

ROAD SAFETY FOR CYCLISTS IN URBAN AREAS

A CASE STUDY OF DAR ES SALAAM

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Abstract

Cyclists are an important road user group in urban areas for a number of reasons, including the existing road use by cyclists as well as the potential of increased cycling rates to address problems such as urban congestion, air pollution, carbon emissions, and lack of fast and cost effective mobility for all, including children and people with mobility disabilities. Road safety for cyclists hinges on the three “Es” of “Engineering”, “Enforcement” and “Education”. “Engineering” refers to road design features, both major and minor, which can enhance the safety of cyclists. This paper comparatively analyses various roads in Dar es Salaam from the point of view of cyclists. “Enforcement” comprises policing of speed, vehicle parking regulations and safe driving by motorists to enhance the safety of cyclists. This paper presents enforcement issues in the context of Dar es Salaam. “Education” comprises both education of cyclists on their responsibilities and education of motorists on the rights of cyclists. This paper presents pertinent issues in this regard in the Dar es Salaam context. The paper draws on international research to highlight measures which could be taken in Dar es Salaam to increase safety of cyclists, both short and long term.

1 Importance of increasing road safety for cyclists

Tanzania is experiencing rapid urbanization, and the proportion of people living in urban areas is forecasted to rise from 24% in 2005 to 38% in 2030ⁱ. 40% of Tanzania’s urban population is found in Dar es Salaam. Dar es Salaam is facing extreme problems of traffic congestionⁱⁱ caused by the increase in use of private vehicles. It is a widely recognized fact that increasing space for cycling and other non-private-vehicle transport reduces congestion and this is documented in the paper “Disappearing traffic? The story so far” which documents 70 case studies from 11 countries demonstrating this.ⁱⁱⁱ As the following photo shows^{iv}, people who cycle take up much less space on the road than people in private vehicles:

space required to transport 60 people



car



bus



bicycle

(Poster in city of Muenster Planning Office, August 2001) Credit: PressOffice City of Munster, Germany

Cycling offers numerous mobility benefits to the user relative to public transport and walking, particularly over distances of 2-10km. It is a private, door-to-door means of transport which does not involve walking to a bus stop, waiting for a bus or the risk of the bus being full or overcrowded. Cycling is much quicker than walking. Cycling also has health benefits; The WHO Charter on Transport, Environment and Health (London, June 1999) aims to promote cycling and walking and suggests that half an hour's daily exercise significantly reduces the risk of heart disease, diabetes, obesity, and high blood pressure. In addition, the cost of maintaining a bicycle for a year is approximately 2.5% of the cost of maintaining a private vehicle for a year, and also compares favourably to the cost of public transport, given that individual residents of Dar es Salaam typically spend Tsh 200,000 to Tsh 400,000 per year on bus fares. A case study from South Africa shows low-income earners spending 25% of income on public transport to and from work; with bicycle purchase, after initial purchase cost, the household cost of transport was reduced to 5% of income after three months.^v

Cycling is also an environmentally friendly means of transport as it does not have any emissions. Tanzania is committed to improving urban air quality through increased provision for non-motorised transport, as stated in the "Eastern Africa Regional Framework Agreement on Air Pollution" adopted at a Ministerial conference on air quality in Nairobi in 2008, which undertakes to:

“Encourage the use of non motorized transport systems that have many advantages and are used by an overwhelming majority, but are constantly overlooked. At least 10% of infrastructure costs should be dedicated to this majority and the focus should be on safety. Particular emphasis should be given to high-demand, mixed-use roads in urban and peri-urban areas;”^{vi} .

As well as not contributing to urban air pollution, cycling also does not contribute to global climate change. 50% of Tanzania’s carbon dioxide emissions come from the transport sector^{vii}. It is likely that a large proportion of these emissions come from private vehicles in Dar es Salaam, as vehicles operating in congested conditions use 3 times as much fuel and emit 3 times as much carbon as vehicles moving smoothly^{viii} . Therefore promoting cycling can form a cornerstone to Tanzania’s contribution to reducing the problem of climate change, both by substituting for vehicles and by reducing congestion.

Cycling is also an equitable mode of transport in that it is accessible to people who cannot easily use public transport or private vehicles including children and people with mobility disabilities. According to the 2002 census and the National Disability Policy^{ix}, Tanzania has 967,932 who have a physical disability. Many of these people use arm-tricycles as a principle means of transport. For reasons of cost and pricing, school children in Dar es Salaam often have difficulties getting to school by public transport, while cycling offers a potential solution to this.

