

**DRIVER BEHAVIOUR AND CITY TRAFFIC: EMPIRICAL
OBSERVATIONS FROM ACCRA, GHANA**

A. M. Abane

Abstract

Deviant driving behaviour and the effect on traffic in Accra is examined. The evidence is inconclusive but seems to suggest that the person behind the wheel is responsible for a substantial number of the traffic problems reported on roads in the city. There is also reason to believe that traffic management and control in the city needs to be stepped up and that this should be approached from the perspective of the road user. However, all these have to be preceded by the collection of data on driver behaviour covering both the individual and a broad spectrum of the wider environment so that the extent of the problem of deviant driving behaviour in the city can be put into proper perspective.

INTRODUCTION

Research on the problems of city traffic is becoming increasingly extensive in the developing parts of the world. The upsurge of interest in city traffic is attributed to a variety of socio-economic developments, not least a rise in the demand for motorised transport and the need to expand existing infrastructures to cope with the increasing volumes of traffic.

Much of the existing research on urban transport in developing countries concentrates on problems of access and mobility (see Adarkwa, 1991; Adeniji, 1983; Frishman, 1986; Ozo, 1986; Sarna and Bhatia, 1991). A substantial number also focuses on traffic congestion, accidents and parking difficulties (Abane, 1993a; Asogwa, 1992; Ehiakpo, 1990; MRH/GHA, 1988; Sharpe, 1990; Tamakloe and Adarkwa, 1988). The most widely researched area is however on travel behaviour; of city dwellers, whether this is examined from the perspective of commuting to and from work, to school, hospital, tourist attractions or to shopping centres (see, for example, Abane, 1990, 1992, 1993b; Chin, 1990; Lartey, 1977; Ogunjumo and Fabgemi, 1991).

Another area that is attracting considerable research attention in the advanced parts of the world, especially in countries such as the United States of America (USA), the United Kingdom (UK), France, Germany, Australia and Canada but which is yet to be seriously explored in developing countries including Ghana is the behaviour of drivers and pedestrians. It is becoming increasingly evident that the person behind the wheel as well as on the road is responsible to a large extent for many of the traffic problems experienced daily. These include jams, accidents and delays reported in towns and cities. It is therefore the opinion of some researchers and city planners (Abane, 1993a; Asogwa, 1980; Chin, 1990; Jacobs 1976, 1982; Jacobs and Sayer, 1983; Kawai, 1991) that drivers and pedestrians need to be studied comprehensively in order to identify the factors underpinning their behaviours as a first step toward recommending practical solutions to the traffic problems. It is against this background that the present study is of significance to traffic management in Accra in particular and to other urban centres of Ghana in general. The study analyses aspects of drivers' behaviour, which for lack of a suitable terminology, is described as 'deviant' behaviour. These are behaviours which in the context of a standard highway code constitute traffic offences and are punishable by law (see MOTC, 1974). The object is firstly, to identify the most frequently occurring deviant driving behav-

ious; and secondly, to examine how such deviant behaviours are influenced by either the personal characteristics of the drivers or the prevailing socio-economic and physical conditions of the area under study. It is expected that the main indicators identified will form a framework for a more extensive study of driving behaviour in the city as well as in other urban centres of the country.

CONTEXTUAL PERSPECTIVE

In 1974 Ghana shifted from left to right hand drive. Prior to that a new Highway Code was launched to educate road users and the wider public on safe use of the road. As stated in the 'Foreword' by Major Asante, the Code 'was designed to serve as a standard of behavior and a source of guidance to all road users' (MOTC, 1974).

1) The Code covers a broad range of topics from use of the road by motorists and pedestrians through driving or cycling on motorways to administering first aid on the road whenever the need arises. In principle all road users and especially vehicle drivers and motor cyclists should be conversant with the topics treated in the Code. This is not only to enable them pass their driving tests but also to ensure that they use the road confidently and safely. Institutions exist to assist in the enforcement of the Highway Code. For example, the Motor Traffic and Transport Unit (MTTU) of the Ghana Police Force is charged with the responsibility among others of maintaining discipline on the roads in the country. The Vehicle Examination and Licensing Division (VELD) of the Ministry of Transport and Communications (MOTC) also issues licenses and roadworthy certificates. With the Highway Code and the roles played by these institutions one expects to see traffic discipline on the roads in the country. Unfortunately, this is not the case. Deviant driving behaviour is a frequent occurrence and is reaching unprecedented levels in the urban centres where volumes of traffic are high. It is therefore important for a study of this nature to be undertaken in the country to highlight the extent of the problem of poor driving behavior. Accra was used as a case study because of its unique position in the country not only from the administrative and socio-economic viewpoint but also from the geographical, planning and traffic management viewpoint. For instance, Accra is the capital as well as the largest urban centre in Ghana. Located on the coast of the Greater Accra Region (Fig 1), the city epitomizes the level of socio-economic development in the country. It is characterised by an increasing rate of population growth (3 - 6% per annum), substantial suburban expansion and a relative rise in the growth of industry, commerce, housing, health and educational establishments. These socio-economic developments are supported by a large and constantly growing labour force estimated at 300,000 - 400,000 (Ghana, 1984).

