Injury, Int. J. Care Injured 44 S4 (2013) S24–S30

Contents lists available at SciVerse ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Prevalence, knowledge, attitude and practice of speeding in two districts in Kenya: Thika and Naivasha

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KEYWORDS

Road traffic injuries
Speed
Kenya
Road safety
Low- and middle-income countries

ABSTRACT

Introduction: In Kenya, RTIs had the second highest increase in disability-adjusted life years between 1990 and 2010, compared to other conditions. This study aims to determine the prevalence, knowledge, attitudes and practices for speeding in Thika and Naivasha districts in Kenya.
Methods: Direct observations of vehicle speed were conducted at various times during the day and different days of the week on six roads selected based on a multi-stage sampling method in two districts to determine the prevalence of speeding. Roadside KAP interviews were administered to drivers, at motorcycle bays, petrol stations, and rest areas.
Results: Eight rounds of speed observations and four rounds of KAP interviews were conducted between July 2010 and November 2012. Results from the speeding observational studies show an overall high proportion of vehicles speeding above posted limits in both districts, with an average of 46.8% in Thika and 40.2% in Naivasha. Trend analysis revealed a greater decline in this prevalence in Thika (OR: 0.804, 95% CI: 0.793-0.814) than in Naivasha (OR: 0.932, 95% CI: 0.919-0.945) over the study period. On average, 58.8% of speeding vehicles in Thika and 57.2% of speeding vehicles in Naivasha travelled at 10 km/h or higher above speed limit. While the majority of respondents agreed that speeding is a cause of road traffic crashes in both Thika (70.3%) and Naivasha (68.7%), knowledge of speed limits at the location of the interview was limited. Enforcement levels also remained low, but subsequent rounds of data collection showed improvement, especially in Thika.
Conclusions: This study demonstrates an improvement in the prevalence of speeding in two districts of Kenya over 2010-2012. It also highlights the need for further action to be taken to address the problem, and represents new data on speeding in Kenya and Africa.

Introduction

Globally, road traffic injuries (RTIs) have increased in prominence over the last two decades. The recent Global Status Report on Road Safety reported 1.24 million deaths due to RTIs in 2010.[1] RTIs are also currently the 10th leading cause of disability-adjusted life years (DALYs), with approximately 34% increase in the total number of DALYs attributed to RTIs between 1990 and 2010.[2] This burden is disproportionately distributed globally, with low- and middle-income countries (LMICs) accounting for the majority of DALYs lost.[1]

While Africa has less than 2% of the world's registered vehicles, the region experiences 17% of road traffic deaths worldwide.[3] Sub-Saharan Africa had the highest rates of road traffic deaths among all regions, with 24.1 per 100,000 population in 2010, which is more than twice in European Region.[2] Recently modeled road traffic death rates from the World Health Organization (WHO) reported that Kenya had a road traffic fatality rate of 20.9 deaths per 100,000 population.[4] Furthermore, estimates from the 2010 update of the Global Burden of Disease (GBD) Study show that RTIs accounted for 2.8% of total years of life lost (YLLs) in Kenya in 2010. This is a significant increase from the 1.8% of total YLLs estimated in 1990, and represents the second highest increase in DALYs compared to other conditions between 1990 and 2010.[5]

As LMICs in Africa develop and road infrastructure is enhanced, the number of vehicles, as well as overall vehicle speeds, are expected to increase, resulting in increased RTIs and fatality rates in these settings in the absence of any intervention.[6-8] Several studies have implicated speeding as a significant risk factor for RTI and fatality.[9,10] A review of the effects of speed limits found that for developed countries where estimates of population-attributable risk were available, speeding contributed more to the risk of traffic injury than any other risk factor for RTIs.[11] Data

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0020-1383/$ – see front matter

from Australia and the United States estimates that approximately 30% of all fatal road traffic injuries involved excessive speeding.[12] Although most information has come from developed countries, a study from Ghana found speed accounts for 50% of all Ghanaian road traffic crashes between 1998 and 2000.[13] Despite the increasing burden of RTIs in developing countries, limited evidence has been generated on the effectiveness of road safety interventions in LMICs[14,15] and little research has been conducted to study speed as a risk factor for RTIs in Africa or Kenya.[7,16,17]

