

**TRAFFIC, SAFETY AND ECONOMIC EFFECTS OF HIGHWAY BYPASS ON
COMMUNITIES IN GHANA: APEDWA- KIBI- BUNSO CASE STUDY**

BY

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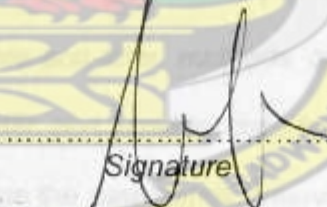
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ABSTRACT

The Kumasi – Accra Road is a section of the National highway network (route N6) and like most national road networks in Ghana, it passes through towns. The continuous cluster of these towns and communities along the highways and their attendant negative effects on traffic mobility and safety has increased the demand for bypassing them. Though the main aim of bypassing these communities was centred on safety and increasing mobility, the general impact of the highway bypass on these communities in economic terms (taking into consideration the possible higher safety levels they might now enjoy) is not known.

This research investigated the effects of highway bypasses on Traffic, Safety and Local businesses of communities with bypasses in Ghana, using the Apedwa - Kibi - Bunso bypass as a case study. The research had three main goals; a) to determine the effect of the bypass on traffic flow and road accidents, b) to evaluate the perception of business owners and community leaders on the effect of the bypass on the local economy and c) to determine how the communities can reap maximum benefits and reduce the negative impacts of the bypass.

In achieving the above objectives the researcher implemented a research methodology which is a combination of a case study and before-and-after methods of impact assessment. The method adopted was mainly qualitative. Traffic and accident data for three (3) years before and after the bypass were compared to determine the new trends. Interviews were conducted in the communities along the old route in an attempt to collect soft data which comprise the perception of residents, business owners and opinion leaders to access the perceived impact of the bypass.

The research concluded that the construction of the bypass has served the purpose of improving traffic flow by reducing congestion on the old route but has also brought in inconveniences to trip makers and additional trip costs. It has also resulted in a tremendous

safety benefits especially for pedestrians though increasing Run-off road accident has emerged after the bypass. On the whole, the bypass has been perceived to have adversely affected retail business; loss of opportunity to trade along the roadside, collapse of the SOS rest stop and retrogressing development of the old route communities.

The introduction of adequate public transport in the form of buses along the old route by the Ministry of Transport (MoT) would assist commuters who have become captives in the patronage of taxis to Apedwa and Bunso. The rehabilitation and installation of appropriate traffic calming measures by Ghana Highway Authority (GHA) in the communities would improve safety since reduced traffic volume on the bypassed route has allow for greater vehicular speed. Placing of adequate directional and information signs along the bypass and provision of adequate access between the bypass (new route) and the old route would attract travellers to the bypassed communities.



DEDICATION

This piece of work is dedicated to the memory of

My father, Mr J. K. Agbati and

My Grand mum, Mama Loame Kakane-Tukpeyi.

May their Souls rest in Perfect Peace.

KNUST



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My greatest gratitude and thanks to God Almighty for the Grace, Love and Strength He has bestowed upon me to this end.

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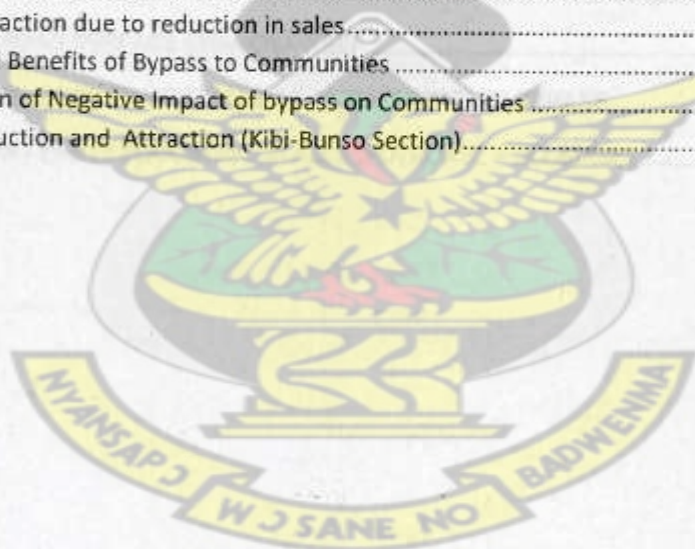
Finally to Stephen and Gloria of RTEP Office (2008/2009); I say 'Thank you more than you can guess'.

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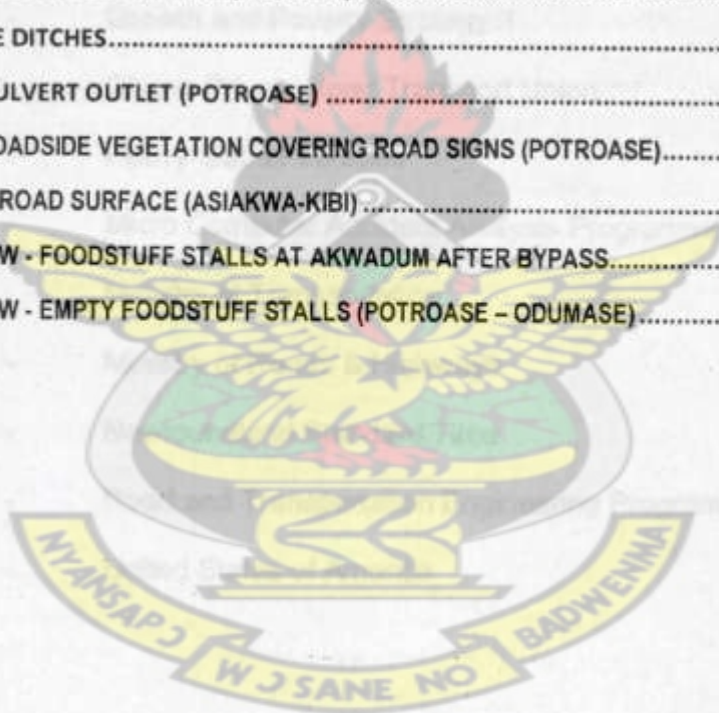
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ABBREVIATION

AADT	-	Average Annual Daily Traffic
ADT	-	Average Daily Traffic
BRRI	-	Building and Road Research Institute of Ghana.
CBC	-	Canadian Broadcasting Corporation
EAD	-	East Akim District
EADA	-	East Akim District Assembly
GHA	-	Ghana Highway Authority
GPRS II	-	Growth and Poverty Strategy II
GPRTU	-	Ghana Private Road Transport Union
HGVs	-	Heavy Goods Vehicles
MAAP 5	-	Micro Computer Accident Analysis Programme 5
MoT	-	Ministry of Transportation
MRH	-	Ministry of Roads & Highways
NST	-	Newfoundland Standard Time
RTEP	-	Road and Transportation Engineering Programme
USA	-	United States of America

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

A highway bypass is a roadway that previously passed through a town which has been realigned through rural land outside the town limits (NCHRP: National Highway Cooperative Research Programme, 1998). The need for a highway bypass arises from increased congestion and safety problems on the highway which serves both as a main street and a regional highway. As congestion increases on the regional road, the street and the regional road need to be separated. Highway bypasses therefore move traffic around Central Business Districts (CBDs) of cities, towns and communities.

According to research conducted in Kansas (USA), the construction of highway bypasses has resulted in many economic benefits both for intercity motorists as well as residents of towns bypassed. Perhaps the most significant of these is the travel time savings of the through (intercity) town motorist who avoids the slower speeds, stops and congestions associated with driving through the bypassed communities. Despite the benefits of bypasses, they remain controversial. Local businesses in the town being bypassed fear that the reduction of traffic passing through the town will adversely affect their sales. This is especially the case for travel related businesses such as car and truck repair shops, hotels and motels, restaurants, convenience stores and fuel or gas filling stations (Babcock and Davalos, 2004).

