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The benefits and challenges of increasing motorcycle use for rural access

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Abstract

In many countries in Africa, Asia and Latin America, most vehicles on low-volume rural roads are now motorcycles. In ten years, motorcycles in Tanzania increased from under 10,000 to 800,000. In Cameroun, Ghana, Kenya, Nigeria, Rwanda, Sierra Leone and Tanzania motorcycle taxi services have developed and spread rapidly, often becoming an essential part of rural living. Motorcycle taxis operate in the informal private sector. Their spontaneous spread has had little regulatory control. They provide many benefits. Travelling on tracks and footpaths, motorcycle taxis effectively extend the reach of roads as villagers can request the motorcycle taxis using mobile phones. Where there is no alternative means of transport, even pregnant women and sick people praise the access provided by motorcycle taxis. On some rural roads, 70-80% or more of the annual passenger transport and goods transport is now provided by motorcycle taxis. However, this is expensive, as the cost per passenger-kilometre and per tonne-kilometre of motorcycle services is much higher than the cost of 'conventional' transport (buses, minibuses and light trucks). Motorcycle taxis provide employment and their profitable operation allows private financing.

Regulatory frameworks and enforcement are often weak. Many motorcycles operate without regulatory or fiscal compliance and may carry excessive loads. Road traffic injuries are high, often due to poor driver behaviour. Few driver training services exist. Poor regulatory compliance fuels petty corruption. Motorcycle operator associations can improved standards and safety through self-regulation.

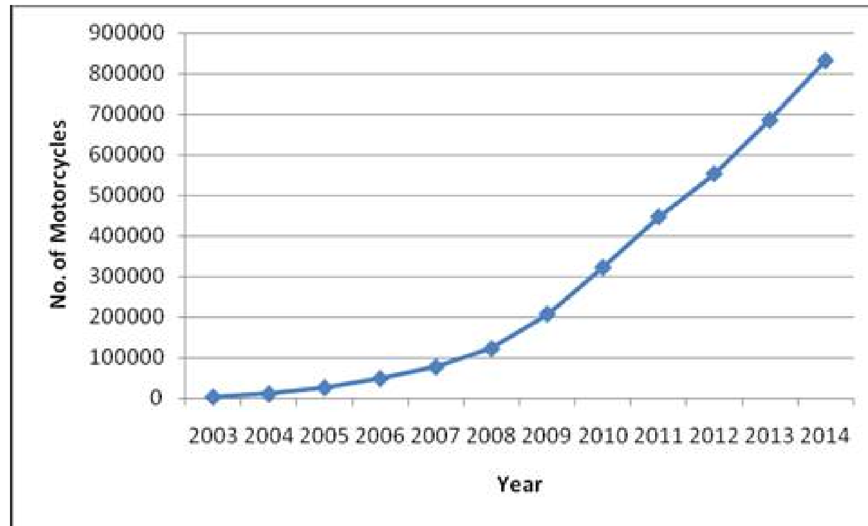
There is a need for research and greater understanding of appropriate ways to effectively regulate (and self-regulate) motorcycle operators for improved safety and ensuring the benefits of improved access are shared by all rural people.

Rapid spread of motorcycle taxis

The rapid spread of motorcycles as a common means of rural transport has been quite remarkable. In many countries in the world, the majority of vehicles operating on low-volume rural roads are now motorcycles. This is true of many countries in Africa, Asia and Latin America. Thirty years ago, one might see some mopeds and motor scooters in urban areas, a few medium-size, Japanese, 'trail' motorcycles used by agricultural extension officers and NGO personnel, and a very small number of powerful motorcycles used by the police or rich enthusiasts. Things began to change in the 1990s when China, India and some other Asian countries started mass-producing medium-sized motorcycles. Many were exported and dramatically undercut the prices of the prevailing Japanese-manufactured models. At $2000 the Japanese motorcycles were mainly used by organisations. At perhaps $600, the Chinese and India products started to be affordable for some rural people, particularly if the costs could be shared by families or through payments for rural transport services (motorcycle taxis).

