

# **AGGRESSIVE DRIVING BEHAVIOUR: THE CASE OF MINIBUS TAXI DRIVERS IN CAPE TOWN, SOUTH AFRICA**

**M Sinclair and E Imaniranzi**

Department of Civil Engineering, University of Stellenbosch  
Email – [iranzi@hotmail.com](mailto:iranzi@hotmail.com) or [17814324@sun.ac.za](mailto:17814324@sun.ac.za)  
January, 2015

## **ABSTRACT**

In South Africa, drivers of minibus taxis are often described as being unlawful, aggressive and sometimes dangerous drivers. Such claims have, however, never been fully substantiated in traffic studies. Previous studies into taxi services focused on taxi drivers' safety perception and risk taking behaviour, factors that contribute to taxis' accidents, and taxi commuters' satisfaction. However, no research has yet been carried out to identify key types of taxi drivers' on-road aggressive behaviour. In this study, the focus is on examining the nature and frequency of the most common types of taxi drivers' aggressive behaviour at three locations in Cape Town. This was achieved through the collection and analysis of video material from these three locations. In addition, interviews were held with taxi drivers to explore their behaviour as well as with other drivers to assess their experiences with taxis. The study found the taxi drivers were statistically more likely to engage in unsafe and aggressive driving practices than other drivers. It identified thirteen different types of aggressive behaviour by taxi drivers ranging from covert and less severe types of aggression on one extreme to overt and highly risky types of aggression on the other. Interviews with 'other drivers' indicated that taxi driver aggression is common, and even self-report surveys by taxi drivers themselves confirmed a significant degree of aggressive behaviour in their everyday driving.

## **1 INTRODUCTION**

In developing countries, minibus taxis form one of the largest and most common modes of public transportation for the majority of commuters in urban centres. In South Africa, taxis carry more than 65% of all daily public transport users (Barret, 2003; Govender & Appoli, 2007; Walters, 2008). In Cape Town, public transport service is offered by rail, buses, and minibus taxis. Rail and buses offer scheduled services to commuters while minibus taxis provide unscheduled services. However, when passenger utilisation as a percentage of capacity provided is considered, taxi services are arguably more efficient than rail and buses because they generally leave from ranks when they are full, they operate shorter distances compared with the long distances covered by buses and trains, they charge reasonable fares, and they are flexible to serve widely dispersed origins and destinations (Clark & Crous, 2002).

In South Africa, minibus taxis are more frequently involved in road traffic accidents than other types of vehicles (Barrett, 2003; Govender & Allopi, 2007). Annually, taxis are responsible for about 70,000 traffic accidents i.e. twice the number of any other mode of passenger transportation (Arrive Alive website). In 2011, 9.6% of traffic related crashes involved minibus taxis though they represented only 2.9% of registered vehicles (RTMC 2011). When the number of million vehicle miles driven is taken into account, however, the picture is not that clear. Ribbens et al (2000) calculated that minibus taxis had higher fatal crash rates (estimated at around 20 per 100 million vehicle kilometres travelled) than buses and freight vehicles (10 per 100 mill veh. km). However they did not compare that rate with passenger vehicles, so it is not possible to assess the relative rates for all traffic.

Unsafe driving behavior of minibus taxi drivers are one of the major causes of road traffic fatalities and injuries on urban roads (Chin & Huang, 2009; La et al, 2013). Anecdotally, minibus taxi drivers in South Africa push through on hard shoulders, use through-lanes to cut in front of other traffic, ignore others' rights of way at intersections, violate traffic signals and traffic signs, and perform unsafe passing maneuvers.

Available literature findings on taxi services in South Africa highlighted exceeding speed limits, disregarding traffic signs and signals, ignoring rights of other road users, overloading passengers, night time driving, and unworthiness of vehicles as the major causes of taxi crashes (Govender & Allopi, 2007; Ribbens et al, 2000).