A consequence of all these developments is an increase also in the demand for motorised transportation. It is not surprising that there is a large volume of vehicles presently serving various parts of the city. Approximately 20,000 commercial commuter vehicles including taxis, trotros (minibuses and wooden trucks), 'one pound one pound' (unmarked saloon cars used for commercial purposes) and buses as well as 20,000 - 25,000 private and departmental vehicles operate in and around the city (Abane, 1993). Added to this list is an estimated 10,000 - 15,000 vehicles of various categories which also enter Accra daily from other parts of the country including places as far north as Wa, Lawra, Bolgatanga, Paga and Bawku. The problems arising from such diverse attitudes, perceptions and behaviours of drivers and pedestrians as found in Accra daily require studies of this nature to assist in finding practical solutions to them.

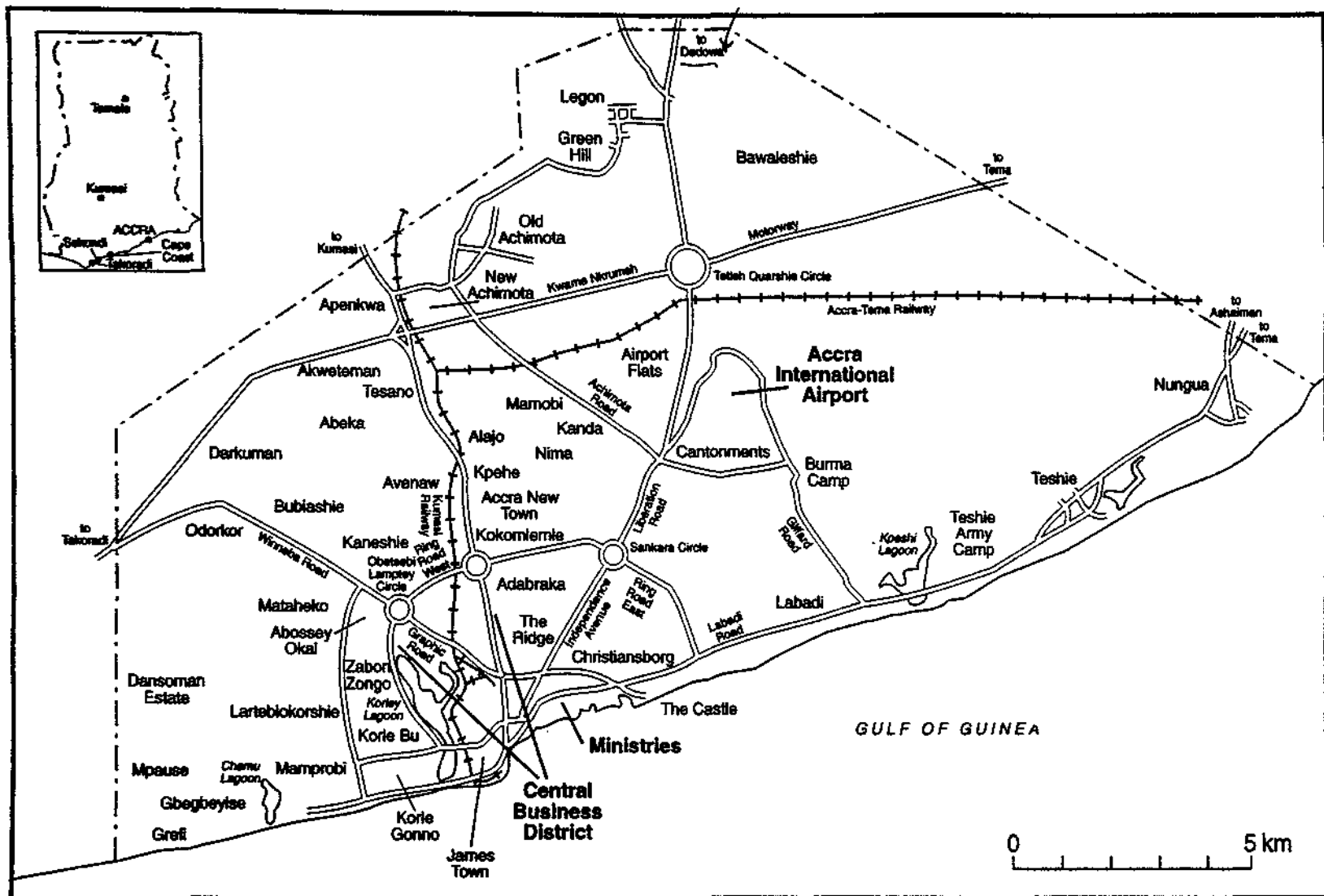


Fig. 1 Accra : position, size, neighbourhoods and transport network

METHODS AND DATA

The data analysed were derived from interviews and road-side observations of drivers plying four selected roads in the city. The roads are the Achimota Road, Tesano-Abeka Junction-Circle Road, the Independence Avenue, and the Labadi Road (Fig 2). The interviews were conducted at the workplaces of drivers. This was necessitated by the need not to disrupt their work since the individual driver's income depends largely on the amount of money made per day.