In a CBC News (Friday June 29, 2007: 7:59am NST) captioned "Highway bypass would kill Daniel's Harbour, mayor warns". The Mayor, Steve Carey, was quoted as saying "if there is a bypass of your town..... that would kill every single business in the town", "Bypassing this community, what you've done is put the headstone on the grave, because you're going to finish burying us".

The common contention that highway bypasses negatively affect the economy of local communities by reducing pass-by traffic for businesses has been widely investigated in most of the developed countries (Andersen et al. 1993; Blackburn and Clay 1991; Buress, 1996; Hartgen 1991; WisDOT 1998; Srinivasan and Kockelman 2002). However, little is known of the impact of bypasses on small communities. Most of the authors whose literature was reviewed concluded that, analyzing the impacts of highway bypasses on the economy of small communities is limited by the lack of community level data for areas with population of less than two thousand five hundred (2,500).

Ghana as a developing country in West Africa is currently experiencing some period of political stability and continuous economic development. The development of road infrastructure is critical to the general development agenda of the country. Most of the National road network passes through communities which can be classified as emerging or developing townships and cities. The continuous cluster of these towns and cities on various highways and its attendant negative effects has increased the demand for bypassing them. One such road construction which has bypassed some notable suburban communities in Ghana is the Apedwa - Bunso highway bypass which forms part of Accra-Kumasi trunk road (National Route N6).

As Handy et al (2001, 2002) argued, the effects of bypasses on small communities are both positive and negative. The benefits include reduction in traffic and subsequent reduction in external costs, and development along the relief route. However, the authors noted that there may be negative impacts on businesses along the old route that were dependent on through traffic. Similarly, Blackburn and Clay (1991) in another USA study, argued that while the bypass of a town centre can remove externalities such as undesirable traffic congestion, truck traffic and the number of traffic accidents in towns, the economic viability of businesses located along the old route that depended upon the flow of traffic are often impacted negatively.

This assertion is buttressed by Professor Robley Winfrey of Iowa University (1996) in his book *Economic Analysis for Highways*, that "the effects of highway bypasses on traffic and safety are easily observed and measured, but the economic and social consequences of bypasses on urban communities are difficult to observe and more difficult to measure". He also added that "effects of bypasses are greatest when the population is small and when a high percentage of total trade comes from through traffic."

1.2 STATEMENT OF THE PROBLEM

Highway bypass assessments and/or evaluations researches are common in European, North American and Australian countries. In Ghana, very little is known or reported on the effect of constructing a bypass on the economy, and safety of communities bypassed.

In the 1980s, the reconstruction of National trunk road routes such as N1 resulted in the bypassing of Nchaban and Sekondi in the Western Region and recently the reconstruction of a section of Accra-Kumasi road (a section of National trunk road, Route N6) has resulted in the bypassing of Kibi and Asiakwa.

Also along the N6, the construction of Nsawam and Nkawkaw bypasses are in progress and it is envisaged that Anyinam and Konongo bypasses will be constructed in the near future. Though the main aim of bypassing these communities is centred around safety and increasing mobility on these road sections, the general impact on the communities is not known.

For example, the Apedwa - Bunso highway bypass which forms part of the Accra-Kumasi trunk road (National Route N6) was opened to traffic in January 2005. The bypass passes through a virgin forest and covers a distance of 21.0km. The old route which is 31km long passes through about eight small towns including two urban centres. These include Wirinkyiren Amanfrom, Odumase Potroase, Owuratwum, Akwadum, Kibi, Sagmaase and Asiakwa. Most of these

communities depend on sales of their farm produce along the highway. Preliminary observations showed that food vendors (Chop bars) at Odumase, Kibi, the rest stop at Asiakwa including fuel stations especially in Kibi which were known to have enjoyed good patronage, have either stopped operation or shrunk in size. The Asiakwa children's home was arguably the most widely known orphanage in Ghana because of the Asiakwa rest stop for intercity transport. With the construction of the bypass, the impacts on these towns have not been studied or are not known. In the past, growth of towns such as Sekondi, Juaso and Mankranso were perceived to have become stagnant because they were bypassed.

The general effect of the highway bypasses on these communities in economic terms, (taking into consideration the possible higher safety levels they might now enjoy), must be known in order to estimate the overall impact of such bypasses. With other communities earmarked to be bypassed, there is the need to understand how bypasses could impact a community in particular and the economy in general.

So, what are the traffic, safety and economic effects of highway bypasses on communities bypassed in Ghana?

This research therefore investigated some key issues that characterized highway bypassed communities in Ghana, using the Apedwa-Bunso highway bypass as a case study. It also aimed to outline the traffic, safety and economic problems associated with such bypasses on the communities and subsequently examined the nature, type and severity of these problems as perceived by the communities. It also identified the strengths and weaknesses in such highway bypasses and proposed recommendations for overcoming identified problems.

1.3 OBJECTIVES OF STUDY

The general objectives of this research are:

- i. To determine the effect of the bypass on traffic flow and safety along the old route.
- ii. To evaluate the perception of residents, business owners and community leaders on the effect of the bypass on the local economy
- iii. To determine how the bypassed communities can achieve maximum benefits and reduce the negative effects

1.4 JUSTIFICATION FOR THE RESEARCH

Case studies of the impact of bypasses are useful since the effects may vary a great deal from place to place. In addition, case studies reveal which types of businesses are impacted by highway bypasses and the quantitative and qualitative magnitude of the impact.

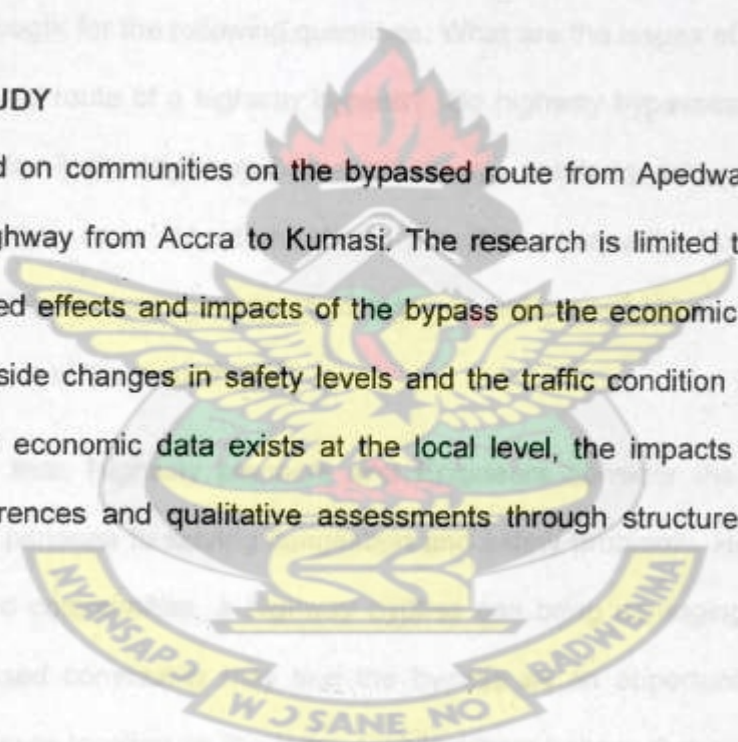
Though enough literature abounds internationally especially in the United States on impact of highway bypasses on their communities, such studies are not commonly reported for developing countries. Between developed and developing countries, the social structure, road designs and standards are completely different and therefore the results of these studies reported in literature may not be applicable to Ghana and other African States. For example, a study in the United States showed that "very little retail flight has occurred in bypassed communities", and that "over a long term, average traffic levels on the old routes in medium and large bypassed communities are close to or higher than pre-bypass counts" (Leong & Weisbrod, 2000). This might be as a result of the much diversified business entities in such communities. Thus information gathered from such assessments could be useful in guidance, but its recommendations cannot be applied to the Ghanaian situation; as most of the communities bypassed are predominantly farming communities which heavily depend on the satellite markets along such highways.