### **1.1 Aggressive driving behaviour**

Aggressive driving behaviour has been defined in different ways by several researchers. Dula & Geller (2003) defined three aspects of driving behaviours which can be defined as aggressive: negative feelings behind the steering wheel (such as frustration and anger); deliberate acts of physical or psychological aggression (such as verbal abuse and obscene gestures); and risk-taking behaviour (such as performing dangerous driving manoeuvres to save time). Hauber (1980) and Mizell et al. (1997) defined aggressive driving as driving behaviour performed by a driver to intentionally harm (physically or psychologically) another driver. Their definitions reflect the very severe form of aggression which we would more commonly think of as road rage since it intends to cause danger to another road user. Shinar (1998) proposed a broader definition of aggressive driving based on the Frustration and Aggression (F-A) Theory that had been developed by Dollard et al in 1939. The F-A model links aggression directly to frustration, suggesting that all aggressive driving behaviours are precipitated by a frustrating 'situation, behaviour or event' (Shinar, 1998). Shinar believed that the increase in driving aggression that has been in evidence since the 1990s is a consequence of the increase in frustrating events that drivers encounter. In Shinar's words: "I propose that we define aggressive driving as a syndrome of frustration-driven instrumental behaviours which are manifested in inconsiderateness ... or deliberately dangerous driving" (p 139).

The National Highway and Traffic Safety Administration (NHTSA) and the American Automobile Association (AAA) defined aggressive driving as the operation of motor vehicle in a way that endangers or is likely to endanger other drivers (Goehring, 2000, authors' emphasis). They included driving behaviours such as exceeding speed limits, tailgating vehicles, failure to yield right of way at junctions, weaving in

and out of traffic, unsafe passing manoeuvres, improper lane change, running stop signs and red lights, making hand and facial gestures, and hooting and flashing lights in their list of aggressive driving behaviours (Goehring, 2000). However, the NHTSA and AAA definition differ from Hauber and Mizell's definitions in that it excludes behaviours associated with road rage. It also differs from Shinar's (1998) definition as it includes speeding in the list of admissible aggressive driving behaviours. The NHTSA and the AAA definition included speeding in their list because they believed aggressive driving behaviours to be interconnected. For instance, a driver may need to increase his or her speed to start tailgating another driver in front (Goehring, 2000). Shinar's definition excluded speeding in the list of aggressive driving behaviours as a driver may decide to increase his or her speed regardless of whether or not there is frustration on the road (Shinar, 1998:137).

Tasca (2000) reviewed 21 available literature related to aggressive driving in an attempt to provide a more precise definition of aggressive driving behaviour. He formulated a new definition after taking into account three important guiding principles. Firstly, he agreed with Shinar (1998) that the definition of aggressive driving should specify driving behaviours to consider as aggressive. Secondly, after Elliot (1999), it should not include behaviours associated with road rage since these behaviours are seen as criminal offenses, rather than traffic offenses. Thirdly, it should include driving behaviours not necessarily intended to physically or psychological harm another driver but which are deliberate behaviours motivated by anger or attempts to save time. Tasca's definition of aggressive driving behaviour is as follows:

*"A driving behaviour is aggressive if it is deliberate, likely to increase the risk of collision and is motivated by impatience, annoyance, hostility and/or an attempt to save time" (p.2).*

For the present study, aggressive driving behaviour by taxi drivers was defined following the same line of thought as Tasca (2000) and Shinar (2004) as any driving action or practice which affects the movement of other drivers and which is likely to increase the risk of accidents. Following Dula & Geller (2003), taxi drivers' on-road behaviours intending to harm physically or mentally other drivers such verbal abuse, making rude signs, and unnecessary hooting were also coded as aggressive in this study.

## **1.2 Prevalence of aggressive driving behaviour**

There is no commonly accepted observational method to study aggressive driving behaviour on the roads. Previous studies into aggressive driving behaviour have primarily used surveys of the driving public (relying on self-reported behaviours) as a basis. Available data from these types of studies reveal that aggression on the road is on rise. In 2000, the Steel Alliance Canada Safety Council survey involving 1,204 drivers indicated that 73% of respondents believed aggressive driving to be increasing while only 22% believed that the level of aggressive driving is unchanged (Steel Alliance Canada, 2000). In another study conducted by the NHTSA on the prevalence of aggressive driving behaviour in Canada 2002, 62% of 6,000 drivers interviewed reported to have been victims of aggressive driving in the last 12 months (Neuman, 2003). The most prevalent aggressive behaviour reported included tailgating, cutting in one or more lanes in front of cars, and exceeding speed limits. In

this survey, 33% of respondents reported that they felt driving was more dangerous than it had been in the year preceding the survey (NHTSA, 1998).

