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Rural Transport Survey Report

Gyasikrom-Ayomso Road, Brong Ahafo Region, Ghana

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Cover photo: A typical mini-bus service on a market day in the Asunafo North District

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Abstract

This study seeks to understand the existing transport systems for rural communities along and within the catchment area of the Gyasikrom – Ayomso road, a low-volume road in Ghana's forested Brong Ahafo region. The rapid rural appraisal methodology was used which produced valuable 'order of magnitude' estimates in a relatively short period, related to movements of people and goods in the surveyed rural communities for distances greater than 5 km. The study found that car taxis are the main mode of transport providing daily rural transport services on the surveyed road, while the mini/midi-buses served the road only on the weekly market days at Goaso, the municipal capital and major transport and market hub. Together, privately-owned motorcycles and commercial motor tricycles move about 30% of passengers and small freight annually. No large buses or commercial motorcycle taxis (*okadas*) served the road. The fare per passenger kilometre for the car taxis and midi-buses is about half that of motor-tricycles. Generally, transport users were dissatisfied with overloading, poor service predictability, long waiting times and high passenger fares. It is argued by the authors that many of the findings of this study can be extrapolated to other low volume roads in Ghana's forested region.

Key words

Rural transport services; Transport operators; Rapid rural appraisal method; Motorcycle taxi; Intermediate means of transport (IMT); Forest ecological zone of Ghana.

Acronyms, Units and Currencies

AfCAP	Africa Community Access Project
AsCAP	Asia Community Access Project
BRRI	Building and Road Research Institute
CSIR	Council for Scientific and Industrial Research
DFID	Department for International Development
DFR	Department of Feeder Roads
e.g.	For example
Frt	Freight
GPRTU	Ghana Private Road Transport Union
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
hr	hour
ICT	Information and Communication Technologies
i.e.	That is
IMT	Intermediate Means of Transport
kg	kilogram
km	kilometre
Ltd	Limited
MMT	Metro Mass Transit
MoT	Ministry of Transport
N	Number/sample size
n/a	Not applicable or not available
NMT	Non-motorised Transport
Pax	Passengers
PMU	Project Management Unit
ReCAP	Research for Community Access Partnership
RTS	Rural Transport Services
RTSi	Rural Transport Services Indicator
SSATP	Sub-Saharan Africa Transport Policy Program
STC	State Transport Corporation
t	tonne
TA	Technical Advisor
TRL	Transport Research Laboratory
UK	United Kingdom
USA	United States of America
USD	United States Dollar
USDc	United States Dollar cent
Vs.	Versus

Contents

Executive Summary

This report is one in a series of three rural transport survey reports prepared under the Rural Transport Diagnostic Study in Ghana. It presents the findings of an 8-day long qualitative study carried out in the forest ecological zone, which focused on the Gyasikrom - Ayomso gravel road, located in the Asunafo North District in the Brong Ahafo region. The surveyed road is 18.6 km long and 4 - 5 m wide and traverses along an undulating terrain with an elevation difference of about 60m. The overall aim of the study is to understand the existing rural transport systems in Ghana based on an understanding of the transport needs and preferences of different road users in the rural communities along and within the catchment area of the selected road, as well as understanding the perspectives of transport operators, regulators and those concerned with socio-economic development. Ultimately, the study should identify both constraining factors and good practices in Ghana's rural transport services, resulting in evidence-based policy suggestions.

Results from the study

Transport users

- Thirty (30) road transport users were interviewed (14 males and 16 females). The respondents included farmers, traders, disabled, elderly, students, nurses, and persons using transport to access health care, maternal healthcare, formal employment, financial services, etc.
- The car taxi is the main mode of rural transport available for the population on a daily basis, while the mini/midi-buses serve the road only on the weekly market days at Goaso. No larger buses or commercial motorcycle taxis (*okadas*) served the road.
- Motorcycles were mostly used for private purposes, but owners were often willing to take a passenger with them. Motor-tricycles, though mostly used for freight services, also carried passengers.
- On annual basis, the car taxi transported 55% of total passengers and 64% of total small freight. The motorcycle is responsible for nearly 25% of annual passenger movements and about 10% of annual small freight movements. Together, the IMTs (i.e. motorcycles and motor-tricycles) transported annually about 30% of passengers and small freight on the route.
- Passengers were generally dissatisfied with fares for the various means of transport. The fares per passenger kilometre ranged from USDc 6 for the midi-bus and USDc 7 for the car taxi to USDc 12 for the motor-tricycle and USDc 14 for the motorcycle.
- Generally, transport users were dissatisfied with overloading, service predictability and loading times.

Transport operators

- Twelve (12) transport operators were interviewed, covering motorcycles, motor tricycles, car taxis and mini/midi buses.
- All the respondents were dissatisfied with the poor road condition, which resulted in high operating costs, and suggested that the surveyed road should be paved (tarred) to lower their operating costs.
- Most transport operators, and particularly those who were just operators rather than owner/operators, suggested that better access to credit facilities to purchase their own vehicles or expand their businesses was paramount.

Transport regulators

- Three regulators were interviewed and they were generally satisfied with the level of compliance of car taxis and mini/midi buses regarding insurance, road worthiness inspections, environmental emissions and road safety.
- The regulators had limited information on the motorcycles, since these were mostly used privately and not for commercial motorcycle taxi services.

Development

- Three stakeholders concerned with socio-economic development were interviewed. They adjudged the car taxi to be the most important mode of transport for supporting the socio-economic development of the rural communities. Motorcycles and mini buses were rated above medium satisfaction levels as well.

Conclusions and recommendations

- The car taxi is the most dominant and available mode of transport on the surveyed rural road, and is responsible for 55% of passenger and 64% of small freight movements. The mini/midi buses only operate on the weekly market day and are responsible for 14% of passenger and 6% of annual small freight movements. Private motorcycles providing irregular public transport services and commercial cargo motor-tricycles complement rural transport services, contributing nearly one-third of the annual passenger and small freight movements.
- Nearly all motorcycles on the surveyed road are privately owned, and it is unlikely that commercial motorcycle taxis will be able to get a major foothold here in the short- to medium-term. It is more likely the commercial cargo motor tricycle will fill the gap between non-motorised transport (NMTs) (i.e. pedestrians/cyclists) and car taxis, unless the tricycles too will be purchased on a private-use basis. It is therefore recommended that, recognising the significant role Intermediate means of transport (IMTs) play in rural passenger transport services, the current road traffic regulations 2012 (LI 2180) should be amended to allow for commercial use of IMTs in rural areas of Ghana.
- Regular road maintenance should be carried out on the feeder road by the Department of Feeder Roads (DFR) – or a model can be explored where spot maintenance is delegated to the rural communities - to improve the riding quality, reduce maintenance costs and make the road passable throughout the year.
- Paving the road is likely to result in more and less run-down vehicles operating along the road, although there were no clear indications that there was a huge unserved demand for transport. A paved road would reduce maintenance costs, which can lead to lower passenger fares, reduced overloading and an increase in frequency, since even a not completely full vehicle can still provide a profitable trip for the operator.

1 Introduction

1.1 Introduction to the rural transport study in the Forest ecological zone

The overall aim of the rural transport diagnostic study in Ghana was to understand the existing rural transport systems and the key issues relating to policies and practices in Ghana. This was based on understanding the needs and perspectives of different transport users with different occupations, ages, gender and abilities, as well as transport operators, transport regulators and those responsible for socio-economic development. Specifically, this study aimed at understanding the needs and perspectives of the different groups of stakeholders including women, men and young people in different rural communities along a representative rural road in the Brong-Ahafo region in the forest

ecological zone of Ghana. The surveyed road, in Asunafo North District, is a four- to five-metre wide gravel road which runs from Ayomso to Gyasikrom, covering a distance of 18.6 km.