It is therefore important that a research into the effects of bypass construction in Ghana is carried out to know how and to what extent they impact on communities.

The results of this study will help Ministry of Roads & Highways (MRH), Ghana Highway Authority (GHA), other road agencies and communities to understand the full effects and benefits of bypasses and their adverse impacts, so that mitigation measures can be planned. It will not only add to the body of knowledge in academia but also outline a mitigating checklist for such highway bypasses and ultimately increase the effectiveness of highway bypasses in Ghana's development agenda.

1.5 SCOPE OF STUDY

The study was focused on communities on the bypassed route from Apedwa through Kibi to Asiakwa on the N6 highway from Accra to Kumasi. The research is limited to the qualitative assessment of perceived effects and impacts of the bypass on the economic development of the communities alongside changes in safety levels and the traffic condition in the bypassed communities. Since no economic data exists at the local level, the impacts and effects are based on stated preferences and qualitative assessments through structured pro forma for interviews.



CHAPTER TWO

LITERATURE REVIEW

2.1 REVIEW OF IMPACT OF HIGHWAY BYPASS STUDIES

The literature that deals with bypass roads, as well as the impact such roads have on development of villages and cities are plentiful, although it does not provide clear answers concerning the direction of this impact.

The literature review conducted for this thesis was based on reports of studies conducted in some states of the United States of America (USA) and in Australia and other countries. In the review answers were sought for the following questions: What are the issues of most concern to communities along the old route of a highway bypass? Do highway bypasses always result in relieving traffic congestion? Do Highway bypasses always result in enhancing safety? Do highway bypasses always have negative effects on the community businesses? What methodologies are used to assess the impact of highway bypasses? What are the identified strengths and weaknesses of these methods?

Researchers observed that, Highway planners and Engineers consider the construction of highway bypass as the panacea to solving congestion and safety problems. However, in many small and medium-sized communities, a highway bypass can bring damaging change. Some members of the bypassed community may see the bypass as an opportunity for economic growth with new businesses locating on the bypass while others believe that construction of the bypass is the death knell for small businesses. In a CBC News (Friday June 29, 2007: 7:59am NST) captioned "Highway bypass would kill Daniel's Harbour, mayor warns". The Mayor, Steve Carey, was quoted as saying "if there is a bypass of your town..... that would kill every single business in the town", "Bypassing this community, what you've done is put the headstone on the grave, because you're going to finish burying us"

In 1969 Professor Robley Winfrey of Iowa University in his book, *Economic Analysis for Highways* stated that "effects of highway bypasses on traffic and safety are easily observed and measured. But the economic and social consequences of bypasses on urban communities are difficult to observe and more difficult to measure". He however added that "effects of bypasses are greatest when the population is small and when a high percentage of total trade comes from through traffic."

From the literature reviewed, most researchers examined the impact of the bypass road on economic development along with changes in safety levels in the bypassed communities. This impact was generally measured in terms of the number of workers and businesses, as well as the amount of commerce, changes in wages (Weisbord, 2001; Jesse, 1991), the spatial distribution of businesses, the enlargement of industrial and residential space, differences in population size, travel behaviour (Collins, 2000; Mackie, 1983) and changes in car accident rate (Newland, 1962). Generally speaking, the focus is placed on commerce, services, business and roadside services.

Anderson, 1993; Gillis, 1994; Collins, 2000 also indicated that variables such as the economic base of the community, the community's geographical situation, the population's demographic features, the regional highway network, the distance from large urban areas and the community's spatial situation relative to the bypass road determine the direction and the degree of a bypass road's impact

The distance of the bypass road from the city centre creates a pocket between the old and new roads, where considerable pressure is exerted for development (Mackie, 1983; Jesse, 1991). Also, studies by Collins, 2000; and Jesse, 1991; have shown that a highway network has a significant positive influence on businesses and wage-earners alike. In cases where the bypass road interfaces with both the bypassed communities and a highway network, greater

accessibility is created to these communities and hence new businesses and wage-earners are drawn to them. They also concluded that size of the bypassed communities greatly impacts the degree of development within; thus, bypass roads have considerably more impact on the strengthening and promotion of businesses located in larger communities than they do in relatively smaller ones.

Collins and Weisbord (2000), whose study included four cities, investigated the effect of bypass roads on medium-sized cities. The study results showed that when the bypass roads were located outside the city limits, as in Richmond and Fort Wayne, there was a decrease in both population and labour force, while in Danville, the bypass, which was located within the city limits, caused the city centre to become stronger and the areas adjacent to the bypass road attracted new businesses. Bypass locations that create sites having easy accessibility to water, sewer, and electrical services will most likely be developed for industrial, commercial, and residential uses.

Steptone and Thornton (1986) observed that bypass construction impacts different segments of the population in various ways. For example, minorities and economically deprived groups tended not to benefit from such construction; in fact, bypasses resulted in these groups failing to compete successfully with large businesses and established firms, as well as having to move to other areas.

With respect to the impact of a bypass on a specific type of business; Almaghawech (1999), Collins & Weisbrod (2000), and Gillis and Casavant (1994), established that businesses that do not deal with the provision of roadside services, but rather with local consumption, do not suffer from the creation of a bypass, but actually benefit from it, as a result of the transfer of traffic from the community centre which enables the local population to access the businesses more easily.

Gillis and Casavant (1994) who investigated the effects of bypass routes on towns in eastern Washington State, identified strategies to maximize the positive economic effects of bypass routes. The towns were agriculture-based and ranged in population from 1,475 to 11,500. The common effects of bypasses were identified, and the information was used to find viable tactics to lessen the negative effects and increase the positive outcomes of highway bypasses on small towns. Their investigation found out that the more dependent a town is on drive-through traffic; the more likely it is to feel negative impacts from a newly constructed bypass. However, if the town has historically been a trade centre for the region, the negative impacts are lessened. This conclusion was explained by the fact that downtown business districts with a well-developed local customer base are less adversely impacted by a bypass than towns without such a client base. The Case studies suggested that the construction of a bypass will initially increase downtown business vacancies, but this will be followed by new uses of buildings as the community adjusts to the new client base and traffic patterns. In addition, Gillis and Casavant (1994) stressed the importance of a newly bypassed town capitalizing on traveller traffic by increasing the amount of signage along the newly constructed route.

2.2 SOCIO-ECONOMIC IMPACTS ON BYPASSED COMMUNITIES

Wisconsin Department of Transport (WDOT) (1988), from a study conducted on some bypassed communities concluded that non-metropolitan communities were concerned that loss of traffic through town would negatively impact central town businesses. Using a case study format, it was realised that several towns did see declines in the vitality of their central business districts. In that study most civic business leaders, however, felt that the decline was caused by regional shopping centres, not by the relief route (bypass). In Mt Horeb, a town reliant on tourism, some felt the 'quality' of customers had increased, since customers exiting the relief route and travelling through town were more likely to make major purchases. Several towns experience

brief decline in through traffic followed by a return to pre-bypass levels. Whilst improved safety is frequently used as a justification for bypass, it was noted in several Wisconsin communities that safety was reduced due to poor interchange or intersection design.

Comer and Finchum (2001) examined economic impacts on 14 bypassed Oklahoma towns, ranging in population from 732 to 13,187. Based on an analysis of sales tax data, the impacts varied according to the nature of the business in question. In the study, three different types of businesses were identified that showed distinct levels of impact: traffic dependant businesses (such as restaurants and gas stations); traffic related businesses (such as downtown shops and professional services); and non-traffic related businesses (such as factories and mines). The conclusions drawn from the study was that, the size and overall economic strength of the town had a principal factor in whether or not a town suffers economically as a result of a bypass. The smaller the town, typically one with a population under 2,500, the more negative the economic impacts. In the case of medium (populations of between 2,500 and 7,500 people) and large (populations over 7,500 people) towns, it was found that where there were negative economic impacts associated with a bypass, the impacts were not as severe.

