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Transportation and its Concerns in Africa: A Review

Massuod Ali Ahmed Abuhamoud, Riza Atiq O.K. Rahmat and Amiruddin Ismail
Department of Civil and Structural Engineering, Faculty of Engineering,
University of Kebangsaan, UKM 43600 Bangi, Selangor Darul Ehsan, Malaysia

Abstract: Urban transportation is not up to the demand of African population. The British colonial impact still persists in African countries and hence there is lack of accessibility of transport to all population and areas. Quality of vehicles is too low and less road safety. This study analyses the constraints of transportation in African cities. Specific land use strategies are to be implemented based on the typical geographical conditions of Africa. As a developing country, Africa needs to address a lot of concerns with respect to urban transportation and to be at par with other developing nations in the world.

Key words: Urban transportation, non-motorized transport, roads, vehicles, road safety, Africa

INTRODUCTION

Ample facilities like road infrastructure, appropriate vehicles for the right place and right time is a crucial factor in determining the quality of transport system. For a developing continent like Africa this has always been a great challenge and continues to be so. Owing to the civil wars, lack of proper investment in the transport infrastructure, low quality the transport system, unhealthy transport solutions, improper planning and increasing number of private cars etc., still remains a problem. Understanding the relationship between the basic needs for the transport systems, its capacities and new technologies serves to the development of transportation and traffic amenities (Hansen and Huang, 1997). Most of the cities are going through an urban development phase with no adequate transport system (Kumar and Barrett, 2008).

Urban development and transport facilities are intricately linked to each other. Cities started to expand creating increase in distance between activity location and people's residence. Simultaneously, the personalization of automobiles and congested traffic further increased. Africa accounts for 14% of world's population (approximately 1 billion) and ranks second in the world scenario. The urban population percentage of the year 2007 was 38.7% with estimated 2% annual rate of change between the years 2005-2010 (Population Divison, 2010).

The total number of vehicles is also increasing overall as observed for 5 years until 2007 by World bank report. Countries like Ethiopia, Niger, Kenya and Tanzania has <25% urban population. About >55% urban population can be seen in countries like Botswana, Libya and South Africa (Fig. 1). The African urbanization is very diverse feature. As seen from the Fig. 2, most of the countries in the sub-Saharan Africa have 2 types of urbanization percentage: 20-40 and 40-60%. An urbanization of 60-80% or >80% could be seen in North Africa. Urbanization pattern of Africa is very similar to Asia. At present, Africa has about 40% urban area (Fig. 3).

History of transportation in Africa: In the past, people used to walk or use animals for mobility. Transportation development came after European colonization to Africa. They came to Africa in the 1400s for the first time (George, 1958). There were well aligned and extensively networked roads during the 1600s.

These roads were also used to transport slaves in the trans-Atlantic slave era (Fage, 1969). Horse-drawn carts or ox-drawn carts were used to transport slaves (Muhammad, 2003). In the colonial era of Africa, there was a decline in interest in road construction due to the Europeans interest to develop rail transport for their raw material mobility.

They focused on rail transport due to the huge cost of investment needed in creating road facilities (Thomas, 1973). They invested in railways because it would return them highest profits of their investments. So the road transport was neglected during this period in the 1900s (Hailey, 1938). In 1934, the Kenya bus services was started and from 1966-1973, it had the monopoly on public transportation across Kenya. In the 1945, Putco bus services was set up in South Africa during and later in the

Corresponding Author: Massuod Ali Ahmed Abuhamoud, Department of Civil and Structural Engineering, Faculty of Engineering, University of Kebangsaan, UKM 43600 Bangi, Selangor Darul Ehsan, Malaysia

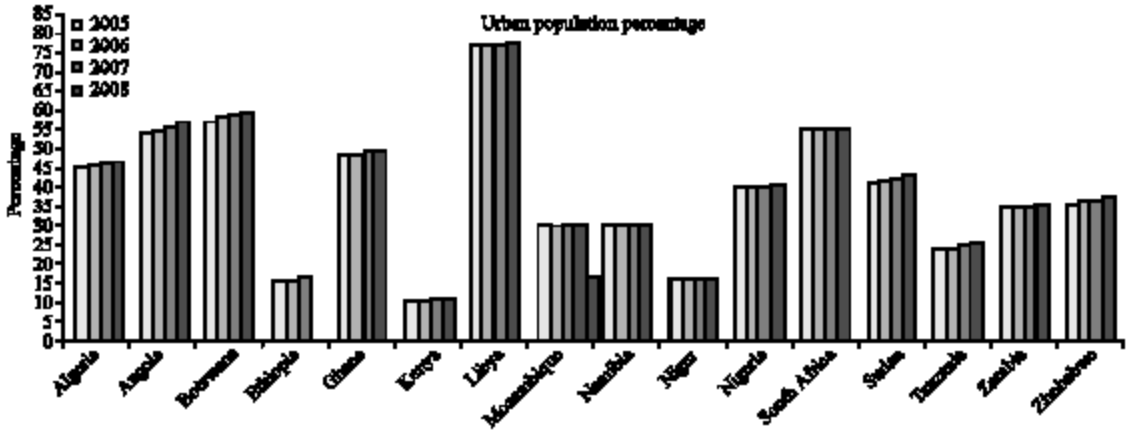

Fig. 1: Urban population percentage from 2005-2008 in some of the African countries World Bank (2010e)

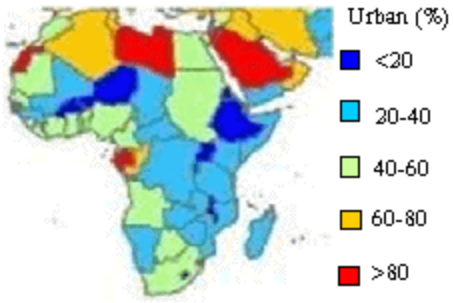

Fig. 2: Percentage of urbanization in African countries (McDonald *et al*., 2009)

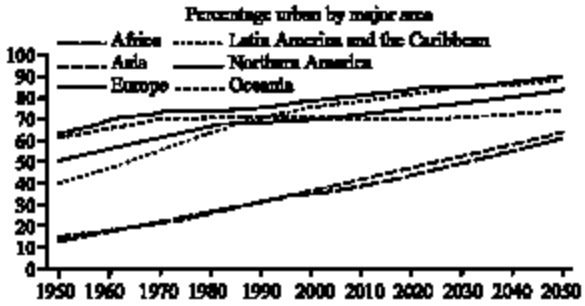

Fig. 3: Percentage urban by major area (Department of Economics and Statistics and United Nation, 2007)

1950s, the French started a well-organized public transport with large buses called as bus Raymond. However, poor management of this company led to its bankruptcy in 1979 (Trans-Africa, 2008). There were only attempts to build those roads which were very important for their colonial administration (Herbst, 2000). The increase in traffic because of passenger and freight transportation led to expand the road networking in the 1960 and 1970s (Delgado and Mellor, 1984). Yet African countries paid less interest in maintaining and repairing the roads which in turn affected the vehicle maintaining costs. Between the periods of 1970 and 1980s, there was increase in buildings with no adequate parking facilities (Howe and Bryceson, 2000). Until the 1980s, low priority was given to road transport development. Anyhow, roads are the most important mode of transportation in Africa now (Heggie, 1995).