Now in most developing and emerging countries, motorcycles are common in rural areas and are increasing rapidly. A decade ago, the use of motorcycles on rural roads was well established in many South Asian and Southeast Asian countries and in a number of African countries (notably Burkina Faso, Benin, Nigeria, Cameroun, Uganda, Kenya and Rwanda). In some other countries, ten years ago, motorcycle numbers were low, but have been steadily increasing ever since. Examples include Ethiopia, Ghana, Malawi, Mozambique, Sierra Leone and Tanzania. For example, in Tanzania, registered motorcycles have increased by a remarkable 40,000%, from under 2,000 motorcycles in 2003 to over 800,000 in 2014 (see Figure 1, from Bishop and Amos, 2015).

Figure 1. Number of motorcycles registered in Tanzania, 2003 to 2014



From: Bishop and Amos, 2015

The rapid spread of motorcycles has been 'spontaneous' and unplanned, with little or no public sector promotion or involvement, other than that related to compliance with fiscal requirements and some road safety regulations. While associated with overall global liberalisation of trade and general reductions in national import tariffs, it has been led by lower cost supplies and a strong latent demand of people for greater mobility for economic and social benefits.

Interestingly, most countries in Southern Africa, have not yet seen such a rapid growth in motorcycles and there is very little use, yet, of motorcycle taxis in these countries. The author suggests that this may be partly related to the historical legacy of apartheid South Africa, which also appears to have influenced the relatively low incidence of bicycle use in these countries. The elite (historically the whites) did not need bicycles or motorcycles, as they had pickups and cars. There was also strict enforcement of regulations relating to helmets, licenses, insurance and passenger loads. In recent years both bicycle riding and motorcycle riding have been associated with elite pastimes, rather than daily work use. The lack of bicycle and motorcycle 'norms' in South Africa appears to have influenced the people (and regulatory authorities) in neighbouring countries such as Lesotho, Swaziland, Namibia, Zimbabwe and Mozambique. However, the author suggests that the benefits of motorcycle use for rural people (as discussed below) will lead to their spread into Southern Africa, initially from the north followed by a rapid spread in South Africa,

once a 'critical mass' of acceptance and adoption has been reached. Comparable predictions of rapid increases in Tanzania and elsewhere have already taken place (Starkey, 2008; 2011).

Motorcycle taxis

In many countries where motorcycles are common, informal 'motorcycle taxi' services have developed. This phenomenon has been recognised in many developing countries in Asia (eg, Indonesia, Cambodia, Thailand, Timor Leste and Vietnam), in Africa (eg, Nigeria, Cameroun, Benin, Uganda, Kenya, Rwanda, Sierra Leone and Tanzania) and Latin America (eg, Brazil, Colombia). While motorcycle taxi services often start in urban areas (where there is a strong 'density' of demand), once the idea becomes established, rural services may develop. Although rural areas have a lower 'density' of demand, other transport options are few so that many people are prepared to pay for motorcycle taxi services. Rural areas also generally have less regulatory enforcement and fewer competing motorcycle taxis.

It should be noted that motorcycle taxis are not limited to developing countries. In several rich countries, including France, some companies provide premium-priced, traffic-beating motorcycle taxi services, notably for congested urban areas and/or airport runs.

Benefits rural motorcycle taxis

Where they exist, motorcycle taxis provide huge social and economic benefits in rural areas. On many rural roads they are the only means of motorised transport available to most rural people. Recent surveys in districts in Tanzania (Willilo and Starkey, 2012) and Cameroun (Kemtsop and Starkey, 2013) have suggested that bus and minibus services only operated regularly on regional or national roads (generally roads that link towns or link main roads). On the small, low-volume rural roads that link villages to towns (or to main roads), traffic mainly comprises pedestrians, cyclists and motorcycles, and possibly some animal-drawn vehicles, freight trucks, pickups and/or some private or official vehicles. The only motorised transport services that people can rely on are motorcycle taxis. For this reason, rural

people rate them very highly for the transport of people and small amounts of freight. Even pregnant women, sick people and older persons regard them as extremely beneficial, as they are generally the only vehicles available to take them to clinics and hospital (Kemtsop and Starkey, 2013; Starkey et al, 2013b; HelpAge International Tanzania, 2015).

