

# Demand and Supply of Transport Infrastructure and Services in the Peripheries of Sunyani, Ghana

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## Abstract

The disparity between peri-urban areas and larger urban centres and cities in Ghana require that there should be an effective accessibility both in each area and between the distinct zones. This study interrogates the challenges that confront the demand and supply of transport infrastructure and services in the peripheries of Sunyani. The data for this study was obtained from 100 households, who were selected sampled from three study areas, (Abesim, Asuakwaa and Adomako). Findings from the study revealed that, peri-urban development in Sunyani is driven by a complex mix of factors and about 84 percent of the inhabitants in the peripheries demand transport daily amidst inadequate transport infrastructure and unreliable transport services. This is mainly as result of activity locations generating trips from the selected peri-urban communities to Sunyani. It is therefore recommended among others, that promoting multi-nuclei centres and mixed-used development which has to do with identification and development of secondary centres with substantial investment such that they provide intervening and working opportunities to the inhabitants of the peri-urban areas to reduce the number of trips made to Sunyani.

**Keywords:** Peri-urban; Transport Demand; Transport Supply; Infrastructure; Services

## 1. Introduction

The very heart of transportation planning is concerned with the design of circulation systems which maximize accessibility for essential movements between linked activities, giving due consideration to safety, comfort, and amenity as well as cost (Chapin, 1976; Blonk, 1979; Kwakye et al, 1994; Scoones, 1998). Accessibility and transport provision have played a key role in shaping the development patterns of major urban areas (Jones, 1981; Litman, 2010). The mainstay of Ghana's development has been as a result of the vigorous improvement in economic activities, which cannot be disassociated from the role played by some level of improvement in transportation in the country (Ghana Investment and Promotion Centre, 2013). The disparity between peri-urban areas and the larger urban centres and cities they relate, require that there should be an effective accessibility both in each area and between the distinct zones. However, there is the absence and inadequacy of transport facilities and services in these peri-urban areas and this does not ensure effective movement between various activity centres and attraction points.

The problem of inadequate and poor condition of transport infrastructure and facilities affect the demand for transport in peri-urban areas. Commuters wait in long queues for long hours to get access to transport facilities to various attraction points. Most access roads that connect them to other communities are in bad states. Public transport systems are in deplorable states; vehicles are old and inefficient and there are no designated bus terminals where people congregate to get on commercial vehicles. This situation affects workers, traders, students and even drivers who ply in peri-urban areas. Already evident in peri-urban areas of Ghana are that, these problems have resulted in the increased travel time, increased cost of transport, high rate of accident, increased vehicle operating cost, environmental (air) pollution and the stress in commuting from one place to the other. The impacts of these problems cannot be overemphasized. This paper therefore seeks to interrogate the challenges that confront the availability and access to transport infrastructure and services in the fringe communities of Sunyani.

## 2. Overview of Transportation in Peri-Urban Areas

### 2.1 Meaning and Characteristics of Peri-urban Areas

Peri-urban (sometimes also called the urban fringe) may be the dominant urban form and spatial planning challenge of the twenty-first century (Ravetz et al, 2013). The concept has been in use for over half a century yet theorists and practitioners have not been especially clear or consistent in their use of the term peri-urban (OECD, 1979:10). In the views of Iaquinta and Drescher (2000), definitions are based on a variety of operational variables and a variable that is seen as definitional by some authors is seen as being an outcome of peri-urban processes by others. Others even argued simply that definitions are largely situational and case-specific. According to the Organisation for Economic Co-operation and Development (OECD, 1979), the term 'peri-urban' came into wide use during the 1980's in Europe. Literally, it means 'around the edges or periphery of a city'. It is used to describe the kind of human settlements, which includes but not limited to edge city, informal settlement, illegal settlement, legal settlement, shantytowns, squatter settlements among others, which may be large or small and located on the fringe of urban settlement or areas. Generally, peri-urban areas can be classified

into four interrelated categories. These include village peri-urban, diffused peri-urban, in-place peri-urban and absorbed peri-urban (Iaquinta & Drescher, 2000). The categorization is derived from the underlying socio demographic processes, especially migration.

