inadequate co-ordination among different government functionaries. In current state, there are various NGOs working in Pakistan having different agenda but no one devoted its focus to the road safety issue in any urban region of Pakistan. Recently, in year 2007, a center has been established based on public-private partnership with a name of Road Traffic Injury research and Prevention Center (RTIR & PC) in Karachi, Pakistan. This section elaborates the purpose, operational model, and outcomes of several projects carried out by this center. Shahzad Shamim, et.el., (2011) elaborated data collected by the centre.

4.1 RTIR & PC Objectives

The need for the establishment of this center was identified by the doctors as they monitor a large number of patients coming in the hospitals due to the accidents which causes significant increase in accident fatality rate. This center was developed with a purpose of providing solutions and interventions based on the analytical study of road crashes and pressurize government functionaries for their implementation. To fulfill this objective, a data collection mechanism was also devised as there were large discrepancies noted with the accident records available from Police department. It was later found out that in year 2008 police data indicated around 1004 road

accident fatalities for the whole province of Sindh (which comprises of many urban cities) and RTIR & PC statistics indicated 1185 fatalities for the Karachi region only. This provide enough justification for inclusion of data collection mechanism in its primary tasks. The centre is involved in collecting the accident data for the last three years from five major public and private sector hospitals of Karachi including Jinnah Post Graduate Medical Centre (JPMC), Agha Khan University (AKU), Civil Hospital Karachi (CHK), Abbasi Shaheed Hospital (ASH) and Liaqat National Hospital (LNH), Karachi (Saqib et al 2010).

4.2 RTIR & PC Operational Model

In order to properly understand the operational model and its various characteristics, it is necessary to list down key activities of this organization (RTIR & PC 2009). These activities are as follows (Figure-1):

- Data Collection, Categorization and Analysis
- Allocation of priority areas
- Development of various proposal or improvement actions
- Involvement of the civic agencies and stakeholders
- Implementation strategy
- Follow up or impact studies

The above list of activities showing the hierarchical structure of various task that are accomplished in the center. There are various functionary cells that are responsible for carrying out these activities. For example, there are data collection teams who are deputed in five major hospitals whose main task is to fill up survey questionnaires by direct interviewing the victim or accompanying person. A team of professionals and engineers are analyzing data along with the inspection of accident sites to identify causes and remedial measures. Based on that, civic agencies and stakeholders are involved and series of meetings were arranged between the top officials of the center and representative from various authorities to discuss the proposed implementation strategies. The main elements of the operational model followed in this center are as follows:

- **Funding Mechanism:** RTIR & PC has earned the funding for its operation from the local vehicle manufacturer known as Indus Motors. However, there is some support provided by the Ministry of Health, Government of Pakistan in terms of space allocation for its central office and facilitation to members of data collection team deputed in various hospitals of Karachi. The major portion of the funding is spent in staff salaries and field visits. The funding from Indus Motors is based on the influential character of the key individual Prof. Dr. Rasheed Juma, who established this center while holding an office of Director General Health in the Ministry of Health.
- **Leadership:** The establishment of this center was based on the Advisory Panel that include key individuals from Academia (NED University of Engineering & Technology),

Medical Profession (Doctors from Aga Khan University Hospital), Professional Engineers and Managers.

However, it has been noticed that head of the center is a key decision maker in almost all aspects, suggesting the fact that there would be a serious leadership issue as there are no persons playing the role of second in command.