Studies have shown that motorcycle taxis often transport a high percentage of the passengers and small freight moving between villages and towns or markets (Kemtsop and Starkey, 2013; Njenga, Opiyo and Starkey 2013; Odero and Starkey, 2012; Willilo and Starkey, 2012). For example, on a rural road surveyed in Cameroun, 82% of 300,000 passenger movements a year were on motorcycles, as well as 74% of the estimated 33,000 tonnes of produce and goods going to and from markets (Kemtsop and Starkey, 2013). This is one reason why people closely concerned with rural development (village authorities, NGOs, extension officers, etc) also rated motorcycle taxis highly (Kemtsop and Starkey, 2013; Njenga et al, 2013).

In addition to providing public transport services as they pass along rural roads, there are two characteristics of motorcycle taxis that allow them to have even more impact. Motorcycles can generally be called by mobile phone, allowing timely point-to-point services. They also can travel along footpaths and tracks, and cross small bridges. This means they effectively bring road transport services to villages and households living away from the road. This can fundamentally alter rural access. The Rural Access Index, developed by the World Bank, 'measures' rural access by estimating the percentage of the rural population living within 2 km of an all-season road (Roberts and Thum, 2005; Roberts, Shyam and Rastogi, 2006). It was assumed that people would have to walk this 2 km (about a 30 minute walk) to reach a road and transport services. However, many villagers that are 2 km from an all-season road can now telephone a motorcycle taxi and ask that they (or their agricultural products) be collected from their front door. The road is no longer a linear ribbon for transport services, but it is wide catchment area, that (depending on the terrain, paths and bridges) may be 5 km or more wide.

Motorcycle taxis provide rural employment. For young men (most, or all, drivers are men), the ability to earn a living through driving an exciting and high status vehicle is attractive, particularly as there may be few other options. The motorcycle taxi work can be flexible, allowing other income-generating activities. In a survey in Cameroun, some rural motorcycle taxi drivers were farmers. They did not do transportation work daily, but gained significant additional income by helping to meet the large transport demand related to the weekly market (Kemtsop and Starkey, 2013).

Funding sources and prices charged

Motorcycle taxis often represent an investment of urban capital in rural areas. In many countries, the owners of the motorcycles are business people or professionals based in towns. They buy the motorcycles and rent them to operators for a daily fee. They are often able to pay off their capital in less than a year (eg, by renting out for 200 days at $3 a day), and so go on to purchase additional motorcycles to rent out. This financial model can be attractive for the owner and the operator and stimulates the development of more rural transport services (Starkey, 2008).

In general, passengers opt for motorcycle taxis because they are timely (minimal waiting, point-to-point journeys, sometimes able to travel more quickly than conventional vehicles) or because there are no appropriate alternatives. Motorcycle taxi tariffs are generally expensive, relative to other means of transport (other than point-to-point, non-shared taxis). While fares vary widely between areas and countries, research suggests there are some ‘typical’ prices as shown in Table 2.

Table 2. Illustrative examples of motorcycle taxi fares and other public transport

Country	Location	Fares per passenger kilometre (USD cents/km)			Source
		Motorcycle[1]	Pickup/Car[2]	Minibus[2]	
Cameroon	Northern	13		6	a
Ghana	Awutu Senya	26	5	6	b
Kenya	Murang'a	18		10	c
Myanmar	Shan	30	2		d
Tanzania	Kilolo	34		5	e

1). Motorcycle fare for one passenger traveling alone. Costs may be about 60% less if two people are travelling.
2) These are typical fares for operations on rough rural roads in the same area, but they may not be based on exactly the same journeys as motorcycles seldom 'compete' on exactly the same routes.

Sources: a) Kemtsop and Starkey, 2013; b) Starkey, 2016. c) Njenga, Opiyo and Starkey, 2013. d). ADB, 2016. e) Willilo and Starkey, 2013.

