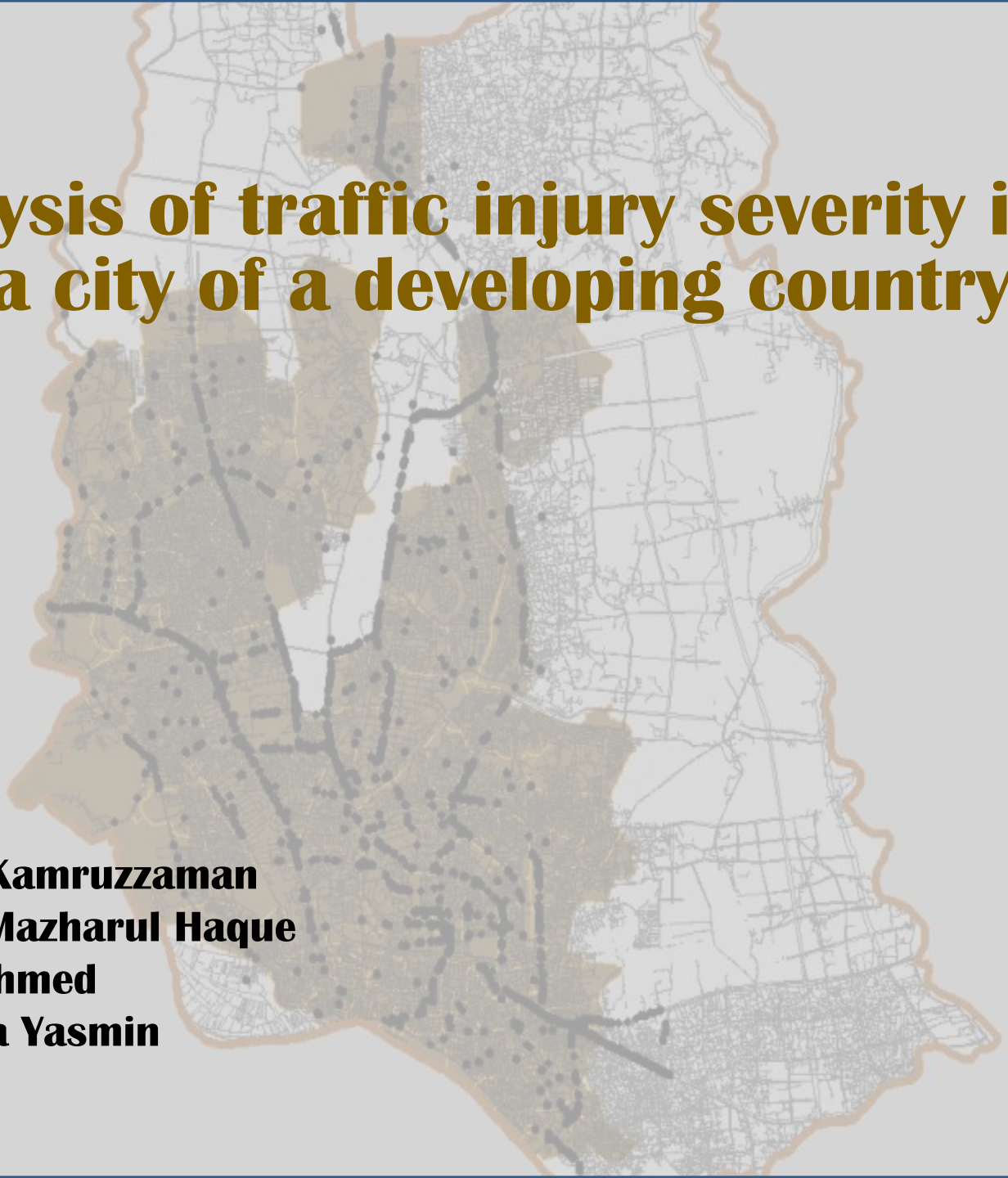
Analysis of traffic injury severity in a mega city of a developing country