The study was carried out from 11th -14th January, 2017 and then 7th - 10th February, 2017 on the Gyasikrom - Ayomso road in the Asunafo North District to gather requisite information to help understand the nature and character of rural transport systems in the forest ecological zone of Ghana. The rapid rural appraisal methodology, adapted by Starkey, et al., 2013 to assess rural transport service, was used for the study. A key feature of the rapid rural appraisal methodology is its focus on gaining a deep understanding of the issues under investigation based on a limited number of in-depth qualitative interviews involving local stakeholders and sector experts, rather than a large-scale quantitative survey approach. The data collected was derived from the rural communities along the selected study road or within its catchment area to produce some valuable 'order of magnitude' estimates relating to movement of people and goods in the rural communities, the transport fares, trends in transport services and preferences of road users. The rural transport services under consideration cover the medium travel distance range, between 5 km and 75 km. Intra-village travels were not considered.

1.2 Introduction to the rural road transport survey report and statistics

The information and results derived for this rural transport study relate to one specific rural road in the forest ecological zone, namely the Gyasikrom - Ayomso road in the Asunafo North District in the Brong Ahafo region, Ghana. The road is 18.6 km long and unpaved throughout from Gyasikrom to Ayomso. The road terrain is undulating with an elevation difference of about 60m between the highest and lowest levels. There is a critical slope section, locally referred to as 'red hill', which becomes muddy and slippery during the rainy season and very dusty during the dry season, posing a risk to motorists.

The research team used the rapid rural appraisal methodology to obtain a 'snapshot' situation of the existing rural transport systems along and around the selected survey road. This methodology is different from large-scale surveys used by enumerators to interview many stakeholders to gain a data size that is statistically significant. Our methodology is based on about forty-five in-depth interviews that provided indicative data on the transport needs and preferences of local stakeholders and experts. Thirty road users were interviewed, balanced for gender. The road users interviewed included farmers, traders, students, elderly, disabled, and people using transport to access health care, maternal healthcare, employment (formal work), and financial services and for socio-cultural reasons such as funerals, church activities and the like. For some of these categories, there were only two people interviewed (one male and one female).

Similarly, in-depth interviews were carried out with a small number of transport operators for the main transport modes plying the route, people familiar with regulatory issues, and those concerned with development. The people selected for the interviews had clear knowledge and understanding of the relevant issues relating to the transport systems along the study road. Their opinions were respected and formed the basis for understanding the existing transport services regulatory framework, policies and practices applicable to the selected rural road and its catchment area. The data generated, though small, provides a 'snapshot' of the existing rural transport situation in this ecological zone. During the data gathering stage, efforts were made to ensure that data obtained were inherently consistent and represented the best possible estimates of the real situation for the study area. Information from the various sources was constantly compared by the researchers to clean the datasets from discrepancies. Follow-up questions were asked to seek a clearer understanding of why information from one interviewee was different from another. This triangulation process is crucial for data quality assurance.

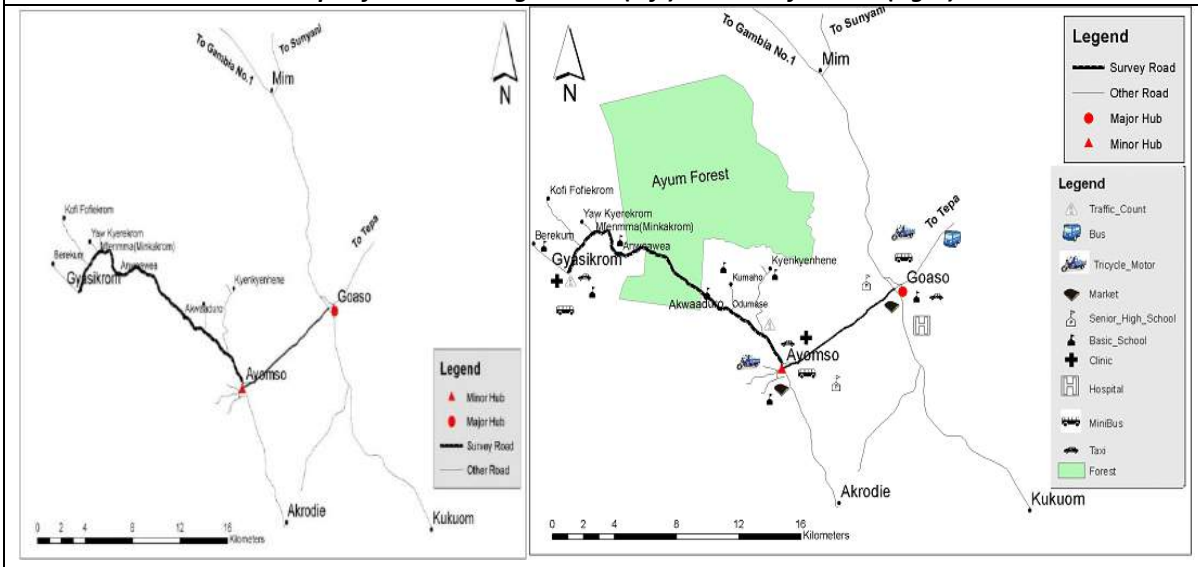
In this survey report, traffic counts were carried out on a 'normal' weekday and on a market day at two different locations. Goaso was the main market hub with a weekly Wednesday market patronised by inhabitants within and outside the study catchment area. Though Ayomso also had a weekly market day, it did not attract patronage from inhabitants in the study catchment area due to its small size. The traffic count therefore investigated only the Goaso market day. The traffic counting teams classified the traffic and recorded the counts during the 12-hour daytime period from 6:00 am to 6:00 pm. The classified counts involved the conventional vehicles, intermediate means of transport (IMTs) and non-motorised transport (NMTs) such as bicycles and pedestrians.

This survey report presents via eight standardised tables. The first four tables summarise most of the key statistics and the assessments and opinions obtained from the surveys, while the last four tables summarise the opinions of the road users, the operators, the regulators and those concerned with development. Maps and photographs have also been added to the text to provide further information on the surveyed road.

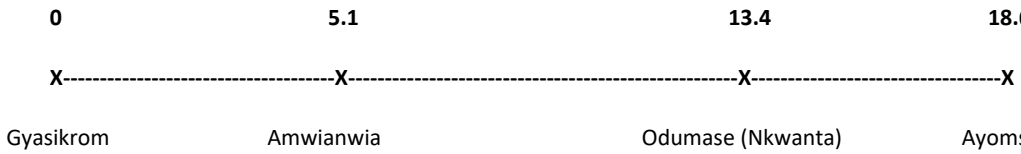
2 Rural transport services: summary tables of key statistics and indicators

RTSi Road Report Table 1. Road information			
Road name: **Gyasikrom-Ayomso**			
Dates of survey: **11th January 2017 – 14th January 2017; 7th February 2017 - 10th February 2017**			
District, Region and Country: **Asunafo North, Brong Ahafo, Ghana**			
Road type: **Gravel**	*Responsible authority:* **Department of Feeder Roads (DFR)**		
Road start location: **Gyasikrom**	*Start GPS coordinates:* **Longitude: 2.423520 W; Latitude: 6.483644 N**		
Road finish location: **Ayomso**	*Finish GPS coordinates:* **Longitude: 2.351142 W; Latitude: 6.454427 N**		
Road length: **18.6 km**	*Catchment population:* **4,460 inhabitants**		
Road quality and condition from different perspectives			
Road authority	*Operators*	*Development*	*Safety*
	★★☆☆☆	★★☆☆☆	★★★★☆
Summary of road geography and socio-economic situation			
The surveyed road runs 18.6 km from the "end of the line" village of Gyasikrom to the larger community of Ayomso, where it connects to a paved, six metres wide road, which then runs for another 8.7 km to Goaso. Goaso is the Municipal capital and acts as the transport hub for onwards travel to the regional capital Sunyani, to Kumasi and other destinations. Goaso has many small shops, a post office, banks and its Wednesday open-air market is the main market for people along the surveyed feeder road, rather than the Thursday Ayomso market. The feeder road is in the forest region of Ghana with a 4.5 km section running through the Ayum forest reserve. Small holder cocoa farms are clearly visible along the road, which is the dominant cash crop in the area. Cassava, yam, plantain, maize, and bananas are common subsistence crops, with surplus sold at the Goaso market. In addition to Gyasikrom, there are another four similar sized villages - Mfamma (Minkakrom), Anwianwia, Akwaaduro and Odumase (Nkwanta) - located along the road, with another two or three small villages situated away from the feeder road, accessible by earth roads branching off the surveyed road. A small health centre is located in Gyasikrom, which refers more serious or complicated cases to the hospital in Goaso. There is also a clinic at Ayomso which can admit a small number of inpatients at a time. Gyasikrom, Mfamma, Anwianwia, Kumaho and Akwaaduro settlements have Primary and Junior High Schools, but for Senior High, students have to travel to Goaso or Ayomso. There is an elevation difference of around 60 metres between the highest and lowest point of the road, and slope sections are rarely longer than 50 to 100 metres and with one exception, there are no steep gradients. During the dry season the road becomes very dusty while in the rainy season some of the hill slopes become muddy, slippery and arduous to climb. Fallen trees and flooded sections can lead to the road being cut off for a few days during the peak rainy season months.			