The Bloomberg Philanthropies Global Road Safety Programme, as part of a global initiative sought to address the problem of speeding on Kenyan roads beginning in 2010.[18] Through a multi-sectoral approach, this initiative intends to utilize multiple strategies including social marketing campaigns, enhanced enforcement, improving trauma care, and capacity development, among others to address this issue and reduce the burden of RTIs in two districts of Kenya - Thika and Naivasha.[18]

In light of this initiative, the present study sought to monitor the prevalence of speeding in Thika and Naivasha between 2010 and 2012. Additionally, we conducted roadside surveys to understand the knowledge, attitudes, and practices around speeding in the two regions during this time period. This study serves not only as an assessment of the speeding situation in Thika and Naivasha, but also attempts to identify underlying factors that may either have contributed to, or prevented, individuals from speeding. Findings from this study will be useful not only to guide the present initiative, but also provide useful information for designing future interventions for speeding in Kenya and other similar settings.

Methods

This study utilized two methods of data collection between July 2010 and November 2012: (1) roadside observations to assess the prevalence and extent of speeding, and (2) roadside surveys on drivers or passengers' knowledge, attitudes and practices (KAP) related to speeding. Each of these methods is further described below.

Speed Observational studies

Speed Observational studies sought to determine the prevalence and extent of speeding in Thika and Naivasha. 8 rounds of data were collected between October 2010 and November 2012. As described in detail elsewhere, three sites were selected in each district following a multi-staged sampling strategy:[17] First, all eligible sites within the district were enumerated, then divided into rural, and urban, as well as the different classes of roads within each area, and finally, a random selection of observational sties was made to ensure that the sites were representative of the district. In addition to safety, the chosen sites had to be in a place where there was a relatively straight stretch of road and vehicles were not slowing down for turning or due to other interventions such as speed bumps.

Observations were made at varying times of the day during 90-minute intervals according to a pre-determined observation schedule on Friday, Saturday and Monday, for each round. Teams of two trained observers used standard microwave radar guns to measure the speed of passing vehicles, which was recorded on a standard form along with the type of vehicle. All the observation sites have speed limits 80 km/h for light trucks (pickup trucks), large trucks (lorries, tankers), buses and matatus (14 passenger vans) except at one observation location (Narok-Mai Mahiu road), where the speed limit is 70 km/h for all vehicles. Saloon cars and SUVs have speed limit of 100 km/h, except on Narok-Mai Mahiu road. These limits were applied to determine speeding.

Knowledge, Attitude, and Practice (KAP) Surveys

Knowledge, Attitude, and Practice (KAP) Surveys were conducted to assess general knowledge, attitudes, and practices towards speeding in each of the two districts. A total of 4 rounds of KAP surveys were conducted between August 2010 and November 2012. To ensure the safety of interviewers, the surveys were administered to drivers in areas where they had already stopped, such as motorcycle bays, petrol stations, and rest areas. The sites were selected based on the multi-stage sampling method previously described for the observational studies.[17]

To obtain a representative sample, surveys were conducted throughout the week at varying times of the day by trained interviewers using structured questionnaires. The questionnaire consisted of mostly close-ended questions on issues such as speeding behaviors, reasons drivers may choose to speed, as well as perceptions and experiences with police enforcement activities on speed. Background demographic characteristics of the respondent were also collected as part of the survey. The questionnaires were pre-tested by interviewers in the local setting prior to administration. Verbal consent was obtained prior to the initiation of each interview and no personal identifiers were collected.

Data for both methods were managed and analyzed using SPSS (SPSS Inc. 1999), Stata 10 (StataCorp 2009), and MS Excel®. Descriptive and exploratory analysis was first done using tabulations and cross-tabulations of key variables to generate frequencies and also gain a basic understanding of the dataset as well as identify underlying patterns. When modeling extent of speeding, vehicles that traveled under or at the speed limit would have zero outcomes, resulting in an over-dispersion of zero outcomes. Zero-inflated negative binomial model accounts for non-speeding observations by including a logistic model and a count model.[19] Results of comparing the variance of the data with the mean from zero-inflated negative binomial model indicated the model was more appropriate than zero-inflated poisson model.[20] Vuong test was also performed to compare the zero-inflated negative binomial model with an ordinary negative binomial model. Univariate and multivariate logistic regression models were used to determine association between the self-reported knowledge, attitude and practice with respect to speeding.[21]

The study was reviewed and approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health and the Kenya Ministry of Public Health and Sanitation.