- **Staff, and the Task Teams:** Within the center, many individuals and professionals are hired to carry out different tasks. For example, Civil/Urban engineers having the background of road safety issues and accident investigations, individuals who can write reports and carry out different analytical tasks with the collected data, individuals that form a data collection teams etc. To an extent these individuals are skilled and having the required capabilities based upon the task, however, there is no mechanism in place for proper management of these human resources. No checks on salary structure and work load distribution and because of that the center always found in scarce of staffing.
- **Data Management & Processing Cell:** As one of the center, prime activity is collection of data from different hospitals, therefore this center possess a cell that manage the collected data in the form of filled questionnaire and then transferred it into an electronic format. Sometimes discrepancies have been found in the data, but quality of data is mostly reliable compared to the data available from Police department.
- **Engineering & Research Cell:** This is the weakest link in the operational model of the center. This cell is responsible for detailed investigation of accident data, carrying out safety audits and other research related tasks. However, the center has only one to two full time professionals that can perform these tasks due to scarce resources and unavailability of road safety professionals. Relevant academics that are part of the advisory panel somehow fill up this gap. This is the reasons center is coming up with point specific solutions which are majority of the cases found unsustainable. For example, center has recommended installation of Pedestrian bridges on few sites, however, after the installation it has been found that those bridges are underutilized and not fulfilling their required purpose due to social problems prevailing in the society i.e. these bridges are occupied with beggars, disable and old age people find difficult to climb stairs, often incidents of cell phone and wallet snatching crimes are reported to placed on these bridges due to lower volume of pedestrians.
- **Involvement of Government Bodies:** This component of the operational model is one of the strength of the center. Regular meetings are arranged with the relevant government functionaries, and based on the findings these functionaries are informed about the condition of road safety in the entire city. With these continuous efforts authorities are now listening, and found supportive of the ideas presented in front of them regarding different aspects of road safety. The motivational factor behind the positive attitude of the government

functionaries is that every intervention was carried out by providing all the credit to these agencies with limited request of funding for implementation.

- **Monitoring Mechanism:** This is again a weakest link; monitoring mechanism of the center activities is almost not present. Proper checks are not carried out at the point of data collection and its computer punching. Additionally, the volume of work that has been carried out for any task is not compared with the standard practices. Roles and responsibilities at different levels are also not very clear.
- **Dissemination Process:** Information dissemination process of the center is also very vague; there is hardly any coverage of media about the positives that this center has brought in the society from his inception. Furthermore, this center has not published any document that tells its progress. However, annual report in the form of tabulation of numbers and figures is published that contains glimpses of the collected data.

4.3 RTIR & PC Successful Efforts

Despite of some deficiencies in the operational model of RTIR & PC this center has possess many success stories. By the efforts of different task teams, road safety audits and major accident investigations has been performed on major arterials of Karachi including Shahrah-e-Usman Ramz, Chaudary Fazal Ellahi road, Korangi road, Korangi Industrial Road, Jail Chowrangi etc. Based on these studies several low cost solutions has been proposed which are implemented with the support of civic agencies. The after intervention studies at these spots show considerable reduction in fatalities and severity of accidents. For example, in the case of Shahrah-e-Usman Ramz, at a particular point where pedestrians movement are significantly high, road curve was very sharp due to which the location could not able to suffice proper safe sight distance requirements (Saqib et al 2010). This finding was disseminated to relevant civic agencies; some specific traffic signs were posted as a short term solution that resolved the issue to a significant extent.

Table-1 explains the marked difference between data collected by RTIR&PC and the police data, especially for the case of non-fatal accidents. Apparently this is a result of inadequate methodology, improper infrastructure and restricted outreach by the police department.

5. PROPOSED OPERATIONAL MODEL

This section proposed an operational model based on the lessons learned from the existing operational models on which various broad based NGOs are operating. The proposed operational model is such that if all elements are incorporated in a particular road safety NGO, not only ensures its self sustainability but ultimately renders increased effectiveness of any proposed road safety interventions. Furthermore, this operational model does not require significant amount of funding as a capital, however, a minimum level of funding requirement is always there to make

sure all component of the model are effective simultaneously. Figure 1 shows the componential framework of a proposed operational model for a road safety NGO in a developing country.

In Figure-2, important components of operational model are shown. Sustainable funding source or mechanism thorough which an NGO can generate funding for its own sustenance is a necessary element. Most of the NGOs are dependent on the funding from donor agencies, and it is always a chance that in periods of recession/or due to some other reasons funding may not be available to carry out activities of the NGO. In this connection elements like strong institutional framework, larger range of offered services e.g. consultancy and advisory services through indigenous research and association of key individuals provide a framework through which an NGO can sustained itself. Strong institutional framework here means there should be a less dependency on the leadership for generation of funding and development of activity plans. For example, BRAC and IRTE are now developed as institutes which are no longer dependent on their founders; however, RTIR & PC has not shown this maturity. It is important that NGOs should be based on institutions not on individuals who are belonging to various institutions. Furthermore, establishment of NGO should be based on clear documentation that represents role, authorities and responsibilities of various individuals in the organization.