Table 1: Population and paved roads in different parts of Africa

Areas	Surface (km²)	Population (million inhabitants)	Sites paved roads (%)
West Africa	5112,060	223,24	22.6
Southern Africa	6005,240	108,77	20.7
East Africa	6755,902	233,87	9.5
Central Africa	3021,180	29,66	4.1
Total for Africa	20894,382	596,00	15.1

(Trans-Africa, 2008)

Seychelles Public Transport Corporation (SPTC) was established in 1977 to provide transport facilities in Seychelles. In the 1980s OTRACO (Trans-Africa, 2008), a public company by the Japan-Burundian bilateral cooperation established public transport throughout Burundi. A major development in road transport could be cited after the 1990s with more private vehicles and public transport development (Pedersen, 2001).

Current scenario: In the 21st century, the transport system varied from country to country in coverage and efficacy. The recent statistics of paved roads in percentage as shown in Table 1. The countries in Central Africa had much less progress in road development. The paved roads are <10% in central Africa whereas in South Africa most countries showed >30% of paved roads in the

Table 2: Paved roads (percentage of total roads) in different countries of Africa

	Years							Years					
Countries	2002	2003	2004	2005	2006	2007	Countries	2002	2003	2004	2005	2006	2007
Central Africa							**West Africa**						
Cameroon	-	-	8.37	-	-	-	The Gambia	-	19.32	19.32	-	-	-
Central Africa Republic	-	-	-	-	-	-	Ghana	-	17.92	-	14.93029	-	-
Chad	-	-	-	-	-	-	Guinea Conakry	-	-	-	-	-	-
Congo Brazzaville							Guinea Bissau	27.94	-	-	-	-	-
Democratic republic of Congo	-	-	1.82	-	-	-	Liberia	-	-	-	-	-	-
Equatorial Guinea							Mail	-	-	18	-	-	-
Gabon	-	-	10.21	-	-	-	Niger	25.66	24.95	20.45	20.61	20.5	20.65326
Eastern Africa	-	-	-	-	-	-	Nigeria	-	-	15	-	-	-
Burundi	-	-	10.44	-	-	-	Senegal	-	29.26	-	-	-	-
Comoros	-	-	-	-	-	-	Sierra Leone	8	-	-	-	-	-
Djibouti	-	-	-	-	-	-	Togo	-	-	-	-	-	-
Eritrea	-	-	-	-	-	-	Souther Africa						
Ethiopia	12	12.9	12.7	13.4	12.7	12.8	Angola	-	-	-	-	-	-
Kenya	-	-	14.12	-	-	-	Botswana	35.3	35.14	33.2	32.6	-	-
Rwanda	-	-	19	-	-	-	Lesotho	-	-	-	-	-	-
Seychelles	-	96	-	-	-	-	Madagascar	-	-	-	-	-	-
Somalia	-	-	-	-	-	-	Malawi	-	45.02	-	-	-	-
Tanzania	-	8.63	-	-	-	-	Mauritius	98	100	100	100	100	98.02761
Uganda	-	23	-	-	-	-	Mozambique	-	-	-	-	-	-
West Africa							Nambia	12.8	-	-	-	-	-
Banin	-	-	9.5	-	-	-	South Africa	-	-	-	-	-	-
Burkina Faso	-	-	4.17	-	-	-	Swaziland	29.99	-	-	-	-	-
Cape Verde	-	-	-	-	-	-	Zambia	-	-	-	-	-	-
Cote D'Ivoire	-	-	8.12	-	-	-	Zimbabwe	19	-	-	-	-	-

(World Bank, 2010c)

Table 3: Some recent transport projects in Africa by World Bank (2010)

Project ID	Project name	Approval date	Closing date	Total project cost*	Status
P096407	Abidjan-Lagos Trade and Transport Facilitation Project (ALTTFP)	23-Mar-2010	30-Sep-2016	257.50	Active
P11525	CEMAC Transport Transit Facilitation Additional financing Central African Republic and Cameroon	05-Nov-2009	N/A	237.00	Active
P079749	West Africa Regional Transport and Transit Facilitation Project	19-Jun-2008	31-Mar-2014	197.20	Active
P079736	CEMAC-Transport-Transit Facilitation	26-Jun-2007	31-Jan-2015	276.00	Active
P079734	East Africa Trade and Transport Facilitation Project	24-Jan-2006	30-Sep-2011	281.67	Active
P098770	East Africa Trade and Transport Facilitation Project	24-Jan-2006	N/A	60.00	Active

*Funding US$ millions World Bank (2010b)

past decade; particularly Mauritius has shown consistent and prominent (100%) rank among all others (Preston, 1981). An average of 8-13% paved roads could be seen in various parts of Eastern Africa and most countries of West Africa had these percentage values ranging from 15-25 (Table 2).

In West Africa, Niger had the maximum number of paved roads whereas in Eastern Africa, Ethiopia showed steady percentage of paved roads. However, throughout the continent, there are regions like Chad, Liberia, Madagascar, Zambia, Cape Verde, etc. where no data are presented by the World Bank with regards to the paved roads.

This shows the variation as mentioned earlier in terms of coverage and efficacy. Geographical conditions like too many mountains, valleys, rivers, too large size etc., are considered to be a big problem in constructing good roads and transportation means especially in regions like Nigeria and Tanzania (Njoh, 2008). There are some ongoing projects for the development of transportation across Africa. An overview of these

Table 4: Road infrastructure coverage in Sub-Saharan Africa and other developing regions

	Comparison of infrastructure coverage and cost	
Infrastructure	Sub-Saharan Africa	Other developing regions
Paved road density (per 1,000 km^2)	31	134
Total road density (per 1,000 km^2)	137	211
Road freight tariffs	0.05-0.25	0.01-0.04

World Bank (2010a)

recent transport projects undertaken by World Bank as shown in the Table 3. At present, the active projects are about 6 in number with an overall funding of >1309 million US$. These are thought to be completed in 3-4 years from now.

Status of roads and vehicles: As with other developing countries in Africa, countries also the number of public investors is limited due to the high cost of paved roads. The lack of proper land use and infrastructure development has made urban transport development to decline. The statistics of road facility of sub-Saharan

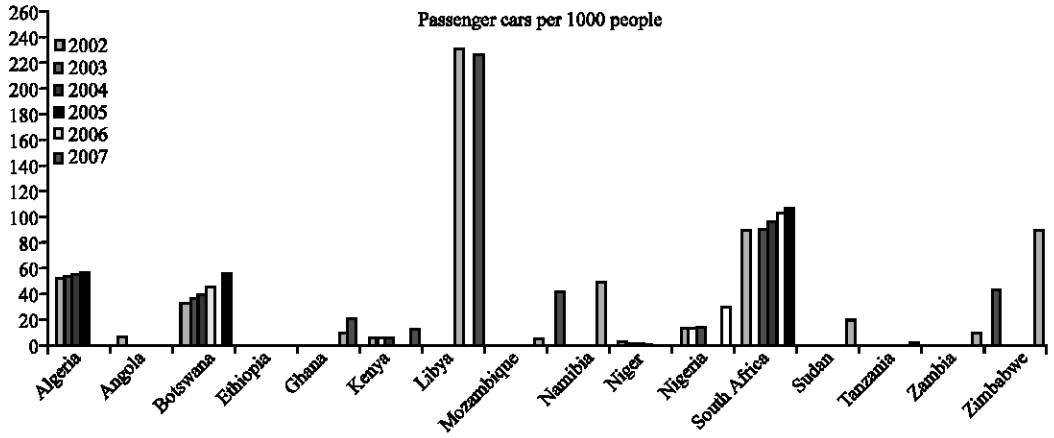

Fig. 4: Passenger cars availability (World Bank, 2010d)

Africa given by World Bank can be seen from the Table 4. As shown in the Table 4, the density of paved road per 1000 km^2 in sub-Saharan Africa (SSA) is only 31 (about 23% of other developing countries) whereas the total road density in SSA is 137 km 1000 km^2 (about 65% of other developing countries (UNECA, 2010) which means that there is not enough infrastructure for transportation. Almost all the roads are unpaved and are eroded in rain (Pinard *et al*., 1999).