Again, Comer and Finchum (2003) identified the impacts of highway bypasses in more rural areas using data from Oklahoma towns ranging in population from 2,500 to 25,000. The study provided insight into the long-term effects of a bypass, as most towns examined had bypasses constructed before 1990. Incorporating economic (income growth rate) and demographic (race, home ownership and age) variables, the study concluded that income growth rates are statistically lower in bypassed towns compared to non-bypassed towns.

Clapp *et al.* (2003) used 20 years of data in a study on the effects on retail sales in bypassed Iowa towns. The study covered three towns that were to be bypassed, compared with six towns that were bypassed in the 1980s and that were of comparable structure, size and distance from

metropolitan centres. All the towns examined had a rural, farm-based economy. From the study, the presence of an active economic development agency in the community and the ability of the town to attract new businesses to the area were identified as factors that helped the bypassed towns adjust to the changes and remain economically vibrant.

Another study by Thompson *et al.* (2001), that was reviewed, also examined communities in Kentucky and matched 21 bypass routes in eight counties that were bypassed with eight counties of similar demographic and economic structure that had not been bypassed. The study analysed economic data from the five years previous to the bypass and the five years after completion of the bypass to make comparisons between the matched counties. Factors that were compared included:

1) total employment growth rates; 2) retail sales growth rates; and 3) retail employment growth rates.

The overall conclusions of Thompson *et al.* (2001) study were as follows:

- The construction of a bypass has either no effect or a modest negative effect on the community;
- The opening of a bypass route reduces aggregate retail sales, but does not have a significant effect on retail employment, total employment or population levels;
- The bypass is more likely to encourage total employment growth if the bypass has partial access control, and is located close to the downtown sector;
- The presence of a bypass influences the business mix in the downtown area; and
- Many of the government officials, media representatives and business people agreed that the bypass promoted growth and improved quality of life.

2.3 TRAFFIC (CONGESTION)

Relieve of congestion on local streets or to provide through traffic with an alternative facility that avoids congested areas of towns were cited by Buffington et al (1992) as some reasons for the construction of bypasses. In another study conducted by Buffington et al (1991), it was noted over time, however, that the improved access provided by the bypass may encourage new development that generates new traffic that offsets some of the initial reduction in congestion. The findings on congestion impact studies are therefore inconsistent.

According to Handy et al (2000), a study in England indicated that Okehamp Bypass failed to attract heavy vehicles and that traffic volumes through town centre were higher than predicted.

Similarly, a study of Wisconsin Communities (Yeh et al, 1998) revealed that, despite an initial drop in traffic volume on the original route, traffic volumes returned to the pre-bypass levels over time. These seemingly inconsistent results were explained by the fact that, the time and cost savings accrue primarily to the users of the new route rather than the old route. The fact however, that traffic volumes on the old route do not always decline with the construction of the bypass is good news for business along the old route even if congestion does not decline (Handy et al 2000)

2.4. SAFETY

According to Handy et al (2000), improvements in safety resulting from highway investments or the construction of bypasses generate a positive economic impact by reducing the costs of personal injury and vehicular damage. But while safety enhancements are frequently cited as benefits of and justification of highway bypasses, studies have suggested that, highway bypasses do not necessarily improve safety.

Cena, Keren and Li (2007), in their assessment of the effects of highway bypasses on crashes and crash rates concluded that the construction of bypasses in Iowa increases traffic safety on both main road and the bypass.

Similarly, investigations of the perceptions of Iowa and Minnesota business owners conducted by Otto and Anderson (1995) revealed that most business owners believed the bypass had increased safety, but official statistics revealed a slight increase in accidents (although the severity of accident was not reported). This was however in contrast with studies conducted by Newland (1962); and Anderson (2001); on the effect of bypass roads on road accidents which showed that the construction of such roads caused a decrease in the number of road accidents with casualties.

Elvik, Amundsen, and Hofset (2001) summarized, in a meta-analysis, the results of a number of studies from around the world that included 93 evaluations of the impact of bypass roads on the number of road accidents. On average, the decrease in the number of road accidents with casualties was around 25%. This meta-analysis seemed to mirror a related study in Norway carried by the same authors on the effect of bypass roads on road accidents on 20 bypass projects. The results indicated that the construction of bypass roads led to a decline of 19% in the number of reported road accidents with casualties. The effects were evaluated by a before-and-after study.

Another study reviewed aimed to compare bypass roads impact on the safety of vehicles and pedestrians. Kipnis and Balasha (1976) thus investigated the effect of the construction of a road that bypassed the town of Ramla. Their results indicated that the bypass road significantly influenced the level of safety for both vehicles and pedestrians although the impact was different on each category. The study results pointed to a 50% drop in road accidents for vehicles with casualties and a 30% drop in road accidents with casualties involving pedestrians.

The researchers explained that the smaller decrease in the percentage of road accidents involving pedestrians was due to the fact that moving the traffic crossing the city's main road to the bypass road increased the attractiveness of that street, and increased the number of pedestrians along that road.

However, Yeh et al (1998) from a series of case studies conducted in Wisconsin Cities revealed that in at least one instance, construction of a highway bypass had a negative impact on safety. A possible explanation for the negative impact on safety gathered from the review is that highway bypasses often increase travel speeds which potentially leads to more severe accidents. This assertion has earlier been noted from studies conducted in Great Britain by Barrel et al (1989) that a significant proportion of residents in the communities surveyed felt traffic speeds had increased to problematic levels. Studies reviewed therefore could not conclude that highway bypass projects always improves the safety of the communities bypassed, an often cited reason for such bypasses.

2.5 THEORIES AND METHODOLOGIES IN IMPACT ASSESSMENT

2.5.1 Introduction

Various theories and methodologies exist for assessing the impact of highway bypasses on communities. Handy et al (2000) suggest that a second starting point for the assessment of a bypass project was a review of the theories and methodologies described in the literature relating to highway relief routes. They argued that not only does these reviews help to identify the variables to be included in the quantitative analysis and the questions to explore in the case studies, but also highlights the strengths and weaknesses of different research methodologies used in such studies.

2.5.2 Theories

Most theories reviewed have economic attributions on the impact of bypasses on communities bypassed and also those along the new highway. Handy et al (2000) stated that most of these theories suggest that "relief routes might impact local economies in a variety of ways by reducing travel times (and, thus, travel costs) to and through the bypassed towns". These theories include (1) The Central Place Theory, (2) Industrial Location Theory, and (3) Economic Base Theory.

2.5.3 Methodologies

Literature reviewed showed that researchers used varied methodologies in the assessment of the impact of highway bypass on communities. These methodologies according to Handy et al (2000) range from exclusively qualitative to exclusively quantitative but most of them use some sort of combination of both qualitative and quantitative techniques. It was gathered from the various literature reviewed that the methodology used for a study largely depended on the nature of the bypassed community, level of economic activity, focus and scope of the study, and time, data and cost constraints (Handy et al, 2000; Comer and Finchum, 2003; Babcock and Davalos, 2004). These methodologies undoubtedly have their strengths and weakness (Handy et al, 2000) and thus employing the best approach to the study will improve the reliability of the results.

2.5.3.1 Before and After Approach

Most of the studies reviewed employed either entirely the before-and-after approach or partially used this approach in conjunction with other statistically dependent approaches. According to Handy et al (2000) this is a common method used for determining the impacts of specific transportation investments. They went on to further state that in studies using this approach, researchers measure an economic variable or set of variables before and after the completion

of a transportation facility, with the difference assumed to reflect the impact of the facility in question. For example, Comer and Finchum (2003) used a before-and-after approach to determine whether population, housing demographics and income levels of bypassed communities and non-bypassed communities were significantly different. Bardwell et al. (1960) used it to examine the impacts of limited access facilities on communities, land use, and land values to determine the effects of a facility. Though the before-and-after approach has been used in many studies, its major drawback of inability to control other factors that may influence the outcome other than the construction of the facility itself cannot be overlooked. Thus to obtain a complete and accurate picture of the impact of the highway bypass combining before and after approach with advanced statistical methodologies was found to be helpful (Mills, 2009).