The information sought from the drivers covered such areas as driving experience, acquisition of driving licence, errors in driving, accidents and their personal circumstances including that of age, sex and occupation.

Data were also collected by direct observations of drivers' behaviours along the selected routes. This was done over a period of four weeks and the main concern was to obtain information on aspects of deviant driving behaviour defined earlier in the text. The emphasis was on eight traffic offences, namely: 1) over-speeding at restricted parts of the city; 2) unnecessary use of the horn such as using the horn as a musical instrument or to attract potential customers; 3) driving on the shoulder of the road when the intention is not to stop or take-off; 4) overtaking at dangerous locations such as junctions; 5) changing a route without signalling; 6) driving with high head light at night; 7) stopping, turning or parking at unauthorised sections of the road; and, 8) failing to stop at pedestrians' crossing points.

A number of problems were encountered in the course of the survey. First, limited resources in terms both of personnel and finance made it impossible to extend the survey to other roads of the city. Secondly, although it would have been desirable to track down deviant drivers for the interviews, it became practically workable because of the varied nature of the destinations of drivers and passengers being transported. Even in situations where a vehicle's registration number was known it was still difficult to follow the driver up because one could not determine which trotro or taxi branch, or ministry or department the particular driver worked for. The only practical thing was to interview a sample of drivers both on the road and at their workplaces irrespective of their behaviour. Thirdly, a number of potential interviewees showed considerable hostility towards the investigator. This was in spite of attempts made to explain clearly to them the objective of the study. Some of the drivers perceived the investigator as one of those researchers whose task is to collect information on their earnings and advise the AMA on matters of income tax.

Despite the problems encountered, some vital information was still gathered on aspects of driver behaviour in the city, for which 107 drivers cooperated and supplied the relevant data. Much of the data were found to be characteristic of data used for similar studies in other parts of the Third World (see, for example, Abane, 1990; Frishman, 1986; Jacobs, 1976; Ogunjumo and Fagbemi, 1991; Sarna and Bhatia, 1991). As many as 302 vehicles of various make were also observed to have committed at least one of the listed offenses and were included in the study. The analyses presented below must therefore be viewed as a reflection of aspects of the behaviour of drivers in Accra in particular and of other urban centres of Ghana in general.

CHARACTERISTICS OF THE DATA

The data showed quite significant variations ($p < 0.0005$, $X^2 = 14.27$ with 9 df). Of the 107 drivers interviewed 83 were males and 24 were females. The median ages of the interviewees were 34 years for the males and 26 years for the females. Sixty-nine (69) drivers, representing 64.5% of the interviewees drove commercial vehicles including taxis (46), trotros (23) and buses (10). The rest (38) drove private cars or other vehicles belonging to government or private organizations. The distribution was similar in the case of the 302 vehicles observed to have committed offences on the roads. Taxis made up the highest number (148) followed by trotros (112) and private cars (31).

The data also showed that of the 107 drivers interviewed 64 or approximately 60% of them obtained their licences after passing a driving test. The rest (43) said they were issued the licences without a test, although some of the people in this group claimed to have been invited specifically for a driving test. An important observation was that, of the 64 drivers who claimed to have acquired their licenses after a test, 49 of them said they obtained theirs in Accra; the rest had their licences issued from the Vehicle Examination and Licensing Division (VELD) offices outside of Accra including those in Kumasi, Koforidua, Tamale, Cape Coast and Sekondi-Takoradi. The majority of those who were tested said the questions included extracts from the Ghana Highway Code. They could recall questions relating to road signs and also manoeuvres which they were requested to perform with their vehicles.

A surprising discovery was that a substantial number of those who obtained their licences without a test (29 or 67% of the 43 drivers) claimed to be professional drivers and drove vehicles belonging to either the Ghana Private Road Transport Union (GPRTU) or some government departments or non-governmental organizations. By contrast, only slightly more than 48% of the respondents who obtained their licences after a thorough examination said they were professional drivers. Nearly all of the non-professional drivers (44) had driving experi-

ence of over 10 years and a third of them (15) said they had been involved in at least an accident since they acquired their licences. In the context of the data collected, this group of drivers appeared to have had a better safety record than the so-called professional drivers. This is because approximately 71% of the professionals said they had been involved in at least one accident in Accra, and only 23% of them (14) had driving experience of over five years. Although a correlation analysis performed showed a very weak and negative association between years of driving experience and number of accidents (-0.018), there is reason to believe that the result could have been different if the sample size had been larger. Further exploration of the issue is therefore needed before a reasonable conclusion can be drawn on it.