A photograph of a disabled user of arm tricycle:



In summary, according to the European Conference of Ministers of Transport^x, cycling is environmentally friendly, cost-effective, quick and healthy, or to quote the United Nations Environmental Programme “All in all, investments in NMT infrastructure are cost-efficient, pro-poor and pro-development measures”^{xi}

Cycling is currently common in urban areas in Tanzania outside Dar es Salaam, but not so much in Dar es Salaam. For example, in Morogoro bicycles were used for 23% of trips, while in Dar es Salaam bicycles were used for 3% of trips^{xii}. In a survey conducted by UWABA, when asked the main reason for not cycling, 75% of respondents cited road safety conditions for cycling. In Dar es Salaam, while cyclists are 3% of road users, they consist of 6% of road crash injury victims and 6% of road crash death victims.

This highlights the rationale for increased investment in improving road safety for cyclists, both to increase the safety of existing cyclists and to reduce the main barrier preventing people from cycling with all its benefits for individuals and society.

There is also political commitment to this aim, with Minister of Works Hon Dr John Magufuli stressing the need for encouraging and supporting bicycling and pedestrian modes of transport in urban areas.^{xiii}

2 Measures to improve road safety for cyclists in Dar es Salaam

In this paper the organizing framework around improving road safety for cyclists in Dar es Salaam is centered around the 3 “E”s of Engineering, Enforcement and Education.

Speed planning is a central element of all 3 E’s. It is important to note that a vulnerable road users hit by vehicles travelling at higher speeds are much more likely to be killed than vulnerable road users hit by vehicles travelling at low speeds.^{xiv}. The chances of a cyclist surviving a collision with a motor vehicle travelling at 30 km/h is 95% whereas it is only 50% at 50 km/h.^{xv}. A collision between a vulnerable road user and a motor vehicle at 30 km/h can be compared to falling from the first floor window of a building. A collision between a vulnerable road user and a motor vehicle at 50 km/h can be compared to falling from the third floor window of a building.^{xvi}

The issue of vehicle parking is also central to the 3 E’s of safety for cyclists. Parked vehicles along the side of smaller roads, and on service roads or cycle tracks, present a safety hazard for cyclists. When doors are opened suddenly this causes cyclists to crash. This is known as cycling in the “door zone” and is very hazardous to cyclists^{xvii}. In addition, large parked trucks cause cyclists cycling on the service road or minor road to be invisible to vehicles pulling out from plots onto the road.

2.1 Engineering and road infrastructure for increased road safety for cyclists

For the reasons of speed planning explained above, it is essential that roads be designed with a particular speed in mind. Urban roads which are designated as high speed roads should have separate facilities for cyclists, while roads designated as low speed roads should have physical calming measures in place to enforce this speed limit.

It is impossible for enforcement agencies (traffic police) to be in all places at all times, whereas physical engineering/design of the road is present at all times. This is why physical road design can work in cooperation with traffic police / enforcement measures to enforce safe driving and protect vulnerable road users.

In Dar es Salaam, the most common design for high-speed roads is the “service road” design. In this design, there is a high speed road, a barrier such as a drain and a “service road”. However, service roads present several safety issues for cyclists. Firstly, they are commonly used by both pedestrians and cyclists, which can cause collisions between cyclists and pedestrians on busy service roads, and can cause cyclists to be forced to use the main high-speed road to avoid colliding with pedestrians. Secondly, the cyclist typically has to cycle right through bus stops/bays where people are waiting for buses. Thirdly, service roads do not have any barriers or pillars preventing vehicles from accessing them at intersections, which means that they are frequently used by vehicles to skip queues or park, causing a hazard for cyclists. Fourthly, there is a lack of clarity as to whether cyclists are supposed to use the service road or cycle on the main road, with no official guidelines or documents stating this clearly. Fifthly on some service roads which are not congested, vehicles frequently travel on the service road at high speed, for example Sam Nujoma Road.

