

SUMMARY OF BACKGROUND PAPER 1

# **AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC**

## **Stuck in traffic: Urban transport in Africa**

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## About AICD

This study is part of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a more solid empirical foundation for prioritizing investments and designing policy reforms in the infrastructure sectors in Africa.



AICD will produce a series of reports (such as this one) that provide an overview of the status of public expenditure, investment needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The World Bank will publish a summary of AICD's findings in July 2009. The underlying data will be made available to the public through an interactive Web site allowing users to download customized data reports and perform simple simulation exercises.



The first phase of AICD focuses on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.



AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. AICD grew from an idea presented at the inaugural meeting of the Infrastructure Consortium for Africa, held in London in October 2005.



Financing for AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.



This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from [www.infrastructureafrica.org](http://www.infrastructureafrica.org). Freestanding summaries are available in English and French.



Inquiries concerning the availability of datasets should be directed to [vfoster@worldbank.org](mailto:vfoster@worldbank.org).

## **Stuck in traffic**

# **Urban transport in Africa**

by Ajay Kumar and Fanny Barrett

Getting to work is increasingly difficult in Africa's sprawling commercial capitals, in large part because of the tidal wave of minibuses and motorcycles that have arrived to take the place of faltering public bus services. The reasons behind the dysfunctional state of urban transport are not difficult to discern. Weak, fragmented, and underfunded authorities have been unable to maintain existing services or to plan for expansion. Buses fall apart after running overloaded for years on rutted roads; replacements are soon idled for lack of parts. Fares are too low, and subsidies too irregular, to permit sustainable operations. Commuters walk or resort to largely unregulated and informal services that are dirty, unsafe, uncomfortable, and unreliable. Everybody loses.

The way forward is as clear as the problem itself: Africa's cities must move quickly toward the model of the metropolitan transport authority used in successful cities around the globe to coordinate planning, regulation, licensing, inspections, monitoring, and enforcement. A way must be found to bring large buses back. Cities that cannot move people become choked by growth.

This note summarizes recent research on urban transport in 14 large African cities performed at the World Bank under aegis of the Africa Infrastructure Country Diagnostic project. The full report is available at <http://www.infrastructureafrica.org>.

## **Choked by growth**

In 2000, one in three Africans lived in a city; by 2030, one in two will do so. But in most cities, authorities have had difficulty meeting the service demands of new urban residents, particularly the poor. The absence of policies on land use and economic development has led to urban sprawl. The declining density associated with sprawl has increased travel distances and pushed up the price of public transport. These developments often affect the poor disproportionately, excluding them from work and social services. Meanwhile, the rising use of private cars has choked roads, endangering the safety of pedestrians and the health of city residents who breathe in automobile emissions.

We collected a set of detailed qualitative and quantitative indicators on urban transport in 14 major African cities, each the principal commercial city (if not necessarily the political capital) of the country in which it is located. All the cities are growing rapidly, and, as populations have grown, so have city boundaries, which now extend into contiguous areas, often managed by different local governments. The expansion of a metropolitan area over several jurisdictions greatly complicates the task of planning, regulating, and operating urban transport services—in Africa as in the industrialized world.

All of the cities in our sample are in low-income countries. Some are medium-sized, with a population of around one million. Two are mega-cities of more than five million residents. The

remainder are large cities, with a population of two to four million. Each accounts for 10–20 percent of the national population and more than 30 percent of the urban population. Each is the principal center of economic, commercial, and industrial activity in the country.

The 14 cities share some common characteristics: a growing urban population inadequately served by the transport system, declining standards of public transport, overlaps and conflicts among the agencies responsible for planning and implementing transport solutions, massive growth in the use of minibuses, growing dependence on private transport (cars and motorcycles), inadequate and deteriorating transport infrastructure, and poor facilities for non-motorized transport (walking and bicycling).

Road congestion is a problem in all cities. Its causes are poor management of traffic flow, inadequate parking, and weak enforcement. Having evolved over the years without adequate planning, the cities are unable to cope with growing motorization. Less than half of all roads are paved, reducing accessibility for buses in densely populated neighborhoods and outlying areas. Paved roads are just one-third of the average for cities in the developing world. (table 1).