Results

A total of eight rounds of speeding observational studies were conducted in both districts between October 2010 and November 2012. Results over 38,674 vehicles observed show that while the proportion of vehicles traveling over the speed limit fluctuated from round to round, on average, more than 40% of vehicles were speeding in both districts (Thika: Average: 46.8%, Range: 30.4%-68.1%; Naivasha: 40.2%, Range: 31.0%-53.6%) (Table 1). It is encouraging to note that both districts have a declining trend in the proportion of vehicles speeding over the study period (Figure 1). These trends were statistically significant, with Thika demonstrating a greater rate of decline from round to round (OR: 0.804, 95% CI: 0.793-0.814) as compared to Naivasha (OR: 0.932, 95% CI: 0.919-0.945).

Distribution by types of vehicles speeding in the two districts suggests that light trucks and matatus consistently remained the most common type of vehicle to exceed the speed limit. An average of 61.2% of light trucks drove over the speed limit in Thika (range: 48.7-81.3%) and 55.9% (range: 48.0-68.8%) in

Table 1
Descriptive statistics on speed and proportion of speeding by observation round in Thika and Naivasha

	Thika				Naivasha			
Observation round	Mean	Min	Max	% above speed limit	Mean	Min	Max	% above speed limit
1	94.17	11	177	68.08	84.00	34	183	33.17
2	92.71	26	197	57.83	86.20	26	191	50.00
3	93.11	34	170	64.70	85.82	26	191	53.60
4	81.45	24	153	30.67	77.77	20	158	31.56
5	82.07	24	158	37.16	78.96	20	158	38.18
6	82.26	23	162	40.47	80.29	20	167	46.43
7	78.79	30	185	30.44	81.92	20	185	36.76
8	85.63	20	198	37.97	77.52	18	146	31.02

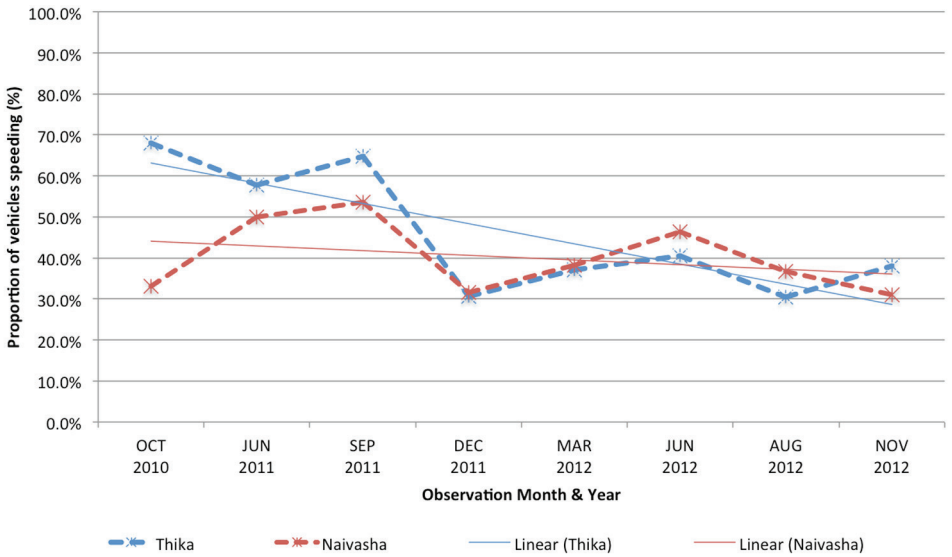

Figure 1. Proportion of vehicles speeding in Thika and Naivasha, Kenya.

Naivasha over the eight rounds of observations. Among matatus, we found an average of 57.8% of matatus over the speed limit in Thika (range: 14.0-88.6%) and 53.2% in Naivasha (range: 37.9-65.3%).