Two other points about the data set need mention. One is that the percentage of male drivers involved in accidents was very high (61%) compared to female drivers (21%). Secondly, fewer females (9) than males (34) acquired their licences without a test. More work is needed to determine how widespread the above problems are in the city. Nevertheless, it is possible for the moment to surmise that female drivers are more likely to abide by traffic regulations in Accra than their male counterparts. Similarly, female drivers are less at risk of being involved in an accident in traffic than male drivers.

DEVIANT DRIVING BEHAVIOR

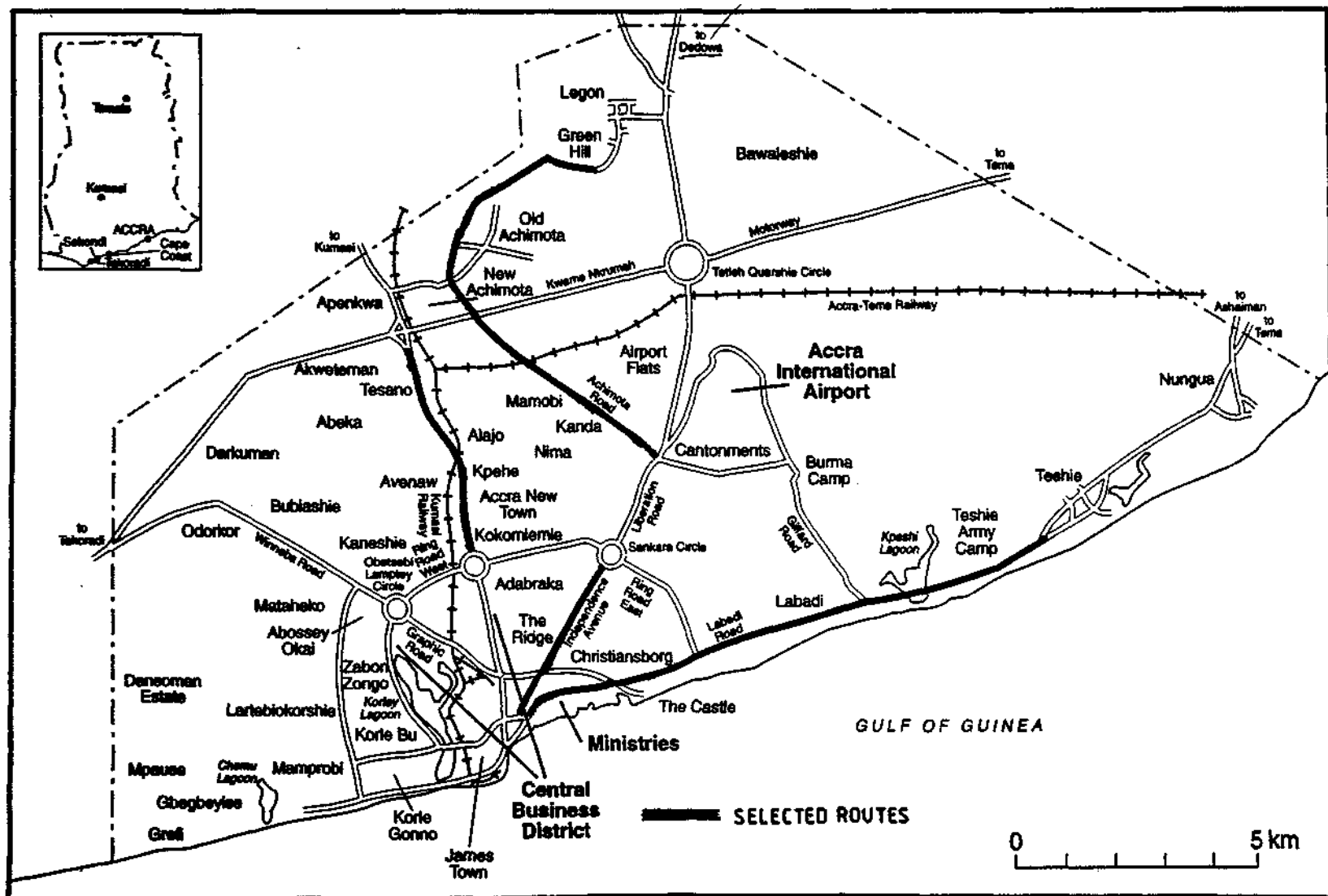
In order to determine the commonest deviant behaviours among drivers in the city, the data on traffic offences were examined. It emerged that of the 302 vehicles observed about a third were found to have committed at least one of the identified offences (see Fig. 3). There were however, instances where drivers committed more than one offence. In one case a driver on the Labadi Road committed five of the listed offences within a distance of about 200 metres after take-off from the main station. Similar cases were also observed on the Independence Avenue and the Tesano-Abeka Junction-Circle Road, although these were on a much smaller scale.

As can be seen in Figure 3, the commonest traffic offences or deviant behaviour observed during the survey was the tendency for drivers to stop, turn, or park at unauthorised sections of road. For instance, out of 478 individual traffic offences recorded on the four selected roads 93, or approximately 20% of the whole, were of this nature. Other deviant behaviours with similarly high scores were misuse/abuse of the horn (74), changing route without signalling (65), driving through red light (61), and overspeeding at restricted areas (58). Offences with relatively low scores were driving on the shoulder of the road (47) and aggressive and untimely overtaking (26).