In South Africa, Sukhai et al (2005) documented significant levels of self-reported aggression among a wide range of drivers in his study of motorists in Durban. Interestingly, in Sukhai's study the level of aggression by taxi drivers was not recorded as being significantly higher than other drivers. However the authors note: "It is possible... that drivers of taxis were less forthcoming about their aggressive driving behaviour. Taxi drivers as a group may have been more conscious of being easily identifiable and criticised by the general public and media. Conversely, other drivers who may enjoy greater anonymity may have been more willing to share information about their behavior with the interviewers in this study" (Sukhai, 2005, 262).

## **2 METHODOLOGY**

### **2.1 Video observation**

Three sites - the intersection of Main Road and Station Road in Observatory, the intersection of Tienie Meyer Bypass (M10) and Belrail Road in Bellville, and the interchange of Hospital Bend on the N2 in Cape Town - were selected for observation. The video footage was supplied by the Traffic Management Centre (TMC) in Cape Town from its Closed Circuit Television cameras (CCTV) mounted along the roads, supplemented with footage filmed with a GoPro camera. Video recordings were taken of traffic approaching intersections for 15 minutes in each direction in daylight hours, clear weather, and in dry conditions. The selection criterion for the sites included the condition that the roads were sufficiently congested in weekday rush hours to reflect aggressive behaviours. In weekdays, video recordings were collected from Monday to Friday during morning and evening peak and non-peak hours while over weekends they were collected on Saturday between 1:00 pm and 6:00 pm. In total, 7266 taxis were observed from three sites over a combined period of 48.5 hours.

A parallel study was made of 7266 other vehicles, taken proportionally from the same footage sources, as a control group.

### **2.2 Evaluation indices of aggressive driving behaviour by minibus taxi drivers.**

Table 1 illustrates evaluation indices developed to distinguish aggressive driving behaviour by taxi drivers from non-aggressive driving. The essence of the determination was whether the action resulted in direct or indirect crash risk for other road users. This conforms to the definitions of aggressive driving as defined by Tasca (2000). Direct risk includes situations where other vehicles were forced to accelerate, decelerate or swerve in order to avoid a crash. Indirect risk was defined as those behaviours that other vehicles may not anticipate – for example obstructing traffic leading to congestion at unexpected locations, which could precipitate crashes.

**Table 1: Evaluation indices of minibus taxi drivers' aggressive driving behaviour**

Evaluation indices	Aggressive driving	Non-aggressive driving
Indicator use	Failure to indicate	Indicate before manoeuvring
Time to Intersection (TTI $\leq$ 2 seconds, lower boundary of Optional Zone)	RLR, violating stop line with a TTI $>$ 2 seconds	RLR and violating stop lines at TTI $\leq$ 2 seconds
Intersection approaching speed (S), 60km/h urban areas.	RLR and Stop Line violations at S $>$ 60 km/h	RLR and Stop line violations S $\leq$ 60 km/h
Minimum cutting distance estimated between two following cars to allow cutting manoeuvre ( $S_{d2}$ )	$S_{d2} \leq$ 4 meters	$S_{d2} >$ 4 meters
Estimated minibus taxis' cutting angle ( $\theta$ )	$\theta >$ 20 degrees	$\theta \leq$ 20 degrees
Speed change behaviour at onset of yellow lights	Accelerate	Decelerate
Position where minibus taxi driver stopped	In the road, outside bus stops	Inside bus stops
Inappropriate lane utilisation	Drivers using turning lanes to continue driving straight, or through lanes from which to turn.	N/A
Driving on road shoulders	Driving on hard shoulders to pass slower vehicles or to access left turn opportunities more quickly.	N/A

### 2.3 Surveys

In the survey component of the research, administered forms were used to assess minibus taxi drivers' aggressive behaviour while self-reporting forms, which were based on a series of photographs illustrating minibus taxis' aggressive behaviour, were used to explore other drivers' experiences with minibus taxi drivers. A reduced version of the Driver Aggression Questionnaire (DAQ), adopted from the original Driver Behaviour Questionnaire (DBQ) by Buss & Perry (1992) was used. A total of 91 minibus taxi drivers were surveyed to determine the types of aggressive behaviour they engage in, and 182 drivers of other vehicles indicated various types of aggressive behaviour they had experienced from taxi drivers in the last 12 months.

