

Symposium on Evaluating Road Safety Interventions for Health Outcomes

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Evaluating Road Safety Interventions: The case of Ghana

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Background

Most severe road traffic crashes occur in settlement areas along the trunk roads in Ghana. Some safety measures carried out at selected black spots have been assessed for their effectiveness.

The study

The study examined 8 selected black spots and 3 other control sites. Evaluation was based on:

- Road traffic accident analysis for the 'before' and 'after' situations. 5-Year before period and 'after' period up to June 2007
- Speed studies.

Measures at Treated and Control Black spot Sites

Road Number and Name	Location	Main Schemes	Measures Completed
<i>N1</i> Cape-Coast – Takoradi	Beposo	Carriageway narrowing, Road line markings; Delineators; Studs; Road signs	Jan., 2006
<i>N1</i> Takoradi – Elubo	Kikam	Carriageway narrowing, Road line markings; Delineators; Studs; Road signs; Rubberized speed humps	May, 2006
	Ewusie Joe	Carriageway narrowing by Walkway; Speed table; Rumble strips	Nov., 2003
<i>N2</i> Atimpoku - Ho	Frankadua	Carriageway narrowing by Delineators, Studs; Road line markings	March, 2006
	Apeguso	Carriageway narrowing by Delineators; Studs; Road line markings	Dec., 2004 Aug., 2005 (speed table)

Measures at Treated and Control Black spot Sites – *Cont'd*

R76 Konongo - Agogo	Patreansa	Carriageway narrowing by Delineators; Studs; Road line markings.	Nov., 2005
	Juansa	Carriageway narrowing by Delineators; Studs; Road line markings.	Nov., 2005
N1 Tema-Sogakope	Dahwenya	Speed Table; Thermoplastic Markings.	Sept., 2005
N1 Takoradi - Elubo	Esiamia	No speed calming measures or other traffic safety devices	Control
N1 Tema - Sogakope	Koluedor	No speed calming measures or Other traffic safety devices	Control
N2 Atimpoku - Ho	Asikuma	No speed calming measures or Other traffic safety devices	Control

Typical Road Safety Interventions

Carriageway narrowing, delineators and speed humps



Rumble strips



Statistical Evaluation of Accidents at Treated sites

Sites	Accidents		K-value	p-value	Comments
	Before	After			
Apeguso Control	11 28	0 15	0.00	0.0223	Accident reduction Statistically significant $P < 0.05$
Frankadua Control	8 26	2 11	0.59	0.5459	Reduction not statistically significant $p > 0.05$
Dahwenya Control	64 27	14 15	0.39	0.0308	Reduction is statistically Significant $p < 0.05$
Beposo Control	15 28	0 11	0.00	0.0223	Reduction is statistically significant $p < 0.05$
Ewusiejoe Control	12 27	0 24	0.00	0.0027	Reduction is statistically Significant $p < 0.005$

Statistical Evaluation of Accidents at Treated sites – *Cont'd*

Sites	Accidents		K-value	p-value	Comments
	Before	After			
Kikam Control	7 23	1 10	0.33	0.3138	Reduction not statistically Significant $p > 0.05$
Patriensa Control	6 26	0 14	0.00	0.0857	Reduction not statistically Significant $p > 0.05$
Juansa Control	2 26	5 14	4.64	0.073	Measures had adverse Effect on road safety. Not statistically significant at 5% but significant at 10% $K > 1.0$

Changes in accident and casualty rates per annum for the treated sites

1 Apeghusu					
<i>Accidents</i>	"Before"	Rate Per Annum	"After"	Rate Per Annum	% Change
Fatal	3	0.6	0	0	-100.0
Hospitalised	1	0.2	0	0	-100.0
Not Hospitalised	3	0.6	0	0	-100.0
Damage only	4	0.8	0	0	-100.0
Total	11	2.2	0	0	-100.0
<i>Casualties</i>					
Fatalities	4	0.8	0	0	-100.0
Seriously Injured	5	1.0	0	0	-100.0
Slightly Injured	9	1.8	0	0	-100.0
Total	18	3.6	0	0	-100.0
2 Frankadua					
<i>Accidents</i>					
Fatal	2	0.4	0	0	-100.0
Hospitalised	4	0.8	0	0	-100.0
Not Hospitalised	1	0.2	2	1.6	700.0
Damage only	1	0.2	0	0	-100.0
Total	8	1.6	2	1.6	0.0
<i>Casualties</i>					
Fatalities	3	0.6	0	0	-100.0
Seriously Injured	7	1.4	0	0	-100.0
Slightly Injured	11	2.2	2	1.6	-27.3
Total	21	4.2	2	1.6	-61.9