From the statistics Table 2, and other survey sources, it is clear that motorcycle taxis may charge 13-34 USD cents per kilometre, when carrying a single passenger (although fares may decrease by about 60% is two passengers are carried). Motorcycle taxi tariffs are invariably much more (often 100-200% more) than the tariffs of rural taxis or minibuses on rough rural roads, which are often in the range 5-10 cents per passenger kilometre (Starkey, et al, 2013a). These rural transport fares are also much higher than long-distance bus fares, which tend to be 1-2 cents per passenger kilometre, as better roads, economies of scale and competition reduce public transport tariffs.

For short journeys, freight tariffs, expressed as cost per tonne-kilometre, are much more variable and can be extremely high (Starkey, 2008; Starkey et al, 2013a). Larger transport services vehicles seldom carry goods for short distances, and their operating costs can be 'shared' by income from more people and/or larger overall freight loads.

This reinforces the observation that rural taxis tend to complement rather than compete with 'conventional' services. Rural users often complain about the high costs of rural motorcycle taxis, and say they prefer to use taxis, minibuses or buses, when these are available (Starkey, 2007; Starkey, 2008 Willilo and Starkey, 2013). It is the absence (or lack of timeliness) of such alternatives that provides the 'market' for motorcycle taxis.

Safety and regulatory issues

Compliance with fiscal and safety regulations is generally low. The use of crash helmets is generally very low, particularly for passengers, increasing the risk of serious injuries in the event of a crash. Many motorcycles in rural areas operate without insurance and without the required vehicle tax. Many motorcycle taxis drivers do not have a driver's license and very few have any had any training relating to safe driving, traffic regulations or road safety. For this reason, Transaid (2015a and 2015b), with support from AfCAP has developed a motorcycle driver training curriculum for use in Tanzania and other countries.

Loading levels on motorcycle taxis are often high, with two passengers common and three (or more) passengers not unusual. In addition there may be freight bundles, and sometimes live animals. When many people, or large loads, are carried, the driver is forced forward, adopting a cramped position that makes it more difficult to control the motorcycle should there be other road users or adverse road conditions.

There are significant issues and concerns relating to road safety and regulatory compliance for motorcycle taxis. Urban motorcycles, motorcycles travelling along main roads and those operating on low-volume, rural roads are often involved in crashes leading to road traffic injuries (RTI). National and global statistics are often very alarming, although these are seldom disaggregated by road type or by operator (private user or motorcycle taxi driver). The contribution of crashes on low-volume rural roads to national statistics is thought to be quite low, partly because there is thought to be under-reporting of crashes on such roads. It is likely that most motorcycle crashes, and most fatalities, occur on urban and inter-urban roads, where there is more traffic moving at higher speeds. Research on rural roads, undertaken in Tanzania by Amend (with support from AfCAP) suggested that injuries among motorcycle drivers on rural roads can be significant, with most drivers reporting some road traffic injuries in the course of a year. A minority of these kept the drivers away from work for several days (Amend, 2013 and 2014; Bishop and Amos, 2015; Bishop, Malekela and Matheka, 2015).

Regulation by authorities

While most countries have clear regulations relating to motorcycle use, the rapid spread of motorcycle taxis has often taken place prior to any regulatory framework for their operation. In the absence of national regulation, some towns have tried to regulate motorcycle taxis, with bylaws requiring motorcycle taxis to register with the authorities and comply with a code of behaviour. This may require the operator to wear a 'tabard' or reflective jacket, which may have the operator's number. This system is widely used in Rwanda and Colombia. Motorcycle taxis may also have to carry two crash helmets, one for the driver and one for the passenger (in some cases the requirement is to carry them rather than to wear them). In Colombia, the crash helmets have to have the registration number of the motorcycle clearly visible. The great advantage of clearly visible numbers is that drivers know they can be recognised, and reported for dangerous behaviour. Also, only regulated motorcycle taxis are provided with numbered tabards, and so clandestine operators can be identified more easily. For these reasons most stakeholders (the police, customers and the operators themselves) generally appreciate such regulation and comply with it.

However, authorities in many countries find it difficult to fully regulate motorcycle taxis, as there are insufficient enforcement personnel. Because there are many different self-employed, interdependent operators, who are all highly mobile, enforcement in one area simply displaces the operators to other areas. Moreover, their services are profitable and generally very popular with the public, so that even after a clamp down, clandestine services start to appear very quickly at the periphery of the regulated area.