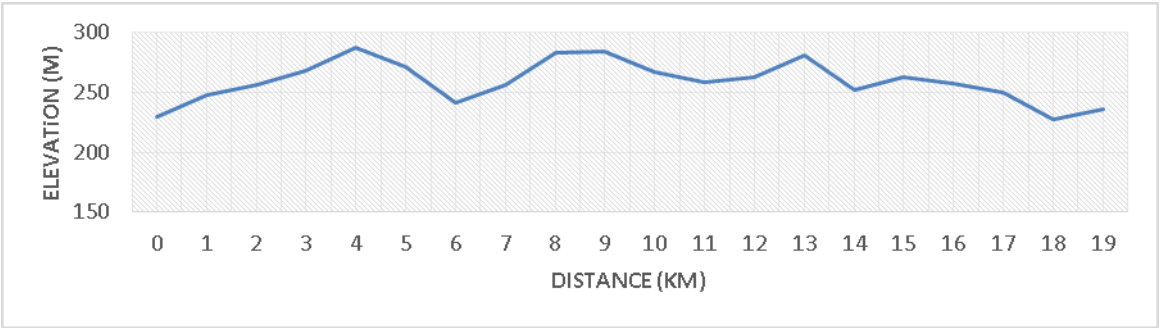
Maps of road showing context (left) and road features (right)



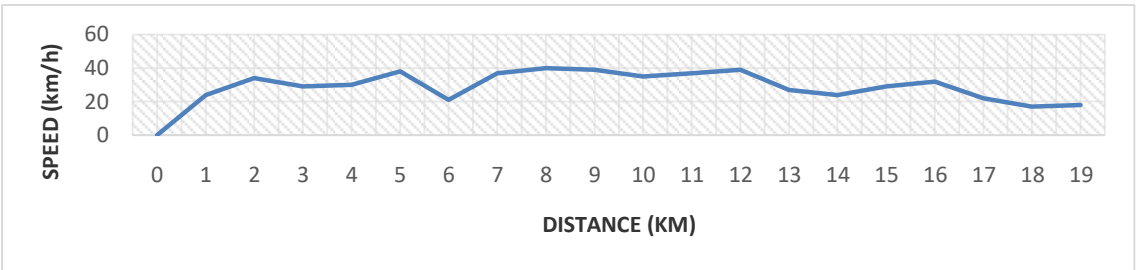
Schematic map of 'straightened' road with features



GPS elevation track



GPS speed track



Description of hub and spoke patterns

The Gyasikrom – Ayomso feeder road connects with National Road N12 at Ayomso. This National Road runs from Elubo in the South to Hamile in the North, but large sections are yet to be paved. Transport service users along the feeder road under investigation all have Goaso as their final destination, meaning they travel on the paved section between Ayomso and Goaso which forms part of the N12. From Goaso, taxis, mini, midi and large buses (Metro Mass Transit) leave throughout the day to different directions with Sunyani and Kumasi being the main destinations, but with onward travel opportunities to Accra. A Metro Mass Transit (MMT) night service runs directly from Goaso to Accra.

Ayomso is not a major hub, despite the fact that other feeder roads connect to the N12 at Ayomso. Again, transport for these other feeder roads have Goaso, rather than Ayomso, as their final destination. Ayomso does have a small car taxi stand with around 10 taxis to accommodate the needs of the Ayomso inhabitants for travelling to Goaso. It also has an emerging cargo motor-tricycle stand located exactly where the Gyasikrom - Ayomso road connects with the N12. The Ayomso based car taxis are reluctant to deviate from the paved road because of the strain unpaved roads put on their cars, but motor-tricycles service the surveyed roads for the transportation of goods – often combined with some passengers. Motorcycle taxis are not present along the full length of the surveyed road, but that should not be understood as if there are no motorcycles present on the surveyed road, or that the private motorcycles are strictly used for private purposes.

Intermodal connectivity *(one to five stars, the more stars the better)*				
'Feeding'	*User satisfaction*	★★☆☆☆	*Development impact*	★★★☆☆
'Linking'	*User satisfaction*	★★★☆☆	*Development impact*	★★★★☆

. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3). ★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).

Table 2 - Traffic and transport along road

Daily traffic flows (in both directions)					**Fleet**	**Passengers and small freight**						
	Normal	*Busy*	*Disrupted*	*Impassable*	*No of RTS vehicles operating on road*	***Trip transport*** *normal day* *per vehicle*		***Daily transport*** *normal day* *all vehicles*		***Annual transport*** *adjusted for traffic fluctuations*		***Change*** *in past year*
						Pax	*Frt*	*Pax*	*Frt*	*Pax*	*Frt*	
						(no)	*(kg)*	*(no)*	*(kg)*	*(no)*	*(t)*	*-- 0 ++*
						14	*15*	*16*	*17*	*18*	*19*	
Midi-bus	0	26	0	0	0	0		0		20,800	375	0
Minibus	0	16	0	0	0	0		0		13,000	204	--
Taxi (saloon/estate)	60	72	16	4	15	6	167	360	40,000	131,447	5,976	0
Light truck	3	21	0	0	1	1		10				
Motor tricycle	12	16	4	3	3	6	275	40	13,750	16,400	1908	0
Motorcycle	80	100	20	8	16	2	14	160	5,600	57,680	815	0
Bicycle	19	28	6	4								
Pedestrians (>5 km)	115	123	50	30								
Totals	**289**	**402**	**116**	**49**	**35**	**15**	**456**	**570**	**59,350**	**239,327**	**9,278**	

Table 3 - Key operational statistics for major transport modes

	Midi-bus	Minibus	Taxi (saloon/estate)	Motor tricycle	Motorcycle
Contribution to annual passenger transport (% of market)	9	5	55	7	24
Contribution to annual small freight transport (% of market)	4	2	64	21	9
Fare per km in USDc	6	7	7	12	14
Journey time (average speed on normal days) in km/hr	18	11	23	36	37
Transport frequency on normal days (number of opportunities to travel per day)	0	0	6	3	9
Number of days a year with 'normal service'	0	0	263	275	296
Number of busy days a year	52	52	57	60	60
Number of days a year with disrupted service	0	0	45	30	9
Number of days a year with no transport services	313	313	0	0	0
Reliability factor(s) (%)	41	74	86	73	87
Men as % of passengers/day	42	47	66	82	100
Women as % of passengers/day	51	46	27	12	0
Children as % of passengers/day	7	7	7	6	0
Cost of 50 kg accompanied freight in USDc per tonne-km	79	78	130	212	95
Cost of 200 kg consigned freight in USDc per tonne-km	68	65	106	198	n/a
Safety: Recalled no. of accidents per 100,000 vehicle trip	58	107	58	210	314
Security: Recalled no. of incidents per 100,000 vehicle trip	0	0	36	0	0
Typical age of vehicle	14	14	16	2	2
Typical fuel consumption of vehicles (litres per 100 km)	12	13	10	5	3
Typical operating distance per year in km	32,400	33,600	56,400	16,955	37,128
Daily cost of vehicle ownership/fixed costs (ownership mode)	3	5	1	n/a	n/a
Total revenue per day (USD)	101	60	44	28	37
Total revenue per km (USDc)	135	74	99	69	35
Total revenue per passenger kilometre (USDc)	10	7	16	11	14
Percentage total revenue due to freight (%)	30	30	76	92	n/a
Regulation compliance (overall assessment)	4	4	4	n/a	4
Development impact (overall assessment)	3	3	5	3	3

Table 4 - User satisfaction with main RTS modes (disaggregated for gender)

	Midi-bus		Minibus		Taxi (saloon/estate)		Motorcycle	
	Men	Women	Men	Women	Men	Women	Men	Women
Sample size (N)	**6**	**8**	**5**	**3**	**14**	**15**	**6**	**8**
Fares	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆
Journey time	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Operational features	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★☆☆☆☆
Freight	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★★☆
Safety and security	★★★★★	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆
Comfort	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆
Universal access	★★★★☆	★★☆☆☆	★★★★☆	★☆☆☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	n/a
Overall satisfaction	**3.5**	**2.5**	**3.2**	**2.7**	**2.9**	**2.6**	**2.8**	**2.3**

The more stars (or the higher score) the better. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3). ★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).