In developing countries, it has been seen that accident are always underreported. To improve this situation NGOs working in these countries make sure that they have reliable data for analysis and recommendation of various interventions; otherwise they should evolve a data collection mechanism so that analytical sound solutions are disseminated to civic agencies. Furthermore, emphasis should be given to indigenous research as it has been noted that straight forward recommendation of any intervention without proper research may lead towards waste of money and other resources. One such example has been illustrated above in section 3. It is important for an NGO to have clear and transparent records of its financial matters, in a long run; this can be very fruitful as donor agencies may require credibility certificates for release of funds.

Media coverage is a key component for showcasing of efforts and endeavors of NGOs towards the betterment of the society. This not only render positive image of the NGO but also raise awareness among people regarding road safety issues. In a similar manner, dissemination of various information and new findings is also a key to promote organization cause through workshops, seminars and conferences. This develops strong network among peer professionals and relevant organizations. All the components of an operational model showed in figure 1 are to an extent correlated to each other, as if one is going in positive direction other will also go positively. At the same time they have an element of independency as well, for instance skilled staff and task teams may render efficient outputs but improper dissemination of these outputs provide no gains to the cause of NGO. Therefore, all the components are equally vital for a successful NGO who vision is to improve effectiveness of road safety conditions.

Table-2 and Figure-3 provide trends of injury severity; namely, minor, serious and fatal accidents. It can be seen that serious efforts implemented on-ground resulted in reduction of fatal accidents from 2008 numbers.

6. CONCLUSIONS

This paper provides comprehensive review of operational models followed by key NGOs related to road safety area in developing countries. The findings mentioned in section 2 and 3 and the proposed operational model will help reducing the duration of the learning curve of road safety NGOs for improvement of their operations. The proposed operational model emphasis on the institutional and structured framework in which carry out different task and activities are less dependent on the leadership. Additionally, consideration has also been made for the positive relationship with civic agencies and stakeholders, Indigenous research, proper monitoring mechanism and aggressive media coverage.

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7. REFERENCES

Aizaz A., 2007. *Road Safety in Pakistan*. [online] National Road Safety Secretariat, Ministry of Communications, Government of Pakistan. Available at: http://www.unescap.org/ttdw/common/Meetings/TIS/EGM%20Roadsafety%20Country%20Papers/Pakistan_Roadsafety.pdf

Bener, A.,Abu-Zidan F.M., Bensiali, A.K., Al-Mulla, A.A., Jadaan, K.S. 2003. Strategy to improve Road Safety in developing Countries. *Saudi Medical Journal* 24(6) pp. 603-608

Ellevest L. A., 1997. *The Role of NGOs in Road Safety.* [online] Road safety in Bangladesh. Available at: http://www.rhd.gov.bd/Documents/ExternalPublications/WorldBank/TransSectPub/contents/documents/B21.pdf

Guler, E., 2008.*How to Improve NGO Effectiveness in Development?.A Discussion on Lessons Learned.* [online] NGO MANGER. Available at: http://www.ngomanager.org/dcd/2_Organisational_Development/Capacity_building/NGO_Effectiveness.pdf

Hoque, M. M., 1991. Accident investigation for the safety improvement of Dhaka-Aricha highway: A section of Asian highway. **Final Report**, Department of Civil Engineering, Bangladesh University of Engineering & Technology, Dhaka, Bangladesh

Hoque, M. M, 2004. The Road to Road Safety, Issues and Initiative in Bangladesh. *Regional Health Forum* 8(1), pp. 39-51.

Luby S, Hassan I, Jahangir N, Rizvi N, Farooqi M, Ubaid S, Sadruddin S. Road traffic injuries in Karachi: the disproportionate role of buses and trucks. Southeast Asian J Trop Med Public Health. 1997 Jun;28(2):395-8.