This condition of the roads makes transportation cost increased. The geographical nature of Africa is yet another concern. The hills, valleys, loose soil, rainfall, etc., contributing to improper road networking especially in the interurban areas (Njoh, 2008). The existing roads are much older and are incompatible for average driving speeds. Road capacity is also another problem created by the huge increase in traffic. Traffic congestion, air pollution, safety and affordability should be addressed to make the situation better (Freeman, 2009). Most African cities are filled with pedestrians (Campbell and Campbell, 2007). In most regions of Africa; especially sub-Saharan Africa, the non-motorized transport like bicycle are in the path of ignorance.

The main focus remains to the motorized vehicles (Guitink *et al*., 1994; Howe and Bryceson, 2000). Buses are the most common means of transportation other than bicycles in cities of developing countries. In addition, taxis, auto-rickshaws also forms the major part of motorized transport system (Rahman *et al*., 2008). In some places, people use motorcycle but with low cubic capacity engines like 100 cc.

Accidents are very common with motorcycles users because the driving license is not compulsory (Kumar and Barrett, 2008). The large buses are being replaced with the so called mini and midi-buses and the increase in motorcycle use has made the traffic congested in African cities (Kumar and Barrett, 2008). Further, the rise of car users has made the roads much more clogged. Africa is a large importer of second hand vehicles (Porter, 2002; Van Schoor *et al*., 2001) especially from Europe (Trans-Africa, 2008; Porter, 2002). Insufficient and inadequate infrastructures creates lot of problem to the public transport operators. The old and second hand vehicles has low mobility and the passengers are forced to wait for long at the bus station (Trans-Africa, 2008). In Eritrea, the urban and interurban transportation is covered by approximately 2,000 public transport vehicles which are very old and not good on road.

Vehicles in use: Motorcycle taxis are unreliable yet popular mode of transportation (Howe and Bryceson, 2000) in various part of Africa. Most of the drivers have no license (Naddumba, 2008). They are popular possibly because that they can be used even in poor road conditions (Sohail *et al*., 2006). Motorcycles-taxis called Zemidjan provides 70% of all urban transportation in Benin (Boko, 2003). This mode of transportation flourished in Benin in the crisis time during the 1980s and at present >150,000 Zémidjan is present in Benin. In Togo also Zemidjan offers 80% of transportation needs (Assamoi and Liousse, 2010). Kabou-Kabou is the motorcycle-taxi available in Niger at regions with poor accessibility (Boko, 2003).

It is called Motos-taxis in Cameroon. In Chad, these are called as clando (Garber, 2004) and emerged in the absence of high capacity buses towards the end of 1990s. Recently after 2007, the cities of Democratic Republic of Congo also have this mode of transport. Motorcycle and bicycle taxis are also operating in the urban cities and outskirts of Burundi, respectively (Fig. 4). The Minister of Transport tried to ban this in the year 2006 but was forced to cancel it (Trans-Africa, 2008). Boda boda is a transport by bicycle-taxi available in Uganda and Kenya (Howe and Davis, 2002). Kenya also have Tuk Tuk that is motor-cycle scooter vehicles operating like taxis at limited charge

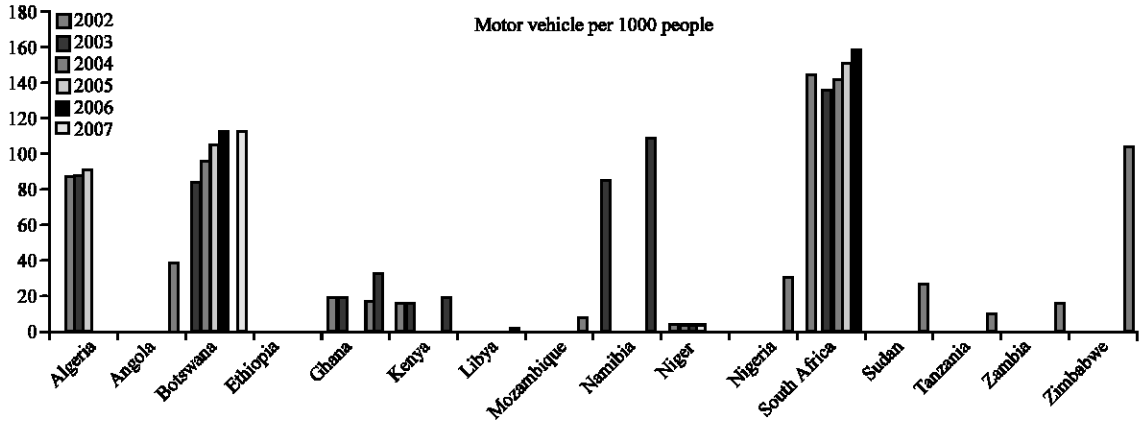

Fig. 5: Motor vehicle availability (World Bank, 2010e)

(Oketch, 2000). Taxi is another mode of transportation in Africa. In Cameroon, the taxis are yellow painted and are in 9,000-10,000 in number (Konings, 2006; Trans-Africa, 2008). All of which are imported from Europe and are second-hand (Trans-Africa, 2008). There are taxis in Chad despite the fact that there are no proper bus or taxi routes. Taxis are more common in Djibouti cities (Trans-Africa, 2008). Like other countries in Africa, there are unmetered taxis operating in Kenya (Wamwara-Mbugua and Cornwell, 2008). In Seychelles however, the taxis are metered and are negotiable (Gossling *et al*., 2002). Taxis are common means of transport to people of Burkina Faso (Manson and Knight, 2006). There is a well-organized and developed taxi network in Cape Verde, operating with meters (Fig. 5). Green tourist and yellow regular taxis (Bah and Goodwin, 2003) with good safety features like seat belts are operating in Gambia. The former one is expensive and the latter is cheap and is usually used by local people (Trans-Africa, 2008). In Bissau, the taxis are white and blue in colour and are not metered (Gacitua-Mario *et al*., 2007; Trans-Africa, 2008). Talladje-Talladje is the name of taxis in Niger (Bourgeois and Piozin, 1986). The country of Senegal has taxi facility but the only city that has metered taxi is Dakar (Godard, 2005).

MACON is the only company that is licensed and safety guaranteed cab operator in Angola. There are unlicensed taxis operating without meter in some parts of the town (Trans-Africa, 2008). Botswana also has taxis as main transport mode (Mupimpila, 2008). Taxis are one of the comfortable transport in Mauritius and are found everywhere in the city but again they do not use meters (Enoch, 2003; Trans-Africa, 2008). Taxis are present in South Africa and also taxi violence (Dugard, 2001). Other countries like Central African Republic, Brazzaville, Democratic Republic of Congo, Gabon, Burundi, Eritrea, Ethiopia, Rwanda, Somalia, Uganda, Ghana, Conakry, Liberia, Sierra Leone, Togo, Lesotho, Malawi, Namibia, Swaziland and Zambia also have taxis on the road transport (Trans-Africa, 2008). Buses are the major means of transportation and they may be conventional buses, minibuses or microbuses (Briggs and Yeboah, 2001). A new bus company called SOCATUR which is a private operator, started functioning in Cameroon since 2001 (Gwilliam, 2008). A limited national bus service company called as Onatracom provides transportation especially to the remote areas otherwise inaccessible by public transport in Rwanda (Cherif, 2004). Burkina Faso State has a private bus company called SOTRACO providing transportation (Kumar and Barrett, 2008). Buses are operated by GPTC (Gambia Public Transport Corporation) in Gambia (McGrath, 1990). Semi-low floor single and double-deck buses are operated by Metro Mass Transit (MMT) in Ghana and was set up in 2003 (Owusu-Ansah and O'Connor, 2006).