Analysis of speeding trends by vehicle type and time of observation was done using zero-inflated negative binomial models, which provided logistic regression and count model. Multivariate logistic regression model of speeding revealed that when controlled for observation round, location of observation and vehicle type, vehicles were more likely to speed in the mid- and late afternoon (3-4.30 pm and 5.30-7 pm) in Thika, while the likelihood of speeding was higher in the early morning between 7.30am-9am than any other observed period of the day in Naivasha (Table 2). Controlling for other variables, light trucks were more likely to travel above speed limit in both districts than other types of vehicles, being 2.93 times and 3.49 times more likely to speed as compared to saloon cars ($p<0.001$) in Thika and Naivasha, respectively. Matatus were the second type of vehicles most likely to travel above the speed limit (Thika: OR: 2.06; Naivasha: OR: 2.94) ($p<0.001$) (Table 3).

While there was an overall downward trend in the prevalence of speeding in both districts, we found that vehicles that were speeding were doing so at speeds significantly higher than the posted speed limits. Speeding vehicles were, on average, traveling at 16.0 km/h and 16.6 km/h above the speed limit in Thika and Naivasha respectively. Although the association between observation time and likelihood to travel above speed limit was statistically significant, observation time does not appear to have significant association with the extent of speeding in Thika (Table 3). In Naivasha, vehicles were not only more likely to be speeding between 7.30-9 am, but also increased the expected speeding extent compared to other observation times when controlled for other variables (Table 3). Unlike the case with prevalence of speeding, when it came to magnitude over the speed limit, SUVs were traveling fastest in both districts. Additionally, SUVs also showed the largest increments in terms of extent of speeding over time, at 29.9% and 31.5% ($p<0.001$) as compared to saloon cars in Thika and Naivasha respectively, controlling for observation time, observation round and location.

We conducted four rounds of KAP surveys between August 2010 and November 2012, with a total of 3034 respondents (Thika: 1811; Naivasha: 1223). Respondents were predominantly male (92.5%), with more than 80% of them having a secondary/high school education or higher (Table 4). Majority of the respondents were public service vehicle drivers of matatus (Thika: 48.7%, Naivasha: 37.2%), followed by saloon car drivers (Thika: 21.5%, Naivasha: 30.6%).

While the majority of respondents agreed that speeding is a cause of road traffic crashes in both Thika and Naivasha (Thika: 70.3%; Naivasha: 68.7%), knowledge of speed limits at the location of the interview was limited particularly in Thika in the first round of interviews conducted in 2010 (Table 5). Only one in three of respondents from Thika said they were aware of the speed limit, compared to 84.6% of respondents in Naivasha in August 2010. Subsequent data collection, however, showed an increased likelihood of respondents knowing the speed limit in Thika by

Table 2
Multivariate logistic regression of speeding by round of observation, vehicle type and observation time in Thika and Naivasha (controlled for observation location)

	Thika			Naivasha		
		95% CI			95% CI	
	OR	Lower limit	Upper limit	OR	Lower limit	Upper limit
Observation round	0.787	0.775	0.799	0.908	0.893	0.923
Observation time						
7.30-9am	Ref	NA	NA	Ref	NA	NA
10-11.30am	0.760	0.695	0.832	0.763	0.681	0.855
12.30-2pm	0.838	0.767	0.917	0.708	0.631	0.794
3-4.30pm	1.305	1.183	1.440	0.694	0.622	0.775
5.30-7pm	1.273	1.161	1.396	0.670	0.598	0.752
Type of vehicle						
Saloon car	Ref	NA	NA	Ref	NA	NA
Light truck	2.929	2.660	3.224	3.485	3.068	3.959
Large truck	0.655	0.595	0.720	0.703	0.629	0.785
Bus	1.543	1.356	1.755	2.248	1.900	2.660
Matatu	2.057	1.906	2.220	2.939	2.678	3.226
SUV	1.933	1.714	2.180	1.831	1.625	2.063

Table 3
Incidence rate ratio of speeding extent by round of observation, vehicle type and observation time in Thika and Naivasha (controlled for observation location)