2.5.3.2 Case Study Approach

The case study approach is used to examine impacts of highway projects on small groups of representative communities. This makes generalization of the results difficult though they allow for a more comprehensive identification of issues and their interrelationships. The case study approach involves the use of qualitative as well as quantitative techniques and thus gives the researcher the ability to evaluate and compare multiple perspectives from clearly specified research questions. However not all case studies follow a standard methodology. Some may be exclusively quantitative like in the case of Otto and Anderson, 1995; while others may be exclusively qualitative (Wisconsin study, 1988). Others may integrate the two approaches (Yeh et al, 1998; Mills, 2009). Yet another permutation of case study methodology is where the researcher selects several cities along the bypass route and studies the impacts of a relief route on the communities bypassed (Parolin and Garner, 1996).

2.5.3.3 Econometric Models

Econometric models, employing multiple regression techniques, and permitting the researcher to isolate the effects of different highway related variables on a variety of economic variables, fall into two major categories: cross-sectional and time-series (Handy et al, 2000). The economic variables investigated are the dependent variables in the model, which are explained by a set of independent variables. Independent, or explanatory, variables include any number of factors, such as distance to a metropolitan area or population of the bypassed community that might influence economic impacts. In contrast to simple before-and-after studies, multiple-regression econometric models offer the advantage of analyzing the effects of a highway relief route on the dependent variables while accounting for other factors that may also influence the dependent variable. However, econometric models have some shortcomings. These include having to compile extensive and expensive databases, ability to misrepresent reality regardless of quality, and normally using equations that reflect associations among variables but not necessarily causality. Thus direction of the relationship between economic impacts and transportation facility being assessed is especially difficult to resolve.

2.5.3.4 Projected Development Models

Projected development models examine developments that occurred after the construction of a highway facility and compare it to hypothetical conditions that would have prevailed if the facility had not been built (Holhouser, 1960). In the project development method, the trends from before the bypass are projected to the future, and compared with the actual situation after the highway facility has been constructed. The differences are attributed to the transportation facility constructed.

Projected development models are not commonly used, probably because it requires substantial time-series data to establish trends satisfactorily, and its accuracy depends on the

validity of the assumption that pre-bypass trends would have continued without the construction of the bypass.

2.5.3.5 Matched-Pairs and Survey-Control Studies

Matched-pairs, or "twin studies," used in transportation impact studies are similar to the practice of observing biological twins to predict the impacts of the environment versus genetics. In this type of study, researchers' select two similar cities matched demographically, geographically, and economically at a point prior to construction of the bypass, except that one community has a bypass and one does not. Then all other differences may be attributable to the bypass. A closely related approach, used more widely for highway impact studies, is the survey-control method in which a bypassed community is compared to a set of similar control cities, but the cities are not matched one-to-one. The survey-control method is somewhat easier to use in practice than the matched pair (Handy et al, 2000).

2.5.3.6 Input-Output Models

The Input-output models are used to predict the economic activity across the economy created by a measured amount of activity in a specific industry and can be used to generate employment and income multipliers. In the case of highway investment, multipliers can be used to estimate the total impact on the economy in terms of employment or income of the highway investment. The total economic impact includes not only the direct effect of the highway investments but also indirect effects generated by linkages between industries within the regional economy and the induced effects generated by increases in household spending. Some input-output models being used and available commercially include IMPLAN, RIMS II model and REMI model (developed and licensed by Regional Economic Modeling, Inc. of the United States).

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This research is a two phase study. The first phase comprised the exploratory studies which includes some literature review and the research proposal. The second stage involved the actual research study culminating in this final research report. The impact assessment methodology employed in the studies is a combination of case study and before-and-after approach.

3.2 DESCRIPTION OF CASE STUDY SITE

The Apedwa-Bunso highway bypass forms part of Accra-Kumasi trunk road (National Route N6). It passes through the East Akim District (EAD) in the Eastern Region of Ghana. It was opened to traffic in January 2005. EAD is located in the central portion of Eastern Region and covers a total land area of seven hundred and twenty-five squared kilometres (725km²). It is bounded by five districts namely Atiwa District to the North-West, Kwaebibirem District to the South-West, Fanteakwa District to the East and New Juaben and Suhum-Kraboaa-Coaltar Districts to the South. The District capital, Kibi, is 55km from Koforidua (the regional capital), 105km from Accra and 179km from Kumasi (Source: GPRS II- EADA, Kibi, Three year medium Term Development plan 2006-2009).

The bypass passes through a rural area and has a length of 21.0km. The old route which is 31km long passes through about eight small towns and small urban centres including Wirinkyiren Amanfrom, Odumase Potroase, Akwadum, Kibi, Sagemaase and Asiakwa. A characteristic feature of the old route is a long curve section around Potroase; a known accident blackspot and one of the frequently cited reasons for the construction of the bypass. Figure 3.1 is a map showing the old route and the bypass.

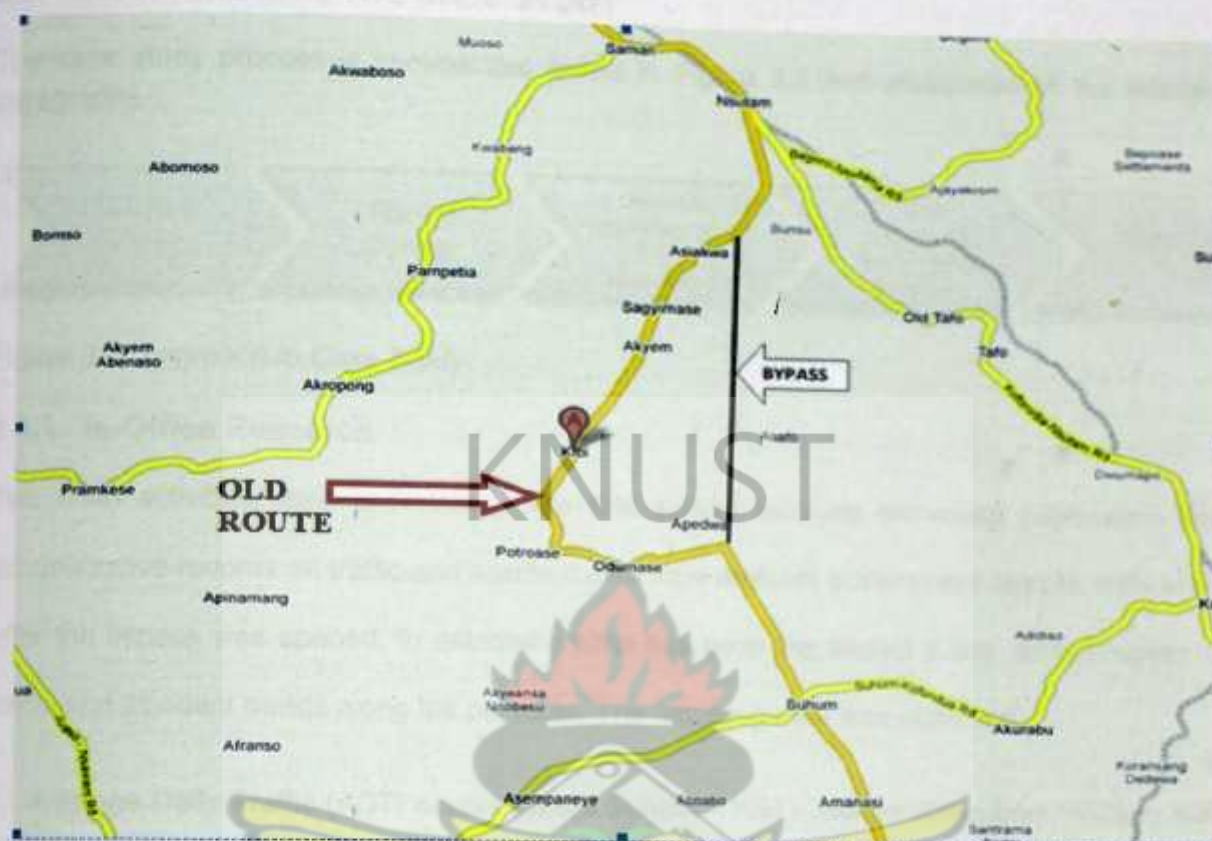


Figure 3.1: Apedwa-Kibi-Bunso bypass and communities on the old route

Three of the few urban towns in the district are located on the old route i.e. Apedwa, Kibi and Asiakwa. Agriculture is the leading employer of the communities' workforce. The population distribution of the communities found along the old route is shown in Table 3.1a.