Dr Md. Kamruzzaman
Dr Md. Mazharul Haque
Bayes Ahmed
Tahmina Yasmin

QUT

Introduction

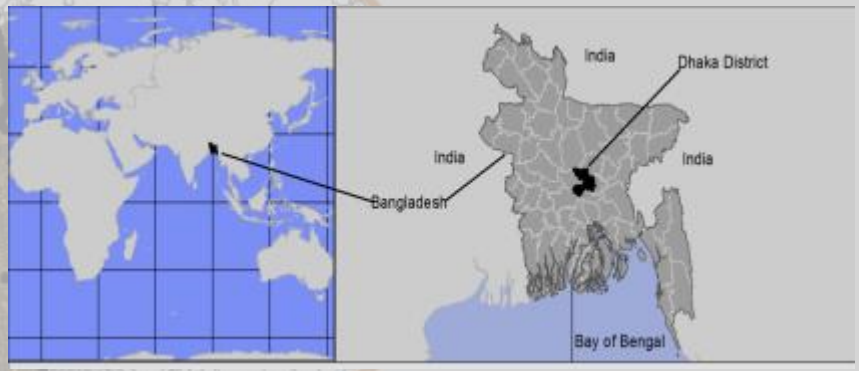
- **Research on the identification of factors affecting traffic injury severity:**
  - **much has been conducted in the developed world**
  - **little is known about developing countries**
- **Developing countries:**
  - **two-thirds of global injuries** (Fatmi et al., 2007)
  - **85% of the deaths from traffic injuries; and**
  - **90% of annual disability adjusted life years lost by road traffic injury** (World Health Organisation, 2004).

Research objectives

- **Two objectives:**
  - **first, to identify factors that influence traffic injury severity in a developing country; and**
  - **second, to compare with factors identified in the literature from developed country.**