Commercial vehicle drivers were found to commit a significantly larger number of the offences observed on the selected roads than all other types ($p = 0.0027$). Taxi drivers in particular were the worst offenders, accounting for nearly 37% of all the observed offences. They were followed by trotro (24.3%) and private car drivers (15.3%). Judging from the data, it is possible to suggest that drivers of buses and other category of vehicles such as pick-ups, range rovers and pajeros are more careful on the roads in the city, at least in the context of the present study. This is because drivers of these vehicles recorded the least number of offences, with buses committing only 51 (10.7%) of the 478 offences observed and other category of vehicles committing the rest (63).

Although aggressive overtaking and driving on the shoulder of the road were not widespread, they were certainly common among commercial commuter vehicle drivers, particularly taxi drivers. As the Figure clearly indicates 25 or 53% of the 47 cases observed under aggressive and untimely overtaking were committed by taxi drivers alone compared with eight by trotro drivers, six by private car drivers, three by bus drivers and five by vehicles of other categories. In the case of driving on the shoulder of roads nine of the 26 cases observed were by taxi drivers, followed closely by private car drivers (8), trotro drivers (5), and bus drivers (4). No instance was observed for other category of vehicles.

FIG. 2 ACCRA: ROUTES COVERED BY THE SURVEY



DEVIANT DRIVING BEHAVIOR AND CITY TRAFFIC

Partly as a consequence of the deviant behaviour of drivers, and partly due to the increasing volume of vehicles and pedestrians competing for space on the roads, traffic in Accra is sometimes in a chaotic state with the worst affected routes characterised by congestions, noise, unnecessary delays and frustrations. Commuting to various parts of the city, and especially to the Central Business District (CBD), becomes very expensive in transport terms. This is because journey times become unnecessarily long, and travellers sometimes find themselves trapped in poorly ventilated trotros and buses for hours. The odds of being involved in traffic jam or accident because of deviant behaviour by other drivers is generally on the high side.

Aggressive overtaking and driving on the shoulder of the road to gain undue advantage over other drivers appears also to be on the increase and actually accounted for over 60% of the 14 accidents recorded during the period of the field survey.

The cost of the congestions and delays caused mainly by deviant driving behaviour cannot be precisely determined here because of the lack of relevant data. Nevertheless it is possible that tens and hundreds of millions of cedis is lost daily on the roads in the city. Other costs incurred through deaths and injuries of people involved in accidents are likely to be higher but as in the case of the former will also require a study focusing on these topics to be able to establish precise values.

DISCUSSION

What the present study has shown is that traffic offences are becoming commonplace in Accra. A substantial number of these traffic offences are caused by the person behind the wheel. Generally, taxi and trotro drivers are more likely to commit traffic offenses than drivers of other type of vehicles. Male drivers are also more likely to commit traffic offences in Accra than female drivers. Although this latter point was supported by the Accra data, there is the need to put the issue into a proper context. For instance, it was found that for every 10 vehicles counted as many as eight were driven by males, thus giving males a prominent position among drivers in the city. It also puts into perspective a previous research finding that in Ghana vehicle ownership and their use is dominated by males and that females are normally content with 'lifts to work, market or other places they wish to visit' (Abane, 1992, 1993a). More important in the context of the present study is, however, the fact that males were found to commit more of the offences probably because they were the persons frequently found behind the wheels.

The commonest deviant behaviours of drivers observed on the roads included changing a route without signalling, misuse/abuse of the horn, and stopping or turning or parking at unauthorised parts of the city. The frequency of occurrence of these deviant practices seems surprising considering the fact that during the survey several city guards belonging to both the Accra Metropolitan Authority (AMA) and the Ghana Private Road Transport Union (GPTU) as well as some members of the MTTU of the Ghana Police Force were posted on the roads. There is reason to suspect that traffic policing is not a priority of all these personnel despite the fact that it could help to reduce some of the avoidable delays and accidents observed on the city's roads.

Another possible explanation for the increasing number of deviant driving behaviours is that drivers or road users generally are inadequately informed about the contents of the highway code. This probably explains why a substantial number of the drivers interviewed seemed undisturbed by suggestions that they were committing serious offenses on the road. The highway code has a very comprehensive list of 'dos' and 'don'ts' in traffic which should generally

ensure safety on the roads and reduce the number of traffic abuses being examined in the present paper. For instance, on the subject of road signs and signals, Section 26 of the Ghana Highway Code states:

Give signals if they would help or warn other road users ... give the correct signal ... give it clearly; and give it in good time (MOTC, 1974: 10).

This is re-enforced in other sections of the Code. As for example, under 'Turning Left' it is indicated as follows:

Before you turn left, use your mirror to make sure you know the position and movement of traffic behind you ... give a left turn signal ... take up position just left of the position, or in the middle of the road, or in the space marked left-turning traffic ... Wait until there is a safe gap ... then make the turn, but do not cut the corner (MOTC, 1974: 21).