Table 3.1a: Population Distribution & Residents/ Businesses interviewed

	Communities								Total
	Asiakwa	Sagyimaase	Kibi	Akwadam	Owuratum	Potroase	Odumase	W irenkyiren Amanfrom	
Population (2000 Census)	3,912	1,580	9,612	858	80	1,529	442	2,015	20,028
Population Projections 2008	4,264	1,722	10,477	935	87	1,557	482	2,196	21,720
No. Interviewed	70	30	120	5	5	30	30	30	300
% Interviewed	2	2	1	1	6	2	6	1	1

(Source: Population projections - GPRS II – EADA, Kibi, Three year medium term development plan, 2006 – 2009)

3.3 APPROACH TO THE CASE STUDY

The case study process is summarized below in Figure 3.2 and elaborated in the following paragraphs.



Figure 3.2: Approach to Case Study

3.3.1 In-Office Research

Two main activities were undertaken. The first activity involved extracting information from administrative records on traffic and accident data from relevant government reports, before and after the bypass was opened, to determine what has been the impact if any, of the bypass on traffic and accident trends along the old route. The following data was collected:

- i. Average Daily Traffic (ADT) counts on the Suhum – Kibi – Bunso Road from 2002 to 2004 and 2005 to 2008 from the data base of the Planning Division, Ghana Highway Authority
- ii. Accident records on the Suhum – Kibi – Bunso Road from 2002 to 2004 and 2005 to 2007 from the Building and Road Research Institute of Ghana (BRRI).

The second activity undertaken was the design of suitable questionnaires and piloting it to test the accuracy, adequacy and sufficiency of the questionnaire with respect to the literature review and the objectives of the research study.

Five different types of questionnaires were designed to assess the perception of; (a) residents and retail sales operators, (b) Chiefs/Opinion Leaders and Youth groups; (c) Head Teachers of schools /Ghana Education Service Officers; (d) Municipal Assembly officials and (e) Drivers and GPRTU officials about the effects of the bypass. Each questionnaire comprised three sections: Section A for general information about the business and the respondent; Section B contained questions that enable the respondent to evaluate the before-and-after trends of traffic flow and

road accidents and Section C contained questions leading to the assessment of the impact of the bypass on retail sales & Community in general.

3.3.2 Pilot Survey

A pre-visit to the site was undertaken to test the structured questionnaire to assess the adequacy of the various questions with respect to the existing conditions of the communities and to remove any ambiguity. During the visit it came to light that for a very good response, the interviewer should be able to translate the questions into Twi, the predominant language spoken in the area. This pre-visit was therefore very important for the selection of the team which administered the final questionnaire.

3.3.3 Study Population and Sampling

The study population consists of residents, retail businesses and focus groups sampled from the eight communities along the old route. In view of the limited time for the study a convenience sampling was used to select a total of 300 residents and retail businesses. The distribution of questionnaires administered are shown in Table 3.1a above.

3.3.4 Questionnaire Administration and Interviews

Four research assistants were engaged in the administration of the structured questionnaires. During this visit the team also observed traffic on the bypassed route. The sampling method used was a combination of simple and stratified random sampling.

The simple random sampling was applied to the residents and retail businesses located along the road. Thus, any businesses chanced upon, along the road, were interviewed. The stratified random sampling was applied to the focus groups and businesses identified in the literature to be highway/traffic dependent (Fuel Filling Stations and Hotels). Thus, these businesses were specifically looked out for and interviewed.

The Self Administered Questionnaire approach was adopted in the questionnaire administration. In this method, the interviewer interviews the respondents and details his comments on the questionnaires.

Table 3.1b presents respondents who were interviewed during the focus group discussions. The choices were based on the town size and the opinion leaders available to respond to the interviews. For very small communities, staffs of schools and chiefs were targeted. For others, District Assembly officials or GPRTU staffs were interviewed.

Table 3.1b: Distribution of Focused Groups Interviewed

Community	Chief/ Elders	Assemblymen or Women	GPRTU/ Drivers	Schools	Staff of * EADA
i. Asiakwa	X			XX	XXX
ii. Sagyimaas	X				
iii. Kibi		XX	XX		
iv. Akwadum					
v. Owuratwum					
vi. Potroase		X			
vii. Odumase				XX	
viii. Wirenkyiren Amanfrom				XX	
Total	2	3	2	6	3

3.4 DATA COLLECTION TECHNIQUE AND TOOLS

The techniques and tools employed in the data collection are as summarised in Table 3.2.

Table 3.2 Technique & Tools Employed in the Study

Subject	Technique	Tools
300 Residents & Retail Businesses	Individual Interview	Semi structured questionnaire (Interview Guide)
Chiefs/Youth Groups/Opinion Leaders (Assemblymen & Women) School Head Teachers GPRTU/Drivers	Focused Group	Semi structured questionnaire and interview guide and Discussions
State of the road	Observation	Camera and Videos
Traffic Count & Origin – Destination Survey on the old route	Manual Count	Twelve-Hour Traffic Count.

3.4.1 Individual Interviews

The semi structured questionnaires were administered to residents and businesses in all the communities according to the distribution indicated in Table 3.1a. The questions asked ranged from perception of relief in congestion, reduction in traffic accidents and general safety to effects on businesses. This interview and the site visits provided an opportunity to understand the perceptions of residents, retail business owners as to how the bypass had impacted their communities and the general quality of life. Appendix B shows the sample of questionnaire administered.

3.4.2 Focused Group Interview & Discussions

The data collected during the focused group interview and discussions tries to determine what the communities think could be done to reap maximum benefits from the bypass and the

mitigating steps that could be taken to address the adverse impacts. Appendices C, D & E show questions administered during the focus group interviews.

3.4.3 Field Traffic Data Collection and Observations

3.4.3.1 Traffic Counts & Origin-Destination Survey

An origin-destination traffic survey and classified traffic volume counts were conducted on the old route to assess the existing traffic mix. This was to provide an indication of the nature of the traffic and to assess whether they served only the local community, or there were through-trips still using the old route. This information was useful for comparing the traffic mix in the before and after comparison.

3.4.3.2 Observations

The observation data (video and photographs) collected was to document the state of the road during the study period.

3.5 DATA PROCESSING AND ANALYSIS

In this study, the data analysis method was a blend of the quantitative and qualitative data analysis. In Quantitative Data Analysis, descriptive analysis of the data collected using Descriptive Statistics like Mean, Mode etc was used to compare and contrast the data gathered with the set objectives. Data from the individual interviews, traffic counts and origin-destination surveys were compared with the focused group discussions to determine the inconsistencies in response to the bypass impact on traffic, safety and retail trade. To this end, the data from the structured questionnaire was analyzed into bar, line graphs and frequency distribution tables to bring out the Descriptive Statistics of the Qualitative Variables of the perception of the impact of the bypass using the Statistical Package for the Social Scientists (SPSS).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 TRAFFIC CHARACTERISTICS: BEFORE AND AFTER BYPASS

A three-year Average Annual Daily Traffic (AADT) values based on classified traffic volume counts before bypass (2002 – 2004) and after bypass (2005, 2006 & 2008) were retrieved from Ghana Highway Authority Planning Division Traffic Database. These counts were for split sections of the old route (Suhum – Kibi – Bonsu), viz; Suhum – Kibi and Kibi – Bunso. There was however no traffic volume count for these sections in 2007.