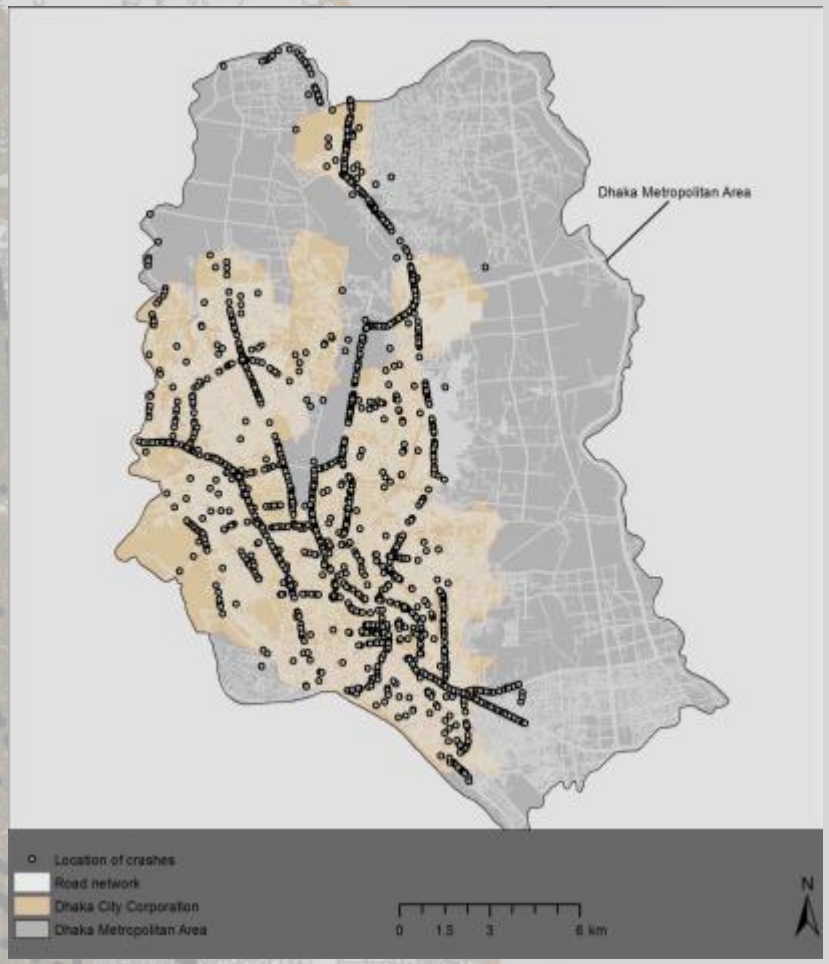
Case study: developing country

- **Bangladesh was chosen**
  - highest fatality rate (100 deaths/10,000 motor vehicles) (UNESCAP, 2007)
  - India (25.3), Sri Lanka (16), Malaysia (5.5), USA (2.1), and UK (1.4) (Ahsan, 2012)
  - fatalities increased 3.5 times to 3000 deaths/yr
  - vehicle 2-10/1000 person (India 12, Sri Lanka 25, UK 426, USA 765)