Transport Future and Société Guinéenne de Transport (Soguitrans) (recently started in 2008) provides urban transportation in Guinea (Trans-Africa, 2008). In Niger a private company, Societe des Transports urbains du Niger (SOTRUNI), started in 2007 has buses providing transportation (Kumar and Barrett, 2008). Dakar Dem Dikk (DDD) started functioning in 2002 with bus service in Senegal (Koenig, 2009). In Sierra Leone, city buses are run by Sierra Leone Road Transport Corporation (SLRTC) that was established in 1964.

Angola has both modern air-conditioned buses as well as very old buses on road (Trans-Africa, 2008). Namibia has a good road infrastructure and has large conventional buses (Jauch and Sakaria, 2009). Buses are accessible to the dislocated black community for work and trips. South African Bus Operators Association (SABOA) has almost 20,000 buses all throughout the country (Khosa, 1995; Trans-Africa, 2008). There are a number

Table 5: Vehicles in use in African countries

Countries	Authorities	Operators
Ethiopia	Ministry of transport and communications	Buses (15%), taxi minibuses and midibuses (75%), taxis cabs (5%)
Kenya	Ministry of transport, Transport Licensing Board (TLB), Nairobi city council	Buses (15%), matatus (75%), taxis (5%), Boda boda
Somalia	Ministry of Transport, Civil Aviation and Ports	Taxis, minibuses and shared taxi
Uganda	State Secretariat in charge of Transport, Transport Licensing Board (TLB),UTODA	Matatus or taxis (30%), Boda boda motorcycle (20%) bicycle (60%), bus (1%)
Ghana	Ministry of Transport, DVLA, NRSC, MMDAs	MMT buses (15%), Tro-tro (minibuses), shared taxi (85%)
Liberia	Ministry of Transport	Buses (25%), taxis cabs (75%)
Niger	Ministry of Transport and Civil Aviation, ECOGAR	SOTRUNI, SNTV
Nigeria	Ministry of Transport, LAMATA, FCTA	Buses (30%), Danfo and Molue (70%)
Angola	Ministry of Transport	Buses, Collective taxis, private taxis
Botswana	Ministry of Works and Transport	Minibuses and midi buses, taxis
Mozambique	Ministry of Transport and Communications	TPM (18%), Chapas (80%),Others
Namibia	Ministry of Works, Transport and Communication	Buses, taxis, combi
South africa	National Department of Transport, Provincial, local depart	Buses (20%), minibuses (70%)
Zambia	Ministry of Communications and Transport	Buses, minibuses, taxis
Zimbabwe	Ministry of Transport and Communications	ZUPCO (10%), commuter buses (80%)

(Trans-Africa, 2008)

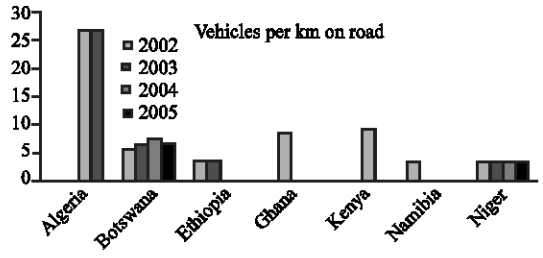

Fig. 6: Vehicles on road (World Bank, 2010f)

of bus operators functioning in South Africa. They are Putco bus services, the city of Johannesburg Metrobus service, Golden arrow bus service (the chief operator in the city of Cape Town), Great North Transport, Northwest Star, Botlhaba, Batswana Gare, Algoa bus service, Interstate Bus Line, Maluti Bus service, etc., (Govender, 1999; Theron, 2009; Trans-Africa, 2008). Congo, Gabon, Burundi, Djibouti, Ethiopia, Kenya, Seychelles, Somalia, Tanzania, Uganda, Cape Verde, Cote d'Ivoire, Ghana, Liberia, Nigeria, Lesotho, Malawi, Mozambique, Swaziland and Zambia are other countries with bus service including mini buses (Trans-Africa, 2008).

High capacity buses called as taxis-bus are used for long distance journeys and employees to go to work. People with low income and no poor road facility use motorcycles or bicycles (Bryceson *et al*., 2008). However in Ethiopia, the geographical nature limits the use of bicycle in the country (Trans-Africa, 2008).

But with Uganda both motorcycle and bicycle use has increased recently and is popular and is the lead cause of traffic accidents (Nakitto *et al.* 2008). There are a large number of populations using these 2 wheelers in Bukina Faso (Starkey, 2007). Burundi and Eritrea are 2 other countries that have 2 wheelers in use (Trans-Africa, 2008). Different vehicles and their percentage of use in different countries in Africa can be shown in Table 5 and Fig. 6.

Non-motorized transport in African cities: Non-motorized transport is a relief for issues like mobility, congestion, safety, environmental and economical aspects (Rahman *et al*., 2008). Countries of Africa where there are no roads or poor road conditions, this type of transportation is best suited. These non-motorized transports are often referred to as green mode of transportation (Forsyth and Southworth, 2008). Besides providing much safety and low pollution (Cherry and Cervero, 2007), this also improves traffic flow avoiding congestion and increase traffic speed (Rahman *et al*., 2009).

Non-motorized transport was promoted in the beginning of this decade by the Government of South Africa by starting a national bicycle transport partnership called shova lula to deliver assisted finance (Gwilliam, 2008). Basically cycle is used for recreation or as transport means for the poor who cannot afford or access other vehicles. Only alternative for poor people will be walking.

Bicycles are much reliable in African scenario as the comparative cost is much less than motorized transport (Cradock *et al*., 2009). It also provides physical exercise to the person traveling to the desired destination without the emission of harmful gases into the environment (Zahran *et al*., 2008). Institution of Transportation and Development Policy had set a program called Access Africa, through which they have provided 7,400 quality new bicycles low-income workers, students and health care staff in various part of Africa like Ghana, Senegal, South Africa and Tanzania (Institute of Transportation