The composition of the traffic on both sections are similar and comprised Light, Medium and Heavy Goods Vehicles (HGVs); a classification based on the Ghana Highway Authority Traffic classification system provided in Appendix A

4.1.1 Traffic before Bypass

The Three-year (2002 – 2004) classified traffic volume counts and AADT values on the Suhum-Kibi section is shown in Table 4.1a. From the Table, the AADT in 2003 was higher than those in 2002 & 2004 but the percentage composition of Light, Medium and Heavy were quite consistent over the years. The average AADT for the three-year period (2002 – 2004) before the bypass was 2,376 and traffic composition was 46% Light, 28% Medium and 26% Heavy vehicles.

Similarly, from Table 4.1b, the 2003 AADT on the Kibi-Bunso section was higher than those of 2002 and 2004 but the percentage compositions were consistent. The average AADT on the section was 2,459 with a mix composition of 42% Light, 36% Medium and 22% Heavy.

Table 4.1a: Classified Traffic Volume Counts and AADT on Suhum - Kibi section before bypass (2002 – 2004)

Years	Light		Medium		Heavy		AADT
	count	%age	count	%age	count	%age	
2002	1,000	47%	575	27%	554	26%	2,129
2003	1,218	47%	699	27%	673	26%	2,590
2004	1,035	43%	723	30%	650	27%	2,408
Average	1,084	46%	666	28%	626	26%	2,376

(Source : Ghana Highway Authority (GHA) - Planning Division Database)

Table 4.1b: Classified Traffic Volume Counts and AADT on Kibi – Bunso section before bypass (2002 – 2004)

Years	Light		Medium		Heavy		AADT
	count	%age	count	%age	Count	%age	
2002	971	43%	791	35%	497	22%	2,259
2003	1,134	43%	923	35%	580	22%	2,639
2004	1,006	41%	922	37%	554	22%	2,482
Average	1,037	42%	879	36%	544	22%	2,459

(Source: Ghana Highway Authority (GHA) - Planning Division Database)

Tables 4.1a & 4.1b together shows that before the bypass there was more traffic on the Kibi-Bunso section than the Suhum-Kibi. This could be explained by the fact that Kibi is an administrative capital and hence, a major trip attraction and production point. Trip production for Medium vehicles (which are likely to travel to Koforidua and Nkawkaw) as well as trip attraction for Light and Heavy vehicles travelling from Suhum. The attraction of light vehicles is attributable to the administrative nature of Kibi and Heavy vehicles to the presence of numerous farming communities that depend on highway satellite markets along the Suhum-Kibi section.

4.1.2 Traffic after the bypass

The AADT on the Suhum-Kibi section has reduced drastically from 2005 to 2006 but quite gradual towards 2008. The traffic mix on this section in 2005 was quite the same as the before

situation but varied considerably in 2006 and 2008. From 2005, 2006 and 2008, traffic along the Suhum – Kibi route averaged 2,030 with a mix of 48% Light, 42% Medium and 10% Heavy as shown in Table 4.2a.

Table 4.2a: Classified Traffic Volume Counts and AADT after Bypass (Suhum – Kibi)

Years	Light		Medium		Heavy		AADT
	count	%	count	%	count	%	
2005	1,076	44	812	34	531	22	2,419
2006	922	47	982	50	59	3	1,963
2008	933	55	756	44	20	1	1,709
Average	977	48	850	42	203	10	2,030

(Source: Ghana Highway Authority (GHA) - Planning Division Database)

From the table, there has been some reduction in the numbers of Light and Heavy vehicles and a significant increase in the Medium vehicles over the period considered after the bypass. Light vehicles however remain the major component of the traffic. The numerical increase in medium vehicles is explained by the fact that Kibi may now be attracting more medium vehicle trips to satisfy the demand which was before performed by a combination of the medium and Heavy vehicles.

The AADT on the Kibi-Bunso section however significantly reduced in 2005, increased in 2006 and reduced in 2008. The increase in 2006 traffic volume counts is attributed to the fact that, one year after the bypass was opened (in 2005), the contractor had to repair failed sections; thus redirected traffic on to the old route.

Over these periods however, traffic along this section of the old route averaged 792; a significant reduction when compared to the before situation of 2,459. Light vehicles continue to dominate the traffic mix after the bypass; i.e. 52% Light, 44% Medium and 4% Heavy as shown in Table 4.2b.

To verify the after data from GHA, a two day study traffic volume count was conducted on the Kibi-Bunso section and results summarized in Table 4.2c.

Table 4.2b: Classified Traffic Volume Counts and AADT after Bypass (Kibi-Bunso)

Years	Light		Medium		Heavy		ADT
	count	%	count	%	count	%	
2005	232	61	147	38	3	1	382
2006	654	49	632	47	59	4	1,345
2008	355	55	272	42	23	4	650
Average	414	52	350	44	28	4	792

(Source: Ghana Highway Authority (GHA) - Planning Division Database)

Table 4.2c: Classified Traffic Count : Kibi-Bunso Section

Light		Medium		Heavy		ADT
Count	% atge	Count	% atge	Count	% atge	
1,931	93	124	6	11	1	2,066

The study count in Table 4.2c shows a traffic mix of 93% Light, 6% Medium and 1% Heavy; for the section. This is comparable with the average GHA data after the bypass. The increase in Light vehicles is explicable by the change in travel patterns due to the bypass. Thus, travellers now travel by Taxi and mini buses to Bunso before joining another vehicle to their final destination.



Plate 1: Traffic as captured in Asiakwa town during the study.

The traffic captured in Plate 1 shows the feature of traffic type along the old route.

The significant reduction in medium and heavy vehicles experienced on the Kibi-Bunso section is due to the bypass i.e. no villages on the bypass and is shorter (10km) than the old route. These characteristics of the bypass encourage higher travel speed (about 80km/hr) than on the old route (about 50km/hr); hence savings in travel time as well as vehicle operating cost.

4.2 ACCIDENTS BEFORE AND AFTER BYPASS

A three-year before (2002 – 2004) and after (2005 – 2007) accident data were retrieved from the MAAP5 for Windows data base of the Building and Road Research Institute (BRRI), analysed and discussed below.

4.2.1 Accident Number, Vehicle Types and Casualties

Table 4.3 shows number of accidents and accident types recorded three years before and after the bypass on the old route.

Table 4.3: Accidents Numbers

Period	ACCIDENT TYPE				Total
	Fatal	Hospitalized	Not Hospitalized	Damage only	
Before Bypass (2002-2004)	46	56	51	68	221
After Bypass (2005-2007)	8	17	19	8	52

(Source: Building & Road Research Institute (BRRI) – Accident Database)

From the table, there has been a general reduction in all accident types on the old route after the opening of the bypass. On the whole, accident on the old route has reduced significantly by about 76%.

The number of accidents before and after the bypass was compared with vehicle types and summarised in Figure 4.1 below.