Mohan, D., and Tiwari, G., 2005. Road Safety in Low Income Countries: Issues and Concern Regarding Knowledge Transfer from High Income Countries. In : G. Tiwari, D. Mohan and N. Muhlard ed 2005. *The way Forward- Transportation Planning and Road Safety*. MacMillian India press, ch. 2.

Muhammad Adnan, Mir Shabbar Ali, Adnan Qadir, Khawaja Sheeraz4 (2011); Increasing effectiveness of Road Safety Interventions – an Operational Model for developing Countries; The first Forum on Traffic Safety, 12-13 December 2011, Dammam, KSA

Ross, A., 1998. Road safety in developing countries, *Highways and Transportation*, April, pp.26-28.

RTIR & PC, 2009. A Journey from Injury towards Intervention by Road Traffic Injury Research & Prevention Centre, Karachi

Saqib, M., Sheeraz K., Farooqui R., 2010, Development of Guidelines for Road Safety Audit in Pakistan: Case Studies. 3rd International Confernece on Infrastructural Engineering in Developing Countries, 3-4 Jul, Karachi, Pakistan.

Shahzad Shamim, Junaid A. Razzak, Rashid Jooma, Uzma Khan Initial results of Pakistan's first road traffic injury surveillance project, International Journal of Injury Control and Safety Promotion Sep;18(3):213-7 (2011)

Sudhir, M., and Sameera, K., 2006. *Bangalore: Silicon city or Black city?* [online] ArriveSafe organizations. Avaialble at: http://www.arrivesafe.org/pdfs/Bangalore-Silicon_Capital_or_Black_City.pdf