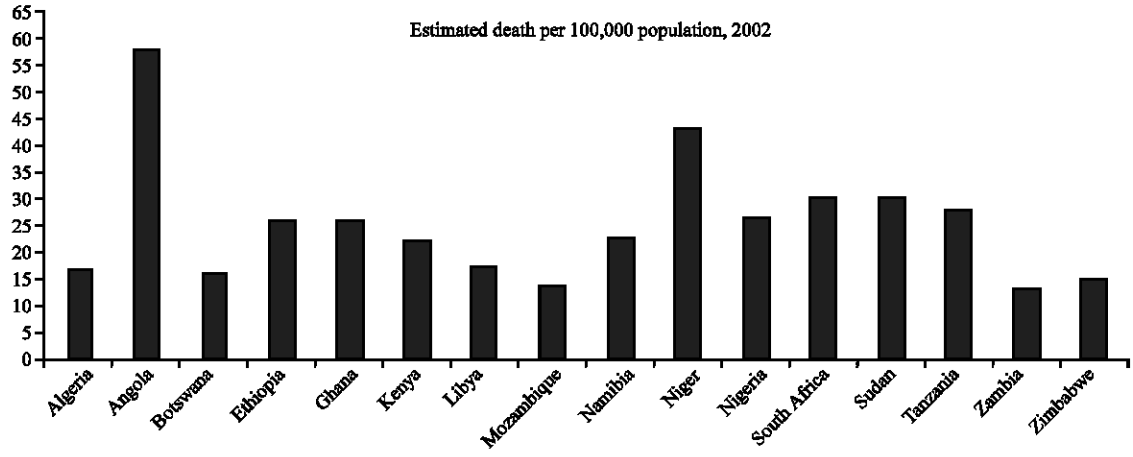

Fig. 7: Road traffic accident deaths (WHO, 2004)

and Development Policy, 2010). This was to make the condition of people much better who otherwise had limited access to jobs, schools and other health care services. These people tend spend much of their income and time on transportation by costly transportation and walking, respectively. However, interpreting car-ownership as status symbol and development of upper-income groups (Scheidegger, 2009), the African government has focused much on motorized transport rather than non-motorized transport (Mock *et al*., 1999). They consider bicycle to be unfashionable and stands as a symbol for poverty and remoteness (Heyen-Perschon and Europe, 2004).

Safety and security: Road traffic injury is big concern throughout the world and is estimated to be the prime cause for morbidity and mortality in a decade from now (Murray and Lopez, 1997). The World Health Organization defines road traffic injury as a fatal or non-fatal injury incurred as a result of a collision on a public road involving at least one moving vehicle. Road traffic injuries creates damage to humans as well as infrastructure (Persson and Odegaard, 1995). World Health Organization has proclaimed road safety to be an international public health concern (Freeman, 2009). Road traffic accidents are rated as second highest cause of injuries and these injuries are rated as third highest cause of mortality in Sub-Saharan Africa. Congestion and pollution are key contributors to poor road safety (Ahsan and Hoque, 2002). In an urban hospital of Nigeria, 57.8% of traumatic death was the result of road traffic accidents (Ekere *et al*., 2005). Public motor vehicle users and pedestrians were more prone to road traffic accidents in Kenya in a study by Macharia *et al*. (2009). In the same study, the researchers has recommended for national road safety concentrate on improving public transport safety to curb this situation. Often congestion of the roads and pollution endanger the safety of pedestrians and city residents (Jeon *et al*., 2006). The factors affecting road traffic accidents can be listed under three categories namely, human (McKenna, 1982), environmental (Shankar *et al*., 1995) and vehicular factors (Peden *et al*., 2004). Though most of the accidents are human factorial, others are also common. Lack of paved roads (Mock *et al*., 1995), incompatible users like pedestrians (Atkins *et al*., 1988), motor cycle users (Langley *et al*., 1994), bicycle users (Cameron *et al*., 1994), cars, buses, trucks, etc.

Nantulya and Reich (2002) adds up to the traffic accidents. The poor road conditions make vehicles vulnerable to accidents. Humans contribute to traffic risk by over speed, drinking, use of drugs, driving without license, etc. (Petridou and Moustaki, 2000). Other factors like lack of seat belts (Clarke *et al*., 2010), dangerous driving and vehicle environments (Stinchcombe and Gagnon, 2010), congested roads (Wang *et al*., 2009) etc., are poor transportation facilities that account to fatalities. Overloading is also prevalent in causing traffic accidents (Van Schoor *et al*., 2001). As mentioned before, the imported second-hand vehicles contribute to large number of older vehicles on road (Chen, 2010).

Current state of African economy fails to provide appropriate maintenance to these vehicles and most of the urban poor are incapable of using this economic service. More often, these vehicles are serviced with inferior quality of machinery and create troubles later on road (Van Schoor *et al*., 2001; Oginni, 2008). It is these vehicles that are used for informal transportation in Africa. Figure 7 gives an impression of traffic accidents. Public transport helps to overcome congestion and pollution in roads (Beirao and Cabral, 2007).

Table 6. Transportation statistics in Africa

Countries	Road network (km) 2000-07*	Road density: Ratio to total land (road km 1,000 km² land area) 2000-07*	Vehicle fleet (per 1,000 people): Commercial vehicles 2000-06*	Vehicle fleet (per 1,000 people): Passenger vehicles 2000-06*
Central African				
Cameroon	51346	11.0	11	11
Central African Republic	24307	3.9	-	1
Congo, Rep.	17289	5.1	-	8
Democratic Republic of Congo	153497	6.8	-	-
Equatorial Guinea	2880	10.3	-	-
Gabon	9170	3.6	-	-
Eastern Africa				
Burundi	12322	48.0	-	1
Comoros	880	6.8	-	-
Djibouti	3065	13.2	-	-
Eritrea	4010	4.0	-	-
Ethiopia	42429	4.2	-	-
Kenya	63265	11.1	18	9
Rwanda	14008	56.8	3	1
Somalia	22100	3.5	-	-
Sudan	11,900	0.5	-	-
Tanzania	78891	8.9		1
Uganda	70746	35.9	5	2
West Africa				
Benin	19000	17.2		13
Burkina Faso	92495	33.8	7	5
Cape Verde	1350	33.5	-	-
Cote D'Ivoire	80000	25.2		7
The Gambia	3742	37.4	7	5
Ghana	57614	25.3	18	12
Guinea Bissau	3455	12.3	1	-
Liberia	10600	11.0		6
Mali	18709	1.5	-	-
Niger	18550	1.5	5	4
Nigeria	193200	21.2		17
Senegal	13576	7.1	14	10
Sierra Leone	11300	15.8	4	2
Togo	7520	13.8	-	-
Southern Africa				
Angola	51429	4.1		8
Botswana	25798	4.6	113	47
Lesotho	5940	19.6	-	-
Madagascar	49827	8.6	-	-
Malawi	15451	16.4		
Mauritius	2021	99.6	138	104
Mozambique	30400	3.9		
Namibia	42237	5.1	85	42
South Africa	364131	30.0	151	103
Swaziland	3594	20.9	84	40
Zambia	91440	12.3	-	-
Zimbabwe	97267	25.1	-	-
Algeria	108,302	4.6	91	58
Egypt, Arab Rep.	92,370	9.3		29
Libya	83,200	4.7	257	232
Morocco	57,625	12.9	59	46
Tunisia	19,232	12.4	95	83

(World Bank, 2010c)

Further, it also adds to road safety enhancement (Woodcock *et al*., 2007). However, the public transport infrastructure is weak in Africa. Some countries favor the public transport development but on the whole this is not the case (Porter, 2002). Owing to lack of confidence in investing to this sector, private investment is also much less (Sagalyn, 2007). Some special groups of people such as police, school children, etc., are exempted in payment for transportation. This makes the private investors to think again before they do. The rising cost of fuel also stagnate the public sector (Essama-Nssah *et al*., 2007; Arndt *et al*., 2008).