3 Rural transport services: report of survey findings

3.1 Overview of road situation and issues

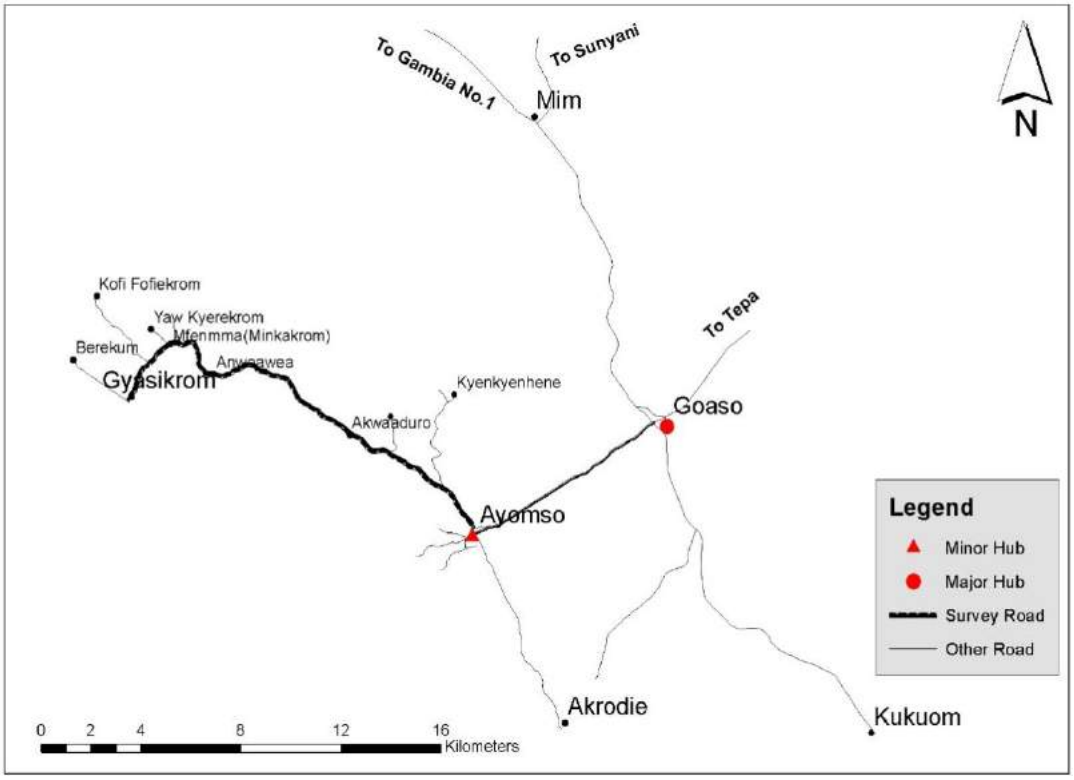


Figure 1 - Map of the surveyed rural road

The 18.6 km unpaved feeder road surveyed runs from the village of Gyasikrom to the large village of Ayomso, with the latter connected via an 8.7 km paved national road to the municipal capital, Goaso. The feeder roads passes through a number of villages, approximately equal in size to Gyasikrom, in addition to some farmsteads dotted next to the roadside. There are a handful of roads

branching off the Gyasikrom – Ayomso feeder road, leading either to other villages or farmsteads or deeper into the forest to logging sites. Gyasikrom is very much the end of the line with few settlements afterwards. All villages along the feeder road and some of the off-the-feeder road (e.g. Kumaho) are connected to the electricity grid. Mobile phone reception quickly deteriorates the further one moves to the end of the road, and in Gyasikrom and many other villages, only one to two particular spots in the village have a mobile phone signal.

Figure 2 (left) – Cocoa drying at Gyasikrom

Figure 3 (right) - Start of surveyed road at Ayomso

The majority of the population along the road and in the road's catchment area are small-holder farmers. Cocoa is the dominant cash-crop, and many cocoa farms can be observed when travelling along the surveyed road as well as off the main road. There are no commercial cocoa plantations. The cocoa buying agents purchase the dry cocoa beans in the village, if a storage facility is available, after which bulk transportation is undertaken by trucks. Few farmers transport the dried beans themselves for more than 5 km as the cocoa sheds/storage facilities are widely spread throughout

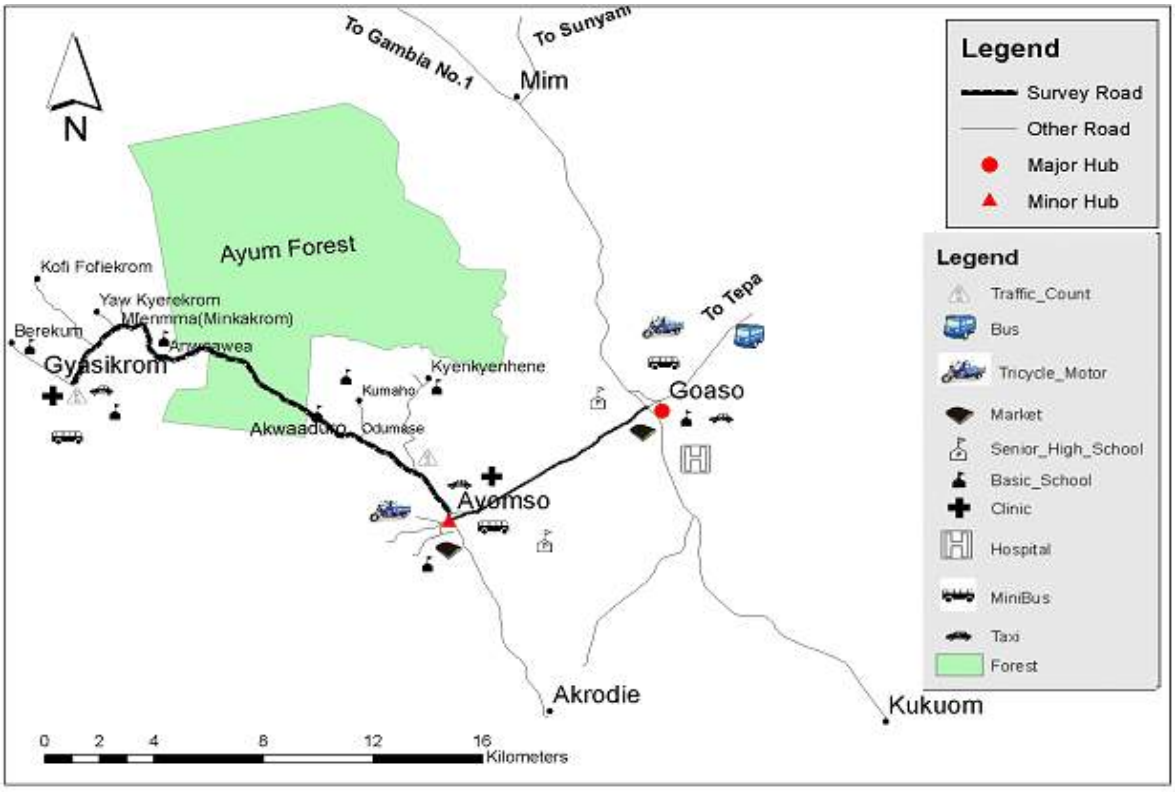


Figure 4 - Transport hubs, services, and features of interest

the surveyed area. Cocoa is the main cash crop in the area, however, some farmers have oil palm farms separately or intercropped with their main cocoa farms. This mixed cropping system gives the farmers supplementary and continuous incomes throughout the year because cocoa is a perennial crop. The main food crops cultivated in the area are plantain, cassava, yam and maize and vegetables grown in the area include peppers, tomatoes and onions. While the food and vegetable crops are predominantly subsistence, there is always surplus produce sold at the weekly market in Goaso. Many households have their own small livestock, i.e. sheep, goats and poultry which freely roam in the villages. Traffic volume on the research road is generally low but the market day sees a considerable increase of traffic, particularly with the services of midi- and mini-buses being offered, which only ply on this road during market days in Goaso.

