Finding Alternatives to Using Speed Bumps as Traffic Calming Measures in Ghana: A Case of Abuakwa-Bibiani Highway

James Damsere-Derry

Shaibu Bawa

Richard Lumor

David Tikoli

AFRO SAFE

Winneba
12-15 August 2025

CSIR-BRRI
Council for Scientific and Industrial Research-Building and Road Research Institute

Presentation Outline

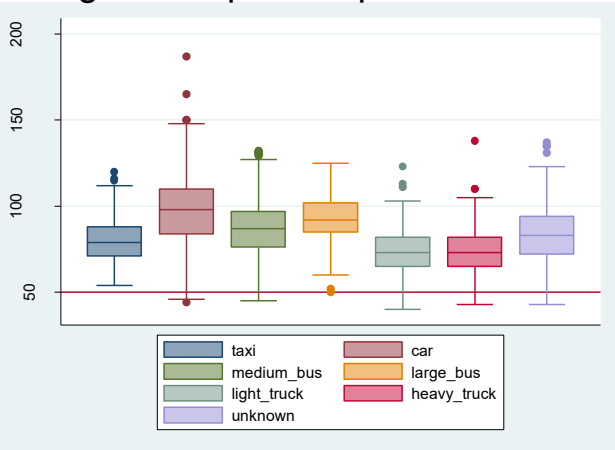
- Background
- Problem Statement
- Objective
- Methods
- Results
- Discussion
- Conclusion

Background

Fig 1: The safe System Approach

Background

Fig 2A Boxplot of speed distribution



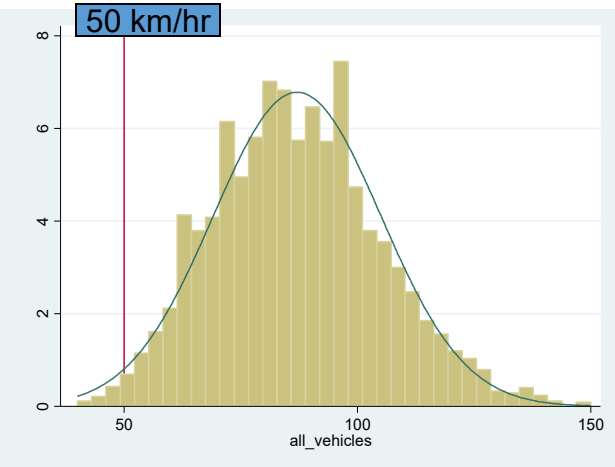


Fig 2B: Histogram of speed distribution

- Mean speed for all vehicles 87 km/hr ±18
- Fastest (cars 187 km/hr ± 18)
- Slowest (H. Trucks 74 km/hr ±13
- Over 95% of all vehicles exceeded 50km/hr limit

Source: Damsere-Derry et al (2007)

Fig 3: Communities requesting for Speed calming devices

Fig 4: Illegally built speed humps at Matse, Ho

Fig 5: Traffic Calming Measures in Seattle, USA

Fig 5A Speed circle

Fig 5B Reduced speed limit sign in residential areas

Fig 5C Chicane

Fig 5D Speed humps

Literature TCM and pedestrians' fatalities in Ghana

- 30% or less motorists exceed speed limit in TCM communities
- 60% or more motorists exceed speed limit in No TCM towns
- 2 times risk of death in towns w/o TCM (OR=1.98. 95% CI=1.09 to 4.43.)

Source: Damsere-Derry et al (2019)

Traffic calming measures becoming a nuisance (1)

- Frustrated Kegyina residents construct speed ramps to stop deaths (ultimatefm, 2018)
- Speed ramps impede our work-GNFS, (Ghanaweb, 2017)
- 5 die, 53 injured in accident caused by speed ramps, (David Kodjo, 2016)
- Speed ramps to cause spinal injury-Minister. (myjoyonline, 2016)

Study site and Materials of TCM

- Abuakwa-Bibiani
- About 80 km
- Inter-Regional Road 5 (IR-5)
- Major settlements include: Nkawie-Toase, Nyinihini and Bibiani

Objectives

Objectives were to determine:

1. Characteristics of TCM (e.g. density, Height, width and intervening distance)
2. Evidence of pavement deterioration
3. Impact of TCM on operating speeds, spot speeds and their implications on general mobility particularly emergency services
4. Typologies of accidents on Abuakwa-Bibiani Highway

Methodology

- Visual inspection
- Measurement of TCM parameters
- Vehicle Speeds
  I. On TCMs
  II. Approaches
  III. In between successive TCMs
  IV. Operating speeds
- Accident analysis

Results

Results

- Road length 78.2 km
- No. TCM 75 legal +25 illegal= 100
- Density of TCM 1.3 units/km

Fig 6: Operating speeds within selected settlements

Nkawie

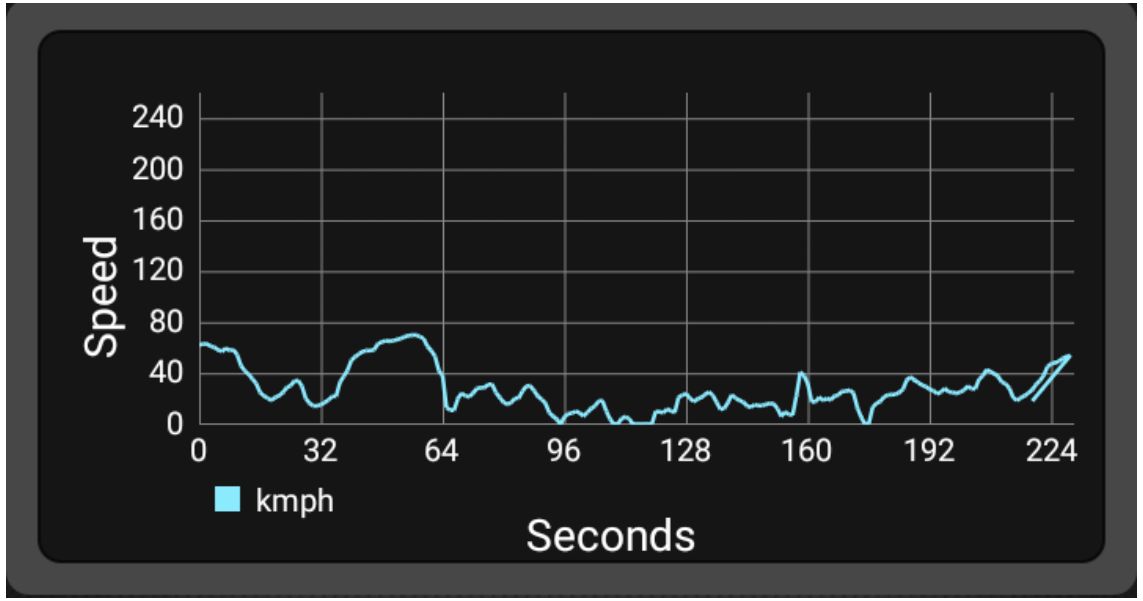


Fig 6 A speed profile at Nkawie

Nyinahin

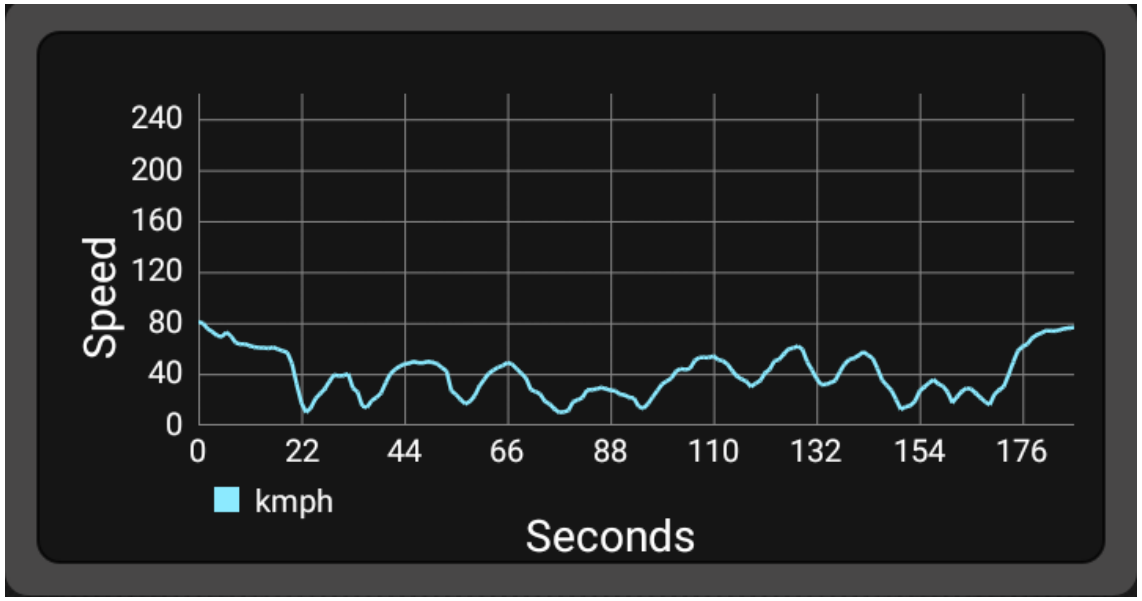


Fig 6 B: Speed Profile at Nyinahin

Fig 7: Samples of road deteriorations on pavement-Abuakwa-Bibiani Road

Fig 8: Evidence of speed table deterioration posing road hazard

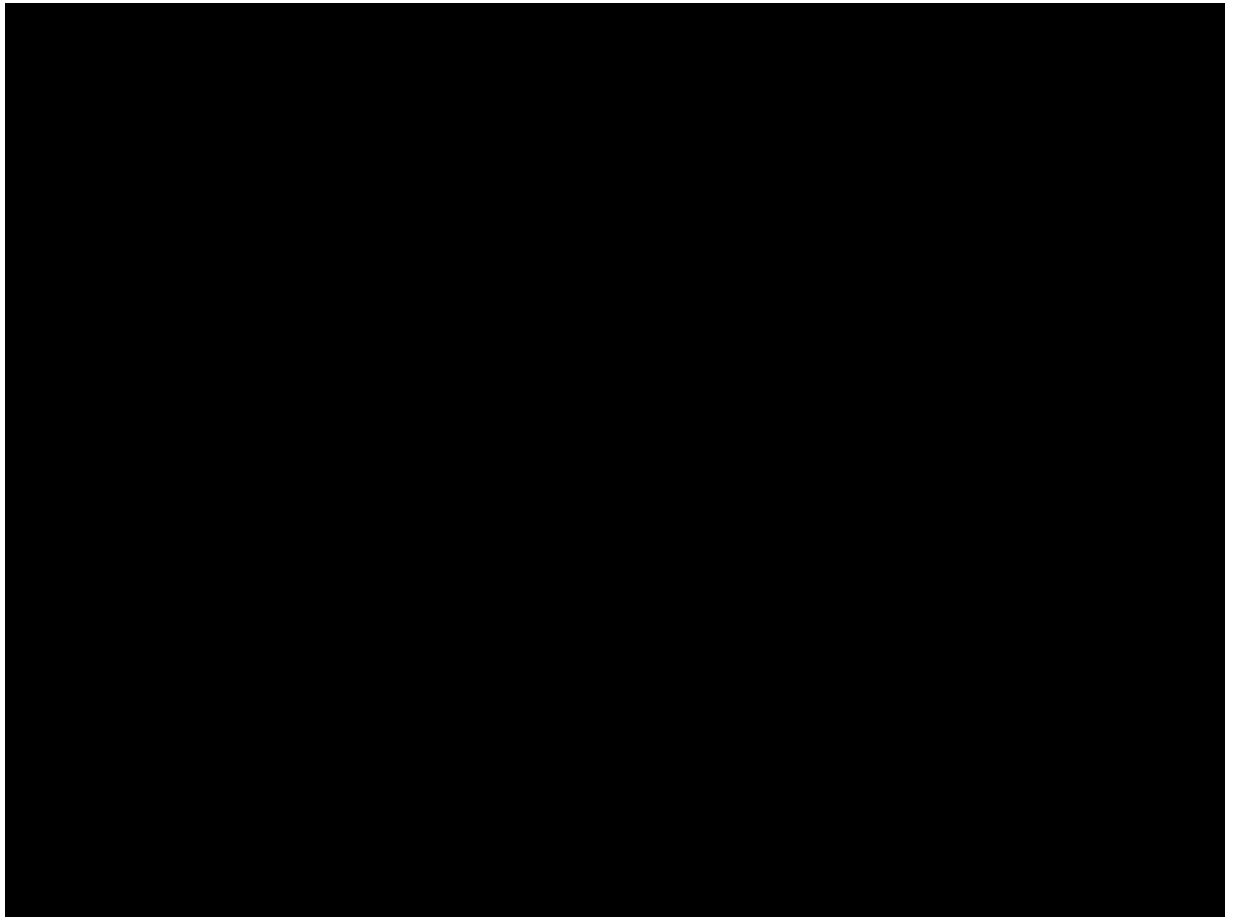
Table 1: Casualty injury severity on Abuakwa-Bibiani (2013-2022)