Table 7: Some recent projects by African Development Bank

Project ID	Project name	Countries	Approval date	Total project cost*	Status
P-TZ-DB0-017	Road programme	Tanzania	30/11/1999	UAC 230,610,000	Approved
P-MA-DD0-002	Elaboration d'un programme de confortement et de réparation des ouvrages de 7 ports	Morocco	01/04/2010	UAC 1,310,000	Approved
P-SZ-DB0-011	National Transportation Master Plan Study	Swaziland	25/10/2009	UAC 373,000	Approved
P-BJ-DB0-013	Projet de bitumage de la route Ndali -Nikki-Chicandou Frontiére Nigéria	Benin	07/04/2010	UAC 36,850,000	Approved
P-Z1-DB0-060	Phase II, chemin fer Isaka Kiga/Keza Musongati	Multinational	17/11/2009	UAC 5,250,000	Approved
P-TG-DB0-002	Projet de réhabitation et modernisation de la route Aflao - Sanvee Condji	Togo	13/01/2010	UAC 23,743,000	Approved
P-TZ-DB0-018	Tanzania Road Sector Support Project I	Tanzania	31/05/2010	UAC 230,610,000	Approved
P-UG-DB0-020	Road Sector Support Project III	Uganda	25/09/2009	UAC 110,270,000	Approved
P-Z1-DB0-039	Multi-Nacala Corridor Project (Mozambique)	MOZAMBIQUE	10/03/2010	UAC 180,030,000	Approved
P-GH-DB0-012	Awoshie - Pokuase Road Project	Ghana	14/10/2009	UAC 84,540,000	Approved
P-MW-DB0-011	Malawi Trunk Road Rehabilitation: Blantyre-Zomba and Mzuzu-Nkhata Bay Roads Tibati-Ngaoundere	Malawi	22/05/2009	UAC 26,713,000	Approved
P-SN-DB0-010	Autoroute Dakar-Diamniadio	Senegal	15/07/2009	UAC 335,600,000	Approved
P-RW-DB0-012	Projet de route Butare-Kitabi-Ntendezi	Rwanda	25/03/2009	UAC 46,740,000	Approved
P-CM-DB0-010	Etude route Batchenga-Yoko-	Cameroon	14/10/2009	UAC 3,740,000	Ongoing
P-GN-DB0-008	Don supplémentaire au projet de réaménagement route Tombo Gbessia	Guinea	29/04/2009	UAC 5,740,000	Ongoing
P-ML-DB0-009	Pret supplémentaire au Mali	Mali	05/05/2009	UAC 7,720,000	Ongoing
1718 P-SL-D00-004	Port Loko - Lungi Lol Road Upgrading Project	SIERRA LEONE	17/06/2009	UAC 26,860,000	Ongoing
P-TD-DB0-008	Projet de bitumage de la route Koumra-Sarh	Chad	02/06/2009	UAC 56,170,000	Ongoing
P-BF-DB0-015	Projet routier Koupela Bitou	Burkina Faso	31/03/2009	UAC 78,340,000	Ongoing

(African Development Bank, 2010)

About 70% of the public transport vehicles are aged between 5 and 15 years suggesting that the public transport sector is in very miserable condition (Trans-Africa, 2008). The transportation statistics in relation to road infrastructure and vehicle ownership are given in Table 6. African transport system is not integrated and hence is inefficient. However, some transport development projects undertaken by African Development Bank is shown in Table 7.

CONCLUSION

Transport systems affects in a great deal the life and development of people and region. This affects their relationships between the countries within and abroad. Compared to other developed countries African countries has a worse urban transport development. Road transport is accompanied with traffic congestion, air pollution, high level of accident rate, waste of time, inaccessibility to vehicles by the poor, poor vehicle condition, high maintenance, travel and repair cost, etc.

Unless, there is an appropriate and united effort to resolve the present condition and promote the urban transport development Africa will continue the pathetic situation as a developing country. The key objective for such a strategy should be to provide high quality and reliable means of transportation accessible to all people by improving the urban transport facilities.

RECOMMENDATIONS

The interest in personalized transport should be transposed towards public transport system. A well planned and organized transport structure with public and non-motorized transport can certainly debilitate congestion as well as environmental problems. Policies and promotions should be made to encourage non-motorized transportation thereby making minimal traffic accidents and fatalities. Financial amendments should be made to facilitate a good road networking. A prudent support from private investment in transport sector can be integrated to government authorized policies in transport development. International trade and investments have brought remarkable development features in the global economy.

International investors should also be promoted and welcomed as countries like China and India are interested in investing in trade and investment (Broadman, 2007).

Upgrading the present status of roads in Africa would expand the trade at a great deal as well as provide construction and maintenance job in poorest parts of Africa (Buys *et al*., 2010). The policymakers thus should view this as an international rather than national context. On the whole, factors hindering urban transport development are many and have many dimensions. Similarly, the solutions will essentially have many dimensions to be worked out in number of stages and over many years.

REFERENCES

African Development Bank, 2010. Project portfolio African Development Bank 2010. http://www.afdb.org/en/projects-operations/project-portfolio/.

Ahsan, H.M. and M.M. Hoque, 2002. Traffic safety in Dhaka city: Key issues and countermeasures. J. Civil. Eng., CE 30: 13-24.

Arndt, C., R. Benfica, N. Maximiano, A. Nucifora and J.T. Thurlow, 2008. Higher fuel and food prices: Impacts and responses for Mozambique. Agric. Econ., 39: 497-511.

Assamoi, E.M. and C. Liousse, 2010. A new inventory for two-wheel vehicle emissions in West Africa for 2002. Atmos. Environ., 44: 3985-3996.

Atkins, R.M., W.H. Turner, R.B. Duthie and B.R. Wilde, 1988. Injuries to pedestrians in road traffic accidents. Br. Med. J., 297: 1431-1434.

Bah, A. and H. Goodwin, 2003. Improving access for the informal sector to tourism in The Gambia. Pro-Poor Tourism Working Paper, 15, pp: 1-40. http://www.eldis.org/assets/Docs/12355.html.

Beirao, G. and J.A.S. Cabral, 2007. Understanding attitudes towards public transport and private car: A qualitative study. Transport Policy, 14: 478-489.

Boko, G.M.J., 2003. Air pollution and respiratory diseases in African big cities: The case of Cotonou in Benin. Proceedings of the 3rd International Conference on Environment and Health, Dec. 15-17, Chennai, India, pp: 32-43.

Bourgeois, F. and F. Piozin, 1986. The redheads of niamey: An original way of providing urban transport. Transport Rev., 6: 331-346.

Briggs, J. and I.E.A. Yeboah, 2001. Structural adjustment and the contemporary sub Saharan African city. Area, 33: 18-26.

Broadman, H.G., 2007. Africa's Silk Road: China and India's New Economic Frontier. 1st Edn., The World Bank Publishing, USA., pp: 391.

Bryceson, D.F., A. Bradbury and T. Bradbury, 2008. Roads to poverty reduction: Exploring rural roads impact on mobility in Africa and Asia. Dev. Policy Rev., 26: 459-482.

Buys, P., U. Deichmann, and D. Wheeler., 2010. Road network upgrading and overland trade expansion in sub-Saharan Africa-super-†. J. Afr. Econ., 19: 399-432.

Cameron, M.H., A.P. Vulcan, C.F. Finch and S.V. Newstead, 1994. Mandatory bicycle helmet use following a decade of helmet promotion in Victoria, Australia-an evaluation. Accident Anal. Prevent., 26: 325-337.

Campbell, T. and A. Campbell, 2007. Emerging disease burdens and the poor in cities of the developing world. J. Urban Health, 84: 54-64.

Chen, G., 2010. Road traffic safety in African countries-status, trend, contributing factors, countermeasures and challenges. Int. J. Injury Control Safety Promot, 4: 1-9.

Cherif, M., 2004. Economic impact of the privatisation programme in Rwanda: 1996-2003. http://zunia.org/uploads/media/knowledge/RwandaPrivImpact_v1.0R_MCherif_Nov03.doc.