## **2.2 Transport Needs of Peri-Urban Areas**

It is long been established that land use patterns are long term factors that set the background for individual travel behavior. So in order to maintain a functioning economy, people must be able to circulate between the various points that are important to them and do so with ease. The ability of individuals, families, entrepreneurs and firms to exchange goods and services and interact with people on a regular basis, is not only crucial to economic life but also quality of life (Okyere, 2012; Eminsang, 2011; Adarkwa, 2013). Peri-urban dwellers move within and outside their areas to their workplaces, schools, markets, financial institutions and these are mostly located in urban areas or main cities around which they live. According to Rodrigue, et al. (2013), estimating transport needs is expressed in terms of number of people, volume, or tons per unit of time and space, i.e, transport demand is measured by the number of people available to make a trip, the volume or tons of goods available to be transported which is expressed per unit of time and destination. Peri-urban development has significant consequences in terms of transportation demand. In that the movements of passengers, the location of residential, commercial and industrial areas influence generation and attraction of movements (Yang, 2005; Yang & Gakenheimer, 2007). The physical land use configuration determines the available travel options of origin and destinations. Land use density, land use mix, and spatial separation of living, working and entertainment activities all have consequences in transportation, (ibid).

From the perspectives of Duany et al (in Yang & Gakenheimer, 2007), peri-urban housing means; longer journeys, increased demand for transportation investments, increased urban congestion and intense air pollution. Similarly, these phenomena pertain in the peri-urban areas in Ghana, as spatial plans do not provide opportunities within rural and peri-urban areas to reduce stress on cities. Peripheral district centres lack the investment to propel growth thereby their inhabitants move to the main city centres to enjoy economic and social facilities available. They do this by commuting daily to the city centre to work either in the formal or informal sectors. According to Farvacque-Vitkovic et al (cited in Eminsang, 2011), about three hours are spent commuting to and from work each day by the working population living at the periphery of Accra and this situation has the tendency to reduce productivity, increase pollution by exhaust fumes of vehicles, increase the already high fuel consumption bill of the nation, and cause stress and deterioration in the overall health condition of the population.

## **2.3 The Availability of Transport Infrastructure in Peri-Urban Areas**

According to Rodrigue et al. (2013) transport supply is expressed in terms of infrastructure (capacity), services (frequency) and networks (coverage). This system comprises the physical, administrative and the legal structures required for the smooth running and administration of the entire process of movement (Adarkwa, 2013; GIPC, 2013; MoR&T, 2011). According to Pucher et al (cited in Poku-Boansi & Adarkwa, 2011), the supply of transport services has lagged far behind demand. This is because public finances, in general, are so limited that funding for transport improvement is woefully inadequate. Transport infrastructure available to peri-urban dwellers include roads, waterways, rails, foot paths, pedestrian facilities and bus stations. Due to the fact that these communities grow organically without proper spatial plans and for most part not recognized by the formal sector and municipal assemblies, transport infrastructure and other basic facilities are not supplied and where it had been supplied the transport system is characterized by the use of old, inefficient vehicles, increasing penetration by private operators, decreasing quality of the publicly owned system, shortages and overcrowding, and inadequate road infrastructure.

This pattern of development limits the use of mass transit and encourages the use of private automobile for most trips (Oduro, 2010) thus making movement very difficult and shooting up transport demand, thus people without private cars have to walk because there are no transport operators within the settlements. Those who access transport facilities such as taxis within the settlements do that on hired basis or at very high fares. This contributes to high cost of transport associated with living in peri-urban areas. According to Zhao and Tian (in Oduro, 2010), peri-urban areas are not given adequate infrastructure provision in that there is an over concentration of offices and commercial activities in the city centre that generates intense vehicle trips that cannot be handled by the expanding road network. Traffic congestion resulting from this nexus of development increases time spent in traffic, air pollution, and the incidence of road rage and conflicts among drivers (Brueckner, 2000; Squires, 2002; UN-HABITAT, Cited in Oduro, 2010), This is as a result of inadequate quantity of road infrastructure, often coupled with rapid population growth. The ripple effects of these traffic problems and associated pollutions cannot be over emphasized. Moving cars usually emit gases such as Carbon Dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), Nitrogen Oxide (NO), Methane (CH<sub>4</sub>) and Nitrous Oxide (N<sub>2</sub>O) responsible for global warming (Agyemang-Bonsu et al., cited in Okyere, 2012). Vehicle operators who ply