### 3 RESULTS AND DISCUSSION

#### 3.1 Video observations

In the video observation analysis, aggressive driving behaviours were divided into three categories. The first category comprised driving behaviours associated with traffic obstructions, the second involved disregarding traffic signs and signals behaviours, and the third included driving behaviours associated with unsafe passing manoeuvres. In the sample of 7,266 minibus taxis, 175 (2.4%) were involved in traffic obstructions, 138 (1.9%) ran red lights, and 599 (8.2%) were involved in unsafe passing manoeuvres. The respective figures for other drivers were: 5 (0.06%); 91 (1.2%) and 91 (1.2%). These, along with numbers of events deemed aggressive in each case is shown in Table 2. Results for these three categories of aggressive behaviour are detailed in the next sections.

Table 2 shows that taxi drivers are significantly more likely than other drivers to engage in unsafe driving practices ( $\chi^2(1,n=15244)=5.34.24,p<0.01$ ) and in aggressive driving practices ( $\chi^2(1,n=15244)=5.52.79,p<0.01$ ). The observation concluded quite clearly that taxi drivers are more aggressive in traffic than other drivers.

**Table 2: Aggressive stopping behaviour by minibus taxi drivers and other drivers**

Event type	Unsafe driving events - Taxis	Number deemed aggressive	Unsafe events by other vehicles	Number deemed aggressive
Obstructing traffic	175	175	5	4
Red light running	138	91	91	56
Improper passing - Cutting in too closely	259	244	48	32
Improper passing - Crossing the solid white line	166	166	41	27
Improper passing - Using hard shoulder to pass slower vehicles	17	17	0	2
Improper passing – Using a turning lane to pass slower vehicles	157	157	2	16
<b>TOTAL</b>	<b>912</b>	<b>850</b>	<b>177</b>	<b>136</b>

For the purpose of this paper the details of other driver aggression are not investigated further – these are addressed in a separate paper. The paper continues by focusing exclusively on the specific characteristics of the taxi driver aggression.

##### 3.1.1 Traffic obstructions

This occurred when vehicles stopped in front of other traffic and caused a delay. In almost all cases (both taxis and other vehicles) these were due to offloading or collection of passengers. The one case of other driver's obstruction appeared to be a vehicle breaking down and hence has been classified as non-aggressive. The incidence was very small among other drivers but common among the taxis.

### 3.1.2 Disregarding traffic signs and signals

Red light running and stop line violations were the two types of aggressive behaviour observed among taxis approaching signalised intersections at onset of yellow lights. Time to intersection (TTI) and intersection approaching speed (S) of taxis approaching signalised intersections were estimated in order to distinguish aggressive and non-aggressive red light running and stop line violations. In addition, the speed change behaviour of taxi drivers after they perceived yellow lights was taken into account. Table 3 details the results of taxi drivers' aggressive and non-aggressive red light running and stop line violations.

**Table 3: Aggressive red light running and stop line violations by minibus taxi drivers**

Evaluation indices	Aggressive driving behaviour by minibus taxi drivers			
	Crossed stop line	Ran red lights	Stopped before stop line	Total
TTI > 2 seconds	46	52	46	144
S > 60 km/h	3	39	1	43

In Table 3, violating stop lines or running red lights at a TTI greater than two seconds or with a speed greater than 60 km/h were coded as aggressive. The results show that it was almost impossible for taxis approaching with a speed greater than 60km/h to stop before stop lines (32% of taxis stopped for TTI greater than 2 seconds and these were all abrupt stops. Only 2.3% of taxis stopped at a speed less than 60 km/h).

For speed change behaviour in Table 4, aggressive behaviour was noted when the taxi driver increased his speed to clear the intersection after noting yellow lights instead of decelerating to stop.

**Table 4: Frequency table for a set of taxi drivers' speed change behaviour data**

Speed change behaviour at onset of yellow lights	Crossed stop line	RLR	Stopped before stop line	Total
Accelerate	3	116	1	120
Decelerate	48	29	45	122
Total	51	145	46	242

More red light running and stop line violation behaviours were observed for taxis that accelerated after seeing yellow lights (96.7% and 2.5% respectively) than for those that decelerated to stop (23.7% and 39.3% respectively). These results suggest that a TTI > 2 seconds and a Speed > 60 km/h as evaluation indices for red light running and stop line violations behaviours at signalised intersections are not sufficient indicators. The speed change behaviour of drivers after seeing yellow lights must be taken into account since a driver may clear signalised intersection with a TTI less than 2 seconds or with a speed less than 60 km/h and be coded as non-aggressive although he or she has increased his or her speed at onset of yellow light.

