

ROAD SAFETY IN RURAL AREAS

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Road Safety: A Global Challenge

- ◆ **1.2 million** deaths and **20-25 million** non-fatal injuries worldwide
- ◆ **3288** fatalities and **54800- 68500** injuries per day
- ◆ Economic loss amounts between **1 and 4%** of Gross Domestic Product in Developing countries

- ◆ Road accidents is projected to be the **5th** largest killer by **2030**
- ◆ About **90%** of all deaths occur in **low** and **middle** income countries though they have **48%** of all registered vehicles
- ◆ Sometimes road accident has been reported as an **epidemic**.

- ◆ In **India** , **114 000** people lost their lives on road mishaps in **2007** (**increase of 6.1% in one year**)
- ◆ There is no estimate of how many injured die a few hours or days after accidents
- ◆ More than **50%** of total accidents take place in **rural areas**
- ◆ There is a difference between rural roads and roads passing through rural areas.
- ◆ ***Rural Areas include both of them***

- ◆ **WHO** report identifies main contributors of fatal accidents as:
 - **Speeding**
 - **Drinking and driving**
 - **Low use of helmets, seat belts and child restraints in vehicles**
- ◆ Increase in average speed directly related to both likelihood of crash and severity of crash.
- ◆ Zones of 30kmph is recommended in areas where vulnerable road users are at risk

- ◆ **Traffic safety is an important public and social issue**
- ◆ **Highest burden is on poor (pedestrians, cyclists etc.)**
- ◆ **The economic cost associated runs into thousands of millions of Rupees**
- ◆ **Not much work has been done on social impact of accidents**

Special problems on rural roads

- ◆ Accidents widely scattered - many of them never reported
- ◆ Persistent failure in fixing responsibility
- ◆ Lack of awareness
- ◆ Non-recording of minor accidents
- ◆ Stray animals get killed
- ◆ Ribbon development and street vending

THE CULPRITS

- The Road User (65-68%)
- Road (10-12%)
- Vehicle (3-5%)
- Environment and Miscellaneous (15-20%)

Causes of Accidents

✓ The Road Users:

- ◆ Drivers
- ◆ Pedestrians
- ◆ Cyclists
- ◆ Passengers

Causes of Accidents (Contd..)

- ✓ Vehicles Defects
- ✓ The Road and its condition
- ✓ Environmental factors-traffic, weather etc.

Causes of Accidents (Contd..)

● Other Causes:

- ✓ Incorrect signs or signals,
- ✓ Gate of level crossing not closed when required
- ✓ Badly located advertisement boards or service station etc
- ✓ Stray animals on the road

Some Causes of Accidents



Measures to Mitigate Accidents Rates

There are Five E's Strategy ways to reduce the rate of accidents. They are-

1. **E**ngineering and Traffic Environment
2. **E**nforcement and Legislation
3. **E**mergency Response
4. **E**ducation and Information
5. **E**valuation and Other Comprehensive Actions

Road Safety Review (RSR) and Road Safety Audit (RSA)

- ◆ Safety Review is **reactive**
- ◆ **Safety Audit is proactive**
- ◆ **Safety review team members are usually involved in design**
- ◆ **Safety audit team members are usually independent of the project**

- ◆ **Safety reviews do not normally consider human factor issues**
- ◆ **Safety audits are comprehensive and attempts to consider all factors**
- ◆ **Safety reviews focus on the needs of roadway users**
- ◆ **Safety audits consider the needs of pedestrians, cyclists along with all others**

Road Safety Audit (RSA)

- ✓ Road Safety Audit is a formal procedure for independent assessment of potential accidents
- ✓ Potential and likely safety performance of a design for new construction or for an existing road

Objectives of RSA

- ◆ Identify potential safety problems for all road users
- ◆ To ensure that measures to eliminate or reduce the problems are considered fully

Benefits of RSA

To Reduce:

- Likelihood of crashes
- Severity of crashes
- Need for costly remedial work
- Total cost to the community

Five stages of RSA

- ◆ Feasibility stage
- ◆ Draft Design stage
- ◆ Detailed Design stage
- ◆ Pre-opening stage
- ◆ Existing Roads

Safety Issues to LOOK FOR

- ◆ **Road Side Features**
- ◆ **Road Surface-Pavement Condition**
- ◆ **Road Surface-Pavement Markings**
- ◆ **Road Geometrics**
- ◆ **Road Signs**

**EXAMPLE OF ROAD SAFETY
AUDIT AND QUANTIFICATION
OF ACCIDENT POTENTIAL
INDEX (API)**

Impact of PMGSY Roads on the Traffic Safety of School-Going Children in Rural Areas (example of Road Safety audit)

- ◆ **Identify parameters for determining traffic safety**
- ◆ **Determine weights of the parameters**
- ◆ **Quantify Accident Potential**

- ◆ The **Accident Potential Index (API)** for school going children of a village has been expressed as:

$$API = \sum (w_i * V_i)$$

where

N = Number of parameters considered for quantifying accident potential index

w_i = weight associated with parameter i

V_i = score on ith parameter based on the existing situation.