Such formal regulation of motorcycle taxis is mainly seen in urban areas, and the level of regulation and enforcement in rural areas is low. There are generally few police or regulatory officials in villages and on low volume rural roads, and those that are present often 'turn a blind eye' and do not enforce regulations strictly. With stricter enforcement in towns, some motorcycle taxis operate only on the rural roads and avoid coming into the nearby town itself.

Associated with non-compliance is petty corruption among enforcing officers. Operators pay a 'gratuity' ('a cup of tea') to avoid being fined or prosecuted. In many countries this is almost ritualised, like a daily road toll, with operators knowing exactly how much to pay and to whom. Such 'ex gratia payments' (or bribes) may be made daily at regulatory control barriers (which are often on the approach roads to towns) or when the officers are encountered. Under such systems, it is not in the officers' interests to achieve compliance, as they would lose an income stream.

Concerned to prevent the urban motorcycle taxi 'anarchy' seen in some West African cities spreading into Ghana, in 2012 the transport authorities made all motorcycle taxi operations illegal in Ghana. Under the 'Prohibition of use of motor cycle or tricycle for commercial purpose', the regulations state, among other things, that: "a person shall not ride on a motor cycle or tricycle as a fare-paying passenger". (Ghana, 2012, Section 128). While the effect of this has been to minimise the use of motorcycle taxis in Accra, where there is a degree of enforcement, motorcycle taxi services ('okadas') have been steadily growing in rural areas. On many of the smaller rural roads in Ghana, motorcycle taxis are the main (sometimes the only) form of transport. Taxi and minibus ('tro-tro') drivers recognise the complementarity of their services, as motorcycle taxis mainly operate between villages and the more formal transport routes. The national regulations against motorcycle taxis are seldom enforced in rural areas as the police and the district authorities realise the motorcycle taxis are providing an important transport service to rural people, who generally have no alternative transport services available.

Self-regulation

As with other transport services, motorcycle taxi operators may form themselves into associations. These are often self-help organisations, designed to assist members in the event of problems. Sometimes they are formed as cartels, to limit competition and restrict new operators. However, just as the large number of mobile, independent operators makes formal regulation difficult, it also makes it hard for motorcycle taxi cartels to control their operating areas. While most motorcycle taxi

associations exist in towns, some rural associations have formed, often as mutual support groups.

The existence of associations, whose members know each other, provides much potential for self-regulation in the interests of safety. Such self-regulation can be linked to external regulation, with authorities authorising the associations on condition that their members comply with safety regulations (such as loading levels and helmet use). Research on 'boda-boda' associations of motorcycle taxis in Tanzania has highlighted the potential for such associations to improve safety through self-regulation and mutual encouragement (Bishop and Amos, 2015).

Attitudes of different stakeholders

Transport services need to be understood from the perspectives of the passengers (of different genders and types), operators, regulators and development agencies, each of which may perceive different priority issues (Starkey, 2007; Starkey et al, 2013a and 2013b). Motorcycle taxis provoke very different attitudes among stakeholders. The key difference is between 'users' and 'non-users'. Non-users, and particularly people who have access to their own cars, tend to be very negative. They see motorcycle taxis as anarchic, unsafe and inappropriate means of transport. They are an embarrassment that clutter up the roads and transport hubs. They should be banned. Such sentiments are common among the ruling authorities in many countries, including several Southern African nations, Colombia and China. It was such attitudes that led to motorcycle taxis being made illegal in Ghana.

However, the users of motorcycle taxis regard them as very convenient and, in rural areas, a lifeline essential for access to markets and services. With strong customer support, the banning of motorcycle taxis is problematic. In Colombia, attempts to ban the practice have generally failed. In Ghana, the ban has been largely ignored in rural areas. In China, a ban must be obeyed, but in reality people know that the 'private' motorcyclists waiting at markets and transport hubs for their 'friends and family' must have very large families as they spend 365 days a year transporting 'friends and family' as a 'favour'! Perhaps the greatest irony is that in several

countries it is possible to see two policemen, without crash helmets, as passengers on a single motorcycle taxi, travelling together en route to a 'regulatory barrier', where they will 'admonish' motorcycle taxis, and gratefully accept the standard 'gratuity'.