The road network in all cities is substandard. Capacity is limited, service lanes are absent, pavement is deteriorating, and street lighting is minimal. Bad conditions reduce vehicle speeds, sapping the productivity of the bus fleet and increasing the cost of vehicle maintenance. They also promote the use of minibuses, taxis, and motorcycles, which have greater maneuverability than large buses but are not as efficient as a means of urban mass transit.

Most roads were laid when cities had a single center, and before the rapid growth in personalized forms of motorized transport. The primary road network radiates from the city center to surrounding areas; orbital or circumferential links are missing. The majority of the roads have one lane in each direction; where the roads are wider, one lane is often taken up by pedestrians and parked vehicles. Intersections are spaced closely together and are ill-designed for turning.

Beyond these general failings, little attention has been paid to other matters that facilitate the operation of public transport systems. Dedicated bus lanes are rare, or absent altogether. Bus stops, bus shelters, and other facilities for passengers are scarce and in poor condition. Bus terminals are little more than overcrowded parking lots, with no facilities for passengers.

Most cities have ignored the needs of pedestrians. Sidewalks are missing on around 65 percent of the road network, so pedestrians and motorized vehicles must share the same space. Where they do exist, sidewalks are poorly maintained, contain open drains, and are taken over by the expansion of adjoining properties. Pedestrian crosswalks and bridges are not provided, except in city centers. Because traffic management is limited, accidents are frequent. Pedestrians account for two-thirds of fatalities.

**Table 1 Paved roads in selected African cities, compared with developing-world average**

City	Paved roads (meters per 1,000 pop.)
Abidjan	346
Conakry	174
Dakar	467
Dar es Salaam	150
Kampala	225
Kinshasa	63
Lagos	400
Average, sample	318
Average, developing world	1,000

*Sources:* City authorities; UN Millennium Cities Database.  
*Note:* — = not available.

## The incredible shrinking bus

Buses—large and small—are the most common mode of public transit in most cities (table 2). Minibuses are much more prevalent than large buses (except in Addis Ababa and Ouagadougou), reflecting the difficulty of operating large buses profitably. Overall, about twice as many trips are taken by minibus than by large bus.

All 14 of our cities originally relied on a monopoly supplier of large-bus service as the backbone of their urban transport system. In most cases the traditional bus companies were nationalized in the process of decolonization, ushering in a regulated regime of public transport in the immediate postcolonial era. Fares were regulated, and governments were reluctant to increase them.

Initially, the state-owned bus companies were able to operate without subsidy, but as operational deficits grew

and public subsidies did not grow commensurately, operators had difficulty maintaining and replacing their fleet. The result was deterioration in service coverage and quality. Most of the public companies eventually failed and went out of business. Some cities (Accra, Dar Es Salaam, Kampala, Kigali, and Lagos) have abandoned large-bus service altogether, and now rely exclusively on private, largely informal, minibus services. Nairobi is the only city not to have passed through this cycle, having retained the private operation of its large-bus service since independence.

Minibuses, which carry roughly 8 to 25 passengers, tend to have colloquial names, such as *tro-tro* in Accra, *danfo* in Lagos, *gbaka* in Abidjan, *sotrama* in Bamako, and *matatu* in Nairobi. So-called midi-buses are a larger form of minibus, with a passenger capacity ranging from around 30 to about 50 (with standees). These vehicles, too, tend to have colloquial names, such as *cars rapides* in Dakar, and *molue* in Lagos. The term used in Dar es Salaam, *dala-dala*, is derived from dollar-dollar. Large buses carry 50 to 100 passengers.

**Table 2 Shares of various modes of transport in use in 14 African cities**

City	Large bus	Mini-bus	Taxi	Motor-cycle	Private car	Walk	Other
Abidjan	11	19	29	0	18	22	1
Accra	10	52	9	0	13	12	4
Addis Ababa	35	20	5	0	7	30	3
Bamako	1	10	5	56	19	—	9
Conakry	1	14	6	0	1	78	0
Dakar	3	73	6	6	11	—	1
Dar es Salaam	0	61	1	1	10	26	1
Douala	10	—	13	12	2	60	3
Kampala	0	41	—	20	35	—	4
Kigali	1	75	10	0	10	5	0
Kinshasa	—	—	—	—	—	High	—
Lagos	10	75	5	5	5	High	0
Nairobi	7	29	15	2	—	47	0
Ouagadougou	8	0	—	58	14	—	20
Average	7	30	8	12	12	37	4

Sources: City authorities, published documents.