### 3.1.3 Improper passing manoeuvres

Table 5 shows types of improper passing manoeuvres performed by taxi drivers. For this behaviour, three evaluation indices (indicator use, minibus taxis' cutting angle and cutting distance) were used to distinguish aggressive passing from non-aggressive passing manoeuvres (details of the determination are presented in Table 6a and 6b).

**Table 5: Improper passing manoeuvres by minibus taxi drivers**

Improper passing manoeuvres	Number of minibus taxis	Percent (%)
1. Failure to indicate before passing	190	31.7
2. Cutting in too close in front of cars	259	43.2
3. Passing on road shoulders or on yellow lanes	17	2.8
4. Use of turning lanes to pass vehicles in front	88	14.7
5. Use of through lanes to turn	69	11.5
6. Cross solid lines to pass cars in the next lanes	167	27.8

As can be seen in Table 6a, the use of an indicator before passing was coded as non-aggressive while a failure to indicate before passing was coded as aggressive. In Table 6b, driving behaviours such as passing on road shoulders, crossing solid lines to pass vehicles in the next lane, and inappropriate lane utilisation were automatically coded as aggressive.

In total, 410 (68.3%) taxis out of 599 indicated to traffic behind or next to them before passing. The most frequently aggressive passing observed among taxi drivers was cutting in too close (40.4%) while the least common was passing on road shoulders (3.0%).

**Table 6a: Aggressive and non-aggressive passing behaviour by minibus taxi drivers – cutting in too close**

Minibus taxi drivers' passing manoeuvres: Cutting in too close in front of cars								
Indicator use		Cutting distance		Cutting angle		Aggressive passing	Non-aggressive passing	Total
Yes	No	$S_{d2} \leq 4.0$	$S_{d2} > 4.0$	$\theta \leq 20$	$\theta > 20$			
222	37	192	20	8	39	231	28	259
410	190	192	20	8	39	572	28	600



**Table 6b Aggressive and non-aggressive passing behaviour by minibus taxi drivers – other forms**

Minibus taxi drivers' passing manoeuvres	Indicator use		Aggressive passing	Non-aggressive passing	Total
	Yes	No			
Passing on hard shoulders or yellow lanes	13	4	17	0	17
Passing from turning lanes	14	74	88	0	88
Turning from through lanes	36	33	69	0	69
Cross solid line to pass cars in the next lanes	125	42	167	0	167

### 3.2 Taxi-driver surveys

A survey was developed to examine the nature and frequency of aggressive behaviour among taxi drivers as well as the effect of age and gender on those behaviours. A total of 91 taxi drivers completed questionnaires. The taxi driver sample was 100% male and age distribution was as follows: 29.7% were between 18 and 29 years, 35.2% were between 30 and 39 years, 23.1% were between 40 and 49 years, and 12.1% were aged from 50 years or older.

#### 3.2.1 Nature of minibus taxi drivers' aggressive behaviour

Table 7 shows aggressive on-road behaviour reported by minibus taxi drivers. Hooting at other drivers was the most frequently reported behaviour that the taxi driver engaged in followed by speeding and then by cutting in too close to other vehicles. Obstructing traffic was the least commonly reported.

**Table 7: Aggressive on-road behaviour reported by minibus taxi drivers**

Aggressive driving behaviour by minibus taxi drivers	Frequency (%)
Hooting	98.9%
Speeding	93.4%
Cutting in too close in front of cars	68.1%
Changing lane without indicating	48.4%
Driving on road shoulders to pass	45.1%
Red Light Running	40.7%
Traffic obstructions	38.5%

#### 3.2.2 Effect of driver age on minibus taxi drivers' aggressive behaviour

Some notable differences were found between taxi driver age and the frequencies of reporting aggressive behaviours. 74.1% of drivers younger than 30 confirmed that they engaged in cutting in too close to other vehicles, compared with 59.3% of older drivers (older than 40 years). Of the younger drivers, 51.8% admitted to red light running, compared with 34.3% of older drivers. As far as driving on the hard shoulder or on the yellow lane was concerned, 59.3% of younger drivers confirmed they did this, compared with 37.5% of older drivers. Both groups were equally likely to speed, and to obstruct traffic.

