# ROAD TRAFFIC ACCIDENT DATA COLLECTION AND ANALYSIS WORKSHOP COUNTRY: MONGOLIA

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

*Presented by*

*David Shelton, Senior Transport Specialist (Road Safety), Asian Development Bank*
*Ravishankar Rajaraman, Road Crash Data Specialist, JP Research India Pvt. Ltd.*

*6 – 7 March 2023*

# 6-Р ХЭСЭГ
# ЗАМ ЗАМЫН ОСЛЫН МЭДЭЭЛЭЛ
# УЛААНБААТАР / МОНГОЛ

Хаддон Матриц ашиглан хувь нэмэр оруулах хүчин зүйлийг тодорхойлохын тулд ослыг эвдэж байна

# HADDON MATRIX ANALYSIS
# *RECOMMENDATION FOR MONGOLIA*

Fatal Accident List (MS EXCEL)

Road accident investigation data collection

Haddon Matrix

# FATAL ACCIDENT DATABASE

| | |
|---|---|
| Crash ID | Unique Identifier |
| Injury Severity | Fatal, Hospitalized, Minor, No Injury |
| 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 | International, State, Provincial, City, Ger |
| 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 |

ADB

ASIA-PACIFIC
ROAD SAFETY
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

# 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.
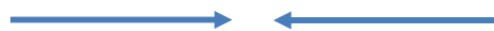
*Example: Two vehicles were approaching each other. The driver of one while overtaking saw the oncoming vehicle and tried to steer off the road on to the right side. The front of the oncoming vehicle struck the left side of the overtaking vehicle. In this case, the directions of both the vehicles are 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 |

ADB

ASIA-PACIFIC
ROAD SAFETY
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

# ACTIVITY:

- Create a coding manual for the following variables:

1. Drink driving

2. Speeding

3. Seatbelt Use

4. Helmet Use

5. Distracted Driving (Mobile Phone)

6. Driver Fatigue

# CREATE A CODING MANUAL

| S. No | Variable Name | Variable Type | Source | Description | Values |
|---|---|---|---|---|---|
| 1 | Speeding | Yes/No | Police | Driver is above speed limit or below | Yes, No |
| 2 | Drink driving | Yes/No | Police | Above or below Breathalyzer (0.2) Blood (0.05) | Above – Yes Below - No |
| 3 | Seatbelt use/Helmet use | Yes/No | Police/Hospital | Belted/Helmet or not | Yes No |
| 4 | Distracted driver | Lookup | Police | Was the driver distracted? | Mobile phone, Billboards, TV,Audio Other: please specify |
| 5 | Driver Fatigue | Yes/No | ??? | ??? | ??? |