Note: — = Not available. Rows may not total to 100 because of rounding.

Note: The modal share shown for Bamako, Dakar, Kampala, Lagos, and Ouagadougou reflects motorized trips only.

In none of the cities studied did the shift to minibuses result from a conscious decision to deregulate public transport. Rather, it was an indigenous response to growing demand and commercial opportunity. Today the minibus transport business generally operates in a regulatory vacuum.<sup>1</sup>

Minibus services are almost invariably provided by the informal sector. Ownership is highly dispersed, with most individual entrepreneurs owning no more than one or two vehicles, which they generally rent out to drivers. Drivers keep the fares they collect but are responsible for paying fuel costs, conductors' wages, terminal fees, and other incidental expenses. Drivers face a strong incentive to carry full loads of passengers to maximize revenues while minimizing variable costs (notably fuel).

In a few cities, formal minibus operations on a larger scale coexist alongside the informal operations just described. In Dakar, for example, of the estimated fleet of 3,000 *cars rapides*, 400 belong to one formal operator and another 200 to a second.

Reinforcing the appeal of minibuses is the relative ease of financing purchases of second-hand vehicles using interest-free loans from personal savings, family, and friends, as well as earnings from operations. Bank finance is rarely used, as the banks are reluctant to accept the vehicles as security for the loan, and revenue streams are not sufficiently reliable to assure the banks that loans will be repaid.

The sector is typified by short periods of owner involvement. With a vehicle in reasonable condition, and with a reliable driver, it is possible to realize a healthy regular cash flow. However when major repairs are required, it is not uncommon for owners not to reinvest.

Most of the cities have a minibus fleet several thousand strong, compared with only a few hundred larger buses (table 3). The minibus fleet tends to be somewhat older than the large buses, since typically it is composed of second-hand vehicles, whereas many large buses are or were supplied new by aid donors.

### **Small buses, big problems**

Minibuses have proliferated by filling a void left by large-bus services. But they are far from an unalloyed good—in fact, they present clear disadvantages from the perspective of the public interest:

- *Road congestion.* Minibuses now account for almost 50 percent of all motorized traffic on some corridors. Their proliferation has produced severe congestion, particularly during peak periods.
- *Safety and emissions.* Most minibuses are old, inadequately maintained, and operated for long hours at low speed. In Accra in 2004 minibuses accounted for the majority of traffic

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<sup>1</sup> Of the cities studied, only Douala and Ouagadougou do not offer some kind of minibus service. Cameroon's government outlawed such services in an effort to develop a new large-bus operator. In both cases, the vacuum created by the absence of minibus services has been filled by shared taxis that operate on a similar model.

violations and 22 percent of accidents. Weak enforcement of regulations on vehicle inspection, driver behavior, and traffic management is common practice in all African cities.

- *Unpredictability of routes, schedules, and fares.* Minibus operators increase fares as demand rises and change routes at will. In Dar es Salaam routes are allocated by the regulator (SUMATRA), and fares are regulated through negotiations with the bus operators' association. Otherwise the dala-dala are as unpredictable as their equivalents in other cities. The flexibility to do so has contributed to their economic success, but at a cost to passengers. Vehicles wait at the terminal until they are fully loaded. This means that passengers wishing to board at other stops along the route often cannot do so. Many walk long distances to the terminal so as to be assured of a seat on the bus.

Access to bus services is very low in the cities surveyed, critically so in some cases. The low density of paved roads—coupled with unplanned growth, poor road surfaces, and narrow streets—suggests that the geographic reach of bus services is seriously circumscribed. Most of the 14 cities have 30–60 bus seats per thousand residents, mostly in minibuses. In Addis Ababa, Kinshasa, and Ouagadougou, the indicator falls to no more than 10 per thousand. The average number of large-bus seats in our sample is only 6 per thousand. As a point of comparison, the average number of large-bus seats per thousand urban residents in the middle-income countries of Latin America, Asia, the Middle East, and Eastern Europe is 30 to 40.