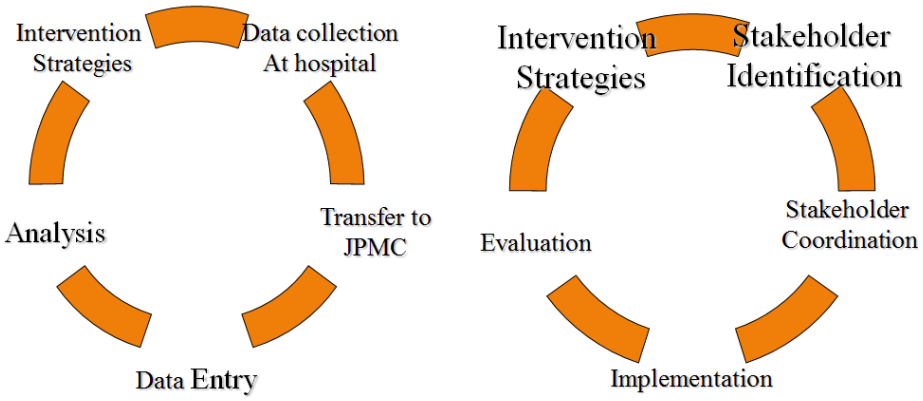

Fig 1. RTIR&PC methodology

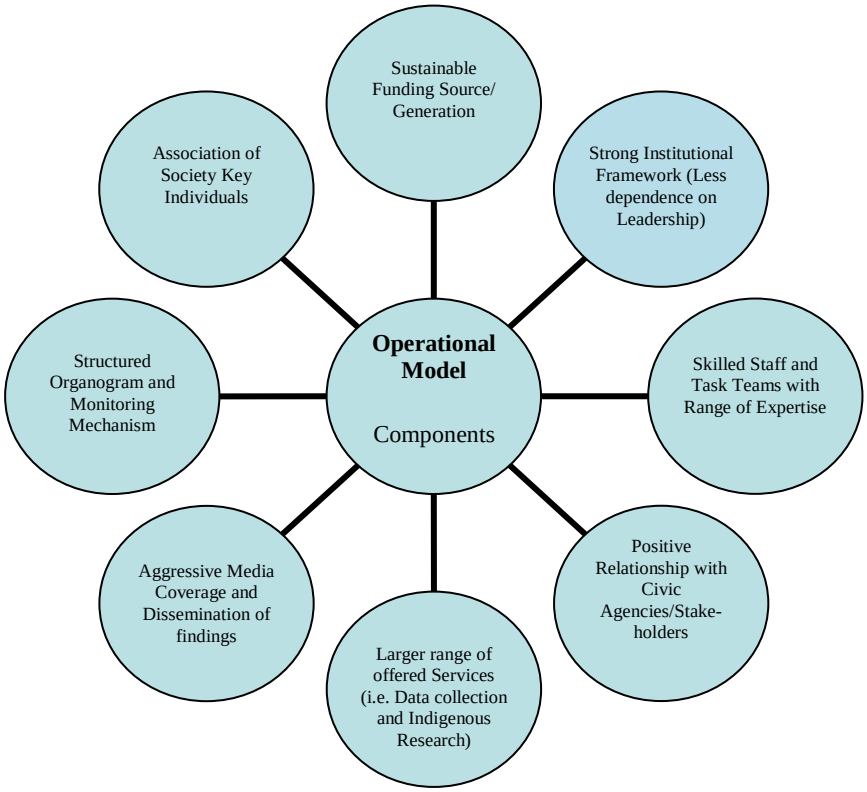

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Fig 2. Operational Model for Road Safety NGO in Developing Countries – Componential Framework

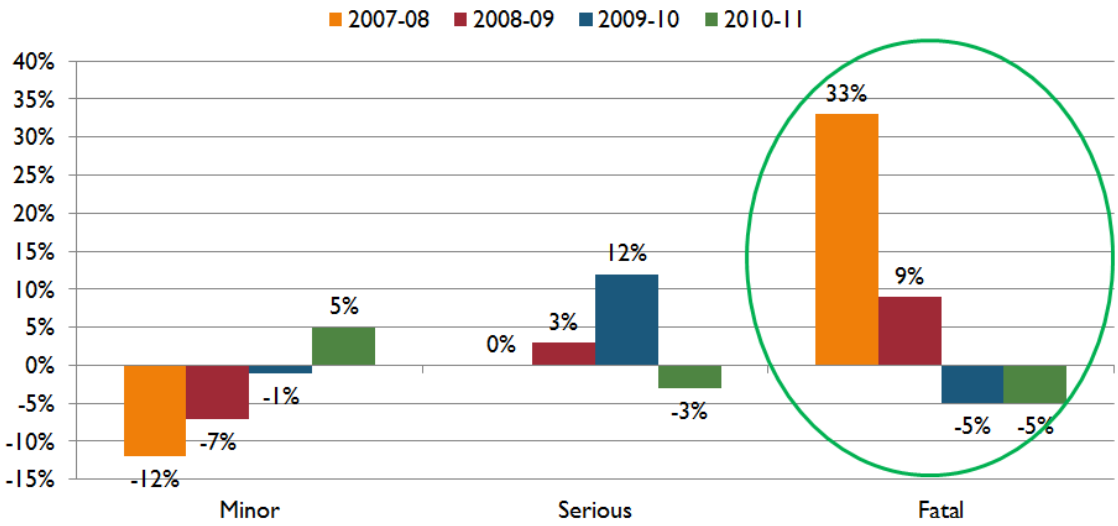

Fig 3. Total accidents trend analysis

Table 1. Comparison of data collected by two sources

	2007	2008	2009	2010	2011	2010 & 2011
Trauma Injury	34707	31312	29763	30340	31139	30739.5
Police Injury	0	0	0	1099	940	1019.5
Trauma Fatal	892	1185	1288	1227	1161	1194
Police Fatal	0	0	0	491	466	478.5

Table 2. Total accidents trend over five-year span

	Number					% Change Over			
	2007	2008	2009	2010	2011	2007-08	2008-09	2009-10	2010-11
Minor	28449	25023	23291	23061	24100	-12%	-7%	-1%	5%
Serious	6258	6289	6472	7279	7039	0%	3%	12%	-3%
Fatal	892	1185	1288	1227	1161	33%	9%	-5%	-5%
Total	35599	32497	31051	31567	32300	-9%	-4%	2%	2%