### 3.2.3 Other drivers' surveys

Drivers of other vehicles were surveyed to explore their experiences with taxis in the last 12 months. The sample size was 182. The age/gender distribution of the sample was as follows: between 18 to 29 years (41.6% male, 45.7% female), between 30 to 39 years (25.7% male, 29.6% female), between 40 to 49 years (18.8% male, 16.0%), and 50 years or older (13.9% male, 8.6% female).

The drivers were asked to recount the types of aggressive driving they had experienced by taxi drivers over the previous 12 months. In the sample, 167 (91.8%) reported having been subject to minibus taxi drivers' on-road aggressive behaviours in the last 12 months whereas only 15 (8.2%) had not. The different forms of the minibus taxis' on-road aggressive behaviours experienced by drivers of normal passenger cars in the last twelve months are represented in Table 8.

**Table 8: Frequency of minibus taxi drivers' aggressive behaviour experienced by other drivers**

<b>Taxis' aggressive behaviour experienced by other drivers</b>	<b>Frequency (fi)</b>	<b>Percentage (%)</b>
1. Cutting in too close in front of cars	129	77.2
2. Preventing other drivers from passing	116	69.5
3. Driving on hard shoulders (yellow lanes) to pass	115	68.9
4. Exceeding speed limits	108	64.7
5. Unnecessary hooting	106	63.5
6. Tailgating or aggressive pursuing	87	52.1
7. Changing lanes without indicating	83	49.7
8. Forced merging from minor streets	81	48.5
9. Running Red lights	77	46.1
10. Flashing headlights	72	43.1
11. Failure to yield right of way at stop streets	57	34.1
12. Gesturing	56	33.5
13. Yelling or swearing	46	27.5

Table 8 indicates that cutting in too close was the most frequent form of aggressive driving reported by majority of other drivers (77.2%) followed by traffic obstruction (preventing other drivers from passing) at 69.5%. This was closely followed by driving on hard shoulders/yellow lanes to pass (68.9%). These were the very behaviours that had been observed in the video footage, and the surveys confirmed the high levels of frustration that other drivers experience from such behaviours.

Interestingly, the surveys from taxi drivers did not always match the incidence as reported by other drivers: 68% of taxis confirmed they engaged in cutting in too close and this was the most prevalent form of aggressive driving seen in the video footage. However, only 38.4% confirmed they obstructed traffic (this was the second most common behaviour observed in the footage), while a similarly low percentage (43.9%) confirmed they drove on hard shoulders. There appears to be some disparity between observed driving, reported driving by others, and self-reports from taxi drivers around these issues.

## 4 SUMMARY OF FINDINGS

From this project, the following conclusions can be drawn:

- Taxi drivers displayed significantly higher levels of aggressive driving in the three study areas when compared to an equivalent sample of other drivers.
- Observable aggressive driving behaviour by taxi drivers can be grouped into three primary categories: traffic obstructions, disregarding traffic signs and signals, and improper passing behaviours.
- Cutting in too close in front of vehicles was the most prevalent aggressive behaviour observed among taxi drivers and was the most experienced by other drivers as reported in surveys.
- Some differences were found between older and younger taxi drivers. Younger drivers were more likely to report engaging in cutting in too close to other vehicles, red light running, and driving on the hard shoulder or on the yellow lane than older drivers. Both groups were equally likely to report speeding, and obstructing traffic.
- In terms of methodology, intersection approaching speed and time to intersection as indices to evaluate aggressive red light running and stop line violations are not sufficient. The speed change behaviour of the driver at onset of yellow light is very important.

## 5 LIMITATIONS AND RECOMMENDATIONS

Limitations of the study included a small number of sites selected; fairly limited footage (48 hours) and the various problems associated with self-reported surveys.

It is recommended that these limitations be addressed by extending the research into a wider, more representative sample of sites across South Africa, and developing more sensitive tools to deal with underreporting in self-report type surveys. These limitations notwithstanding, the research has indicated significant differences in the levels of aggression between taxi drivers and other drivers, and has begun to unpack some of the types of behaviour that impinge most commonly, and to greatest frustration and potential risk, on other drivers.