Cherry, C. and R. Cervero, 2007. Use characteristics and mode choice behavior of electric bike users in China. Transport Policy, 14: 247-257.

Clarke, D.D., P. Ward, C. Bartle and W. Truman, 2010. Killer crashes: Fatal road traffic accidents in the UK. Accident Anal. Prev., 42: 764-770.

Cradock, A.L., P.J. Troped, B. Fields, S.J. Melly, S.V. Simms, F. Gimmler and M. Fowler, 2009. Factors associated with federal transportation funding for local pedestrian and bicycle programming and facilities. J. Public Health Policy., 30: S38-S72.

Delgado, C.L. and J.W. Mellor, 1984. A structural view of policy issues in African agricultural development. Am. J. Agric. Econ., 66: 665-670.

Department of Economics and Statistics and United Nation, 2007. World Urbanization Prospects The 2007 Revision. http://www.un.org/esa/population/publications/wup2007/2007WUP_ExecSum_web.pdf.

Dugard, J., 2001. From low intensity war to Mafia war: Taxi violence in South Africa (1987-2000). Violence Transition Ser., 4: 1-46.

Ekere, A.U., B.E. Yellowe and S. Umune, 2005. Mortality patterns in the accident and emergency department of an urban hospital in Nigeria. Niger J. Clin. Pract., 8: 14-18.

Enoch, M.P., 2003. Transport practice and policy in Mauritius. J. Transport Geography, 11: 297-306.

Essama-Nssah, B., D.S. Go, M. Kearney, V. Korman, S. Robinson and K. Thierfelder, 2007. Economy-wide and distributional impacts of an oil price shock on the South African economy. Policy Research Working Paper No. 4354. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1015667&rec=1&srcabs=160788.

Fage, J.D., 1969. Slavery and the slave trade in the context of West African history. J. Afr. History, 10: 393-404.

Forsyth, A. and M. Southworth, 2008. Cities afoot-pedestrians, walkability and urban design. J. Urban Des., 13: 1-3.

Freeman, P.N., 2009. Ten years of World Bank action in transport: Evaluation. J. Infrastruct. Syst., 15: 297-304.

Gacitua-Mario, E., H. Nordang and Q. Wodon, 2007. Livelihoods in Guinea-Bissau. World Bank Working Paper, pp: 59-75. http://mpra.ub.uni-muenchen.de/11180/1/GB_Conflict5.pdf.

Garber, D.S., 2004. Oil, Dutch disease and development: The case of Chad. A Summary of Work Conducted in Chad, University of Wisconsin-Madison. July/August 2004. http://global.wisc.edu/skj/fellows/reports/2004-travel-garber.pdf.

George, K., 1958. The civilized west looks at primitive Africa: 1400-1800 a study in ethnocentrism. Isis., 49: 62-72.

Godard, X., 2005. Dakar, senegal experience in bus reform. The World Bank Group and PPIAF. http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/documents/toolkits/UrbanBusToolkit/assets/CaseStudies/full_case/Dakar.doc.

Gossling, S., C.B. Hansson, O. Horstmeier and S. Saggel, 2002. Ecological footprint analysis as a tool to assess tourism sustainability. Ecol. Econ., 43: 199-211.

Govender, P., 1999. Johannesburgs strategic plan for municipal service partnerships. Dev. Southern Afr., 16: 649-667.

Guitink, P., S. Holste and J. Lebo, 1994. Non-motorized transport: Confronting poverty through affordable mobility. Transportation, Water And Urban Development Department, The World Bank. http://siteresources.worldbank.org/INTURBANTRANSPORT/Resources/T-UT-4.pdf.

Gwilliam, K., 2008. Bus transport: Is there a regulatory cycle. Transport. Res. Part A: Policy Pract., 42: 1183-1194.

Hailey, W.M., 1938. An African survey. Oxford University Press, London.

Hansen, M. and Y. Huang, 1997. Road supply and traffic in California urban areas. Transport. Res. Part A: Policy Practice, 31: 205-218.

Heggie, I.G., 1995. Commercializing Africa's roads: Transforming the role of the public sector. Transport Rev., 15: 167-184.

Herbst, J., 2000. States and Power in Africa: Comparative Lessons in Authority and Control. Princeton University Press, Princeton, NJ USA., pp: 208.

Heyen-Perschon, J. and I. Europe, 2004. Making the African cities mobile: Non-motorized transport solutions in African cities the case of Jinja/Uganda. Trialog., 82: 21-21.

Howe, J. and A. Davis, 2002. Boda Boda-Ugandas rural and urban low-capacity transport services. Urban Mobility for All, pp: 1-27. http://www.transport-links.org/transport_links/filearea/documentstore/134_Boda%20Boda%20WP.doc.

Howe, J. and D. Bryceson, 2000. Poverty and urban transport in East Africa: Review of research and Dutch Donor experience. Report prepared for the World Bank, Delft International Institute for Infrastructural, Hydraulicand Environmental Engineering. http://siteresources.worldbank.org/INTURBANTRANSPORT/Resources/poverty&ut_eafrica.pdf.

Institute of Transportation and Development Policy, 2010. Access Africa (ITDP). http://www.aidforafrica.org/member-charities/access-africa-itdp/.

Jauch, H. and I. Sakaria, 2009. Chinese Investments in Namibia: A labour Perspective. Labour Resource and Research Institute (LaRRI), Namibia, pp: 54.

Jeon, C.M., A.A. Amekudzi and J. Vanegas, 2006. Transportation system sustainability issues in high-middle-and low-income economies: Case studies from Georgia (US), South Korea, Colombia and Ghana. J. Urban Plann. Dev., 132: 172-186.

Khosa, M.M., 1995. Transport and popular struggles in South Africa. Antipode, 27: 167-188.

Koenig, D., 2009. The challenges of urban growth in West Africa: The case of Dakar, Senegal. Working Paper No. 8. http://www.mu.ac.in/arts/social_science/african_studies/doloreswp8.pdf.

Konings, P., 2006. Solving transportation problems in African cities: Innovative responses by the youth in Douala, Cameroon. Afr. Today, 53: 35-50.

Kumar, A. and F. Barrett, 2008. Stuck in traffic: Urban transport in Africa. AICD, Background Paper, World Bank, Washington, DC. http://www.regulationbodyofknowledge.org/documents/198.pdf.

Langley, J.D., D.J. Begg and A.I. Reeder, 1994. Motorcycle crashes resulting in death and hospitalisation. II: Traffic crashes. Accident Anal. Prevent., 26: 165-171.

Macharia, W.M., E.K. Njeru, F. Muli-Musiime and V. Nantulya, 2009. Severe road traffic injuries in Kenya, quality of care and access. Afr. Health Sci., 9: 118-124.

Manson, K. and J. Knight, 2006. Burkina Faso: The Bradt Travel Guide. 1st Edn., Bradt Travel Guides, Zanzibar, Tanzania, pp: 312.

McDonald, R.I., R.T.T. Forman, P. Kareiva, R. Neugarten, D. Salzer and J. Fisher, 2009. Urban effects, distance and protected areas in an urbanizing world. Landscape Urban Plann., 93: 63-75.

McGrath, B., 1990. Land use and transportation in a small African city: The example of greater Banjul. Third World Plann. Rev., 12: 41-41.

McKenna, F.P., 1982. The human factor in driving accidents an overview of approaches and problems. Ergonomics, 25: 867-877.

Mock, C.N., E. Adzotor, D. Denno, E. Conklin and F. Rivara, 1995. Admissions for injury at a rural hospital in Ghana: Implications for prevention in the developing world. Am. J. Public Health, 85: 927-931.