# COLLECT DATA FROM THE CRASH INVESTIGATION TEAM

- Scene photos

- Vehicle photos

- Scene diagram

- Estimated speed of the car

- CCTV footage

# SCENE DIAGRAM

# SCENE PHOTOS
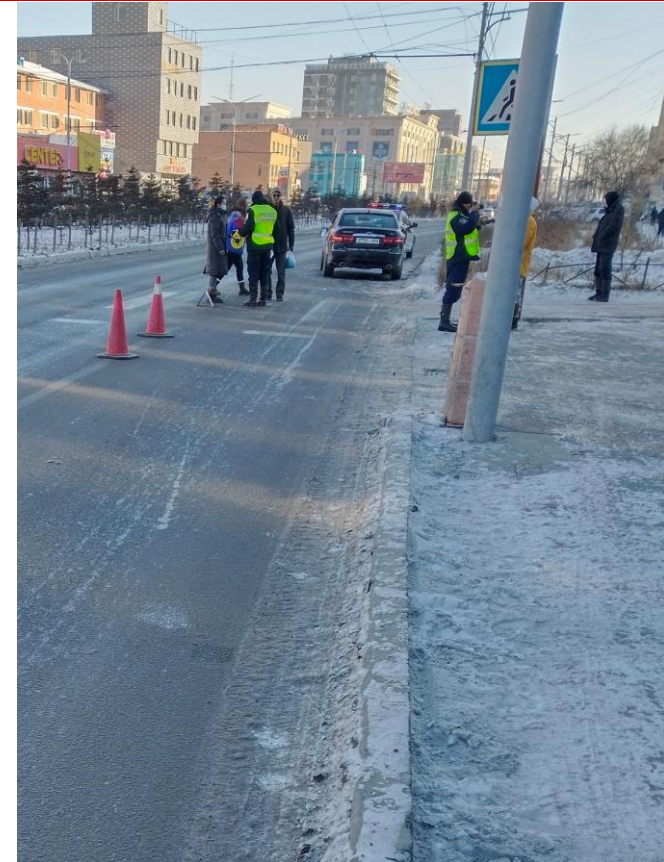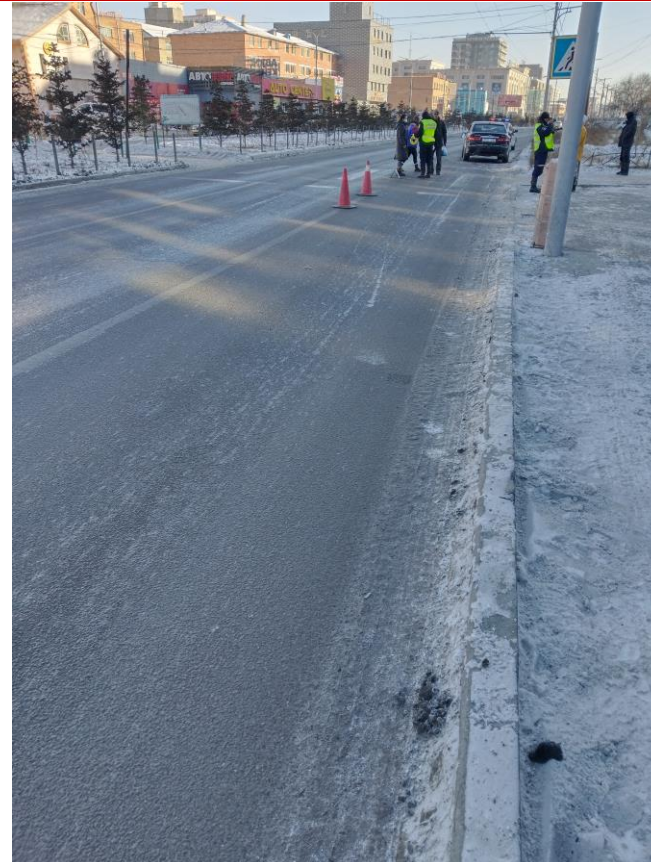
# SCENE PHOTOS

# SCENE PHOTOS

# VEHICLE PHOTO

# HADDON MATRIX ANALYSIS

| PHASES | | FACTORS | | |
|---|---|---|---|---|
| | | HUMAN | VEHICLE | INFRASTRUCTURE |
| PRE-CRASH | Crash prevention | Car: <br>• Speeding for conditions (icy road) | Car: <br>• Vehicles blocked driver vision | Pedestrian <br>• Wide road. <br>• Poor marking and signage |
| CRASH | Injury prevention during the crash | None found | Car: <br>• Knocked down pedestrian | None found |
| POST-CRASH | Life Sustaining | None Found | None Found | None found |

ASIA-PACIFIC
ROAD SAFETY
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

# HADDON MATRIX TABLE

| CRASH ID | S. No | ROAD USER TYPE | FACTOR | PHASE | DESCRIPTION |
|----------|-------|----------------|--------|-------|-------------|
| 1 | 1 | Car | Human | Pre-Crash | Speeding for conditions |
| 1 | 2 | Car | Vehicle | Pre-Crash | Driver sight distance reduced |
| 1 | 3 | Car | Vehicle | Crash | Knocked-down pedestrian |
| 1 | 4 | Pedestrian | Infrastructure | Pre-Crash | Wide road |
| 1 | 5 | Pedestrian | Infrastructure | Pre-Crash | Poor marking and signage |

ASIA-PACIFIC
ROAD SAFETY
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

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

Source: JP Research Kolkata City Accident Study - 2018
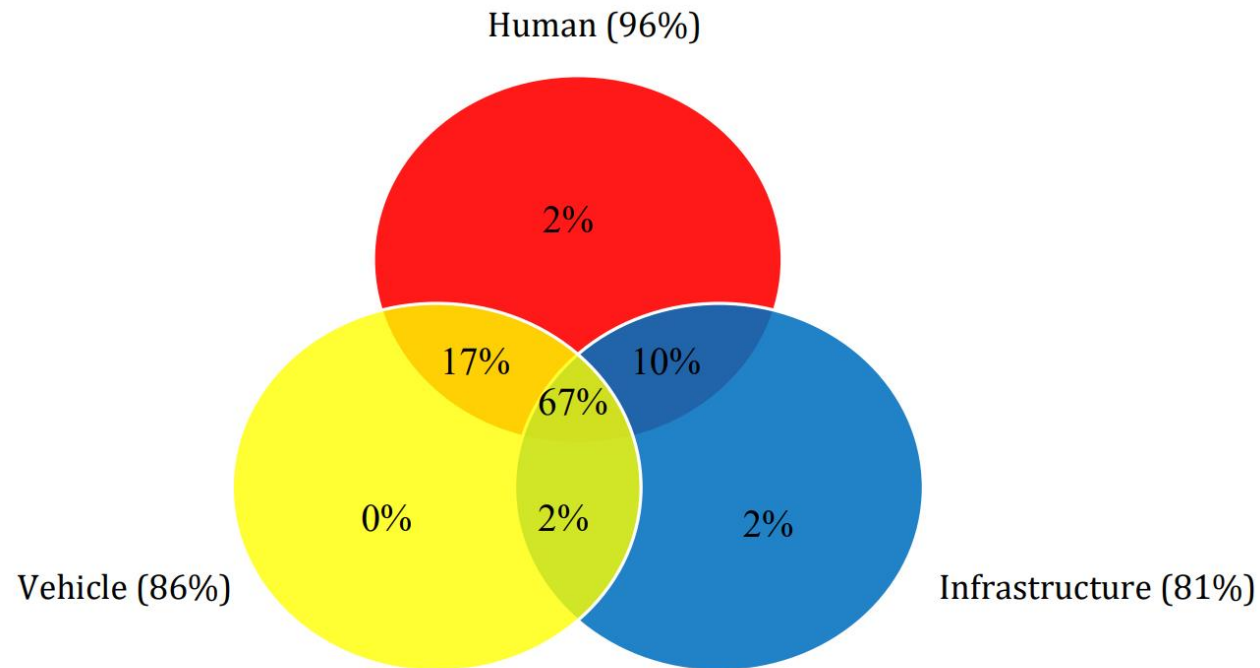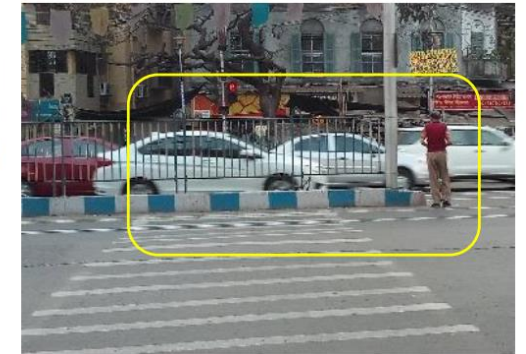


