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Aishatu Abubakar Sadiq
University of Lyon, INSA-
Lyon, CNRS UMR 5229,
LamCos, F-69621, France.

Salah Khardi
Universit e Gustave Eiffel
(UGE), Bron Campus, 25
Avenue Francois Mitterrand,
Lyon.

Ana Marie Sfarghiu
LamCos Laboratories F-69621,
Batiment S. Germain, 69621,
University of Lyon, INSA
Lyon, CNRS UMR5259
France.

Imam Wada Bello
Department of Public Health,
Ministry of Health, Kano
State, Nigeria.

Correspondence:

Aishatu Abubakar Sadiq
University of Lyon, INSA-
Lyon, CNRS UMR 5229,
LamCos, F-69621, France.

A Review of road transportation, air pollution and the vehicular registration system (2016-2019) in Rural and Urban communities, Kano State, Nigeria

Aishatu Abubakar Sadiq, Salah Khardi, Ana Marie Sfarghiu, Imam Wada Bello

Abstract

Nigeria is major Petroleum producing nation and user of petroleum products. We conducted a mixed method study to ascertain knowledge, perceptions and assess the vehicular registration system. Stakeholders from transportation, health and environment participated in In-depth interviews. Informed written consent was obtained in the language of choice; Hausa or English. Data were analyzed using thematic areas with Epi info statistical software version 7 (CDC Atlanta). Secondary abstraction of Road Vehicular registration data (2016-2019) was conducted in Partnership with the Federal Road Safety Corps (FRSC). Twenty-four respondents were interviewed. Road infrastructure and transit experience on roads was assessed as low cited were; poor maintenance, widespread use of low capacity vehicles for public transportation and non-zoning. Of 11,652 registered vehicles, the highest number of vehicles was recorded in Urban Local Government Areas (LGAs), private car ownership was higher 88%. Stakeholders indicated a need for improved enforcement of regulations and legislation. Recommendations were made to; improve public awareness on air pollution, automate the vehicular registration system and increased Harmonization of data. We also recommended regular road maintenance, zoning of roads and introduction of large capacity public transport vehicles.

Keywords: Vehicles, Stakeholders, Pollution, health, transportation

Introduction

Vehicles produce both exhaust and Non-exhaust emissions which vary in concentration and composition. The common sources of emissions vary from Urban to rural areas; in urban settings most sources are vehicular and industrial (1). Rural communities have emission sources dependent on the location of the communities' e.g. in proximity to highways. Internationally differing limits are set and enforced to ensure compliance with limits of Air pollutants. Air pollution may still have health effects at levels below current standards (2). Therefore reductions in exposure to very low levels can still be expected to provide benefit (3). Motorization is expected to increase to at an unprecedented rate in the developing world (4). This economic need and conflicting priorities, such as infective disease control and unstable Government policies outweigh the quest for pollution control. The contribution of transport to sustainable development depends on the resources it consumes, and the negative side effects it generates (5). The presence of residential communities in proximity to roadways is a feature of developing African countries. This leads to increased exposure to consistent levels of pollutants produced by road vehicles. Studies have revealed that the highest exposures normally occur at a distance ranging from 50 to 100 meters from roadways (6).

Materials & Methods:

A review of the Vehicular registration system was conducted for 2016-2019 using data extraction at the Federal Road Safety Corps (FRSC) Central data repository. In-Depth interviews were also conducted with stakeholders. Kano State (Population: 14.3 million)

comprises of 44 Local Government Areas (LGAs). The respondents were identified at the FRSC State office and

in; three (3) Local Government Areas; Kano municipal, Kumbotso and Nassarawa.