Closely related to the above problem is the problem of illiteracy. A substantial number of the drivers interviewed could neither read nor write. Consequently, they are unable to take advantage of the highway code to refresh their knowledge or follow on-the-spot traffic regulations. Indeed, nearly 76% of the interviewees in the survey agreed to a suggestion that they did not possess copies of the Ghana Highway Code. Approximately 46% of them also stated that they did not need it since they could neither read nor write the English language. Yet the ability to read and interpret traffic signs and instructions is a vital component of driving. It is not an issue for debate. What is debatable is whether the document should be in the English language or translated into Ghanaian languages so as to attract more users.

The issue of illiteracy or lack of formal education and the effect of this on driving behaviour in Ghana has recently attracted a critical editorial comment in one of the Ghanaian dailies. Part of the commentary read as follows:

The level of education of majority of our drivers is so low that most of them obey traffic regulations from experience rather than on-the-spot understanding or interpretation of rules and signals (People's Daily Graphic, October 13, 1993. p. 2)

It is important to point out here that the behaviour of drivers in Accra or even Ghana for that matter, resulting mainly from inadequate knowledge and poor interpretation of the highway code, is not unique. Studies on driver behaviour in other parts of the world have shown a similar pattern. As for example, Jacobs (1982) and Jacobs and Sayer (1983) have reported poor driving behaviours of drivers from a selected number of cities in countries of the developing parts of the world. In one specific case the behaviour of drivers at 'Zebra-type' crossings in cities of five Third World countries was compared with similar crossings in two British cities.

It was found that although mandatory for drivers in all the cities to stop for passengers, the average proportion of drivers stopping in the selected Third World cities ranged from 10 - 17% whilst that for the two British cities ranged from 40 - 72%. It is clear that in both cases a substantial proportion of drivers showed examples of deviant behaviour by refusing to stop for passengers.

The mode of obtaining a driving licence also attracted a critical comment. It is expected that all drivers using the roads in the city as in the country as a whole be sufficiently qualified to do so. However a substantial number of the drivers interviewed indicated that they had never been tested before. Without a formal driving test it is difficult to understand why these persons should be allowed to drive in the city. They are 'traffic hazards' who should be removed from the roads. Indeed, Lartey drew attention to this problem in a discussion paper on traffic in Ghanaian cities as far back as 1977. He classified drivers in the cities into five categories. These he named as (1) 'the bully', that is one who tries to overtake by forcing other road users out of lane or even off the road; (2) 'the Jack Rabbit' or one who drives in leaps and bounds with sudden stops and quick starts; (3) 'the Bumper-Hagger' who rides very close to other vehicles; (4) 'the Light-Jumper' who always wants to gain advantage over the other road users to the extent of driving through red light; and (5) 'the Speed Demon' who makes his own laws in speeding and believes he/she is in a race with other drivers. Lartey indicated that all drivers falling in the five categories are road hazards and should not be allowed to use the roads. Sixteen years on the same message is being repeated. It will not be out of place to suggest that the traffic management programmes in place are not working as expected. More importantly, the traffic policing system is very poor and needs to be overhauled. This brings into focus the recent remark made by a government official at the Ministry of Transport and Communications (MOTC) on the subject of vehicle examination and licensing in the country. Speaking at a durbar of Technical Officers of the VELD of the MOTC, the official expressed surprise at the large number of defective vehicles on the roads in Ghana and wondered how the owners of those vehicles obtained their 'Roadworthy Certificates' and licences. The official went on to state that it 'created the impression that the VELD is not performing its assigned roles of inspection of vehicles and testing the proficiency of drivers' (People's Daily Graphic, September 20, 1993: 8 - 9).

There is reason to believe that the licencing system currently in operation should be reviewed. Measures should also be put in place to weed out incompetent drivers. This is a normal practice in cities of the advanced countries such as the UK, USA, France, Germany and Italy where many of the deviant driving behaviours examined in the present paper are largely non-existent because of strict policing policies. If the same policies are instituted in Ghana, it will go a long way in reassuring concerned critics of the traffic management programmes such as Lt. Col. Sharpe (1990: 4) who believe that the system of obtaining a driving license in the country is not rigid, making it possible to litter the country's roads with incompetent, unqualified drivers with undesirable driving behaviours.

It was also discovered during the field survey that use of abusive language by drivers has become a very common practice. Although this was not an important parameter in the survey, it emerged as one problem which needs to be tackled sooner rather than later. It was particularly widespread among drivers of commercial vehicles. It is difficult to explain the reason behind such behaviour; perhaps one reason is the desire by these drivers to make as many trips as possible from a day's working session in order to earn a substantial amount of money. They seem to rely on aggression to gain advantage over other road users. Where this method fails, then there is the tendency for the individual driver to get peeved and accuse other road users of incompetent use of the road. In a rare show of expediency one of the interviewees agreed to

frequently using that tactic to gain advantage over other drivers. He remarked:

It is money we want. At the end of the day you have to give a specific amount of money to your master. You also need a bit of pocket money. Therefore you are forced to use whatever trick that is available to outwit other competitors. Unfortunately, non-commercial drivers are also affected (Remark by respondent).