Changes in accident and casualty rates per annum for the treated sites – *cont'd*

3 Dahwenya		Rate Per		Rate Per	
<i>Accidents</i>	“Before	Annun	“After	Annun	% Change
Fatal	11	2.2	3	1.7	-22.1
Hospitalised	14	2.8	4	2.3	-18.4
Not Hospitalised	14	2.8	2	1.1	-59.2
Damage only	25	5.0	5	2.9	-42.9
Total	64	12.8	14	8.0	-37.5
 <i>Casualties</i>					
Fatalities	15	3.0	3	1.7	-42.9
Seriously Injured	26	5.2	5	2.9	-45.1
Slightly Injured	45	9.0	7	4.0	-55.6
Total	86	17.2	15	8.6	-50.2
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4 Beposo					
<i>Accidents</i>					
Fatal	3	0.6	0	0	-100.0
Hospitalised	4	0.8	0	0	-100.0
Not Hospitalised	6	1.2	0	0	-100.0
Damage only	2	0.4	0	0	-100.0
Total	15	3.0	0	0	-100.0
 <i>Casualties</i>					
Fatalities	9	1.8	0	0	-100.0
Seriously Injured	12	2.4	0	0	-100.0
Slightly Injured	14	2.8	0	0	-100.0
Total	35	7.0	0	0	-100.0

Changes in accident and casualty rates per annum for the treated sites – cont'd

5	Ewusiejoe					
	<i>Accidents</i>	"Before"	RatePer Annum	"After"	RatePer Annum	% Change
	Fatal	2	0.4	0	0	-100.0
	Hospitalised	4	0.8	0	0	-100.0
	Not Hospitalised	2	0.4	0	0	-100.0
	Damage only	4	0.8	0	0	-100.0
	Total	12	2.4	0	0	-100.0
	<i>Casualties</i>					
	Fatalities	2	0.4	0	0	-100.0
	Seriously Injured	6	1.2	0	0	-100.0
	Slightly Injured	3	0.6	0	0	-100.0
	Total	11	2.2	0	0	-100.0
6	Kikam					
	<i>Accidents</i>					
	Fatal	5	1.0	1	0.9	-7.7
	Hospitalised	2	0.4	0	0.0	-100.0
	Not Hospitalised	0	0.0	0	0.0	-
	Damage only	0	0.0	0	0.0	-
	Total	7	1.4	1	0.9	-34.1
	<i>Casualties</i>					
	Fatalities	5	1.0	1	0.9	-7.7
	Seriously Injured	3	0.6	0	0.0	-100.0
	Slightly Injured	1	0.2	0	0.0	-100.0
	Total	9	1.8	1	0.9	-48.7

The accident and casualty rates per annum for the treated sites – *cont'd*

7	Patriensa		Rate Per		Rate Per	
	Accidents	“Before”	Annum	“After”	Annum	% Change
	Fatal	1	0.2	0	0	-100.0
	Hospitalised	5	1.0	0	0	-100.0
	Not Hospitalised	0	0.0	0	0	-
	Damage only	0	0.0	0	0	-
	Total	6	1.2	0	0	-100.0
	Casualties					
	Fatalities	1	0.2	0	0	-100.0
	Seriously Injured	14	2.8	0	0	-100.0
	Slightly Injured	3	0.6	0	0	-100.0
	Total	18	3.6	0	0	-100.0
8	Juansa					
	Accidents					
	Fatal	0	0.0	2	1.3	-
	Hospitalised	1	0.2	1	0.6	215.8
	Not Hospitalised	0	0.0	0	0.0	-
	Damage only	1	0.2	2	1.3	531.6
	Total	2	0.4	5	3.2	689.5
	Casualties					
	Fatalities	0	0.0	2	1.3	-
	Seriously Injured	2	0.4	1	0.6	57.9
	Slightly Injured	12	2.4	0	0.0	-100.0
	Total	14	2.8	3	1.9	-32.3