	CASUALTY INJURY				
COLLISION TYPE	Fatal	Hospitalised	Injury	Total	% of Fatalies
Hit Pedestrian	74	113	45	232	32.5
Ran Off Road	48	323	422	793	21.1
Head On	44	123	92	259	19.3
Rear End	36	147	98	281	15.8
Right Angle	8	28	46	82	3.5
Side Swipe	8	33	35	76	3.5
Other	10	27	29	66	4.4
Total	228	794	767	1789	100.0

Table 2: Distribution of Road Accident Casualties (2013-2022)

	CASUALTY INJURY				
DATE	Fatal	Hospitalised	Injury	Total	% of fatalities
2013	23	39	92	154	10.1
2014	20	54	104	178	8.8
2015	16	28	60	104	7.0
2016	9	19	33	61	3.9
2017	17	79	88	184	7.5
2018	31	108	48	187	13.6
2019	14	67	50	131	6.1
2020	34	126	92	252	14.9
2021	33	167	89	289	14.5
2022	31	107	111	249	13.6
Total	228	794	767	1789	100.0

Recommendation: Intelligent Speed Bump



Recommendation: Non-Newtonian Fluid Bump

Conclusion

1. Intelligent Speed bump
2. Pedestrian Education
3. Automatic Number plate recognition

Thank you

- Damsere-Derry, J., Afukaar, F. K., Donkor, P., & Mock, C. (2008). Assessment of vehicle speeds on different categories of roadways in Ghana. *International journal of injury control and safety promotion, 15*(2), 83-91. doi:10.1080/17457300802048096
- Damsere-Derry, J., Afukaar, F. K., Donkor, P., & Mock, C. (2007). Study of Vehicle Speeds on a Major Highway in Ghana: Implication for monitoring and control. *Traffic injury prevention, 8*(2), 142-146. doi:10.1080/15389580601100944
- Damsere-Derry, J., Ebel, B. E., Mock, C., Afukaar, F. K., & Ojo, K. T. (2019). Evaluation of the effectiveness of traffic calming measures on vehicle speeds and pedestrian injury severity. *Traffic injury prevention, 20*(3), 336-342.
- David Kodjo (Producer). (2016, 2nd March, 2018). 5 die, 53 injured in accident. Retrieved from http://www.ghanaiantimes.com.gh/5-die-53-injured-in-accident/
- Myjoyonline.com (Producer). (2016, Monday, July 11, 2016). Speed ramps to cause spinal injury-Minister. Retrieved from http://www.ghanaweb.com/GhanaHomePage/health/Speed-ramps-to-cause-spinal-problems-Minister-454311
- Radio Tamale (Producer). (2017, 10--1-2019). Speed ramps impede our work-GNFS. Retrieved from https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Speed-ramps-impede-our-work-GNFS-550438
- Ultimate FM (Producer). (2018, 7 February, 2018). Frustrated Kegyina residents construct speed ramps to stop deaths. Retrieved from https://www.ghanaweb.com/GhanaHomePage/regional/Frustrated-Kegyina-residents-construct-speed-ramps-to-stop-deaths-623178