Brong Ahafo forms part of the forest region of Ghana and the vegetation of the area is the moist deciduous forest which contains the country's most valuable timber trees like odum (*Milicia regia*), wawa (*Triplochiton scleroxylon*) and sapele (*Entandrophragma cylindricum*). Approximately half way the surveyed rural road – from Ayomso going to Gyasikrom – the Ayum forest reserve is entered. Apart from wild fires which razed a greater part of the vegetation two years ago and reduced its luxuriance, the main threat to the forest reserve is illegal logging. The loggers fell, cut the wood to beams and transport the timber illegally, mostly at night, with impunity. A number of logging trucks were picked up by our traffic counts and observed by the researchers on non-traffic count days. The heavily loaded trucks do sometimes get stuck in the mud during the rainy season and block the road, while they also damage the arguably poorly constructed culverts.

Figure 5 (left) – Deteriorated road section of one of the feeder roads

Figure 6 (left) – Damaged culvert on surveyed road

The surveyed road is a gravel road, with the most recent maintenance having taken place 1 to 2 years ago (inconclusive). At the time of the survey, the team encountered the Assembly man of Gyasikrom with some young men repairing the culverts: damaged reinforced concrete slabs were replaced with timber beams, cut to size with a chainsaw. During the peak of the rainy season there are a few days when the road becomes impassable for all traffic, with disrupted services going on for a few weeks. One section of the road, locally called 'Red Hill', close to Ayomso, is particularly notorious, becoming slippery and difficult to climb in the rainy season and extremely dusty during the dry season. Heavily loaded vehicles frequently get stuck in the mud on the 'Red Hill' and disrupt transport during the rainy season.

4 Overview of the situation of transport services and issues

Transport services along the road are restricted to the lower capacity categories: bicycles, motorcycles, cargo tricycles, car taxis and the smaller version of the midi-bus (with approximately 21 seats). Head loading and walking are almost inevitable. For example, at Kofi Fofie Krom, 4.5 km off the Gyasikrom-Ayomso road, inhabitants travelling to Goaso, have to make the first part of the journey by walking to Mfamma (Minkakrom), a distance of 5.5 km. Similarly, children of school going age also walk for 5.5 km to Mfamma or 7 km to Gyasikrom to attend school every day. The story is similar at Kyenkyenhenekrom where vehicles go to the village only on Goaso market days. Pupils at

Kyenkyenhenekrom benefit from a primary school in their village but parents either have to rent accommodation for their children at Ayomso once they complete their basic education or pupils will have to commute daily from Kyenkyenhenekrom to Ayomso: a distance of about 6.5 km. No larger midi-buses or buses (eg. Metro Mass Transit (MMT) or State Transport Corporation (STC)) were serving the road. Moreover, the midi-buses only served the road on the market day in Goaso, so during the remainder of the week, transport services are provided by the other transport modes mentioned above. It must be mentioned that the mini-bus/midi-bus distinction is not particularly relevant in Ghana, and they are both referred to as 'Tro-tros'. As mentioned, the 'Tro-tros' serving the road were of the midi-classification (e.g. 'Sprinter' and '207') and mini-buses or 'urvans' were noticeably absent on the non-market days.

In this cocoa-rich area, a number of farmers have purchased motorcycles for private use. In every sizable village along the surveyed road, between 5 and 10 privately owned motorcycles were present. The owners tend to take good care of their motorcycles, with weekly or fortnightly oil-changes, and are generally reluctant to use them to transport heavy loads (e.g. bags of cocoa) or take on more than one passenger. The motorcycles are not used as a commercial mode of transport, and no commercial motorcycle taxis (*Okadas*) served the road. If travelling in a certain direction, a private owner is often willing to take a passenger with him, but even then the passenger is not always expected to pay for the fuel. Private motorcycle owners indicated that they are reluctant to start riding people around, even if financially compensated: 'We are too busy with other things, to start doing that,' is the common explanation. However, in case of emergency, they can be called upon, but even then they do not expect financial compensation (to be given by the person in distress as money for the fuel used). For now the private motorcycles provide an important (back-up) service, mainly free of charge, as long as fellow villagers do not over-ask or misuse the goodwill of the owners.

Cargo motor tricycles – with Hadjin and Apsonic being the two popular brands – are on a slow but steady increase. Ownership is limited in the villages, but a small hub has developed where the Gyasikrom – Ayomso feeder road meets the N12 in Ayomso. Chartered at Ayomso they provide the opportunity to transport freight to and from the village, which may be too voluminous or heavy to be carried by a car taxi (let alone be head-loaded) or too inconvenient to be carried by the weekly tro-tros. While the chartered journey will often be characterised by the freight and its owner, the return leg is likely to have a mixed load of passengers and small freight. Passengers are in for a somewhat uncomfortable and slow journey and generally pay a flat rate, irrespective of the distance travelled. It would be interesting to see if in future these tricycles will become more common as private modes of transport (starting at around 6,000 Cedis (i.e. USD 1,500), not necessarily beyond the means of a more successful cocoa farmer) and will be used in the same manner as the private motorcycles described above, or that the tricycle stand at Ayomso will slowly expand, following a commercial model along the lines of the motorcycle taxis. Furthermore, if 'okadas' will ever start operating along the road, it is quite likely that the first ones will set up base opposite the cargo motor tricycle stand.

Car-taxis operate on the surveyed road on a daily basis with on average 4 trips from Gyasikrom towards Ayomso/Goaso per day during non-market days, and 6 trips on the Goaso market day. For all car taxis the end station is Goaso and not Ayomso, though few passengers alight at Ayomso. For the return journey, not all car taxis will drive all the way to Gyasikrom, reflecting the limited demand at the end of the road. Some car taxis have villages on the feeder road such as Odumase (Nkwanta) or Anwianwia as their final destination, while one or two serve the villages along one of the branches of the surveyed road. There were two taxi-drivers resident in Gyasikrom, so the villagers have access to an early morning service. To illustrate, the tro-tro serving Gyasikrom on the market day are based in Goaso and will only reach the village between 8 am and 9 am.

Figure 7 (left) – Motorcycle in front of a broken-down taxi

Figure 8 (right) – Cargo motor-tricycle with passengers

Tro-tros only serve the feeder road on Wednesdays, when it is a market day in Goaso. As mentioned, the Thursday Ayomso market day is just for Ayomso inhabitants and it does not attract market activities from the villages along the surveyed rural road. In general, the tro-tros are rated higher for their large capacity, seat comfort and because they are a bit cheaper than the car taxis. But while their travel speed may be similar to the car taxis, they take longer to fill-up and it is therefore not an uncommon sight to have passengers waiting for a tro-tro at Gyasikrom to fill up alighting from the vehicle the moment a car taxi arrives. This, together with the somewhat late 'first service' of the tro-tro, probably explains why tro-tros do not operate during the other days of the week when transport demand is even more limited.

Finally, there are a significant number of small logging trucks using the road, to access the forest reserves, apart from Thursdays which are considered a taboo to enter the forest. All the beams loaded on these trucks are illegally logged. Unloaded trucks travel from Ayomso towards Gyasikrom (but may branch off to follow one of the logging roads) usually at excessive speed, with a youthful gang of loggers in the back. Heavily loaded trucks return, at lower speed, but with little or no consideration for other road users, thereby posing danger to other road users. A few take passengers - with or without freight - with them, but most often they do not. The very few security incidents reported by users referred to loggers stopping vehicles in search of chainsaw fuel.