However, for the politicians and regulatory authorities, the challenge is what is the alternative? The decisions makers themselves probably travel in their own cars, which is not an option for most rural people in developing countries. Unless there are good public transport services on rural roads, and access to affordable ambulance systems, the banning motorcycle taxis would impoverish rural people.

Need for further studies and collaboration

The phenomenon of motorcycle taxis is very recent, and there is much that needs to be studied (and experiences shared) to ensure the clear 'benefits' can be achieved with minimal costs, particularly in terms of safety. We need to understand what counts as 'best practice' in terms of regulation and self-regulation. What is the most appropriate compromise between safety regulation and the transport and economic benefits of some practices?

The legal limit for loads on motorcycles is generally one driver and one passenger. However, the safety implications of exceeding such limits on rural roads are not always clear. Clearly, four adults on a motorcycle, with the driver cramped forward is likely to be a risk, particularly if the motorcycle has to manoeuvre suddenly. However, if a vulnerable person (a child, a sick or elderly person or a woman in labour) needs to travel, it is generally safer and appropriate for a second person to travel on the motorcycle taxi to hold them securely. This is widely practised, but is technically illegal. In recent discussions with rural women in Tanzania, it was suggested that having two women passengers is actually safer than one, since the two women support each other, and jointly they can exert greater influence on the driver to drive slowly and safely (TFG and IFRTD, 2015). As the causes of many road crashes are attributable to driver behaviour, increasing the safety by the pressure of passengers who are 'in the majority' could override any safety disadvantage due to 'overloading'. It is difficult to know the appropriate compromise between road

safety and fare prices (and on all modes of transport, compromises are made – only the most expensive cars have all possible safety features). For the rural women interviewed, the fact that two women could travel together meant that each paid significantly less than if they had travelled alone. This made it easier for them to travel, for health, for market access or for income-generation. Compliance with the 'one passenger' rule would greatly increase their transport costs, and inhibit their travelling. So there is a researchable question, what are the safety costs and socio-economic benefits of the widespread practice of motorcycle taxis carrying two passengers? If there were significant benefits without excessive risk, it might be possible to modify motorcycle taxis to make it slightly safer for the two passengers (eg, appropriate seat configuration, two sets of passenger foot rests). If research were to demonstrate clearly that the safety risk of carrying two passengers outweigh the benefits, then the challenge will be to see how can the 'single passenger' rule be best enforced, and/or what affordable and safe transport solutions be made readily available. In this regard, the role of three-wheelers for rural transport may be investigated. The additional width of three wheelers, might restrict their access to off-road villages, in which case greater attention might be given to affordable trail technologies that could improve the connectivity of the more isolated communities.

Many countries have found it quite difficult to enforce helmet use among motorcycle drivers. It is even more difficult to make motorcycle taxi passengers to wear helmets, partly because people dislike wearing other people's headgear. Research and/or exchange of 'best practices' is required to understand how through technologies (helmet liners, cheaper or more portable helmets, etc) and/or through regulation and self-regulation, passenger safety can be improved.

Conclusions

Motorcycle taxis are seen in all regions of the world, and they are increasing rapidly in rural areas in many countries, including a large number of African countries. As a result, road traffic injuries associated with motorcycle crashes and also increasing rapidly, although most motorcycle crashes and most fatalities are likely to be on urban and inter-urban roads. Attempts to ban or regulate rural motorcycle taxi use

have proven difficult, partly because rural stakeholders (including local police and authorities) can see the benefits of motorcycle taxis, particularly on those rural roads where there are no alternative forms of public transport. There is a clear need for more evidence of the benefits and costs of motorcycle taxis. Information needs to be shared on good practices (and problem areas) in the regulation and self-regulation of motorcycle taxis and ways of making their operations safer. The ReCAP programme will be looking for appropriate high-quality research and information exchange in this rapidly-developing area.

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