Mean Speed Changes at the Treated Sites

Name of Town	Speed Study Location	Speed Statistics		Mean Speed Change Compared to Gates	
		Mean (Km/hr)	σ (Km/hr)	Absolute	%
Apeguso	Gates	77.0	15.0	-	-
	Mid-town	51.8	10.2	-25.2	-32.7
	Speed table	41.3	14.7	-35.7	-46.4
Frankadua	Gates	72.9	12.6	-	-
	Mid-town	70.9	9.9	-2.0	-2.7
	Speed table	20.8	5.8	-52.9	-72.6
Dahwenya	Gates	65.6	12.7	-	-
	Mid-town	39.9	9.2	-25.7	-39.2
	Speed table	23.9	5.1	-41.7	-63.6
Beposo	Gates	66.9	12.7	-	-
	Mid-town	48.8	11.7	-18.1	-27.1
	Delineators – Takoradi	50.7	9.4	-16.2	-24.2
	Delineators – Cape Coast	58.4	11.7	-8.5	-12.7
	Mid-town	56.9	10.4	-10.3	-15.3

Mean Speed Changes at the Treated Sites – *Cont'd*

Name of Town	Speed Study Location	Speed Statistics		Mean Speed Change Compared to Gates	
		<i>Mean (Km/hr)</i>	<i>σ (Km/hr)</i>	Absolute	%
Ewusiejoe	Gates	65.1	15.9	-	-
	Mid-town	49.9	8.0	-15.2	-23.3
	Speed table	42.8	10.5	-22.3	-34.3
	2 nd Strip	52.4	11.7	-12.7	-19.5
Kikam	Gates	66.2	12.7	-	-
	Mid-town	37.6	4.9	-28.6	-43.2
Patriensa	Gates	62.0	9.2	-	-
	Mid-town	58.9	11.5	-3.1	-5.0
Juansa	Gates	67.2	10.0	-	-
	Mid-town	56.9	10.4	-10.3	-15.3

Mean Speed Changes at the Control Sites

Name of Town	Speed Study Location	Speed Statistics		Mean Speed Change Compared to Gates	
		<i>Mean (Km/hr)</i>	<i>σ (Km/hr)</i>	Absolute	%
Kuluedor	Gates	83.2	17.80	-	-
	Mid-town	78.6	16.3	-4.6	-5.5
Esiama	Gates	68.2	14.2	-	-
	Mid-town	57.2	9.9	-11.0	-16.1
Asikuma	Gates	68.7	12.7	-	-
	Mid-town	63.6	11.8	-5.1	-7.4

Speed Distributions at a Typical Treated Site - *Dahwenya*

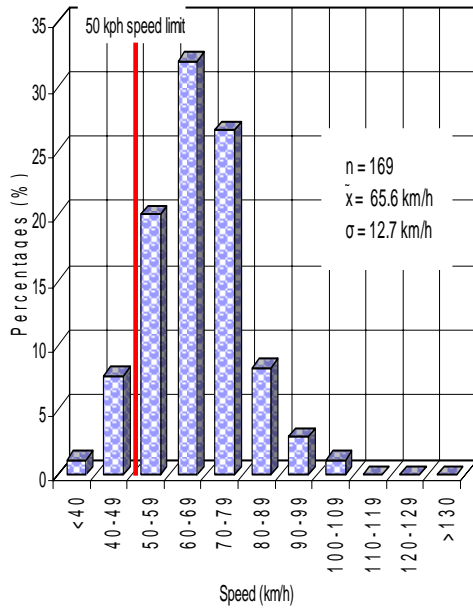


Fig 4.8a Distribution of vehicle speeds at Dahwenya (Gates)

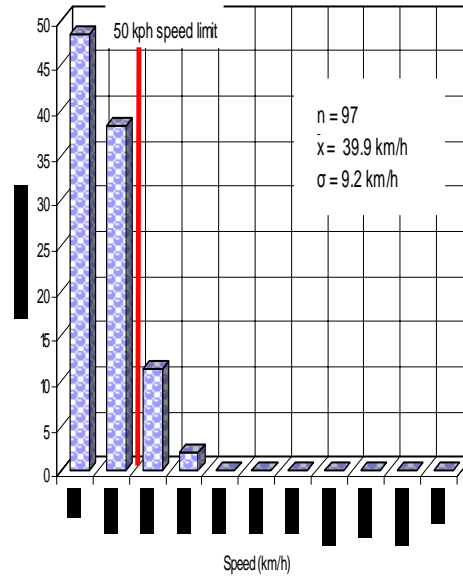


Fig 4.8b Distribution of vehicle speeds at Dahwenya (Between speed tables)