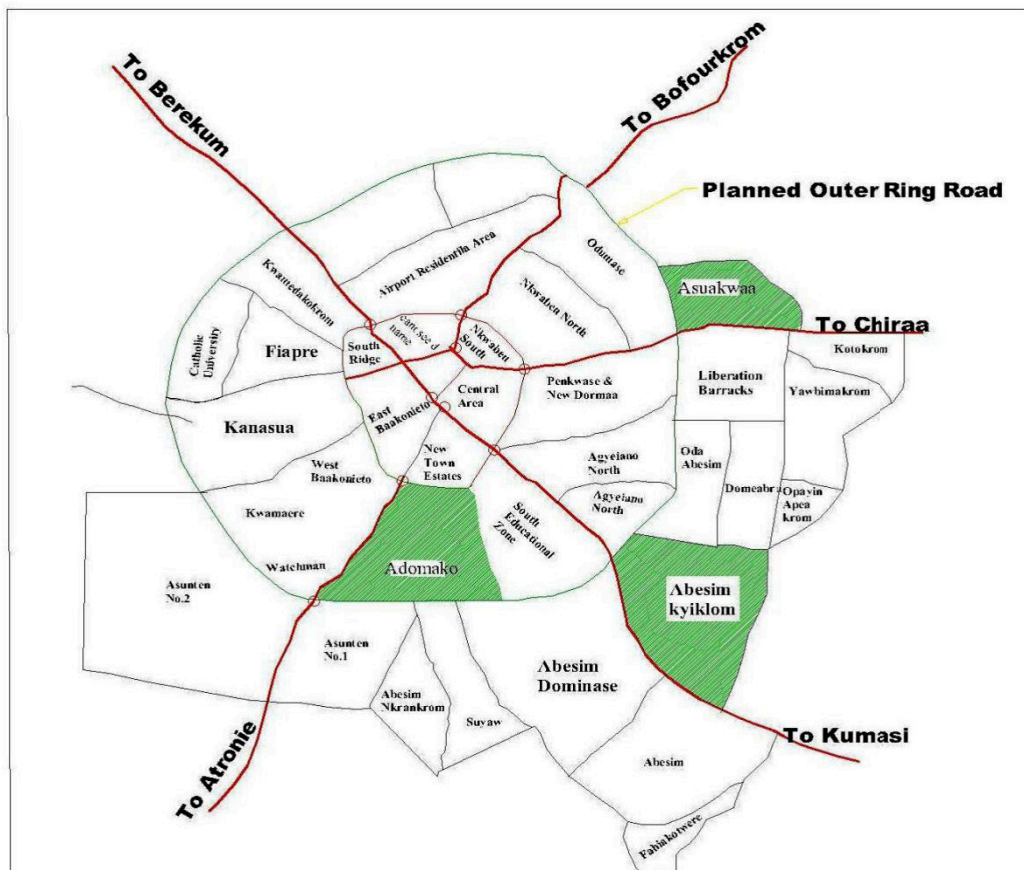
these congested routes tend to charge the additional cost incurred in the delay on the road.

### 3. Methods

The procedures for this study were based on a selected case study approach through a field study in the peri-urban areas of Sunyani. Specifically, the study was conducted in three fringe communities of Sunyani (Abesim, Asuakwaa and Adomako), selected purposively from three out of the four main arterial roads connecting the centre of Sunyani to its peri-urban interface. This was intended to reveal how different locations of towns away from the city centre impact the demand and supply of transport infrastructure and services. The study focused on examining the challenges that confront the demand and supply of transport infrastructure and services in the peripheries of Sunyani. It also establishes useful relationships between the demand and supply of transport in fringe communities of Sunyani. Consequently, based on this, data for this study was gathered from 100 households selected systematically from three study areas (46, 34 and 20 households from Abesim, Asuakwaa and Adomako respectively). Interviews and questionnaire administration served as the major methods for data collection for this study. Using semi-structured questionnaires and interview guides, data was obtained from households and institutions involved in the management of peri-urban areas, supply and regulation of transport infrastructure and services in peri-urban areas.