FIGURE 22: VENN DIAGRAM ANALYSIS FOR 125 CRASHES IN KOLKATA CITY

# 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 | 7% |
| | Object impact - road side - trees/plantation | 2 | 2% |
| Post-crash | - | - | - |

Poor pedestrian infrastructure - crossing

ASIA-PACIFIC ROAD SAFETY OBSERVATORY

# 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.

ADB

ASIA-PACIFIC
ROAD SAFETY
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

# 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

ASIA-PACIFIC ROAD SAFETY OBSERVATORY

# FATAL ACCIDENT ANALYSIS AND ACTION
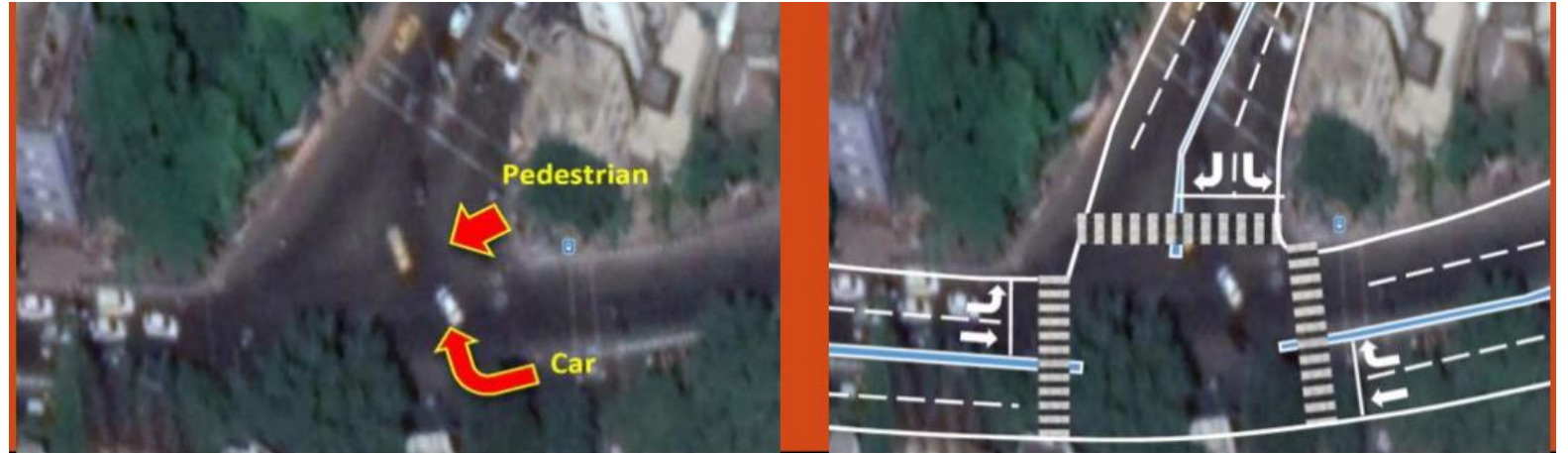


- For every fatal accident, Kolkata Traffic Police (KTP) was provided a report with infrastructure counter measures.

- 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.*

ADB

ASIA-PACIFIC
**ROAD SAFETY**
OBSERVATORY

CAREC
Central Asia Regional Economic Cooperation Program

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

For any queries or feedback, please contact:

dshelton@adb.org

ravishankar@jpri.in