The traffic count stations were placed about two kilometres outside Ayomso along the surveyed road, so that local Ayomso traffic would not be counted, and at the other end of the road opposite the health centre at Gyasikrom which is located just before one enters the village. A traffic count was conducted during a normal day and a busy day, which is when it is market day in Goaso. It is immediately clear from the traffic count data that midi- and mini-buses (i.e. tro-tros) only operate on the surveyed road when it is market day, with no services recorded during normal days. Therefore it comes as no surprise that despite the significant passenger capacity of the tro-tros, the annual contribution to the total amount of passengers carried along the road is just under 15%. Clearly, from Table 5, it is the car taxi which moves the majority of passengers and small freight on a yearly basis with about 55% passengers and 64% goods. The car taxi is the dominant mode of transport available to the population on daily basis. They passed the traffic count station 60 times on a normal day and 72 times on a busy day. This is only a small increase for the car taxi traffic for a market day, which is understandably because the mini/midi buses also operate on the route on the market days to provide competitive and complementary passenger transport services. If the mini/midi buses were not operational on market days, the car taxi trips would have tripled to nearly 180 passes, considering the average number of passengers transported by the buses. It was also observed that the private motorcycle too is a mover of people and small freight.

Table 5 - Annual share (%) of passenger and small freight by mode on Gyasikrom-Ayomso road

Major transport mode	Annual share (%) of passenger transport	Annual share (%) of small freight transport
Mini-bus (tro-tro)	14	6
Car Taxi (saloon/estate)	55	64
Motorcycle	24	9
Motor-tricycle	7	21

More often than not the private motorcycle takes a passenger with it. Already it is responsible for nearly 25% of the total annual passenger movements and nearly 10% of total annual small freight movements. The cargo motor tricycle is very much what its name indicates and transports significant loads: on average 275 kg per trip and a total annual small freight movement of slightly over 20% but just 7% of the annual passenger movements. Together, the IMTs (i.e. motorcycle and motor-tricycle) annually moved about 30% of all passengers and freight on the surveyed road, demonstrating the important role they play in the provision of transport services in rural Ghana. Moreover, the cargo motor tricycle is equal with the car taxi in the number of people – on average six - it carries, on top of the freight. Given its local purchase costs, this may be a smart investment for the operator. More so because the fare per passenger kilometre is significantly higher for the tricycle (USDc 12) than that of the car taxi (USDc 7). In exchange, passengers get a slow and uncomfortable ride, but one that does not wait hours to get filled up. Despite the non-commercial nature of the motorcycles, the price per kilometre for the motorcycles (USDc 14) is still double that of the car taxi (USDc 7). This reflects mainly the way we pitched the question, asking users how much they pay if they are expected to do so, thus not counting the many genuine free services.

4.1 User perspectives

A total of 30 users were interviewed, who commented on one, two or even three modes of transport, depending on what they were familiar with. The gender distribution was as follows: 14 men and 16 women. The categories included farmers, traders, disabled, elderly, students, health users, maternal health care and those using transport for employment. In a number of cases there was an overlap between the categories, e.g. farmers stating that they were also doing some trading, health users stating that they were farmers, etc. The age distribution ranged from 18 to 72 years. Nearly all of the users indicated that they mostly used both the rural car taxi and the tro-tro, with motorcycle and cargo tricycle being the next two used means of transport. As mentioned, users generally commented on two or three different modes, which helped the users to reflect on and compare their responses.

With midi-buses only serving the villages on a weekly basis during market days, it became clear that car taxis were the main form of rural transport available for the population, providing on average four travel opportunities during normal days. Those at the end of the line, in Gyasikrom, saw the fewest departures of car taxis to Goaso, but generally had a fair opportunity to board it. Those mid-way towards Ayomso saw more taxis pass through their villages on a daily basis but many of these tend to be already full with passengers, so the higher number did not necessarily translate itself into more travel opportunities. A common strategy adopted by the villagers living along the road, usually on market days, was to reserve a place by paying in advance to the taxi driver going to Gyasikrom so that during its return journey to Goaso, they were able to get on it.

Services on demand were mainly limited to the motor tricycles at the Ayomso hub. With no commercial motorcycle taxis present ‘on demand’ service opportunities were normally quite low, although this was somewhat set-off by the presence of private motorcycles. Mobile phone reception is rather limited in the villages along the feeder road, and usually telephone reception is restricted to

one or two particular locations in the villages, as shown in the picture below. With limited or inconvenient access to mobile phone services, integration of the transport sector with mobile phone provisions is yet to take place.



Figure 9 (left) – Climbing 'red hill' on a motorcycle

Figure 10 (centre) – Disabled transport user making a call, possible in a particular location only

Figure 11 (right) – A village bus stop (travellers' waiting area) in Akwaaduro

Table 6 shows user satisfaction with the various forms of transport on the Gyasikrom - Ayomso road. Passenger fares for all means of transport are judged as unsatisfactory, meaning basically that the fares are judged to be too high. Generally, women were more dissatisfied with the transport fares than men. For example, some female farmers and/or traders at Anwiawia and Mfamma expressed grave concerns with the high transport fares, considering the relatively short distance travelled and the discomfort experienced on board. As explained in more detail below, maintenance costs for transport operators are very high on this unpaved road, and the costs are passed on to the passengers. Service frequency and service predictability also draw few stars. While people know that the morning service is regular and can fill up quickly, the next service is much less predictable. Travelling outside the early morning and late afternoon peak times, or departing from a place that is not the start station, both bring even more unpredictability with them. On the other hand, freight handling collects many stars, as it is generally accepted that drivers are responsible for any damage to the freight making them more careful with the freight handling. Freight availability for the transport modes is also sufficient. Between the various means of transport there are some noticeable differences. The midi-bus is receiving the highest score overall (3.4) by male users, but nearly the lowest overall score (2.5) by female users. More generally, females were more dissatisfied with the level of comfort in terms of available space - mostly due to overloading - the seat condition, and presence of baggage in the seating area and poor service predictability, than their male counterparts.

Table 6 - Summary of use satisfaction responses disaggregated for gender

Means of transport	Midi-bus		Minibus		Taxi (saloon/estate)		Motorcycle	
Gender of respondent	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Sample size (N)	**6**	**8**	**5**	**3**	**14**	**15**	**6**	**8**
Passenger fares	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆
Journey times	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Service frequency	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★☆☆☆☆
Service predictability	★★★☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	n/a	★☆☆☆☆
Passenger capacity	★★★★☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Small freight availability	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★★☆
Small freight	★★★☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆

charges								
Small freight handling	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆	★★★☆☆	★★★☆☆	★★★☆☆	★★★★☆
Medium freight availability	★★★★☆	★★★☆☆	★★★★☆	★★★★★	★★★☆☆	★★★☆☆	★★★☆☆	n/a
Medium freight charges	★★★☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	n/a
Medium freight handling	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆	n/a
Courier services	★★☆☆☆	★★★☆☆	★★★☆☆	★★★★☆	★★★☆☆	★★★☆☆	★☆☆☆☆	★★★★★
Road safety	★★★★★	★★★☆☆	★★★★☆	★★★★★	★★★★☆	★★★☆☆	★★★☆☆	★☆☆☆☆
Security	★★★★★	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★★
Comfort: space	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★★☆	n/a
Comfort: seat type/conditions	★★★★☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Comfort: surrounding baggage	★★★★☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆	n/a	n/a
Comfort: environment	★★★☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★☆☆☆☆
Access for vulnerable people	★★★★☆	★★☆☆☆	★★★★☆	★☆☆☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	n/a
Average	**3.4**	**2.5**	**3.0**	**2.8**	**2.8**	**2.7**	**2.6**	**2.5**
The more stars (or the higher score) the better. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3).★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).								

Table 7 - Satisfaction for all transport types

Gender of respondent	**M**	**F**
Facilities at roadside stops	★☆☆☆☆	★★☆☆☆
Feeding intermodal connectivity	★☆☆☆☆	★★☆☆☆
Linking intermodal connectivity	★★☆☆☆	★★★★☆
Overall un-weighted	**1.4**	**2.6**
Overall weighted		
The more stars (or the higher score) the better. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3).★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).		