This provided insight on the issues relating to the demand and supply of peri-urban transport. The following institutions; Sunyani Municipal Assembly, Town and Country Planning Department, chiefs/land owners (of Sunyani, Abesim-Kyidom, Asuakwaa and Adomako), heads of transport related institutions (such as the Urban Roads Unit of the Sunyani Municipal Assembly (SMA), the Drivers and Vehicle Licensing Authority (DVLA) were purposively selected owing to the special role they play in transportation and urban development in Ghana. This was complimented by key informant interviews and secondary data sources to enhance the validity and reliability of data for the study.

**Figure 1. Selected Communities in Sunyani Municipal Context**



Source: Town and Country Planning Department, Sunyani, 2012

### 4. Results and Discussions

#### 4.1 Transport Situation in Peri-urban Areas of Sunyani

The peri-urban transport in Sunyani is characterised by the use of old, inefficient vehicles, private transport operators, and inadequate road infrastructure. Walking is the main mode used for internal access in almost all the

peri-urban areas of Sunyani (*see Table 1– Household Trip Modes in Study Areas*). Inhabitants of Asuakwa, Adomako and Abesim-Kyidom walked averagely 1.2km, 1km and 0.8km respectively to the main roads that connect Sunyani to board taxis for their trips. In the cases of Adomako and Asuakwa, the community mobilizes to pay for construction of access roads as well as the maintenance of the main roads that connect the Sunyani-Atronie road and Sunyani- Techiman road respectively. These roads are not motorable all year round and most taxi drivers refuse to ply it during the dry-season because it is too dusty. The average cost of a roundtrip from Asuakwa, Adomako and Abesim to sunyani is GH¢8, (US\$ 3.1) GH¢4.3 (US\$ 1.7) and GH¢3.6 (\$1.4) ,(as at March, 2014) respectively as many of the return trips are done by chartered taxis.

Comparatively, the findings from the study reveals that fringe communities of Kumasi where public transport (‘trotro’<sup>1</sup>) operates, tend to pay far less for a round trip of equivalent distances to fringe communities of Sunyani. For instance, the distance between Asuakwa to Sunyani (6.2km) is about same as from Tech-Junction to Kwamo and this roundtrip cost GH¢1.20 (US\$ 0.46). In the case of Abesim-to-Sunyani (7.5km), the equivalent distance is Tech-Junction to Adum/Kejetia and the roundtrip cost GH¢ 1.40 (US\$ 0.54), as at March, 2014. These revelations show that transports in the peri-urban areas of Sunyani are expensive due to the poor nature of roads that serve these areas and the over reliance on taxis (which is the only available means) to make trips. It is important to mention that households in Abesim, spent 15-20 percent of their monthly income on transport whereas those in Asuakwa and Adomako spent close to 30 percent of their monthly income on transport.

**Table 1 – Household Trip Modes in Study Areas**

Mode	Trip	Percentage
Walking	57	18.4
Private car	29	9.4
Taxi	205	66.1
Cycling	19	6.1
Total	310	100

*Source: Author’s Construct, 2014*

#### 4.2 Estimating Demand for Transport in the Peri-Urban Areas of Sunyani

Several studies have established that demand for transport infrastructure and services is measured and expressed in terms of number of people, volume, or tons per unit of time and space. That is transport demand is measured by the number of people available to make a trip, the volume or tons of goods available to be transported which is expressed per unit of time and destination.

