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ROAD SAFETY  
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# ROAD TRAFFIC ACCIDENT DATA COLLECTION AND ANALYSIS WORKSHOP COUNTRY: TAJIKISTAN

**TA-6763 REG: Accelerating Innovation in Transport**

*Presented by*

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# PART 6: CRASH DATA ANALYSIS *RECOMMENDATION FOR TAJIKISTAN*

Breaking down a crash to identify the contributing factors using the Haddon Matrix

# RECOMMENDATIONS

- Identify an area to initiate road traffic accident investigations and analysis
- Conduct road traffic accident investigations and collect good quality data
- Conduct Haddon Matrix analysis
- Share results

# IDENTIFYING LOCATIONS TO BEGIN

- Select a stretch of highway with high number of fatalities.
- List of Top 10 roads with highest fatalities below:

S. No	Road Nomenclature	Road Name	Length (in km)	Fatalities (2021)
1	RB01	Dushanbe - Chanak	368.2	59
2	RB04	Dushanbe - Kulma pass	1008.7	50
3	RB09	Dushanbe - Bokhtar - Panj Lower	181.3	40
4	RB13	Aini - Panjakent - UZB border	113	8
5	RB07	Vahdat–Rasht–Jirgatal–Kyrgyz Republic Border	319	8
6	RC 033	Kulob - Muminabad	41.8	7
7	RB10	Bokhtar - Levacant - Dangara	76.1	7
8	RB11	Kizilkala - Charbucha	168.2	7
9	RB02	Dushanbe - Tursunzoda	56.2	6
10	RC 058	Uzun - Dosty - Mamnugahi	32.5	5

# IDENTIFYING LOCATIONS TO BEGIN

- Since highways have different lengths, top 10 roads based on fatalities / km was identified.

S. No	Road Nomenclature	Road Name	Length (in km)	Fatalities (2021)	Fatalities per 10 km
1	RC 010	Entrance to the centre of Sh. Hisar	3	1	3.33
2	RC 054	Bokhtar – Vahsh	13.8	4	2.90
3	RB09	Dushanbe - Bokhtar - Panj Lower	181.3	40	2.21
4	RC 025	Village Chashma - Shahr Norak	5.3	1	1.89
5	RC 033	Kulob – Muminabad	41.8	7	1.67
6	RB01	Dushanbe – Chanak	368.2	59	1.60
7	RC 064	Istharavshan – Devashtic	12.6	2	1.59
8	RC 058	Uzun - Dosty – Mamnugahi	32.5	5	1.54
9	RC 034	Ziraki – Dahana	6.8	1	1.47
10	RC 048	Dushanbe - Shahraki Aini – Hisor	17.6	2	1.14

# RECOMMENDATION FOR HADDON MATRIX ANALYSIS

Fatal Accident List  
(MS EXCEL)

Road accident  
investigation data  
collection

Haddon Matrix

# FATAL ACCIDENT LIST

Crash ID	Unique Identifier
Injury Severity	Fatal
Traffic police station	<List of police stations>
Date	DD/MM/YYYY
Time	HH:MM <24 hour format>
GPS Latitude	xx.xxxxx N
GPS Longitude	xx.xxxxx E
Road Name	<Name of the road>
Road Type	
Location	Area name
Description of the accident	Summary of the accident as per police report providing details of the crash participants, intended directions of the crash participants, their pre-crash movement, and number of deaths in each crash participant.
Number of deaths	<Integer>
Most Affected Road User	Pedestrian, Bicyclist, Motorcyclist, Car, Bus, Truck
Collision Partner	Pedestrian, Bicyclist, Motorcyclist, Car, Bus, Truck, Object
Crash Configuration	Head-on, Rear-end, Side/Angle, Pedestrian, Object, Rollover

# CREATE A CODING MANUAL

S. No	Variable Name	Variable Type	Source	Description	Values



# CODING MANUAL EXAMPLE

## *CRASH CONFIGURATION*

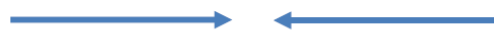
- **Variable Name:** CRASH CONFIGURATION
- **Variable Type:** Lookup
- **Source:** Researcher, based on accident description
- **Description:** It describes the “intended travel directions” of the colliding vehicles prior to the collision.

# CODING MANUAL EXAMPLE

## *CRASH CONFIGURATION VALUES*

### 01 - Head - on

When two vehicles approaching each other in opposite directions collide with each other (generally front ends of both vehicles), such a collision is called a head - on collision.