The mini-bus too is more preferred by men as compared to women, but here the overall average scores are much closer, (3.0 vs. 2.8). Transport users, irrespective of gender, were generally not satisfied with the car taxis and motorcycles, with overall scores being less than 3.0 (indicating below average satisfaction). In the case of the car taxi, user discomfort could be broken down into overloading, poor service predictability, high passenger fares and tariffs. For motorcycles, the passenger capacity and levels of comfort of seats and the environment (exposure to dust, sun, rain, etc.) adversely affected the overall scores.

While there were no formal time-tables, people tend to know approximately when the taxis are coming and going, or at least they do so for the morning services and evening services. The same is

true for the midi-bus service on market days. Nearly all of the people in the villages along the surveyed road are farmers and attend the Wednesday Goaso market day. It is on that day that they usually purchase items or access services not available in the village. This may suggest that increasing the rural transport supply, e.g. by increasing the number of daily travel opportunities by car taxi, or increasing the number of days that midi-buses serve the villages, may be in vain and economically non-viable (as exemplified by a tro-tro driver who decided to try a non-market day service, without success). Alternatively, and as is often the case for transport services in rural areas, there could be a suppressed demand: people do everything on Wednesday because on other days transport is less readily available. One interesting finding may give a partial answer to this dilemma: during the cocoa harvesting season transport services increase significantly. This is not only because of the transport of the cocoa beans – much is transported by trucks of the various cocoa buying companies – but mainly because people tend to have more cash, resulting in more economic activity and a generally increased ability to pay for transport services.

Both road safety and security were considered satisfactory by all users. Nevertheless, two deadly accidents happened on the surveyed road in 2016. One involved a car taxi which veered off the road and ran into a farm, killing the farmer who happened to be at work there. The other was a head-on collision between a cross country vehicle and a motorcycle rider, with the latter being killed. Two deadly incidents on 18.6 km rural road is significant. In addition, the interviewed health staff at the clinic recalled a number of smaller traffic injuries, particularly with motorcycle users. A few security incidents happened involving gangs of loggers, often armed, stopping taxis in search of fuel for operating their chainsaws, which is sometimes transported by other loggers using taxis.

All respondents were dissatisfied with the road-side waiting facilities. This is of little surprise as they were non-existent, except for one shelter in Akwaaduro, a village halfway between Gyasikrom and Ayomso. Construction of these could be easily managed by local communities with local materials through a small financial incentive.

4.2 Operator Perspectives

Three operators of car taxis and three operators of mini/midi buses were interviewed. Two of these car taxi operators were owner-operators, while a third one was an operator. In comparison, none of the three operators of the mini/midi buses were owner-operators. They were all operators who rendered regular sales to the vehicle owners. These transport operators mentioned that they belonged to active driver unions based in Goaso, the Municipal capital, and that it was the Union, namely the Ghana Private Road Transport Union (GPRTU), which arranged for them to provide the weekly transport services on market days to Gyasikrom. On other days, the tro-tro operators provide services mainly to Kumasi, the second largest city in Ghana, and Sunyani, the Brong-Ahafo regional capital. Contrarily, the operators of the motor-tricycles, mainly based at Ayomso, and those operators of the motorcycles (which were not ran for hired services) did not belong to any association/union. The unionised operators expressed their main concerns to be with the poor road condition for transport operations and the general lack of credit facilities to boost or start their own businesses. One respondent said, 'we wish drivers could be supported financially with credits to become owner-operators. This will take away the stress in meeting daily sales, for our owners'.

Table 8 - Summary of operator perspectives

Means of transport	Midi-bus	Minibus	Taxi (saloon/estate)	Motor tricycle	Motorcycle
Sample size (N)	2	1	3	3	3

Road condition for operations	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Adequacy of working capital	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆	★★☆☆☆
Facilities for formal credit	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★★☆☆☆
Facilities for informal credit	★★☆☆☆	★★☆☆☆	★☆☆☆☆	★★☆☆☆	★★☆☆☆
Adequacy of technical facilities	★★★★☆	★★★☆☆	★★☆☆☆	★★★☆☆	★☆☆☆☆
Regulatory disincentives	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆
Regulatory incentives	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆	★☆☆☆☆
Active associations	★★★★☆	★★★★☆	★★★★★	n/a	n/a
Security risks	★★★★★	★★★★★	★★★★☆	★★★★★	★★★★★
Overall Average	**2.6**	**2.6**	**2.5**	**2.5**	**2.0**

The more stars (or the higher score) the better. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3).★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).

There is a noticeable difference between the owner-operators and operators regarding maintenance, with the former maintaining their cars on a more regular basis (e.g. oil changes were done fortnightly as compared to once a month by the operator). In general, the maintenance costs were so considerable on the dusty road that profits were marginal and it is unlikely that sufficient savings can be made to replace the vehicle at the end of its working life, hence the focus on keeping the vehicle in good condition.

While there were no commercial motorcycle taxis active in the area, the private motorcycles do provide some public transport services. As mentioned, these are not always paid trips, and even when the passenger is paying, it is just for fuel. As with the owner-operator car taxis, the motorcycle owners tend to cater well for their vehicles by having regular oil-changes - once a week was not uncommon - and hardly overloading. It would be difficult to see a motorcycle with more than one passenger or even a bag of cement on it.

As earlier indicated, access to credit is generally non-existent. Both owner-operators of car taxis and motor-tricycles interviewed received the vehicles as a present/livelihood opportunity from their parents and most motorcycles are bought from cocoa income. One motorcycle owner obtained his vehicle when working for a logging firm, via monthly deductions from his salary.

Table 8 further underscores the above observations. The condition of the road is universally disliked by all operators irrespective of the mode of transport. The same is true for working capital, facilities for formal and informal credit. Disincentives were hardly in place; there is a one particular police check-point just before entering Goaso, coming from Ayomso, but vehicles either circumvent the checkpoint, taking a detour, or, if overloaded, let some passengers off who are then asked to walk a few hundred meters, only to board the vehicle again once out of sight of the checkpoint. Only motorcycle operators complained about disincentives, which may be caused by the police officer in Ayomso who stated that he would stop and penalise motorcyclists who were not wearing crash helmets. What all means of transport have in common is that they do not receive any support from the government to provide their services on this road. Finally, security risks are deemed to be non-existent, again something which is shared by all operators.

4.3 Regulator perspectives

One of the regulators interviewed was a policeman, based at the Ayomso police 'station', close to where the N12 met the surveyed road. Asked about regulation and safety issues, he made a difference between what could be reasonably enforced/regulated and what would be unrealistic, if not inappropriate to enforce. For the first he gave the scenario of motorcycle riders being stopped if

not wearing crash-helmets. This was for the safety of the rider and thus a reasonable request. But to stop car taxis from overloading would be highly unreasonable because of the limitations people along the rural road have in travelling to the hub. Vehicles generally fully load at the start of the trip but pick up passengers along the way making the vehicles overloaded. If he would start to stop and fine drivers for this, the community would turn against him and this would make his work, if not his life, very difficult. The regulators expressed concerns about the operation of logging trucks in carting timber beams illegally from the Ayum Forest Reserve, encouraging deforestation and bushfires. They suggested that the truck operators were careless and lawless, sometimes intimidating other road users in the use of road space. Generally, the regulators had limited information on the motorcycles since they were mostly used privately and not for commercial services on the surveyed route.

Table 9 - Summary of regulator perspectives

Means of transport	Midi-bus	Minibus	Taxi (saloon/estate)	Motorcycle
Vehicle technical compliance	★★★★★	★★★★★	★★★★★	★★★★☆
Vehicle fiscal compliance	★★★★★	★★★★★	★★★★★	n/a
Insurance compliance	★★★★★	★★★★★	★★★★★	n/a
Operational compliance	★★☆☆☆	★★☆☆☆	★★☆☆☆	n/a
Safety compliance	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆
Environmental compliance	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Regulatory planning framework	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆
Safety of the road	★★★★☆	★★★★☆	★★★★☆	n/a
Overall Average	**3.6**	**3.6**	**3.5**	**3.5**
Number of people interviewed	3			
The more stars (or the higher score) the better. ★☆☆☆☆= Very dissatisfied (= 1). ★★☆☆☆= Dissatisfied (= 2). ★★★☆☆= Medium (=3). ★★★★☆= Satisfied (= 4). ★★★★★= Very satisfied (= 5).				