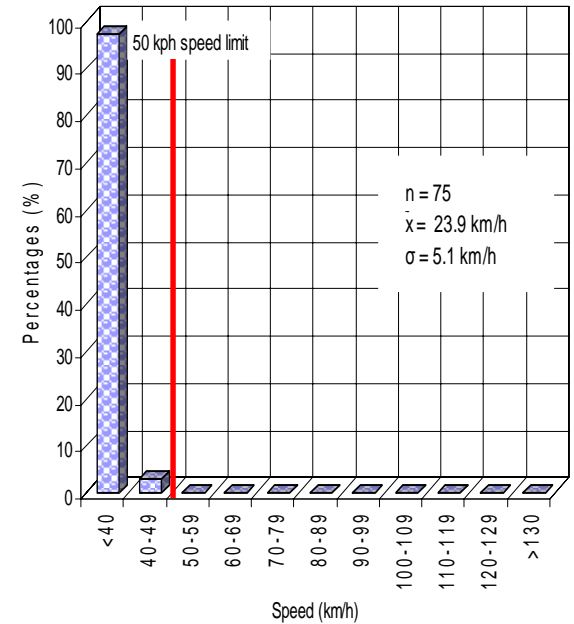


Fig 4.8c Distribution of vehicle speeds at Dahwenya (on speed table)

Speed Distributions at an Untreated Site - *Koluedor*

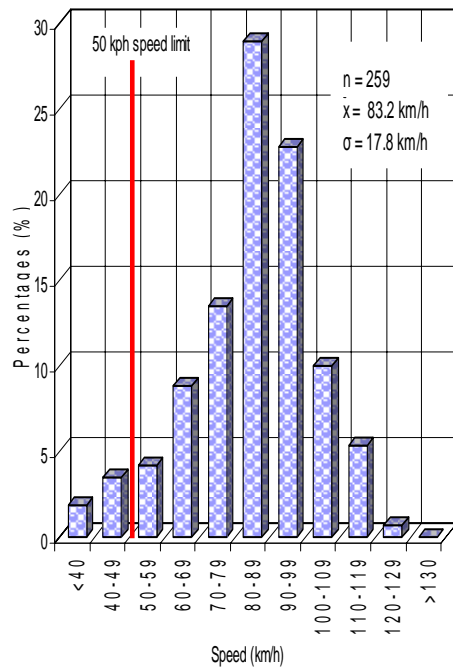


Fig 4.14a Distribution of vehicle speeds at Koluedor (Gates)

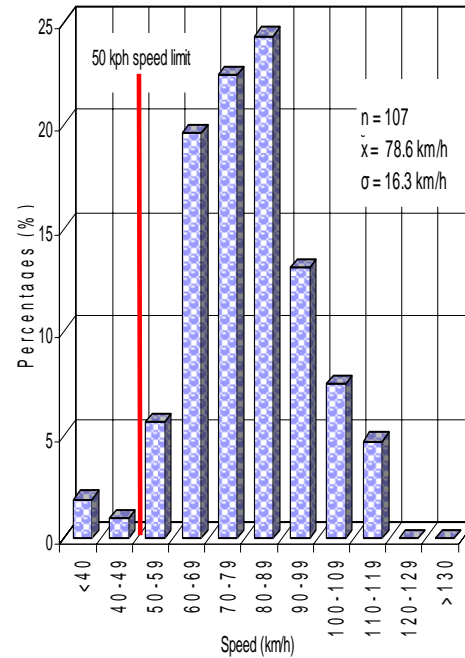


Fig 4.14b Distribution of vehicle speeds at Koluedor (mid town)

Findings

- ❑ Generally, road traffic safety improvement occurred at most of the treated sites
- ❑ Patterns of traffic crashes after safety interventions changed to favour reduced fatal and serious crashes
- ❑ Based on the p-values, significant road safety improvements were experienced at most of the treated sites but at one location the measures had adverse effect on road safety.
- ❑ Considerable speed reductions were experienced at locations where speed tables/speed humps have been installed.
- ❑ Improved road traffic safety outcomes were associated with interventions which reduced vehicular speeds

Conclusion

The evaluation of road safety interventions on the trunk roads in Ghana has brought to the fore the fact that road traffic safety improves with reduced vehicular speeds in settlement areas.