As can be seen in Table 2, ‘trips to work’ accounts for 59 percent of estimated trip purposes of the study communities. Again, 23 percent and 15 percent of trips from the study communities were trips to school and market respectively. It was also established that usually these trips terminate in Sunyani (*see Table 3*). The study revealed that 71.6 percent of all trips generated are made to Sunyani which is the hub for all the major economic and social activities. It was also revealed that about 11.9 percent of all trips generated ends in other areas aside Sunyani and only 16.5 percent of the trips are generated and end within the communities. This implies that residents in the peripheries of Sunyani demand transport to access these areas stated above, especially work places. It is also important to mention that these trips that end in Sunyani and other areas are generated by about 84 percent of the populations of these areas combined. Abesim-Kyidom had 92.2 percent of its population making trips to Sunyani and other areas daily whilst Asuakwa and Adomako had 79.1 percent and 69 percent respectively.

**Table 2 – Trip Purposes of Trip Makers in the Study Areas**

Trip purposes	Trip	Percentage
Work	182	58.7
School	72	23.2
Recreation	4	1.3
Shopping	45	14.5
Church	6	1.9
Funerals	1	0.3
Total	<b>310</b>	<b>100</b>

*Source: Author’s Construct, 2014*

<sup>1</sup> Trotro is a form of minibus used for short distance travel in Ghana. The word ‘tro’ evolved from the local ‘Ga’ language meaning three pence, that is, the penny coins used in the Colonial Gold Coast, now Ghana. Buses were at the time charging three pence per trip, hence it was dubbed ‘trotro’.

**Table 3 – Trip Origin and Destination of Study Communities**

Trip Origins	Trip Destinations							
	Within comm.		Outside comm.		Sunyani		Total	
	No.	%	No.	%	No.	%	No.	%
Abesim	12	23.5	17	45.9	127	57.2	156	50.3
Asuakwaa	18	35.3	13	35.1	55	24.8	86	27.7
Adomako	21	41.2	7	18.9	40	18.0	68	21.9
Total	51	100	37	100	222	100	310	100

*Source: Author's Construct, 2014*

Based on the foregoing discussions, it can be inferred that these peri-urban areas serve as dormitory towns to Sunyani and effective transport is needed for residents of these areas to commute daily to their places of work. Again, this phenomenon contributes to the high volume of traffic on the arterial roads from Sunyani to these fringe communities.

#### 4.3 Delivery of Transport Infrastructure in the Peripheries of Sunyani

In Ghana, the supply of transport infrastructure and the network itself is mainly done by the government. The local government oversees the development of this infrastructure where the national government cannot do so as stated in the Local Government Act, 1993, Act 462. It was against this background that the Government of Ghana distributed graders and other equipment to all MMDA's (Metropolitan, Municipal, and District Assemblies) to enable it develop some of its road infrastructure and make their area of jurisdiction accessible. However, due to the fact that most of the peri-urban communities in Sunyani have unapproved planning schemes, they are normally not recognized by the Municipal Assembly and thus, transport infrastructure especially roads are not supplied in these areas. Supply of transport infrastructure in these areas therefore is done by the communities themselves, (*see transport in peri-urban areas of Sunyani*). Inhabitants in Adomako and Asuakwaa have to mobilize resources in 2012 and 2013 of which every house was charged GH¢35 and GH¢ 30 respectively to pay for the construction of access roads as well as the maintenance of the main roads that connect them and the rest of Sunyani. An inventory into the transport infrastructure available in these areas show that these areas are under supplied as summarized in Table 4.

**Table 4: Inventory of Transport Infrastructure in Peri-Urban areas of Sunyani**

Study areas	Main Road		Access Roads				Lorry stations	Bus stops
	Road	Condition	% with motorized Access	Conditions (%)				
				Good	Fair	Poor		
Abesim-Kyidom	Abesim Road	Good	34.8	6.3	12.5	81.3	Yes	Yes
Asuakwaa	Asuakwaa Road	Poor	38.2	-	30.8	69.2	No	No
Adomako	Adomako Road	Poor	40	-	37.5	62.5	No	No
Total	-	-	37	2.7%	24.3%	73.0%	-	-

*Source: Author's Construct, 2014*

As illustrated in Table 4, Abesim-Kyidom is served by the main Sunyani-Kumasi road which is a well-engineered and asphalted, thus giving it a - good road condition. This is however different in Asuakwaa and Adomako. The major roads that connect the towns are dusty and un-engineered. These roads are not all year round motorable and as stated earlier, the roads are managed by the communities themselves. In terms of access roads, Asuakwaa and Adomako have most of their roads being - fair about 30.8 percent and 37.5 percent respectively. This can be attributed to the community's involvement in road maintenance and construction. Notwithstanding, Adomako and Asuakwaa have no bus stops and lorry stations. Abesim-Kyidom however has few bus stops located along the Sunyani-Kumasi road and a lorry station located in Abesim-Newtown.