Mock, C.N., S.N. Forjuoh and F.P. Rivara, 1999. Epidemiology of transport-related injuries in Ghana. Accident Anal. Prevent., 31: 359-370.

Muhammad, P.M., 2003. Trans-atlantic slave trade: A forgotten crime against humanity as defined by international law. Am. U. Intl'L. Rev., 19: 883-883.

Mupimpila, C., 2008. Internalising the externalities of public transport in Botswana. Botswana J. Econ., 5: 46-46.

Murray, C.J.L. and A.D. Lopez, 1997. Global mortality, disability and the contribution of risk factors: Global burden of disease study. Lancet, 349: 1436-1442.

Naddumba, E.K., 2008. Musculoskeletal trauma services in Uganda. Clin. Orthopaedics Related Res., 466: 2317-2322.

Nakitto, M.T., M. Mutto, A. Howard and R. Lett, 2008. Pedestrian traffic injuries among school children in Kawempe, Uganda. Afr. Health Sci., 8: 156-159.

Nantulya, V.M. and M.R. Reich, 2002. The neglected epidemic: Road traffic injuries in developing countries. Br. Med. J., 324: 1139-1139.

Njoh, A.J., 2008. Implications of Africas transportation systems for development in the era of globalization. Rev. Black Political Econ., 35: 147-162.

Oginni, F.O., 2008. Causes of road traffic accidents in developing countries. Traffic Accidents: Causes and Outcomes, pp: 225.

Oketch, T.G., 2000. New modeling approach for mixed-traffic streams with nonmotorized vehicles. Transport. Res. Record: J. Transport. Res. Board, 1705: 61-69.

Owusu-Ansah, J.K. and K. O'Connor, 2006. Transportation and physical development around Kumasi, Ghana. World Acad. Sci. Eng. Technol.

Peden, M., R. Scurfield, D. Sleet, D. Mohan, A.A. Hyder, E. Jarawan and C. Mathers, 2004. World report on road traffic injury prevention. World Health Organization Geneva. http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/summary_en_rev.pdf.

Pedersen, P.O., 2001. Freight transport under globalisation and its impact on Africa. J. Transport Geography, 9: 85-99.

Persson, U. and K. Odegaard, 1995. External cost estimates of road traffic accidents: An international comparison. Transport Econ. Policy, 29: 291-304.

Petridou, E. and M. Moustaki, 2000. Human factors in the causation of road traffic crashes. Eur. J. Epidemiol., 16: 819-826.

Pinard, M.I., B. Obika and K.J. Motswagole, 1999. Developments in innovative low-volume road technology in Botswana. Transport. Res. Record: J. Transport. Res. Board, 1652: 68-75.

Population Divison, 2010. Urban and rural areas 2007. Population Divison, Department of Economic and Social Affairs, United Nations 2007. http://www.un.org/esa/population/publications/wup2007/2007_urban_rural_chart.pdf.

Porter, G., 2002. Living in a walking world: Rural mobility and social equity issues in sub-Saharan Africa. World Dev., 30: 285-300.

Preston, B., 1981. Road safety: International comparisons. Transport Rev.,1 1: 75-100.

Rahman, M.M., D.E. Glen, and J. Bunker, 2008. Problems and prospects of non-motorized public transport integration in developing cities. Proceedings of the 30th Conference of the Australian Institutes of Transport Research, Dec. 10-12, Perth, Western Australia, http://eprints.qut.edu.au/17053/.

Rahman, M.M., G. D'Este and J.M. Bunker, 2009. Is there a future for non-motorized public transport in Asia? Proceedings of the 8th International Conference of the Eastern Asia Society for Transportation Studies (EASTS), Nov. 16-19, Surabaya, Indonesia, http://eprints.qut.edu.au/27196/.

Sagalyn, L.B., 2007. Public/private development. J. Am. Plann. Assoc., 73: 7-22.

Scheidegger, U., 2009. Mobility and the Promotion of Public Transport in Johannesburg. Mobilities and Inequality, pp: 207.

Shankar, V., F. Mannering and W. Barfield, 1995. Effect of roadway geometrics and environmental factors on rural freeway accident frequencies. Accident Anal. Prevent., 27: 371-389.

Sohail, M., D.A.C. Maunder and S. Cavill, 2006. Effective regulation for sustainable public transport in developing countries. Transport Policy, 13: 177-190.

Starkey, P., 2007. A methodology for rapid assessment of rural transport services. Sub-Saharan Africa Transport Policy Program Working Paper 87A, World Bank, Washington, DC. http://siteresources.worldbank.org/EXTAFRSUBSAHTRA/Resources/SSATPWP87-A.pdf.

Stinchcombe, A. and S. Gagnon, 2010. Driving in dangerous territory: Complexity and road-characteristics influence attentional demand. Transport. Res. Part F: Traffic Psychol. Behav., 13: 388-396.

Theron, J., 2009. Informalization from above, Informalization from below: The options for organization? http://blogs.uct.ac.za/gallery/679/Informalisation%20from%20above,%20informalisation%20from%20below_jt_4_03_2008.pdf.

Thomas, R.G., 1973. Forced labour in British West Africa: The case of the Northern territories of the gold coast 1906-1927. J. Afr. History, 14: 79-103.

Trans-Africa, 2008. Promoting public transport in Africa. State-of-The-Art of Public Transport in Sub Saharan Africa. http://www.uitp.org/knowledge/pics/2009/STATE-OF-THE-ART-OF-PUBLIC-TRANSPORT.PDF.

UNECA, 2010. Challenges to agricultural development in Africa. UN Economic Commission for Africa 2009. http://www.uneca.org/era2009/.

Van Schoor, O., J.L. van Niekerk and B. Grobbelaar, 2001. Mechanical failures as a contributing cause to motor vehicle accidents-South Africa. Accident Anal. Prevent., 33: 713-721.

WHO, 2004. Causes of death. http://www.who.int/entity/healthinfo/statistics/bodgbddeathdalyestimates.xls.

Wamwara-Mbugua, L.W. and T.B. Cornwell, 2008. The impact of tourism on the consumption environment: Coping and potential praxis in Malindi, Kenya. Afr. J. Bus. Manage., 2: 99-110.

Wang, C., M.A. Quddus and S. Ison, 2009. Impact of traffic congestion on road accident: A spatial analysis of the M25 motorway in England. Accident Anal. Prevent., 41: 798-808.

Woodcock, J., D. Banister, P. Edwards, A.M. Prentice and I. Roberts, 2007. Energy and transport. Lancet, 370: 1078-1088.

World Bank, 2010a. Africa Development Indicators 2010. The World bank, USA., pp: 184.

World Bank, 2010b. Motor vehicles (per 1,000 people). http://data.worldbank.org/indicator/IS.VEH.NVEH.P3.

World Bank, 2010c. Passenger cars (per 1,000 people). http://data.worldbank.org/indicator/IS.VEH.PCAR.P3.

World Bank, 2010d. Roads, paved (% of total roads). http://data.worldbank.org/indicator/IS.ROD.PAVE.ZS/countries.

World Bank, 2010e. Urban Population (% of total). http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS.

World Bank, 2010f. Vehicles (per km of road). http://data.worldbank.org/indicator/IS.VEH.ROAD.K1.

Zahran, S., S.D. Brody, P. Maghelal, A. Prelog and M. Lacy, 2008. Cycling and walking: Explaining the spatial distribution of healthy modes of transportation in the United States. Transport. Res. Part D: Transport Environ., 13: 462-470.