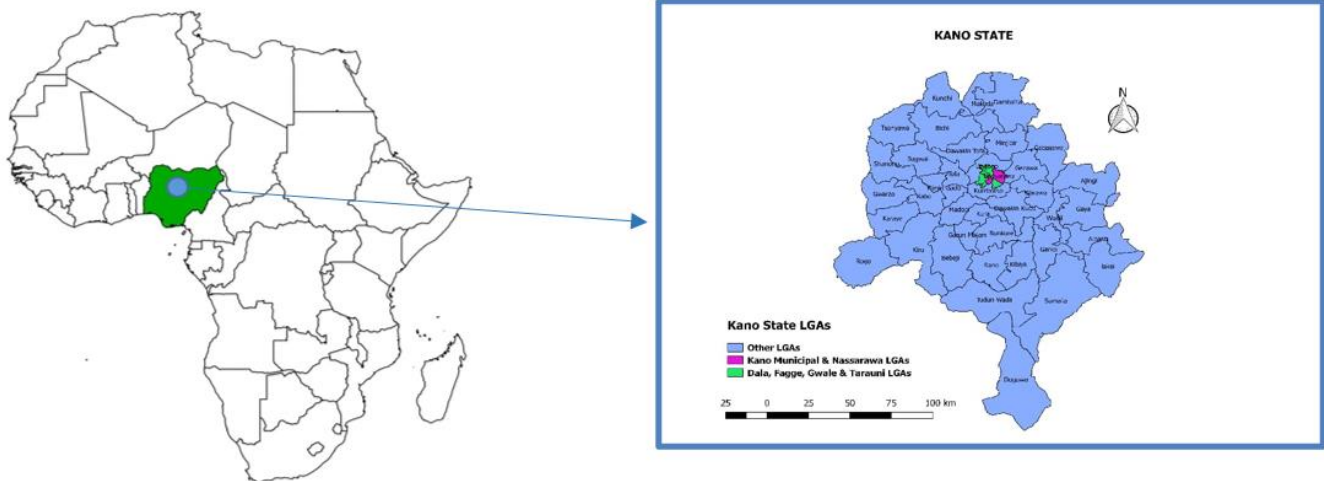
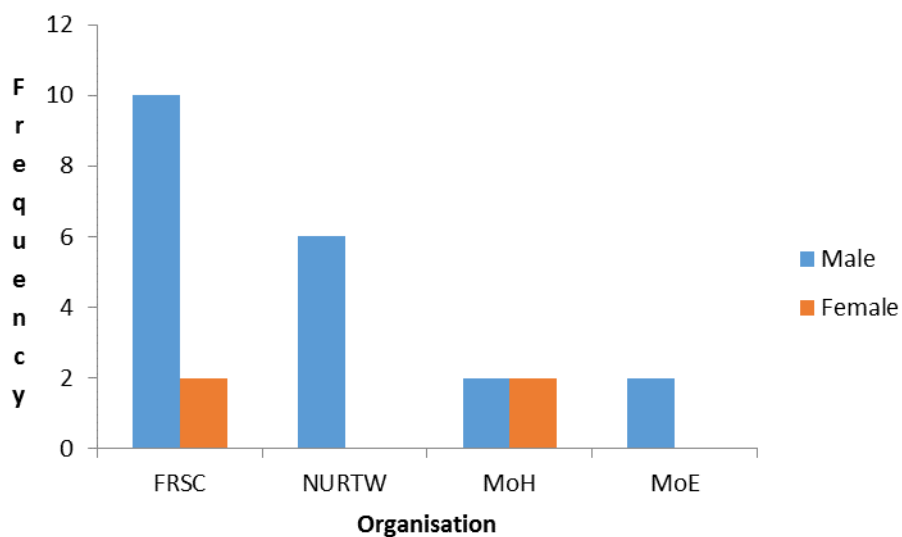


Fig 1: Map of Africa with Nigeria highlighted in green as a country. The study area; Kano state (North-west) in blue showed the highest number of registered vehicles in; Kano Municipal and Nassarawa LGAs: >1000, Dala/fagge/gwale/tarauni: 500-1000, Other LGAs: 1-500.

In-Depth Interviews: Thematic areas were assessed using the Interview guide (*Appendix A*). Responses were analyzed by thematic areas: Introduction and socio-demographics, Road Vehicular use and registration, Legislation and regulation of vehicular emissions and Role of stakeholders in Air pollution control. Twenty Four (24) interviews (KII) were conducted, each lasting 20-30 minutes. Informed consent (*appendix B*) was obtained from each participant. Data were entered into Epi-info statistical software version 7 (CDC Atlanta).

Secondary data Abstraction: There were limited number of variables available, information on the type of vehicle, address and chassis number were restricted. Obtained data contained the following variables; date/month of registration, local Government area, type of ownership (Public or private) and sex of owners. The present system utilizes a double entry; manual registration of vehicles, followed by online entry into an e-platform.

Results:



FRSC: Federal Road Safety Corps
NURTW: National Union of Road Transport Workers
MoH: Ministry of Health
MoE: Ministry of Environment

Fig 2: Sex distribution of respondents from organizations.