#### 4.4 Nature of Transport Services in the Peripheries of Sunyani

In Ghana, Public Transport Services are provided predominantly by the private sector, which operates a mix of buses, minibuses ('troto'), and taxis (Poku-Boansi, 2003; Poku-Boansi & Adarkwa, 2011). Good quality transport services are seen by passengers to mean affordable fares, good frequency of transport services, short travel time, and improved safety (Poku-Boansi, 2008; Poku-Boansi & Adarkwa, 2011). This implies that vehicle operators need to provide services which meet these needs as well as in an economically, efficient manner. Therefore it was not surprising to see the supply of transport services to the peripheries of Sunyani been done mainly by the private taxi services (see Table 1) which supplies 66.1 percent of the total transport demand.

Abesim-Kyidom which has a good main road receives many of the supplies whilst Adomako and Asuakwa receive least of the supplies due to the poor nature of the roads. On market days, the inhabitants of Adomako and Asuakwa are faced with serious transport problems to the extent that many of their return trips are done by ‘dropping’<sup>1</sup>. Table 5 summarizes the waiting time to and fro Sunyani to the study communities.

**Table 5 - Waiting Time to and fro Sunyani to the Study Communities**

Study Areas	Ordinary/ Normal days						Market days					
	To			From			To			From		
	<10mins	11-20mins	21mins +	<10mins	11-20mins	21mins +	<10mins	11-20mins	21mins +	<10mins	11-20mins	21mins +
Abesim-Kyidom	78.3%	21.7%	-	82.6%	17.4%	-	80.4%	19.6%	-	69.6%	23.9%	6.5%
Asuakwaa	11.8%	67.4%	20.7%	2.9%	70.6%	26.5%	8.8%	61.8%	29.4%	2.9%	64.7%	32.4%
Adomako	10%	60%	30%	20%	65%	15%	5%	65%	30%	5%	50%	45%
Total	43%	45%	12%	42%	30%	16%	40%	45%	15%	34%	43%	23%

*Source: Author’s Construct, 2014*

It can be inferred from the above table that the average waiting time from the peripheries to Sunyani falls within 11-20 minutes on both ordinary/ normal and market days because of unavailability of taxis in these areas on time, partly, due to the poor nature of their roads. It can also be seen from the Table 5 that the average waiting time from Sunyani to the peri-urban areas is <10 minutes on ordinary/ normal days because most of the trips are done by dropping/ on hire basis and 11-20 minutes on market days because some taxi drivers refuse to ply on the poor roads of the peri-urban areas. Abesim- Kyidom however has waiting time of less than 10 minutes on both normal and markets days, (78.3 percent and 80.4 percent respectively) because it is the destination of many taxi drivers due to good roads. From the foregoing discussion, it is clear that the demand for transport infrastructure and services and supply is inversely related in the peripheries of Sunyani due to poor nature of roads, use of low occupancy vehicles and total neglects by city and town managers to ensure the orderly development of these areas.

### 5. Reflections for Future Policy Action

Central to this study is the understanding of the demand and supply of transport infrastructure and services in the peripheries of Sunyani. The above discussions have portrayed the nature, extent and intensity of transport demand and supply in Sunyani. This section of the paper suggest ways to explore potential future development scenarios based on current evidences and effectively plan for transportation to support the local economic development of peri-urban areas of Sunyani.