*Example: Two vehicles were approaching each other. The driver of one while overtaking saw the oncoming vehicle and tried to steer off the road on to the right side. The front of the oncoming vehicle struck the left side of the overtaking vehicle. In this case, the directions of both the vehicles are as per the configuration given above. Hence, it is coded as a Head - on collision.*

### 02 - Read end

This type of collision occurs between two vehicles travelling in the same direction. Usually one vehicle (leading vehicle) is travelling/stopped ahead of the other vehicle (following vehicle). Such conditions may occur due to the leading vehicle is waiting or parked, travelling slower than the following vehicle, or changing lanes.



### 03 - Side/Angle Impact

This type of collision occurs between two vehicles which are travelling in directions that are at an angle to each other, such as at an intersection, driveway or U - turns. Usually the front plane of one vehicle contacts the side plane of another vehicle during collision. Please note that at least one of the vehicles must have had an intent to crossover or turn (at an intersection, u - turn or driveway) before the crash.



### 05 - Pedestrian

When a vehicle hits a pedestrian, such an impact is coded as a pedestrian impact.

### 06 - Rollover

Rollover describes the overturning of a vehicle along its longitudinal or lateral axis. The usual case is when a vehicle loses control, goes off - road, and rolls. However, a rollover can also take place on - road. Rollovers can also be initiated by any another type of collision (a front - side crash, for example).

### 07 - Object

When a vehicle hits an object, it is coded as an object impact. Objects include both fixed objects (trees, lamp posts, etc.) and movable objects (construction materials, flower pots, etc.). Impacts with animals are also included in object impacts.

### 08 - Fire

When a vehicle catches fire and is partially burnt or completely burnt, it is coded as a Fire. This can also be a consequence of an earlier impact.

### 09 - M2W rider / Bicyclist self fall

This code is to be used when a M2W rider or bicyclist falls off his vehicle because of a driver loss of control or slipping or avoidance maneuver or any other reason, but without any physical contact or collision with another road user.

# FATAL ACCIDENT DATABASE (MS EXCEL)

Crash ID	1
Injury Severity	Fatal
Traffic police station	Sukhbaatar
Date	27/11/2022
Time	1015
GPS Latitude	47.922103
GPS Longitude	106.862886
Road Name	Ard Ayush Avenue
Road Type	City
Location	Khoroo 7, Ulaanbaatar
Description of the accident	A car was travelling towards east on the right lane of a 6-lane divided road. A female pedestrian was crossing the road from North to South at a pedestrian crossing. The car driver impacted the pedestrian. The pedestrian was injured and taken to hospital where she died under treatment.
Number of deaths	1
Most Affected Road User	Pedestrian
Collision Partner	Car
Crash Configuration	Pedestrian

# ACTIVITY: CREATE A CODING MANUAL

S. No	Variable Name	Variable Type	Source	Description	Values
1	Speeding				
2	Drink driving				
3	Seatbelt use/Helmet use				
4	Distracted driver				
5	Driver Fatigue				

# COLLECT DATA FOR EACH FATAL ACCIDENT

- Scene photos
- Vehicle photos
- Scene diagram
- Estimated speed of the car
- CCTV footage

# CONDUCT HADDON MATRIX ANALYSIS

PHASES		FACTORS		
		HUMAN	VEHICLE	INFRASTRUCTURE
PRE-CRASH	Crash prevention	<ul style="list-style-type: none"> <li>Information</li> <li>Attitudes</li> <li>Impairment</li> <li>Police enforcement</li> </ul> <p>1</p>	<ul style="list-style-type: none"> <li>Roadworthiness</li> <li>Working lights</li> <li>Good brakes</li> <li>Handling</li> <li>Speed control</li> </ul> <p>2</p>	<ul style="list-style-type: none"> <li>Road design and layout</li> <li>Speed limits</li> <li>Pedestrian Facilities</li> </ul> <p>3</p>
CRASH	Injury prevention during the crash	<ul style="list-style-type: none"> <li>Use of safety systems</li> </ul> <p>4</p>	<ul style="list-style-type: none"> <li>Crash worthiness</li> <li>Crash protective design</li> <li>Occupant restraints</li> <li>Other Safety devices</li> </ul> <p>5</p>	<ul style="list-style-type: none"> <li>Crash protective roadside objects</li> </ul> <p>6</p>
POST-CRASH	Life Sustaining	<ul style="list-style-type: none"> <li>First-aid skill</li> <li>Access to medics</li> </ul> <p>7</p>	<ul style="list-style-type: none"> <li>Ease of access</li> <li>Fire risk</li> </ul> <p>8</p>	<ul style="list-style-type: none"> <li>Rescue facilities</li> <li>Congestion</li> </ul> <p>9</p>