Solutions for high-speed urban roads are:

- Dedicated cycle paths with physical barriers preventing vehicles from accessing them such as bollards at intersection points as well as clear signage labeling it as a cycle path with no vehicle access
- Where there are many pedestrians, footpath should be separate to cycle path. In areas with fewer pedestrians, there can be a wide combined cycle path / footpath physically protected from vehicles accessing it.
- In the short term, if vehicles must be allowed access to service roads to access plots along the road, low wide painted speed bumps with gaps for bicycle wheels should prevent speeding by vehicles on the service road.
- Cycle path should pass behind, not through, bus bays/ bus stops (as on Nyerere road)
- Cycle path should be accessible to all cyclists including disabled users of arm-tricycles, and bollards should be spaced accordingly to allow tricycles to pass but not motor vehicles
- Cycle tracks should not have kerbs preventing the cyclist from using them, for example on Salander bridge there is a good cycle track, but a cyclist must dismount to carry bicycle onto the path over kerb.

Some research supporting these recommendations is:

"The evidence to date suggests that purpose-built bicycle- only facilities (e.g. bike routes, bike lanes, bike paths, cycle tracks at roundabouts) reduce the risk of crashes and injuries compared to cycling on-road with traffic or off-road with pedestrians." ^{xviii}

For roads which are designed to be minor low-speed roads, there is no need for separate cycling facilities as it is safe for cyclists to be integrated with the other traffic, but it is important that infrastructure design ensure that low speeds are maintained by vehicles. This can be done by well designed (visible and painted) speed bumps and raised zebra crossings. In addition, parking by vehicles along the sides of such roads should be prohibited due to the hazards it causes.

Intersection design is also important. A cyclist can be travelling along a protected cycle track which then comes to an abrupt end on the wrong side of the road, presenting a dilemma as to how to negotiate the intersection. Therefore in designing roads, it is important to consider how all users (and not just motor vehicles) cross through intersections or move from one road to another. ^{xix}

The costs of cycle infrastructure have been proven in the majority of cases in various research studies to outweigh the benefits^{xx}. A review of the literature by Davis (2010) states "This review assesses the evidence base from both peer reviewed and grey literature both in the UK and beyond. Almost all of the studies identified report economic benefits of walking and cycling interventions which are highly significant. The median result for all data identified is 13:1 and for UK data alone the median figure is higher, at 19:1."^{xxi} According to the IEA's assessment, "the provision of walking and cycling infrastructure is amongst the least expensive elements in changing land use and transport patterns."^{xxii}

In addition, building cycling infrastructure typically increases cycling rates, which in turn reduces problems such as congestion and pollution: "Higher levels of bicycle infrastructure are positively and significantly correlated with higher rates of bicycle commuting."^{xxiii} "Improved cycling infrastructure in the form of bicycle paths and lanes that provide a high degree of separation from motor traffic is likely to be important for increasing transportation cycling amongst under-represented population groups such as women."^{xxiv}

2.2 Enforcement and law for increased road safety for cyclists

It is important that the behavior of motor vehicle drivers which comprises the safety of cyclists be prevented through enforcement.

Firstly, it is important that laws and regulations are clear and specific and provide protection to vulnerable road users. For example, in Netherlands, if there is a collision between a motor vehicle and a cyclist and it is not clear who was at fault, it is assumed that it was the driver's fault as the driver holds more responsibility than the cyclist^{xxv}. This forces drivers to be more aware and contributes to Netherlands being very safe for cyclists.

Secondly, laws must be enforced. In Dar es Salaam, parking on service roads is a common practice but measures are not taken by traffic police to enforce parking regulations. For example, on Morogoro Road there are large trucks which use the service road by a fuel station as their permanent parking place, causing cyclists cycling along the service road to be invisible to drivers coming out of the fuel station. No measures have been taken by traffic police despite frequent follow up by UWABA. Emphasis in enforcement of laws should be on safety and protection of vulnerable road users above all else, with focus on parking which causes safety hazards, dangerous driving practices and speeding.

2.3 Education for increased road safety for cyclists

Education has two aspects – education of drivers to respect cyclists, and education of cyclists themselves. In Tanzania, vehicle drivers often do not respect cyclists and aggressively push them off the road. Vehicle drivers also consider it normal to park on footpaths, cycle tracks and service roads and do not consider the danger to vulnerable road users. In addition, many cyclists are unaware of basic safety measures such as cycling on the left side of the road and wearing bright reflective clothing at night time. UWABA has been running a cycle safety education program in schools to improve cyclists' safety, and cycle safety could be mainstreamed into school curricula. Respecting the rights of cyclists and other vulnerable road users should also form explicit parts of driver training curricula.