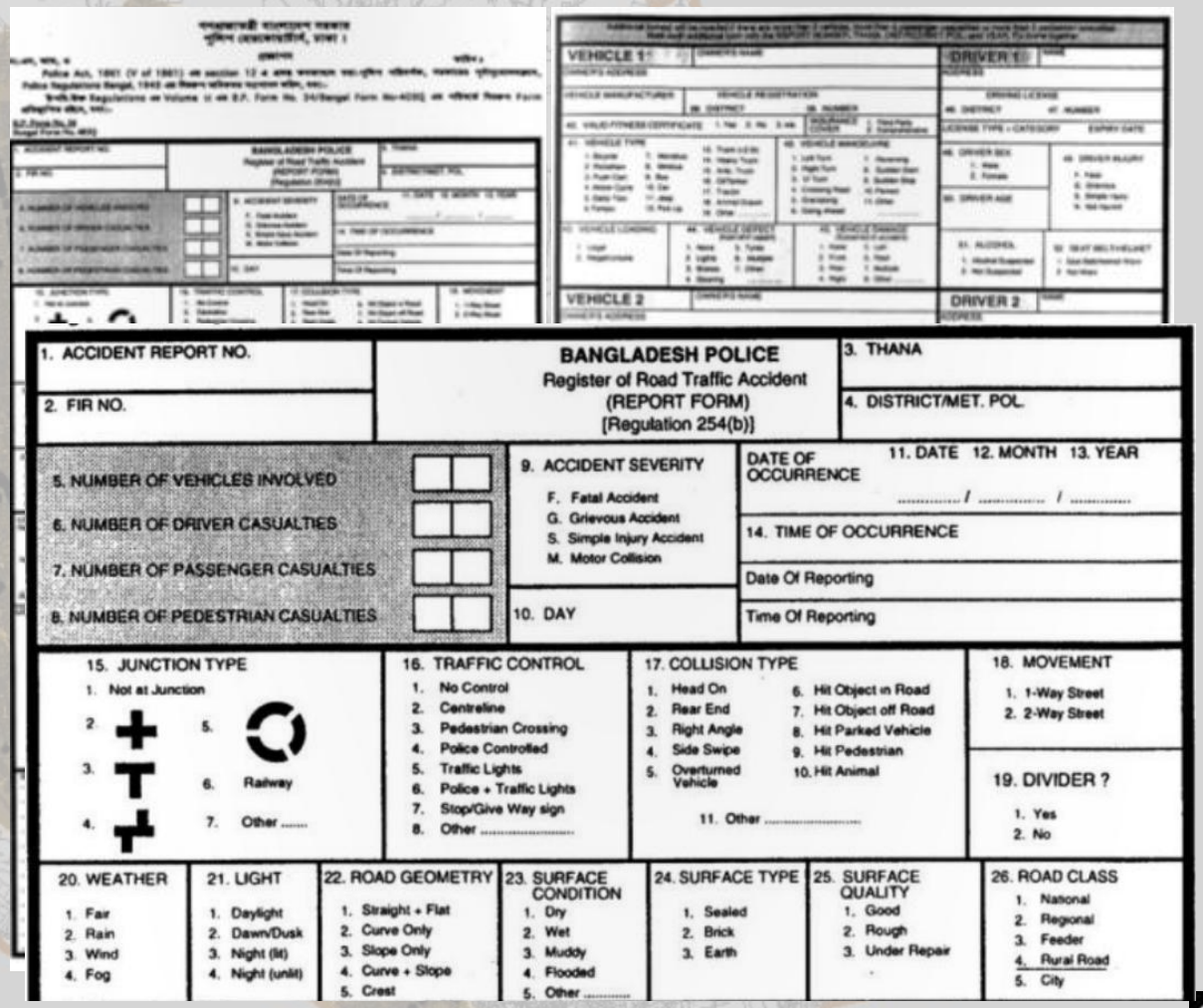
Case study: Bangladesh

- **Dhaka, the capital of Bangladesh:**
  - **14 million people**
  - **Non-motorised modes dominate (e.g. walk 20%, rickshaw 40%, bus 30%, car 5%)** **(Ministry of Environment and Forest and Ministry of Communication, 2010).**



Data

- Source: Dhaka Metropolitan Police
- Accident reporting form
- 2714 collisions ’07 - ’11
- 12 variables



BANGLADESH POLICE
Register of Road Traffic Accident
(REPORT FORM)
[Regulation 254(b)]

1. ACCIDENT REPORT NO.
2. FIR NO.
3. THANA
4. DISTRICT/MET. POL.
5. NUMBER OF VEHICLES INVOLVED
6. NUMBER OF DRIVER CASUALTIES
7. NUMBER OF PASSENGER CASUALTIES
8. NUMBER OF PEDESTRIAN CASUALTIES
9. ACCIDENT SEVERITY
F. Fatal Accident
G. Grievous Accident
S. Simple Injury Accident
M. Motor Collision
10. DAY
DATE OF OCCURRENCE 11. DATE 12. MONTH 13. YEAR
14. TIME OF OCCURRENCE
Date Of Reporting
Time Of Reporting
15. JUNCTION TYPE
1. Not at Junction
2.
3.
4.
5.
6. Railway
7. Other .....
16. TRAFFIC CONTROL
1. No Control
2. Centreline
3. Pedestrian Crossing
4. Police Controlled
5. Traffic Lights
6. Police + Traffic Lights
7. Stop/Give Way sign
8. Other .....
17. COLLISION TYPE
1. Head On
2. Rear End
3. Right Angle
4. Side Swipe
5. Overturned Vehicle
6. Hit Object in Road
7. Hit Object off Road
8. Hit Parked Vehicle
9. Hit Pedestrian
10. Hit Animal
11. Other .....
18. MOVEMENT
1. 1-Way Street
2. 2-Way Street
19. DIVIDER ?
1. Yes
2. No
20. WEATHER
1. Fair
2. Rain
3. Wind
4. Fog
21. LIGHT
1. Daylight
2. Dawn/Dusk
3. Night (lit)
4. Night (unlit)
22. ROAD GEOMETRY
1. Straight + Flat
2. Curve Only
3. Slope Only
4. Curve + Slope
5. Crest
23. SURFACE CONDITION
1. Dry
2. Wet
3. Muddy
4. Flooded
5. Other .....
24. SURFACE TYPE
1. Sealed
2. Brick
3. Earth
25. SURFACE QUALITY
1. Good
2. Rough
3. Under Repair
26. ROAD CLASS
1. National
2. Regional
3. Feeder
4. Rural Road
5. City

VEHICLE 1 DRIVER 1
VEHICLE 2 DRIVER 2

Method

- Outcome variable ‘injury severity’ was measured as ordered category with 4 levels
- Categorical explanatory variables
- An ordered Probit regression model was estimated