Table-1 Responses from experts on the weight on the selected parameters

	Importance Score							
Road geometric characteristics (RGC)	4	5	4	4	4	4	5	4
Width and Quality of Shoulder (WQS)	4	4	4	4	4	5	4	4
Distance to travel along PMGSY road (DT)	3	2	3	2	3	3	2	2
Mode of Transport of the user (MT)	2	3	2	2	2	3	2	2
Traffic volume and mix encountered during travel (TV)	3	4	3	3	4	3	4	3

Table-2 Normalized weight of the selected parameters

Parameters	Normalized Weight
Road geometric characteristics	0.26
Width and Quality of Shoulder	0.25
Distance of travel	0.15
Mode of Transport of the user	0.14
Traffic volume and traffic mix encountered during travel	0.19
Total	1.00

Table-3 Details about PMGSY roads connecting the villages in the study area

Name of village	Population of village	Year of construction of PMGSY road	Length of PMGSY Road in Km
Mahatwas	2606	2002	3.400
Kutina	3357	2003	2.425
Chawandi	1209	2004	2.910
Bighana Jat	1026	2005	3.850
Bhim Singh Pura	811	2006	0.700

Table-4 Data collection details

Village	Number of students interviewed		
	Boys	Girls	Total
Mahatwas	19	20	39
Kutina	07	-	07
Chawandi	13	07	20
Bighana Jat	09	11	20
Bhim Singh Pura	08	06	14
Total	56	44	100

Table 5: Score on alignment and geometrics of the road from the point of view of safety

Road Geometric Characteristics	Score
Number of sharp curves without signposts and markings	5
One/Two sharp curves without signposts and markings	3
Moderately straight level road	1



**Sharp curves with poor sight distances
make the road users susceptible to accident**

Table-6 Scores on the Width and quality of shoulder provided

Shoulder Characteristics	Score
No proper shoulder	5
Inadequate shoulder	4
Shoulder with level difference with the carriageway	3
Shoulder not properly maintained	2
Proper shoulder	1



**Absence of shoulders causes problem
mainly for cyclists and pedestrians**



Edge failures and level difference between the shoulder and the pavement make it dangerous for all kinds of vehicles

Table-7 Scores on Distance traveled along PMGSY roads

Distance (kms)	Score
Above 4	5
3-4	4
2-3	3
1-2	2
Less than 1	1

Table-8 Scores on Mode of Transport used for traveling to school

Mode of Transport	Score
Walk	5
Bicycle	4
Motorized two-wheeler	3
Animal drawn vehicles	2
School Bus	1

Table-9 Scores on the kind of vehicles encountered on the way while going to school or returning from school

Traffic mix	Score
Mix of heavy vehicles (bus, truck), jeep, car, tractor and other non-motorized vehicles.	5
Mainly jeep, car, tractor and other non-motorized vehicles.	3
Mainly non-motorized vehicles	1



It is difficult for the pedestrians and cyclists to travel safely in the presence of motorized vehicles, especially in the absence of proper shoulders



Fast-moving motorized and slow-moving non-motorized vehicles together with pedestrians use the narrow one-lane roads

Table-10 Distances travelled by students for going to school

Village	Location of School (name of village)	Total distance to school in (km)	Distance traveled by children going along PMGSY road in (km)
Mahatwas	Mandhan	6.000	2.500
Kutina	Shahajanp	10.000	2.425
Chawandi	Ur Mandhan	7.000	2.910
Bighana Jat	Raisrana	3.850	3.850
Bhim Singh Pura	Majri	4.000	0.700

Table-11 Scores on the selected parameters as obtained through questionnaire survey

Village	Scores on				
	Road Geometrics (RGC)	Shoulder quality (WQS)	Distance of travel (DT)	Mode of travel (MT)	Traffic characteristics (TV)
Mahtawas	5	4	3	3	5
Kutina	3	2	3	3	5
Chawandi	5	1	3	3	5
Bighana Jat	1	1	4	3/5*	4
Bhim Singh Pura	3	5	1	5	5

Table-12 Accident Potential Indices of the villages

Village	Accident Exposure Index for students traveling by	
	Walk	Bicycle
Mahatwas	-	4.12
Kutina	-	3.10
Chawandi	-	3.37
Bighana Jat	2.57	2.29
Bhim Singh Pura	3.86	-

Difficulties of carrying out accident studies in Less Developed Countries

- **No standard format for accident records**
- **Police records are insufficient and do not provide a clear picture of the nature of the accident**
- **Condition diagram and collision diagrams are not available**
- **Eye witnesses do not usually speak out**

Important issues in rural areas:

- ◆ **Impact (both economic and social) of death of family members in road accidents**
- ◆ **Impact of accidents on individuals who survive with injury and becomes permanently disabled**
- ◆ **Impact of domestic animals getting killed on poor households**
- ◆ **Development of community driven accident record system in rural areas**

- ◆ **Development of effective Community driven Traffic Safety Education**
- ◆ **Development of accident management system at local level involving government departments and community**
- ◆ **Safety of children in villages around highways passing through rural areas**

Other important safety issues

- ◆ Special problems in hilly areas (e.g safety issues in trail bridges)
- ◆ Safety issues in water transportation

Road Accidents are leading towards.....

DISASTER!!!

Unless Steps are taken **NOW**

THANK YOU