	Thika			Naivasha		
		95% CI			95% CI	
	IRR	Lower limit	Upper limit	IRR	Lower limit	Upper limit
Observation round	1.016	1.009	1.024	0.991	0.981	1.001
Observation time						
7.30-9am	Ref	NA	NA	Ref	NA	NA
10-11.30am	0.987	0.940	1.036	0.944	0.887	1.005
12.30-2pm	1.033	0.985	1.084	0.993	0.932	1.058
3-4.30pm	1.060	1.009	1.114	0.879	0.827	0.934
5.30-7pm	0.998	0.951	1.047	0.856	0.802	0.915
Type of vehicle						
Saloon car	Ref	NA	NA	Ref	NA	NA
Light truck	1.246	1.188	1.307	1.030	0.959	1.105
Large truck	0.907	0.854	0.962	0.719	0.668	0.773
Bus	0.905	0.841	0.973	0.762	0.692	0.839
Matatu	1.011	0.971	1.053	0.793	0.750	0.838
SUV	1.299	1.218	1.384	1.315	1.223	1.414

each round of survey (OR: 2.36, 95%CI: 2.12, 2.63). Knowledge of the speed limit also varied by the type of vehicle respondents were driving (chi-square: 11.494, $p<0.05$) - the majority of bus drivers (88.8%), and drivers of light truck (76.2%) were aware of posted speed limits in Thika. In Naivasha, knowledge of speed limits was highest among drivers of light trucks (92.3%).

Extent of speeding was also seen to be a problem from the KAP surveys, with 22.1% of respondents in Thika, and 12.8% in Naivasha reporting to always or nearly always drive at 10 km/h or more above the speed limit. While these proportions varied over the study period, there was a general decreasing trend in both Thika and Naivasha ($p<0.001$). Matatu drivers were the main risk takers based on the KAP surveys in Thika, with approximately 27% of them saying that they always or nearly always drove 10 km/h or more above the speed limit ($p<0.001$); whereas in Naivasha, drivers of SUVs (17%) were most responsible for speeding at 10 km/h or more above the speed limit compared with other types of vehicles ($p<0.001$).

KAP surveys also revealed useful information on the reasons why people chose to speed in the two districts. Traffic levels and the amount of time individuals had to reach their destination were the two predominant cited reasons for speeding (55.4% and 36.8% respectively, Table 5). While traffic level continued to be the most commonly cited reason, the amount of time individuals had to reach their destination became a less prominent factor over the course of the study period (OR Thika: 0.747, $p<0.001$; OR Naivasha: 0.693, $p<0.001$).

Perception of the risk associated with speeding and the notion of "driving safely" may also be factoring into an individual's decision to speed or not. Three quarters of respondents in Thika (75.1%), and 52.9% in Naivasha somewhat agreed or strongly agreed to the statement: 'it is okay to exceed the speed limit if you are driving safely', in the first round of survey (August-October 2010). This, however, changed over time in both Thika and Naivasha ($p<0.001$), with less than 30% of the respondents in the third round of survey in Thika (February 2012) agreeing with the statement but increased to 52.4% by the last round of data collection. Interestingly, there was also an uptick in the prevalence of speeding observed in Thika during the same round (Figure 1).

Table 4
Background characteristics of respondents of KAP surveys in Thika and Naivasha

	Thika		Naivasha		Total	
	n	%	n	%	n	%
Sex*						
Male	1692	93.4%	1115	91.2%	2807	92.5%
Female	119	6.6%	108	8.8%	227	7.5%
Education						
No schooling	15	0.8%	20	1.8%	35	1.2%
Primary school	310	17.4%	196	17.8%	506	17.6%
Secondary or high school	890	49.9%	555	50.5%	1445	50.1%
University	568	31.9%	328	29.8%	896	31.1%
Type of vehicle ownership*						
Commercial	273	15.3%	152	13.8%	425	14.7%
Government	50	2.8%	48	4.4%	98	3.4%
Private	408	22.9%	447	40.7%	855	29.7%
Public Service Vehicle	1069	60.0%	539	49.0%	1608	55.8%
Tourist	11	0.6%	36	3.3%	47	1.6%
Other	5	0.3%	4	0.4%	9	0.3%
Type of vehicle driving*						
Saloon car	389	21.5%	375	30.6%	764	25.2%
Light truck	153	8.4%	132	10.8%	285	9.4%
Large truck	200	11.0%	126	10.3%	326	10.7%
Bus	88	4.9%	33	2.7%	121	4.0%
Matatu	882	48.7%	456	37.2%	1338	44.1%
SUV	88	4.9%	97	7.9%	185	6.1%
Other	11	0.6%	7	0.6%	18	0.6%