**Table 3 Average bus age and fleet size**

City	Large bus		Minibus	
	Average age	Fleet size	Average age	Fleet size
Abidjan	7	650	15	5,000
Accra	1–2	600	15–20	6,000
Addis	—	350	—	10,000
Bamako	17	168	15	1,800
Conakry	20	50	10–15	1,500
Dakar	—	410	15–20	3,000
Dar es Salaam	n/a	0	15	7,000
Douala	15	100	15–20	2,000
Kampala	n/a	0	10–15	7,000
Kigali	4	20	15	2000
Kinshasa	2 <sup>a</sup>	180 <sup>a</sup>	15–20 <sup>b</sup>	1,200 <sup>b</sup>
Lagos	—	<100	>15	75–120,000
Nairobi	—	250	>15	10,000
Ouagadougou	5	55	n/a	0
Average	9	218	14	11,400

Source: City authorities, published documents.  
Note: — = not available; n/a = not applicable.  
a. Publicly owned operator.  
b. Informal operators.

Fares are also high in relation to the purchasing power of the typical family in the cities, and bus usage is correspondingly low. The average family is able to afford no more than one daily round trip on the bus, while for the poorest households even this basic level of mobility is unattainable. But even this low rate of use translates into peak demand for around 200 seats per thousand residents, about five times higher than the supply available in any of the cities sampled.

Fare structures are not uniform across the cities, but elements of both flat and distance-related tariffs can be identified in most cases. The most common practice is a set fare for a given route, with fares varying across the network according to route length. The average cost of a trip is around \$0.30, with no systematic variation between the fares charged by large buses and the

nominal fares of informal minibuses. In countries in South Asia and Latin America at similar income levels bus fares are typically much lower—between \$0.10 and \$0.15.

### **Alternatives to bus transport**

In Douala, Lagos, and Kampala, the use of motorcycles for commercial transport has grown very rapidly in recent years, as a consequence of the poor state of the roads and the inability of bus companies to meet growing demand. In Ouagadougou and Bamako, the use of privately owned motorcycles is now common. Initially, motorcycle services provided access from residential areas to main roads, where passengers would take taxis or buses. However, motorcycle services are now found on main roads, and even in the city center. Motorcycle drivers are often young and inexperienced. Accidents are common—and often fatal.

In comparison with Asian cities, the use of non-motorized vehicles (bicycles, rickshaws) is surprisingly low in African cities, as is the use of two-wheeled motorized vehicles.

The extent of walking as a mode of commuting (for those cities that have attempted to measure it) also varies enormously. In some cities walking accounts for most urban trips. In others, many residents walk long distances to work. Facilities for pedestrians are very poor, however, and those for bicycles are nonexistent (except in Ouagadougou). The widespread recourse to walking indicates that many city residents may not be able to afford public transport.

Small-scale suburban rail networks exist in Dakar, Kinshasa, Lagos, and Nairobi, but account for less than 2 percent of the market. While highly desirable, light rail systems are also expensive to build and maintain.

### **Weak regulation, lax enforcement**

Effective urban public transportation requires coordinated attention to urban planning, to the construction and maintenance of infrastructure, and to the organization of transport services. In the 14 cities studied, these functions are seldom combined. Even where all three functions remain at the central government level, several different ministries are usually involved. In most of the cities studied, many institutions at all levels of government—federal, state, and local—are involved in planning, regulating, licensing, and monitoring urban transport.

The net effect of the widespread role confusion in regulation and planning is poor accountability, lack of coordination, and diffusion of commitment at all levels toward the implementation of transport strategies that serve people's needs. In short—ineffective regulation and an almost universal absence of integrated planning.

Only a handful of African cities have established agencies with overarching responsibility for urban transport. Those in our sample are Abidjan (AGETU), Bamako (DRCTU), Dakar (CETUD), Dar es Salaam (SUMATRA), and Lagos (LAMATA), but even these lack the necessary executive powers to implement their vision and must work through other agencies of government. In Addis Ababa, a city-wide transport authority does exist, but it is not autonomous.

In Accra, Dakar, Bamako, Kampala, Dar es Salaam and Nairobi, the government makes no attempt to control the supply of minibuses—that function has been left to route associations or syndicates. The general practice is for the syndicates to collect dues from their members, in return for the right to use the terminal facilities it manages. The syndicates also charge daily fees based on terminal use. Some play a role in regulating routes and setting fares. By effectively self-regulating the sector, an orderly market has been created in which the worst consequences of competition on transport routes have been avoided.