# HADDON MATRIX TABLE

CRASH ID	S. No	ROAD USER TYPE	FACTOR	PHASE	DESCRIPTION

# EXAMPLE RESULTS: *KOLKATA CITY, INDIA (2018)*

Source: JP Research Kolkata City Accident Study - 2018

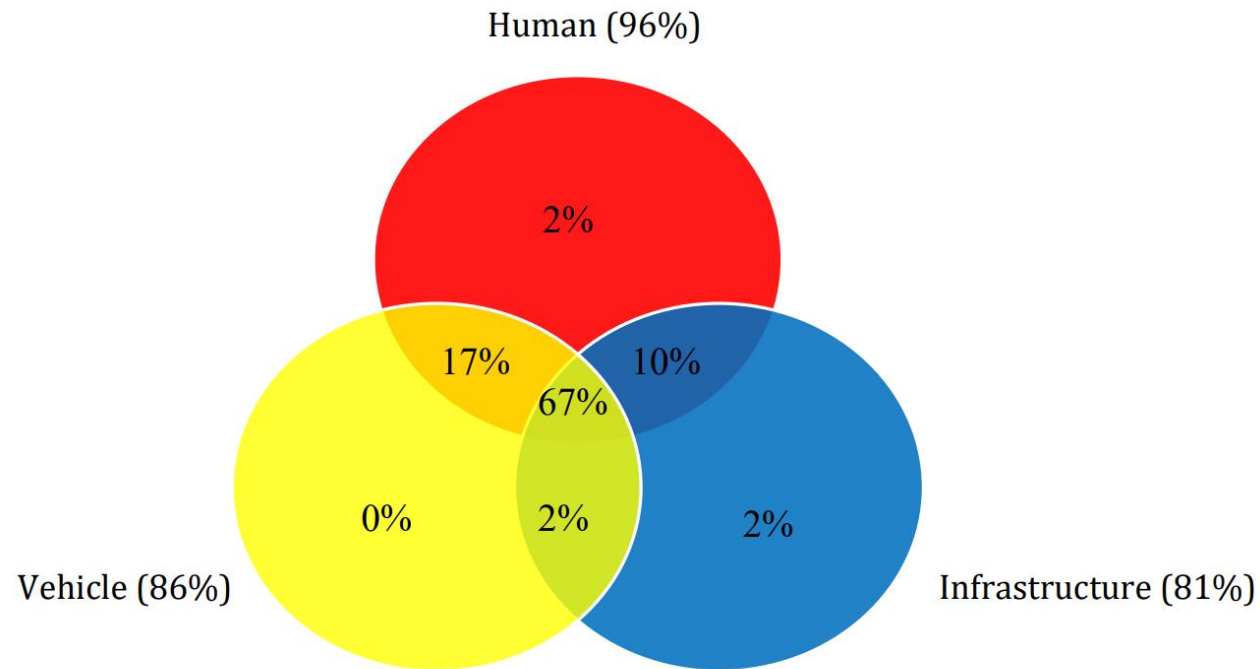


FIGURE 22: VENN DIAGRAM ANALYSIS FOR 125 CRASHES IN KOLKATA CITY



# EXAMPLE RESULTS: *KOLKATA CITY, INDIA (2018)*

TABLE 5: DISTRIBUTION OF INFRASTRUCTURE CONTRIBUTING FACTORS FOR 125 CRASHES

Source: JP Research Kolkata City Accident Study - 2018

Phases	Infrastructure factors	No. Of crashes	% influenced
Pre-crash	Poor pedestrian infrastructure - Crossing	23	18%
	Poor road marking/signage	22	18%
	Intersection	17	14%
	Undivided	15	12%
	Vision Obstruction – Manmade structure	10	8%
	Vision Obstruction - Trees/Plantation	5	4%
	Vision Obstruction - Others	5	4%
	Poor street lighting	5	4%
	Road Design – Others	4	3%
	Defective traffic signals	4	3%
	Vision Obstruction - Parked vehicles	3	2%
	Poor pedestrian infrastructure - Crossing	2	2%
	Crash	Object impact - road side - manmade structures	9
Object impact - road side - trees/plantation		2	2%
Post-crash	-	-	-



Poor pedestrian infrastructure - crossing

# EXAMPLE RESULTS: *KOLKATA CITY, INDIA (2018)*

TABLE 6: DISTRIBUTION OF CONTRIBUTING VEHICLE FACTORS FOR 125 CRASHES

Phases	Vehicle factors	No. Of crashes	% influenced
Pre-Crash	Vision obstruction -due to vehicle interiors	23	18%
Crash	Knock-down of m2w/bicyclist	40	32%
	Knock-down of pedestrian	36	29%
	Runover of pedestrian	21	17%
	Runover of m2w rider/bicyclist	12	10%
	Fall-down	8	6%
	Seatbelts not available/usable	7	6%
	Passenger compartment intrusion - other	5	4%
	Runover of bus occupant	4	3%
	Crash protection – others	4	3%
Post-Crash	Ejection	5	4%
	Entrapment	4	3%



View of pedestrian from driver seat of heavy vehicle.