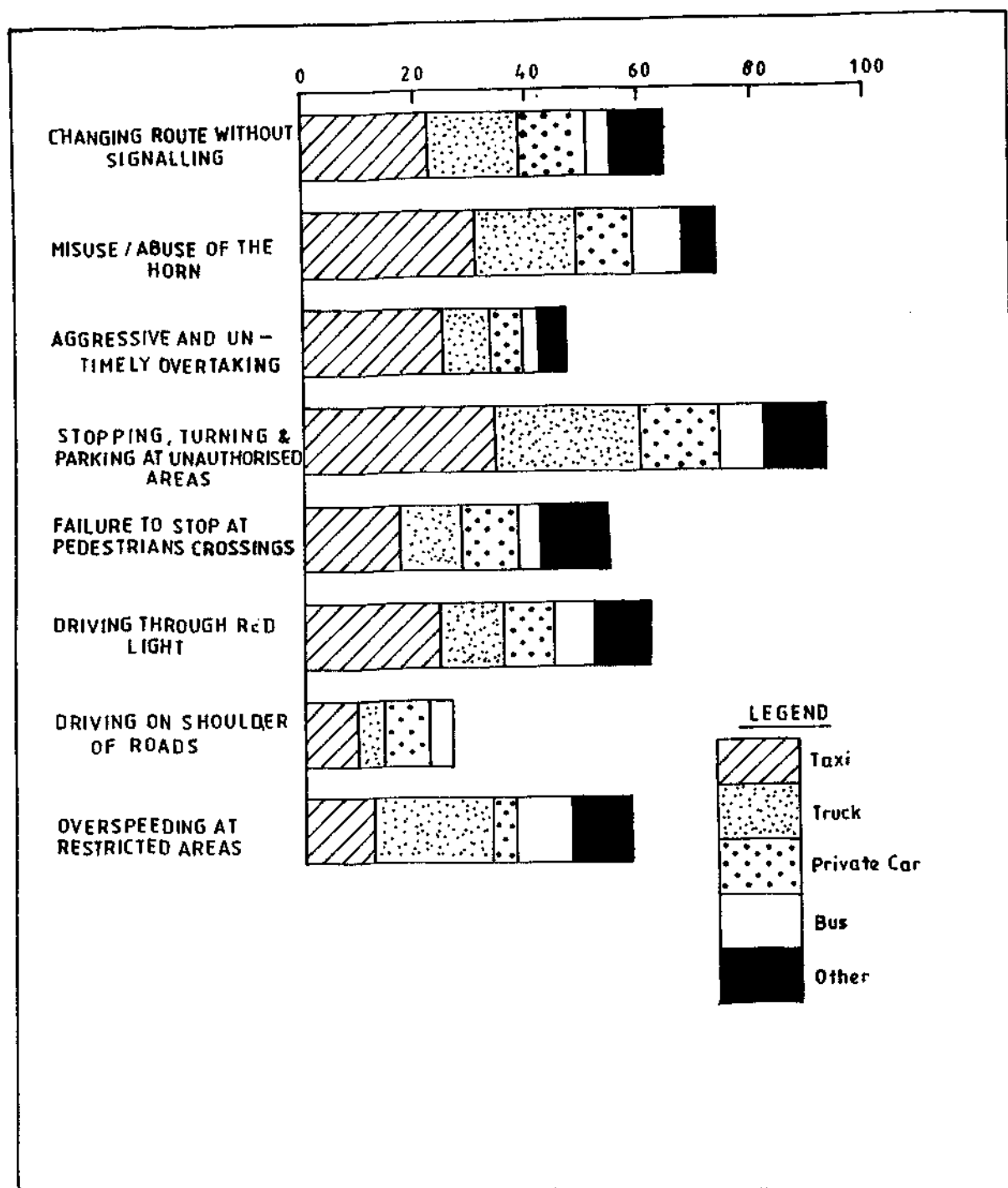
Finally, traffic management and control must be taken seriously in Accra if the stresses and frustrations experienced by drivers, passengers and pedestrians are to be eased. The present study has examined only a few of the city's traffic problems. A more extensive study is required to be able to identify the critical indicators which should be addressed in order to create a more congenial traffic atmosphere in the city. For instance, there is need to relate drivers' knowledge of the highway code with the traffic offences committed on the roads. There is also need to collect data 'over a wide range of levels from the perspective of the national scene to the detail of the individual' (Jacobs and Sayer, 1983: 5) with a view to determining the main parameters associated with the unacceptable increases in deviant driving behaviours in the country. Furthermore, there is need for a future study of this nature to recognise the importance of cognitive factors and to include them in the data gathering process. Incorporation of cognitive factors will not only help to reveal their value in behavioural research but also assist in explaining the aggressiveness and 'positive-self' versus 'negative-other' attitude among others of the road users as well as the poor spatial knowledge of the environments in which they operate (Finn and Bragg, 1986; Mathews and Moran, 1986). Above all, there is need to clearly define the problem of deviant driving behaviour. It is when these are tackled that some progress can be made towards improving traffic management and control in the city of Accra in particular and other urban centres of the country in general.