Most respondents 22 (91.7%) believed the highest concentration of vehicles (Fig 3a) in the State was present in Urban areas. Only 2 respondents (8.3%) declared a larger number of vehicles were in rural areas citing proximity to highways and large commercial car parks.

Preferences for vehicles vary (Fig 3c) and are largely dependent on nature of roads, finances and purpose of purchase. Maintenance culture which is the practice of ensuring a vehicle remains road worthy and safe for use, while posing minimal or no threat to the environment.

Majority 20 (83.3%) of respondents classified it as Average, 1 (4.2%) as good and 3 (12.5%) as bad. The age of a vehicle can serve as an index of its functionality and

impact on users and the environment. When responding to the perceived age of privately owned vehicles, 19 (79.2 %)

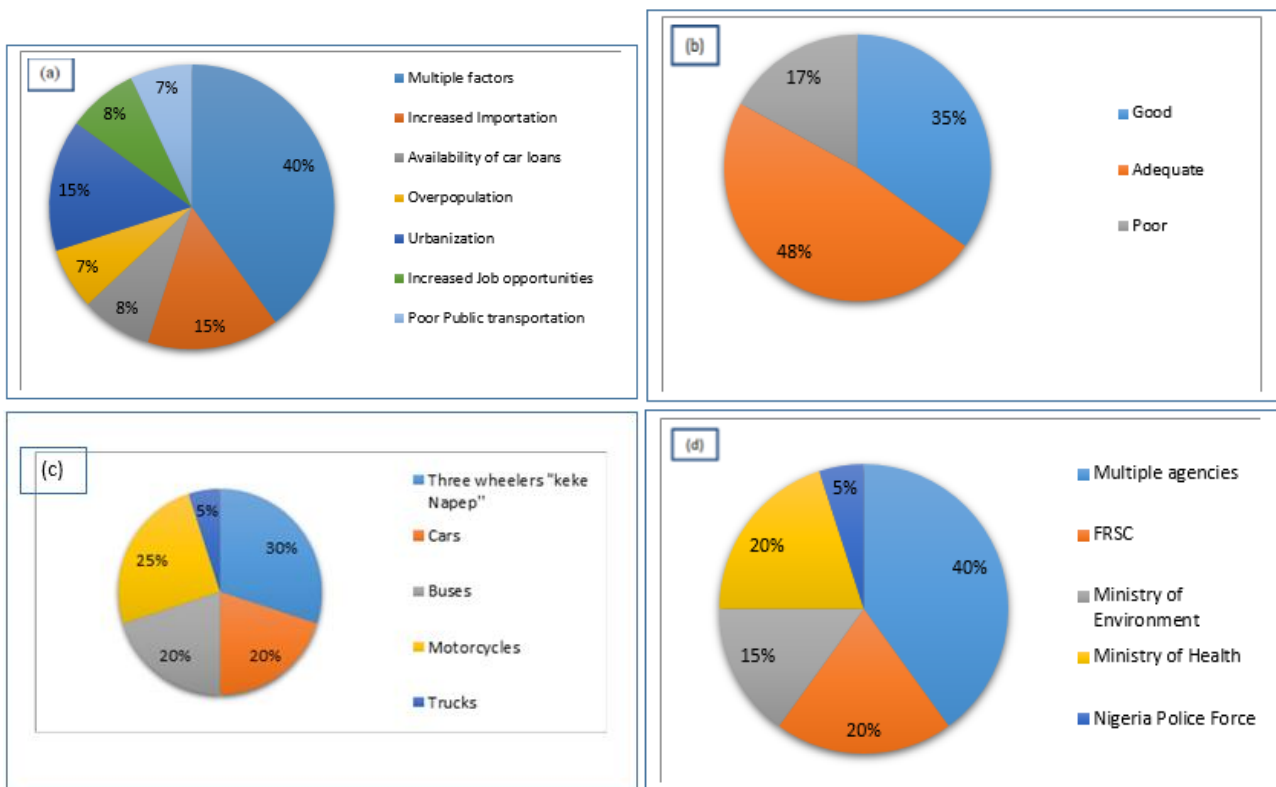


Fig 3a-d: (a) Factors responsible for increased car ownership, (b) Effective Traffic regulation, (c)Types of Vehicles in use, (d)Stakeholder participation in transportation and health.