# EXAMPLE RESULTS: *KOLKATA CITY, INDIA (2018)*

TABLE 7: DISTRIBUTION OF CONTRIBUTING HUMAN FACTORS FOR 125 CRASHES

PHASES	HUMAN FACTORS	NO. OF CRASHES	% INFLUENCED
PRE-CRASH	Pedestrian - Dangerous behavior on roadway	30	24%
	Disobeyed traffic signal	22	18%
	Speeding - Excessive speed for conditions	21	17%
	Pedestrian Inattention	16	13%
	Improper lane change/lane usage	15	12%
	Speeding - Exceeding speed limit	11	9%
	Driver Inattention	11	9%
	Overtaking in undivided road	7	6%
	Violation of Right of Way	7	6%
	Illegal road usage (includes travelling in the wrong direction)	6	5%
Driver alcohol	5	4%	
CRASH	Helmet not used	30	24%
	Helmet not used properly	10	8%
	Seat belt not used	5	4%
	Overloading of occupants	4	3%
POST-CRASH	-	-	-



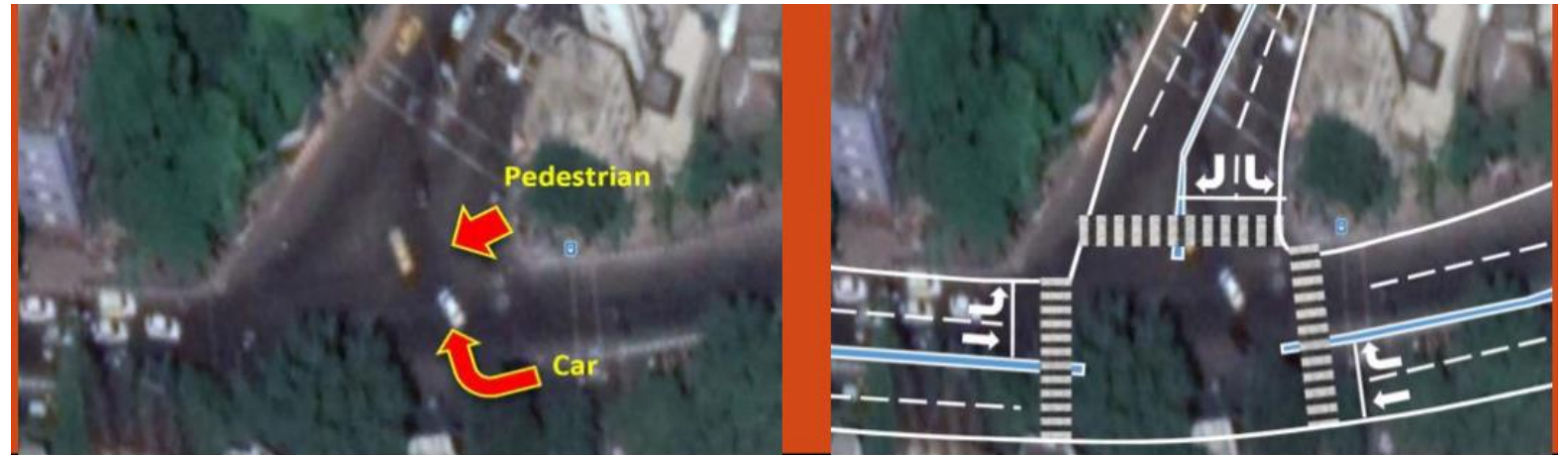
Motorcyclist violating red traffic signal



Motorcyclist helmet not strapped



# FATAL ACCIDENT ANALYSIS AND ACTION



- For every fatal accident, Kolkata Traffic Police (KTP) was provided a report with infrastructure counter measures.
- Counter measures mainly focused on repositioning and maintaining lane lines and stop lines, and CCTV based enforcement of stop line violations.
- KTP has a Road Marking and Signage (RMS) team for making changes to line markings.
- Other measures, not in their control, were forwarded to concerned authorities.

# FATAL ACCIDENT ANALYSIS AND ACTION RESULTS



Year	Fatalities	% Reduction from 2015
2015	413	-
2016	407	1.5%
2017	329	20%
2018	294	29%
2019	267	35%

Source: JP Research from data provided by Kolkata Traffic Police

- Poor placement of road markings
- Inappropriate road user behavior

- Proper placement of road markings
- Improved road user behavior through effective enforcement

*In-depth crash data analysis indicates that a lot is still to be done to reduce fatalities further.*

*Footpath width and surface quality, traffic signal timings, sight distance issues due to median plantation, bus stop locations, etc.*



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# PART 6: CRASH DATA ANALYSIS *RECOMMENDATION FOR TAJIKISTAN*

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