REFERENCES

- Abene, A. M. 1990 'Private and government-controlled agencies in the commuter transport sector of Cape Coast and surrounding settlement' *Oguaa Soc. Sci. Jour.*, 1 (1), 41 - 57
- Abene, A.M. 1992 **Work travel in Ghana: the case of Accra**, Ph.D. Thesis, Department of Geography, University of Southampton, Southampton, England.
- Abene, A.M. 1993a 'Tackling traffic congestion in Accra, Ghana: a road user's perspective', *Journal of Advanced Transportation*, 27 (2), 157 - 168
- Abene, A.M. 1993b 'Mode choice for the journey to work among formal sector employees in Accra, Ghana' *Journal of Transport Geography*, 1 (4), 119 - 129
- Adarkwa, K. 1991 'Urban consumer needs in the transport sector and government policy in Ghana', *Journal of Advanced Transportation*, 25 (1), 42 - 53
- Adeneji, K. 1983 'Urban development and public transport in Nigeria', *Third World Planning Review*, 5 (4), 583 - 594.
- Asogwa, S.E. 1980 'The crash helmet legislation in Nigeria: before-and-after study', *Acc. Anal. and Prev.*, 12, 213 - 216.
- Chin, A.T.H. 1990 'Influences on commuter trip departure time decisions in Singapore', *Transportation Research*, 24A (5), 321 - 333.
- Ehiakpo, J. 1990 'Accra's traffic problems', *West Africa*, Dec. 3 - 9, 2943 - 2944.
- Finn, P. and Bragg, B.W.E. 1986 'Perception of the risk of an accident by young and older drivers', *Accid. Anal. Prev.*, 18, 289 - 298.
- Frishman, L. 1986 'Urban transportation decisions in Kano, Nigeria', *African Urban Quarterly*, 1 (1), 54 - 6.
- Ghana 1984 **Ghana Population Census Report**, Statistical Service, Accra.
- Jacobs, G.D. 1976 'A study of accident rates of rural roads in Kenya in 1972', **Department of the Environment Department of Transport**, TRRL Report LR 732, Crowthorne (Transport and Road Research Laboratory).
- Jacobs, G.D. 1982 'The potential for road accident reduction in developing countries', *Transport Review*, 2, 213 - 224
- Jacobs, G.D. and Sayer, I.A. 1983 'Road accidents in developing countries', **Department of the Environment Department of Transport**, TRRL Suppl. Report 646, Crowthorne (Transport and Road Research Laboratory).

- Kawai, K. 1991 'A traffic-management perspective on easing traffic congestion', **The Wheel Extended a Toyota Quarterly**, 75, 14 - 19.
- Lartey, E. 1977 'Traffic in our cities', **Proceedings of the Ghana Academy of Arts and Sciences**, XV, 119 - 123
- Mathews, M.L. and Moran, A.R. 1986 'Age differences in male drivers' perception of accident risk: the role of perceived driving ability', **Accid. Anal. Prev.**, 18, 299 - 313.
- MOTC 1974 **Ghana Highway Code: Right Hand Traffic**, Accra.
- MRH/GHA 1988 **Accra District Traffic Management and Improvement Study (Final Report)**, De Leuw, Carter International Ltd.
- Ogunjumo, A. and Fagbemi, A. 1991 'Towards modal choice decision-making models: a case study of Lagos State Transport Corporation bus riders', **Transportation Research**, 25A (6), 391 - 397.
- Ozo, A. O. 1986 'Residential location and intra-urban mobility in a developing country: some empirical observations from Benin City, Nigeria', **Urban Studies**, 23 (1), 457 - 470.
- People's Daily Graphic**, No. 13315 (Sept. 20, 1993), pp. 8 - 9.
- People's Daily Graphic**, No. 13335 (October 13, 1993), p.2.
- Sarna, A.C. and Bhatia, N.L. 1991 'Mobility patterns of residents of Indian cities', **Journal of Advanced Transportation**, 25 (1), 105 - 116.
- Sharpe, Lt.-Col. J.E. 1990 'Causes of accidents' **The Transporter**, 48/90, p. 4.
- Statistical Service 1990 'Motor Vehicle Registration Statistics, Jan-Dec. 1990', **Statistical News Letter**, Accra, Ghana.
- Tamakloe, E.K.A. and Adarkwa, K. K. 1988 'Parking of freight vehicles in Kumasi, Ghana', **Journal of the UST**, 8 (2), 42 - 57.

FIG. 3 OBSERVED DEVIANT DRIVING BEHAVIOURS ON SELECTED ROADS IN ACCRA



SOURCE: FIELD SURVEY, 1993