Respondents 15(62.5%) mentioned mixed settlements comprising of residential, commercial and occasionally industrial areas were located close to highways. Opinions differed (Fig 3b) on adequacy of traffic regulators available on roads.

On the role of automated vehicles and use of intelligent transportation in ensuring green motility; A large number of respondents 18(75%) believed automated and intelligent

transportation would have a positive effect on green motility. Reasons cited included; greater traffic control, improved health, reduction in emissions and traffic accidents. Negative responses were due to previous bad experiences with automated transportation devices e.g. traffic lights, automated speed monitors and automated emission monitoring devices.

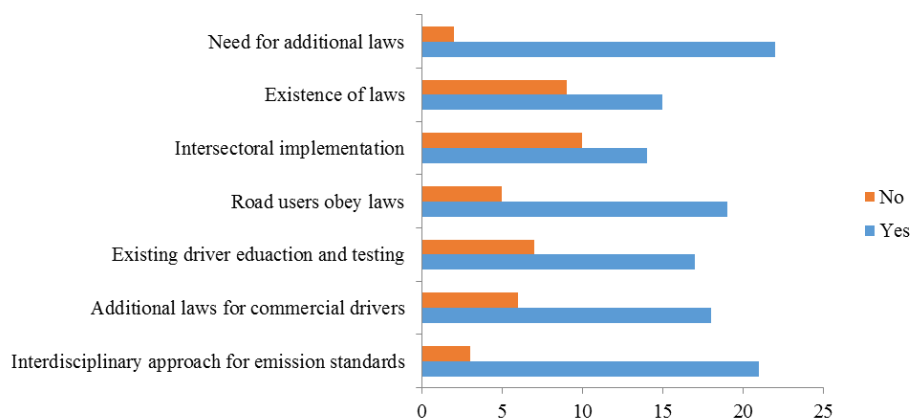


Fig 4: Perceptions on Legislation/regulation of vehicular from Road transportation vehicles.

Perceptions were majorly positive on aspects of legislation and regulation (Fig 4). Constant disregard of existing laws, prevalence of drug use among Public transportation drivers and low educational level were cited as justification for separate legislation.

“They possess an inherent disregard for established laws and the survival of their passengers, resulting in their involvement in majority of road accidents. They will definitely benefit from separate rules and regulations”
 Road traffic Officer- Federal Road Safety Corps (FRSC)

Table 1: Respondents knowledge on air quality and emissions

Criteria	Responses		
	Yes (%)	No (%)	I don't know (%)
Effective implementation of laws on emissions and transportation:			
Multiple measures	46	54	0
Monitoring & inspection of cars	31	69	0
Installation of air quality detector	3	97	0
Risk communication	12	88	0
Regular car inspections	8	92	0
Inter-disciplinary monitoring and regulation of air quality	97	23	0
Concept of air quality	80	20	0
Factors affecting air quality	85	0	15
Classification of air quality in communities (good):	73	27	0
Awareness of measures to improve air quality	17	43	7

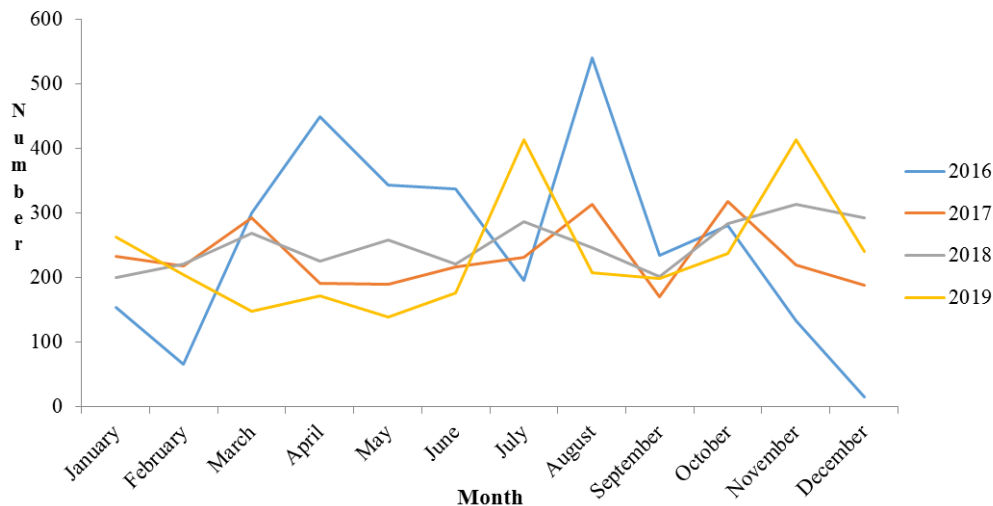


Fig 5: Trend of Vehicular registration data in Kano State, Nigeria 2016- 2019.