Transport demand has been measured by the number of people available to make a trip, the volume or tons of goods available to be transported which is expressed per unit of time and destination. The study as a matter of limitation could not estimate the volumes or tons of goods available to be transported from the peri-urban areas to Sunyani and other areas because of general lack of information on the outputs of the inhabitants of these areas. The study however extensively, estimated the number of people available to make a trip. It was estimated that about 84 percent of the populations of the three (3) study areas combined demand transport services daily. Abesim-Kyidom had 92.2 percent of its population making trips to Sunyani and other areas daily whilst Asuakwa and Adomako had 79.1 percent and 69 percent respectively.

The major cause of transport demand in the peripheries of Sunyani is the multiplicity of trips resulting from the over concentration of activities in Sunyani. As stated earlier, 71.6 percent of all trips generated in the peripheries end in Sunyani. Introducing measures to reduce the number of trips into Sunyani, would therefore, go a long way to reducing demand for transport. This can be done by promoting multi-nuclei centres and mixed-use development which has to do with identifications and development of secondary centres with substantial investment such that they provide intervening and working opportunities to the inhabitants of the peri-urban areas to reduce the number of trips made to Sunyani. Thus, transport demand would reduce considerably.

The supply of transport infrastructure and networks in the peripheries of Sunyani are mainly done by the communities themselves. It was established that inhabitants of Adomako and Asuakwa contributed GH¢35 and GH¢30 respectively in 2012 and 2013 to pay for the construction of access roads. In terms of transport services, private taxi services supply these areas. Abesim-Kyidom which has a good main road, thus receives many of the supplies whilst Adomako and Asuakwa receive least of the supplies due to the poor nature of the roads connecting them. On market days, the inhabitants of Adomako and Asuakwa highly face transport problems to the extent that many of their return trips are done by ‘dropping’ or on hire basis.

Juxtaposing the demand estimated with supply, it was clearly established that the demand for transport infrastructure and services and supply is inversely related in the peripheries of Sunyani due to poor nature of

<sup>1</sup> Dropping is a term used to describe a chartered taxi service in Ghana.

roads, use of low occupancy vehicles and total neglects by city and town managers to ensure the right things are done in these areas. Consequently, the level of demand for transport is far in excess of the level of supply. Invariably, residents of fringe communities of Sunyani tend to pay more for poor and inefficient services. In corollary, this undermines the imperative potentials of transportation to propel the local economic development of these fringe communities.

It is therefore recommended that, city authorities should ensure the orderly development of these areas and collaboratively help these areas to develop their access roads since they are already doing it. Lack of self-help initiatives is one of the major development challenges face by Ghana as a nation because everything is expected to be done by the government. The Assembly can therefore buy into this initiative by releasing graders and road maintenance equipment at less or no cost to these communities to facilitate these initiatives to make the peri-urban communities in Sunyani generally accessible.

## 6. Conclusion

Ravetz et al (2013) argue that, perhaps the most enduring urban form and spatial planning challenge of the present century is peri-urbanization. Peri-urban transformations leading to increased spatial interactions between urban centres and fringe communities have meant high dependence on transport for commuting. The study sought to interrogate the demand and supply of transport infrastructure and services in the peripheries of Sunyani. Essentially, it also examines the relationship between the demand and supply of transport services in these fringe communities. Owing to this, the study confirms the general assertion that peri-urban areas experience rapid physical development driven by a complex mix of factors. Among such factors include: a drift of residents from the urban centres into fringe communities in search of cheap accommodation; uncontrolled development of peripheries; over concentration of activities in the main cities necessitating daily trips to Sunyani; and the total neglect of sustainable measures that accommodates peri-urban development. It was also revealed that, the relationship between the demand and supply of transport infrastructure and services in the peripheries of Sunyani is inversely related.

In the light of this, necessary transport investments that can support and sustain development in these peri-urban areas should be put in place. There is the need to explore the self-help financing strategies being used by residents of Adomako and Asuakwa as a useful financing tool for transport infrastructure in fringe communities. Again, creating multiple centres to create intervening opportunities and also limit overdependence on Sunyani. A transport strategy that prioritizes public transport systems will be essential enhancing mobility between urban centres and fringe communities. Fundamentally, there is a need for concerted effort among all relevant actors and stakeholders in ensuring an effective and efficient transport services in peri-urban areas of Ghana.

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