* chi-square p-value <0.05

Table 5
Selected responses for KAP surveys in Thika and Naivasha

Indicators on KAP of speeding	Thika				Naivasha			
	Aug-Oct 2010 %	Apr-Jun 2011 %	Feb-12 %	Oct-Nov 2012 %	Aug-Oct 2010 %	Apr-Jun 2011 %	Feb-12 %	Oct-Nov 2012 %
Know speed limit at this part of the road	33.52	63.62	84.454	84.28	84.62	85.63	93.73	81.18
How to decide speed								
Depending on traffic	60.62	55.48	52.69	61.64	49.27	53.67	59.87	49.51
Depending on whether I am in a hurry	58.64	36.92	24.68	37.57	54.38	36.52	30.59	27.62
Following the signs	19.55	50.70	44.16	40.12	22.26	43.82	40.79	34.18
Just following the cars	9.35	12.41	5.07	7.83	3.65	4.52	4.28	7.66
Don't like to follow other cars	1.42	3.51	2.60	1.37	6.20	5.08	3.62	4.72
Never thought about it	3.12	3.75	2.97	2.54	5.11	3.95	2.96	9.04
Other factors	29.75	37.85	7.42	12.92	20.36	15.25	14.14	18.47
It is okay to exceed the speed limit if you are driving safely								
Strongly agree	14.37	11.40	11.33	34.72	18.84	39.89	32.53	15.25
Somewhat agree	61.49	43.47	19.73	17.86	34.06	20.22	11.76	25.80
Indifferent	1.15	6.18	4.69	4.37	3.26	6.74	5.19	5.76
Somewhat disagree	12.07	14.01	24.41	12.10	14.86	8.99	9.34	20.90
Strongly disagree	10.92	24.94	39.84	30.95	28.99	24.16	41.18	32.20
Speeding is a cause of road traffic crashes								
Yes	82.15	65.64	69.27	67.00	61.09	68.36	73.36	70.58
No	15.58	29.38	22.16	28.85	31.64	27.68	24.67	23.45
Not Sure	2.27	4.98	8.57	4.15	7.27	3.95	1.97	5.97

We also sought to assess enforcement levels for speeding in the two districts and found that during the initial round of KAP surveys, 23.2% and 24.7% of drivers in Thika and Naivasha respectively reported being stopped by the police for speeding in the 12 months preceding the survey. Monitoring this proportion over the study period, we found that the odds of being stopped

for speeding increased by 12% (OR: 1.12; p=0.027) with each round of interviews in Thika, while no such trend was found in Naivasha. Bus drivers (32.6%) and matatu drivers (27.9%) were among the most likely to have been stopped for speeding in Thika, whereas saloon car drivers (24.2%) and matatu drivers (21.7%) were usually the ones stopped for speeding in Naivasha.

Discussion

Results from this study highlight the high prevalence and extent of speeding in Thika and Naivasha districts of Kenya. Speed has been regularly cited as a major risk factor in road traffic crashes.[22] Through this study, we found that a significant proportion of vehicles in both districts were traveling over the posted speed limit. However, more concerning is the fact that a significant proportion of these vehicles were being operated at speeds substantially above the speed limit. A study by Finch and colleagues from nearly two decades ago showed every km/h of travel speed counts, and even a 1 km/h increase in travel speed will result in a 3% increased likelihood of a crash with injuries.[23] Vehicle speeds have also been found to be directly related to the risk of death when a pedestrian is involved, and studies have shown that at 50 km/h, the risk of death for a pedestrian is eight times that at 30 km/h.[24] This is worrisome in the case of Kenya and other similar settings, where there are a significant number of vulnerable road users such as pedestrians who account for approximately 40% or more of all road traffic fatalities each year.[7,25] In Thika and Naivasha, the situation is exacerbated by the fact that the majority of those speeding are operating larger vehicles (SUVs, Matatus, and trucks).