Of total entries in the data base, only 11,652 were solitary entries, 173 (1.46%) were duplicates. The highest number of registered vehicles were in metropolitan Local Government Areas (LGAs); Kano Municipal and Nassarawa (Fig 1). The highest number of registered vehicles was recorded in 2018; private car ownership was higher 88% than commercial/public vehicular ownership. More males than females M: F ratio; 8:1 (Fig 6) were

registered as owners of Road transport vehicles. Vehicular registration data showed a constantly irregular pattern (Fig 5). This indicates multiple factors affecting car ownership and registration. Data officers mentioned; the existence of large numbers of unregistered out-of state vehicles. An influx of three wheeler vehicles, popularly known as “*Keke Napep*” used widely as public transportation were recorded (Fig 3c).

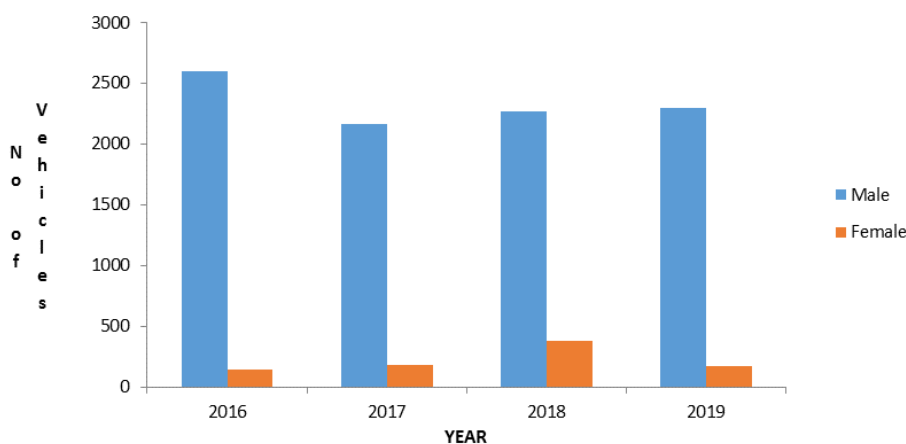


Fig 6: A distribution by Sex of Registered owners of Road Transportation Vehicles in Kano State, Nigeria (2016-2019).

Discussion:

A disparity in data available on the FRSC online database and manual entry logbooks was identified. Causative factors cited include; poor internet access and high turnover

of data management officers. Health effects of air pollution still prevail in most cities within Nigeria. Attributable to multiple factors such as; single engine use, expended vehicles and the Harmattan in the North West

(7). The enactment and implementation of legal statutes governing transportation and vehicular use is country specific, though with global cross cutting regulatory bodies for international transportation. With the technical problems, data and methodological constraints in developing countries (8) well in hand the modern cities are faced with traffic problems more complex than ever before. Vehicular registration needs to be updated to meet current automated methods available to ensure effectiveness of entries and ease of analysis. Real-time automatic vehicle identification based on Digital Video Recorder (DVR) play a major role in maintaining law enforcement on roads (9). The persistence of urgent conflicting priorities in the developing country landscape has continually limited the restrictions or upgrades of pollution sources and control. A study showed; these upgrades can be strenuous to enforce as they are not in line with the state's paradigms (10). The increasing need for transportation of Nigeria's upwardly mobile and productive sub-set of the population (youth) is largely unmet. This is due to unmatched growth in transport facilities (11). Acceptable Standards on Vehicular emission levels were perceived as not fully implemented by regulatory agencies, despite adequate knowledge on sources and air pollution.

Conclusion:

The findings from this study indicate adequate knowledge among majority of stakeholders on transportation and related areas. Improvements are recommended in legislation, road infrastructure, regulation of commercial drivers in the public transportation sector and control of emissions from road transport vehicles. A gap exists between the knowledge, skill and the ability to implement control measures in the country. Recommendations made include; harmonization of existing registration databases, improvement of internet access for data officers and the phasing out of manual entries.

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