3 *Photographs of cycling conditions in Dar es Salaam*

Example of truck parking on service road, forcing cyclists to cycle on busy dual carriageway:



Example of narrow footpath on Kawawa Road which is not wide enough for both cyclists and pedestrians, with Kawawa Road itself being a fast moving dual carriageway. In addition, vehicles use the footpath for parking, creating danger for both pedestrians and cyclists.



Another example of vehicles using service road for parking.



An example of good infrastructure – Nyerere Road, where bicycle track passes behind bus stop rather than going through it:



An example of barriers on Nyerere Road preventing vehicles from accessing footpath and cycle track:



An example of the use of bollards to prevent vehicles driving on footpath (Bibi Titi Mohammed Street) – this footpath is commonly used by less-confident cyclists also as the main road often has fast-moving vehicles.



4 Progress in improving road safety for cyclists

UWABA has been working to improve road safety for cyclists since 2006. However, we are yet to see a substantial impact on cyclists' safety.

- There is a lack of coordination between Government institutions, with TANROADS, traffic police, city council, municipal councils each tending to place responsibility for acting on the others
- There is a lack of emphasis on cyclists or non-motorised transport generally at forums such as the Dar es Salaam bi-annual regional roads meeting
- There is also a lack of coordination among donors, with some donors (World Bank) emphasizing non-motorised transport in their road funding while other funders (JICA) completely ignore the need for provision for cyclists.
- Cyclists safety has not been integrated into city planning except for the DART project
- The DART project has been delayed for many years – it was announced in 2003 and initial funding received in 2005, with a dedicated DART agency formed in 2007, and a “launch” of phase I was announced in 2010, but no infrastructure development under this project has yet begun until the present (end 2011). It was initially planned to be the first BRT system in Africa, but other African cities started planning later but have already implemented BRT.
- Roads which have been built in recent years while DART has been delayed are not making provision for cyclists in line with DART guidelines. An example is the JICA funded Ali Hassan Mwinyi Road from Mwenge to Tegeta – the design for this road has only a narrow footpath and no provision whatsoever for safe cycling. When this road later comes under the DART design, the road margins will have to be completely rebuilt, causing a huge waste in resources from JICA funding construction of narrow footpaths and DART later funding the same footpaths to be demolished and replaced with DART compliant designs.
- While Traffic Police have been cooperating with UWABA in the provision of road safety education, parking rules are still not enforced despite UWABA repeatedly advocating on this.
- UWABA has been successful in educating hundreds of children and other cyclists on safe cycling, but this has not been mainstreamed into school curricula.
- UWABA has been successful in building relationships with Government agencies and political leaders, many of whom have made commitments to improve safety for cyclists, but as yet there is little progress on-the-ground.
- Nyerere Road is Dar es Salaam's one good example of cycle infrastructure, and it was built more than ten years ago and the design has not been replicated in roads renovated/built since then

5 Conclusion

This paper presents the case for investing in improving road safety for cyclists in Dar es Salaam, and demonstrates how Dar es Salaam is not adequately providing for cyclists and therefore not benefiting from the potential benefits of increased cycling rates for society, the economy, the environment and reducing poverty.

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- ⁱⁱ Center for Economic Prosperity
<http://www.ceptz.org/docs/Monthly%20Report%20on%20Dar%20es%20Salaam%20Travel%20Time%20March%202010.pdf>
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http://www.onestreet.org/images/stories/Disappearing_traffic.pdf
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- ^v Bicycle Empowerment Network (2004), Internal survey findings.
- ^{vi} United Nations Environment Programme http://www.unep.org/urban_environment/PDFs/EABAQ2008-AirPollutionAgreement.pdf
- ^{vii} http://earthtrends.wri.org/pdf_library/country_profiles/cli_cou_834.pdf
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- ^x <http://internationaltransportforum.org/pub/pdf/04Cycling.pdf>
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^{xxiii} Dill, J. & Carr, T., 2003. *Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them*. Board, National Research Council, Washington, DC, 1828(1), pp.116-123.

^{xxiv} Garrard, J., Rose, G. & Lo, S.K., 2008. *Promoting transportation cycling for women: the role of bicycle infrastructure*. *Preventive Medicine*, 46(1), pp.55-59 as quoted on <http://www.copenhagenize.com/2011/08/case-for-bicycle-infrastructure.html>.

^{xxv} www.bicyclelaw.com