Although speeding remains a major problem on roads within the two study districts, our study suggests a slight improvement over the last three years. The prevalence of speeding is on a downward trajectory, and results from KAP surveys indicate that multiple factors may have played a role in this. Knowledge of speed limits, especially in Thika, improved over time, and so did perceptions of safe driving. Both these indicators were accompanied with a corresponding decrease in the prevalence of speeding. To further improve the situation, it may be imperative to improve road signage, as that has emerged as a potential contributing factor to speeding over the course of multiple rounds of KAP surveys. However, traffic level remains the most prominent factor in determining speed. Low traffic volume may encourage drivers to travel at higher speeds without frequently bypassing other vehicles. Additional research is required to examine this further as well as determine potential effective interventions to ensure sustained reduction in speeding behavior.

Perception of speeding also emerged as an issue. Based on observational studies, light trucks were most responsible for speeding in both districts, however, results from KAP surveys indicate otherwise. This may be due to the fact that these drivers are often under a time crunch while on the road, and previous studies have found drivers traveling under time pressure to be more likely to speed, as well as underestimate their speed.[26,27] Drivers also tend to overestimate the impact of increased speed on reduction in journey time.[28,29] Subsequent studies ought to examine these links, which may warrant targeted social marketing campaigns for "regular" drivers to improve awareness of the harmful effects of speeding and the need to pay close attention to their speeds while driving. In the interim, findings from this study may be used as an advocacy tool for matatu associations and other civil societies in Kenya.

Our results indicate that enforcement may also have had a part to play in the trends observed in the two districts. As part of the Bloomberg Global Road Safety Programme in Kenya, local police in both Thika and Naivasha have been equipped with speed cameras to assist with enforcement activities. Having started with less than a quarter of all drivers indicating they had been stopped for speeding in the initial round of data collection, enforcement seems to have improved over the study period, especially in Thika, where we saw the likelihood of being stopped increase by 12% with each round of KAP surveys. Effects of this were evident from our observational studies, which showed a better speeding compliance situation in Thika than in Naivasha. This represents an improvement in the right direction in the two districts, but enforcement levels are still low and represent an opportunity to address the speeding situation. Studies have found visible and regular police enforcement to be an effective deterrent against speeding and associated with a reduction of road traffic injuries.[30,31] It is therefore imperative that enforcement of existing speed legislation be a key part of any comprehensive multi-faceted programme to address speeding. While social marketing campaigns will aid in improving knowledge of drivers on key issues related to speeding, behavior change needs to be reinforced with widespread, regular, and visible enforcement to ensure a sustained change in the speeding situation in Kenya.[32]

This study has several limitations. One limitation of this analysis is the potential self-reporting and social desirability bias for sensitive issues such as speeding in the KAP survey. Additionally, because of the nature of the issue being addressed and the survey locations, people willing to participate in the roadside KAP interviews may not be representative of the general driving population in the two districts. One example is the proportion of matatu drivers surveyed, which appears to be higher than the share of traffic volume composed by such vehicles in the study districts. Secondly, despite efforts to conduct the speed observation studies in a covert manner, the nature of the speed measurement methodology employed may have made data collection activity noticeable by drivers and could potentially have affected their driving behavior. This may result in a decrease in traveling speed observed, and therefore possible underestimation of the true prevalence of speeding. Thirdly, the study was conducted in only two districts in Kenya. While it provides information on the issue of speeding in the study sites, it does not represent the issue of speeding in Kenya nationally. Additional studies are needed to determine the extent of the speeding problem and the associated burden on road traffic injuries nationally.

Conclusions

It is evident from this study that action needs to be taken to address speeding, especially the dangerous levels of speeding on the roads in Thika and Naivasha. Efforts such as those supported by the Bloomberg Philanthopies as part of the Global Road Safety Programme,[14] may be contributing to the decreasing trends of speeding observed especially in Thika. As seen from findings in this paper, the situation in Kenya calls for a comprehensive multi-faceted strategy to decrease speeding, and extent of speeding on Kenyan roads by raising awareness among regular drivers, sustaining regular and visible speed enforcement, and improving road design with physical speed restraint measures for a lasting solution to this problem.

Conflict of interest

All authors have no competing interests to declare.

Acknowledgements

This work was conducted as part of the Global Road Safety Programme, funded by Bloomberg Philanthropies.

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