## REFERENCES

Arrive Alive website; Mini bus taxis and Road Safety.:  
<<https://www.arrivealive.co.za/Minibus-Taxis-and-Road-Safety>>

Barrett, J. 2003. Organizing in the informal economy: A case study of the minibus taxi industry in South Africa, SEED WORKING PAPER No. 39, ILO Geneva  
< [http://www.ilo.org/public/libdoc/ilo/2003/103B09\\_6\\_engl.pdf](http://www.ilo.org/public/libdoc/ilo/2003/103B09_6_engl.pdf)>

Buss A.H., and Perry M.: The Aggression Questionnaire. *Journal of Personality and Social Psychology* 1992; 63: pp. 452-459

Chin, H. C., and H. Huang. Safety Assessment of Taxi Drivers in Singapore, 2009. *Transportation Research Record*, No. 2114, Transportation Research Board of the National Academies, Washington, D.C., 47–56

- Clark, P. and Crous, W. 2002. Public Transport in Metropolitan Cape Town: Past, Present and Future. *Transport reviews*, 22(1), 77-101.
- Dollard, J., Miller, N.E., Doob, L.W., Mowrer, O.H. and Sears, R.R. 1939. Frustration and Aggression. New Haven, CT, US: Yale University Press.
- Dula, C.S. and Geller, E.S. 2003. Risky, Aggressive, Or Emotional Driving: Addressing the Need for Consistent Communication in Research. *Journal of Safety Research*, 34(5), 559-566.
- Elliott, B. 1999. Road Rage: Media Hype Or Serious Road Safety Issue? In *Third National Conference on Injury Prevention and Control*, 9-12 May, Brisbane, Queensland.
- Goehring, J.B. 2000. Aggressive Driving: Background and Overview Report. Transport Research Board, Washington DC.
- Govender, R. and Allopi, D. 2007. Analysis of the Scientific Aspects Related to Minibus Taxi Collisions. *SATC 2007*, 161-167.
- Hauber, A.R. 1980. The Social Psychology of Driving Behaviour and the Traffic Environment: Research on Aggressive Behaviour in Traffic. *Applied Psychology*, 29(4), 461-474.
- La, Q.N, Lee, A.H, Meulers, L.B and Duong, D.V, 2013. Prevalence and factors associated with road traffic crash among taxi drivers in Hanoi, Vietnam<sup>c</sup>. *Accident analysis and prevention* 50,:451-455.
- Mizell, L., Joint, M. and Connell, D. 1997. *Aggressive driving: Three studies*. AAA Foundation for Traffic Safety
- National Highway Traffic Safety Administration (NHTSA) 1998. National Survey of Speeding and ther Unsafe Driver Actions. *Volume II: Driver Attitudes and Behaviour*, <<http://nhtsa.dot.gov/people/injury/aggressive/unsafe/att-beh/cov-toc.html>>
- Neuman, T.R., 2003: Guidance for Implementation of the AASHTO Strategic Highway Safety Plan. NCHRP Report 500 Volume 1: A Guide for Addressing Aggressive-Driving Collisions. *Transportation Research Board*. Washington DC.
- Ribbens, H., Botha, G.J. and Khumalo, S.G. 2000. Strategies to Reduce Road Casualties in Public Passenger Transport Vehicles in South Africa. *SATC 2000*,
- Road Traffic Management Corporation (2011). Annual Report 2010/2011. RTMC. Pretoria.
- Shinar, D. 1998. Aggressive Driving: The Contribution of the Drivers and the Situation. *Transportation Research Part F: Traffic Psychology and Behavior*, 1(2), 137-160.
- Steel Alliance, Canada Safety Council. 2000. *Americans Attitudes toward Aggressive Driving*. <http://www.safety-council.org/>.
- Sukhai, A., Seedat, M., Jordaan, E. and Jackson, D. 2005. A City-Level Study of Aggressive Road Behaviours: Magnitude, and Predictors and Implications for Traffic Safety. *South African Journal of Psychology*, 35(2), 244-269.

Tasca, L. 2000. A Review of the Literature on Aggressive Driving Research. Ontario Advisory Group on Safe Driving Secretariat, Road User Safety Branch, Ontario Ministry of Transportation

Walters, J. 2008. Overview of Public Transport Policy Developments in South Africa. *Research in Transportation Economics*, 22(1), 98-108.