Results

Explanatory factors	Coef.	z	P>|z|
Number of vehicles: single (ref: multi)	1.48	27.30	0.00
Traffic control: only police (ref: uncontrolled)	-0.31	-5.20	0.00
Intersection type: 4 way (ref: not in an intersection)	-0.13	-1.61	0.10
Intersection type: roundabout (ref: not in an intersection)	-0.41	-1.76	0.08
Traffic flow direction: two way (ref: one way)	-0.16	-1.87	0.06
Presence of road divider: no (ref: yes)	0.41	4.13	0.00
Time of day/light condition: night (ref: day)	0.20	3.36	0.00
Time of day/light condition: dawn/dusk (ref: day)	0.42	4.74	0.00
Road class: city and feeder road (ref: highway)	-0.40	-6.87	0.00
/cut1	0.89		
/cut2	1.13		
/cut3	1.81		
Log likelihood = -2032.71	Pseudo R^2 = 0.19	N = 2714			

Discussion and conclusion

Factors	Severity impact		Citation
	This research	Developed countries	
Vehicles involved: one	Increased	Increased	Miles-Doan (1996)
Traffic control	Mixed	Mixed	Pitt et al. (1990); Lee and Abdel-Aty (2005)
4-way intersection	Decreased	No effect	Quddus et al. (2002)
Roundabouts	Decreased	Increased Decreased	Boufous et al. (2008) Gray et al. (2008)
One way	Increased	Decreased	Sze and Wong (2007)
Highways	Increased	Increased	Miles-Doan (1996); Sze and Wong (2007)
Darker period of time	Increased	Increased	Kim et al. (2007); Klop and Khattak (1999)
Presence of road divider	Decreased	Decreased	Quddus et al. (2002)

References

Ahsan, H.M., 2012. Road Safety in Bangladesh: Key Issues and Countermeasures, Forum. The Daily Star, Dhaka.

Boufous, S., Finch, C., Hayen, A., Williamson, A., 2008. The impact of environmental, vehicle and driver characteristics on injury severity in older drivers hospitalized as a result of a traffic crash. Journal of Safety Research 39, 65-72.

Fatmi, Z., Hadden, W., Razzak, J., Qureshi, H., Hyder, A., Pappas, G., 2007. Incidence, patterns and severity of reported unintentional injuries in Pakistan for persons five years and older: results of the National Health Survey of Pakistan 1990-94. BMC Public Health 7, 152.

Gray, R.C., Quddus, M.A., Evans, A., 2008. Injury severity analysis of accidents involving young male drivers in Great Britain. Journal of Safety Research 39, 483-495.

Kim, J.K., Kim, S., Ulfarsson, G.F., Porrello, L.A., 2007. Bicyclist injury severities in bicycle–motor vehicle accidents. Accid Anal Prev 39, 238–251.

Klop, J.R., Khattak, A.J., 1999. Factors influencing bicycle crash severity on two-lane, undivided roadways in North Carolina. Transportation Research Record: Journal of the Transportation Research Board 1674, 78–85.

Lee, C., Abdel-Aty, M., 2005. Comprehensive analysis of vehicle–pedestrian crashes at intersections in Florida. Accid Anal Prev 37, 775–786.

Miles-Doan, R., 1996. Alcohol use among pedestrians and the odds of surviving an injury: evidence from Florida Law Enforcement Data. Accid Anal Prev 28, 23–31.

Ministry of Environment and Forests, Ministry of Communication, 2010. Developments in EST in Bangladesh, Fifth Regional Environmentally Sustainable Transport (EST) Forum in Asia, Bankok.

Pitt, R., Guyer, B., Hsieh, C., Malek, M., 1990. The severity of pedestrian injuries in children: an analysis of the Pedestrian Injury Causation Study. Accid Anal Prev 22, 549–559.

Quddus, M.A., Noland, R.B., Chin, H.C., 2002. An analysis of motorcycle injury and vehicle damage severity using ordered probit models. Journal of Safety Research 33 445– 462.

Sze, N.N., Wong, S.C., 2007. Diagnostic analysis of the logistic model for pedestrian injury severity in traffic crashes. Accid Anal Prev 39, 1267–1278.

UNESCAP, 2007. THE STATUS PAPER ON ROAD SAFETY PROBLEMS IN BANGLADESH: The Bangladesh Country Paper. United Nations Economic and Social Commission for Asia and the Pacific.

World Health Organization, 2004. World report on road traffic injury prevention, Geneva.

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Thank You

Question?