Union control has some adverse consequences, however. Chief among them is the rigidity of the route network. Routes run between designated terminals under the unions' control, which fails to match transport supply to passenger demand. To enforce an "equitable" distribution of revenue among members, the unions impose operating practices that work against passenger interests. The most egregious of these is waiting for the assembly of a full load before setting out on the route, which often forces passengers to sit in the vehicle under the sun in order to retain their place. Waiting times at terminals can exceed an hour off peak, extending waiting times along the route and making it difficult for intending passengers to access the service.

By loading vehicles in strict rotation, the unions also prevent intending passengers from rejecting vehicles that fail to meet expected standards of cleanliness or physical condition. This, in turn, lowers the incentive for vehicle owners to improve their performance. Investment in a premium-quality vehicle also becomes impractical under these circumstances.

All of the cities studied have difficulty enforcing regulations pertaining to vehicle inspections (safety and emissions). In Lagos, we found that 37 percent of vehicles were operating without a valid certificate of roadworthiness, and 47 percent without a valid test certificate. One driver in five acknowledged that he did not hold a valid driver's license. In Nairobi it was reported to be easier to obtain a forged certificate of roadworthiness for an unsafe vehicle than to submit for official inspection a vehicle in good condition. Overcrowding is routine. In Kinshasa and Dar es Salaam, the average load factor on large buses at the morning peak reaches 200 percent, with passengers hanging out of the bus or even sitting on the roof.

In every city we studied the licensing regime emphasizes the vehicle, rather than its operator. Weak or nonexistent operator-licensing regimes make it difficult to influence the behavior of transport operators and to raise their standards in the public interest. A stronger regime would require operators to maintain their vehicles in roadworthy condition and to enforce the requirement through inspections, tests, and sanctions.

### **Wanted: metropolitan transport authorities**

Improving urban public transport in African cities will depend on a strategy of coordinated measures to improve infrastructure, traffic management, service quality, and network reach. Short-term steps include increasing road funding, enforcing existing regulations, controlling overcrowding, and strengthening vehicle inspections. Medium-term measures include rehabilitating roads, improving traffic management, setting and enforcing service standards (fares, schedules), developing a new route structure, and rationalizing service through controlled

competition. The long-term goal is to consolidate gains in all these areas through the creation of a metropolitan transport authority with jurisdiction over roadways and vehicles.

A capable authority must coordinate transport planning, infrastructure development, and regulation of services. Its budget must be sufficient to attract and retain qualified staff and must not be subject to arbitrary changes when the sponsoring department comes under pressure. User charges—principally operating permits or franchise fees levied on operators—are the preferred funding option. These need not be onerous or have a significant effect on fares.

Large buses provide greater comfort, safety, and speed than minibuses, particularly on high-density corridors, *if* they can be managed efficiently and sustainably. They also hold out the promise of relieving the growing congestion of African cities. To exploit their potential, however, African cities must repair their roadways, improve traffic-management practices, and ensure the economic viability of large-vehicle services through cost recovery, either through the fare box or through predictable subsidies. If these goals were achieved, minibuses would continue to have an important role as feeder services in outlying areas.

Reintroduction of large buses also will depend not only on physical and institutional improvements, but also on a staunch political commitment to sustainable operations. Few private operators are able to raise the capital needed to acquire larger buses. Under current conditions, it is doubtful that even those few would elect to do so. Overcoming the investment barrier will require controlled competition in the form of allocated rights to operate exclusive bus services along dedicated routes. Controlled competition can be introduced by consolidating the informal sector into larger units or associations, thereby enabling them to participate in the competition for exclusive route contracts. The avoidance of wasteful competition should serve to reduce congestion and raise speeds of operation, making larger buses commercially attractive. This approach is premised on a contract duration that is commensurate with the investment payback period, and on a system of tariff regulation that ensures recovery of reasonable costs over time and insulates operators and regulators from transient political pressures. For example, in Dar es Salaam, the government, having made a commitment to improve the quality of urban transport, is implementing a bus rapid transit system. Dar Rapid Transit, or DART, will be introduced in phases with a planned opening of 20 kilometers of busways in 2010. The busways eventually will cover a route of 130 kilometers, with connections to feeder services and bicycle routes. The system will have 18 terminals and some 228 stations.

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