4.4 Development perspectives

One of the people interviewed was a female nurse stationed at the Gyasikrom health centre. The health centre played an important role for minor health problems and as a referral station to the hospital in Goaso for more serious cases. The use of motorcycles in case of emergency, or of the two resident car taxis was again confirmed. An interesting comment was made with regard to the impact of transport on culture, with specific reference to logging. In this part of Ghana there is a taboo on entering the forest on a Thursday, something that was not always respected by the loggers. Nevertheless, the number of logging trucks on the Thursday (the day of our non-market traffic count) was considerably lower than on other days.

Another person asked to comment on the development impact of rural transport providers was the head teacher of the Primary and Junior High School in Gyasikrom. Overall, the head teacher was satisfied but indicated that the tarring of the road would make a difference for the teaching staff and the community dwellers, particularly during the rainy season when travel disruption was regular. Besides road improvements, a key development priority was a better mobile phone signal.

Table 10 summarises the development contributions of the various modes of transport. The clear winner is the car taxi which is given near full marks, resulting in a 4.7 overall score, meaning nearly 'very satisfied'. At the other end of the scale is the light truck which received a 1.7 score. Again, it

must be noted that most of the trucks passing are logger trucks with virtually no relations or social commitments to the people along the feeder road. The motorcycle is given some four and five star ratings in a number of categories but only picks up two stars for mobile phone integration. Despite the poor telephone reception in the area – the taxi is awarded five stars in this category – which underlines again the fact that the motorcycle is not an 'okada' service.

Table 10 - Summary of Development Perspectives

Means of transport	Midi-bus	Mini bus	Taxi (saloon/estate)	Light truck	Motor tricycle	Motorcycle
Agricultural facilitation	★★★★☆	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★☆
Enterprise/trade facilitation	★★★★☆	★★★★★	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆
Women's empowerment	★★★☆☆	★★★★☆	★★★★★	★★★☆☆	★★★★☆	★★☆☆☆
Disabled people's empowerment	★★★☆☆	★★★☆☆	★★★★★	★☆☆☆☆	★☆☆☆☆	★★☆☆☆
Young people's empowerment	★★★☆☆	★★★☆☆	★★★★☆	★☆☆☆☆	★★★★☆	★★★★☆
Maternal health needs	★★☆☆☆	★★★☆☆	★★★★★	★☆☆☆☆	★☆☆☆☆	★★★★☆
Medical service transport	★★★☆☆	★★★☆☆	★★★★★	★☆☆☆☆	★★☆☆☆	★★★★★
Education-related transport	★★★☆☆	★★★☆☆	★★★★★	★☆☆☆☆	★★★★☆	★★★★★
Mobile phone and ICT integration	★★☆☆☆	★★☆☆☆	★★★★★	n/a	★☆☆☆☆	★★☆☆☆
Average of the above nine issues	**2.9**	**3.4**	**4.7**	**1.7**	**2.8**	**3.3**
Cultural impact	★★★☆☆	★★★☆☆	★★★★☆	n/a	★★★☆☆	★★★☆☆
Environment impact	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★★☆☆
HIV/Aids impact	★★★☆☆	★★★☆☆	★★☆☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Average of the above three issues	**3.0**	**3.0**	**2.9**	**2.3**	**3.0**	**2.5**
Integration with feeder transport	★★★☆☆					
Integration with external transport	★★★★☆					
Road maintenance adequacy	★★☆☆☆					
Final weighted average						
Number of interviews (people answer questions relevant to their experience)	3					

The more stars (or the higher score) the better, from the development perspective. For example, the contribution of each mode of transport to the achievement of development goals in that area of concern has been rated by the people interviewed as:

★☆☆☆☆ *= Very poor (= 1).* ★★☆☆☆ *= Poor (= 2).*

★★★☆☆ *= Medium (= 3).* ★★★★☆ *= Good (= 4).* ★★★★★ *= Very good (= 5)*

5 Conclusions

The surveyed road with its transport services is likely to be quite typical of the cocoa-growing forest region. Cocoa growing is dominated by small-holders and if prices for cocoa are high, this can create significant revenue. Private motorcycle ownership in the area is a clear indication of some affluence, and for most owners, hardly charging passengers for fuel, is a second indication. If motorcycle ownership will continue to grow over the years, it is unlikely that commercial motorcycle taxis will be able to get a major foothold on the surveyed road. It is more likely that the commercial cargo motor tricycle will fill the gap between NMTs (i.e. pedestrians/cyclists) and car taxis, unless the tricycles too will be purchased on a private use basis.

The car taxi is the most dominant and available mode of transport on the Gyasikrom-Ayomso road. It contributes yearly 55% and 64% of passenger and freight movements respectively. The IMTs (i.e. motorcycles and motor-tricycles) also contribute nearly one-third of the annual passenger and small freight movements on the surveyed road, showing the significant role they play in the socio-economic development of the area.

The Goaso market is the main market for all people along the surveyed road and Ayomso is completely by-passed. Rural transport services have responded to this by making the Gyasikrom to Goaso trip as their usual journey. According to the respondents, the role of the Ayomso market was reduced significantly when the Ayomso - Goaso road was paved, further underscoring the gravity model where services tend to become centralised, if bottlenecks are removed.

The travel needs of the people in the catchment area are to some extent in balance with the rural transport services offered: when demand is higher – most notably during market days but also during the cocoa harvesting season – rural transport services respond to this by providing more travel opportunities. Nevertheless, waiting times remain very long. It is likely that the paving of the road may relieve suppressed transport demand and would directly attract more transport modes to compete for passengers and goods resulting in many more travel movements and also in reducing overloading. Furthermore, it would significantly reduce the operating costs of the vehicles on the road, which in turn could reduce the fees charged to transport users, or prevent future rises of these. Moreover, less money to cover transport needs may leave more money for other basic needs or investments in income generating activities.

A more realistic and cheaper intervention than paving the road would be to tackle the road's bottlenecks. There are a handful of steep sections, with the so-called 'Red Hill' slope section soon after leaving Ayomso being notorious – adversely affecting the journey to all communities, on and off the surveyed road. Hills slow down traffic during the dry season, particularly if eroded sections are not repaired, and can make ascents or descents very dangerous if not impossible during the rainy season. Together with some sections which become very muddy, often because of blocked side drains and culverts and the occasional fallen trees, the road experiences disruption for a number of weeks and there are a few days during the rainy season when the road is completely cut off. One approach is to concentrate efforts at spot improvements and with the support of the District Assembly through the DFR, these obstacles could be mitigated if not eradicated to a large extent by the communities themselves, which may not require heavy equipment from outside. An added advantage would be a further cash injection into the community for labour and locally sourced materials.

Overloading remains a problem for users of car taxis. Regularly, car taxis take up to 8 or 9 passengers, with the boot often used both for freight and people. This then could be interpreted as insufficient transport services. Equally, it could be the result of the need for taxi drivers to make their trips economically viable, given the high maintenance costs: if a taxi would take no more than four passengers, travel fares would nearly double. This would be highly unacceptable by the local inhabitants according to one taxi-driver, who was intimidated when he was forced to raise the fare due to increased fuel prices. Taxi drivers from other localities such as Ayomso and Goaso are not prepared to go on the surveyed road to compete with the drivers for passengers, even during market days, simply because of the poor nature of the rural road. A paved road with good riding quality may change this. A fairly good rural road will attract fairly good rural transport services. It is further recommended that the significant role of the IMTs in rural passenger transport services should be recognised by the Ministry of Transport by revising the current road traffic regulations 2012 (LI 2180) to allow regulated commercial operations of IMTs for rural passenger services. Further research is needed comparing motorcycle taxi services in rural areas with those in the urban

areas in Ghana. This will help to understand the different functions and usage of motorcycle taxis in the two settings and would allow for tailor-made suggestions if developing a new regulatory framework to optimise transport services for both rural and urban users.