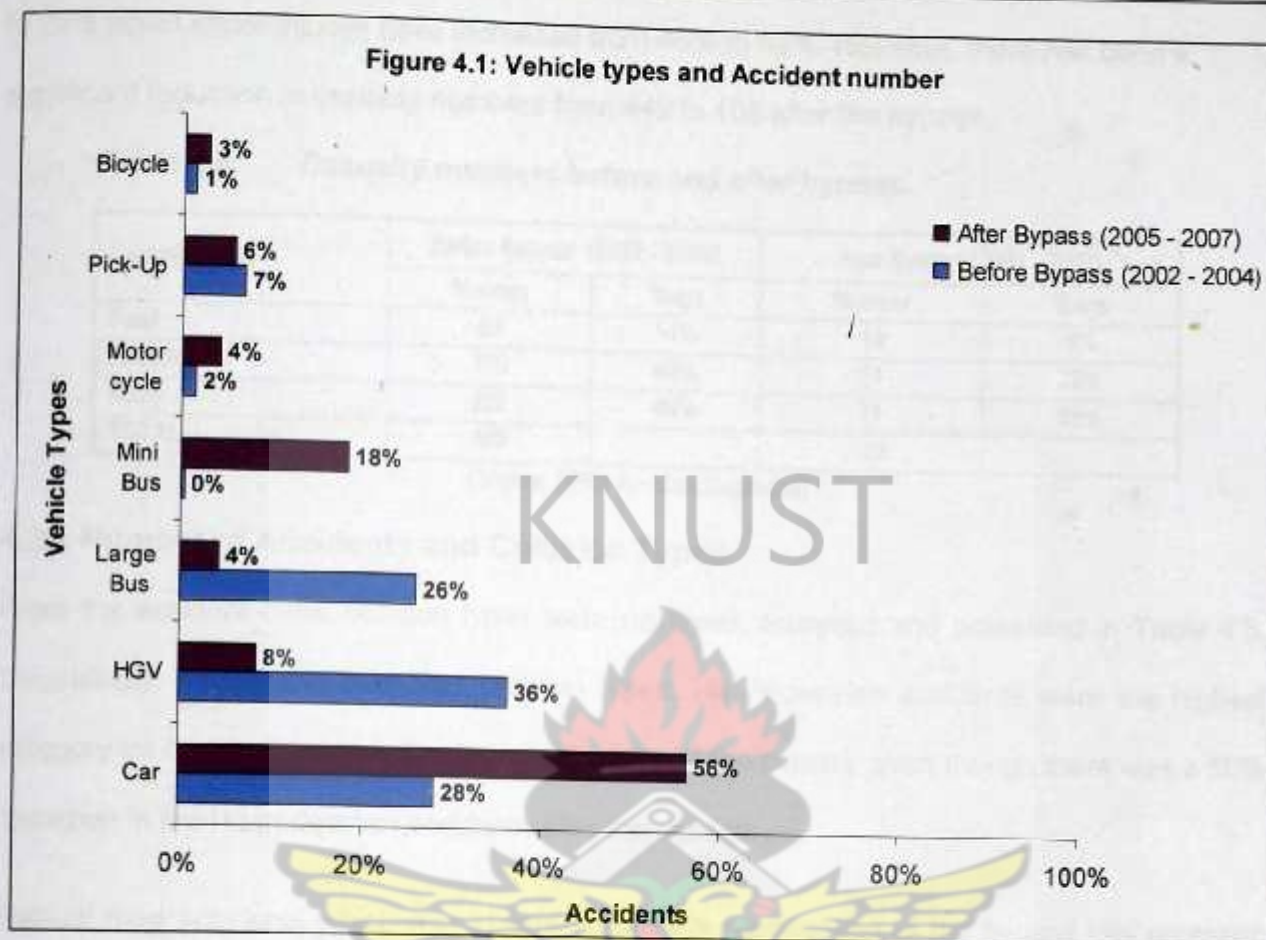


Figure 4.1: Vehicle Types and accident Number

From Figure 4.1, accident involving cars have increased from 28% to 56%; HGV accidents have reduced from 36% to 8%, Minibus accidents have increased by 18%. The remainder is indicated in the figure. The rapid rise in accident involving cars could be explained by the increase in taxi trips along the old route. This is reflected by the rise in the percentage of light vehicles for the two sections of the old route after the bypass. The reduction in the percentage of HGV traffic also gives an indication to explain the 8% involvement of HGV in accidents compared to the 30% before. The trend is similar for large buses.

Accidents numbers and casualty classes were compared and summarized in Table 4.4. From the table, casualties resulting in death have reduced from 14% to 9%, those hospitalised from 40%

to 22% whilst minor injuries have increased from 46% to 69%. However, there has been a significant reduction in casualty numbers from 449 to 108 after the bypass.

Table 4.4: Casualty numbers before and after bypass.

Casualty class	Before Bypass (2002 - 2004)		After Bypass (2005 - 2007)	
	Number	%age	Number	%age
Fatal	63	14%	10	9%
Hospitalised	179	40%	24	22%
Injury	207	46%	74	69%
TOTAL	449		108	

(Source: BRRI Accident Database)

4.2.2 Number of Accidents and Collision Types

From the accident data, collision types were retrieved, analysed and presented in Table 4.5. Surprisingly, among the classified collision types, Hit Pedestrian accidents were the highest category for both before and after the construction of the bypass, even though there was a 50% reduction in the Hit pedestrian accidents after the bypass.

Ran-off road accidents which was absent before the construction of the bypass has emerged pre-dominant (19%) after the bypass. Overturned, Hit Parked vehicle and Right Angle collision types have been eliminated after the bypass over the period.

Table 4.5: Collision types: before and after bypass.

Collision Types	Before Bypass (2002 - 2004)		After Bypass (2005 - 2007)	
	Number	%age	Number	%age
Head On	23	10%	8	15%
Rear End	27	12%	5	10%
Right Angle	7	3%	0	0
Side Swipe	23	10%	5	10%
Overturned	3	1%	0	0
Ran-Off Road	0	0	10	19%
Hit Object Off Road	5	2%	2	4%
Hit Parked Vehicle	13	6%	0	0
Hit Pedestrian	38	17%	19	37%
Other	82	37%	3	6%
TOTAL	221		52	

(Source: Building & Road Research Institute (BRRI) – Accident Database)

Despite the reduction in traffic volume, the continuous high percentage of Hit pedestrian may be explained by the fact that the removal of traffic from the bypassed community on to the new route (bypass) has made the streets attractive to pedestrians (see Plate 2) and also allow for greater speed of smaller cars within the communities.



PLATE 2: Road space and Pedestrians captured after the bypass (Potroase – Odumase)

Even though hit pedestrian accidents' contribution to total accident numbers after the bypass is significant, the reduction in overall traffic volume has resulted in tremendous safety benefits for pedestrians.

The construction of the bypass however, has resulted in eliminating Overturned and Hit Parked vehicle collision types which mainly involved HGVs. The emergence of Ran-off road accident after the bypass could be attributed to several factors. Notable among them include speeding due to a high proportion of smaller cars used as taxis, poor road signage and overgrown roadside vegetation (resulting in poor sight distances and judgement).

4.3 PERCEPTION OF EFFECTS OF THE BYPASS ON BUSINESS, TRAFFIC FLOW AND SAFETY.

4.3.1 Characteristics of Respondents

Respondents to the interview were categorised as shown in Table 4.6 below. They comprised 43% retail businesses (i.e. traders, hawkers and roadside foodstuff sellers), 22% artisans (carpenters, dressmakers, hair dressers, drivers, mechanics, vulcanizers etc.), 15% food vendors (chop bar operators), 7% unemployed, 1% Gas/Fuel filling Station operators and Hotel operators respectively. These categories were determined by categorizing the respondents interviewed into groups.

Age distribution by category of respondents is summarised in Figure 4.2. Retail business and Food Vendor categories cut across the various age grouping with majority of Retail business people (36%) in 33-46year group and Food Vendors (44%) in 19-32year group. The dominating age of Vocational & Artisans and Unemployed respondents are in the 19-32year group contributing 63% and 55% to their respective categories. Generally, the dominant age grouping of respondents is 19-32years and the least is the 5-18year grouping. The data collected therefore cut across the various age bands and involved more of the working class adults (19-60years); which corresponds to 90% of respondents.

Table 4.6: Category of Respondents

Public Servants	Vocational & Artisans	Retail Businesses	Farmers	Driver/ Auto Mech.	Filling Station	Un employed	Food Vendor	Hotels	Total
8 3%	41 14%	129 43%	30 10%	23 8%	2 1%	20 7%	45 15%	2 1%	300

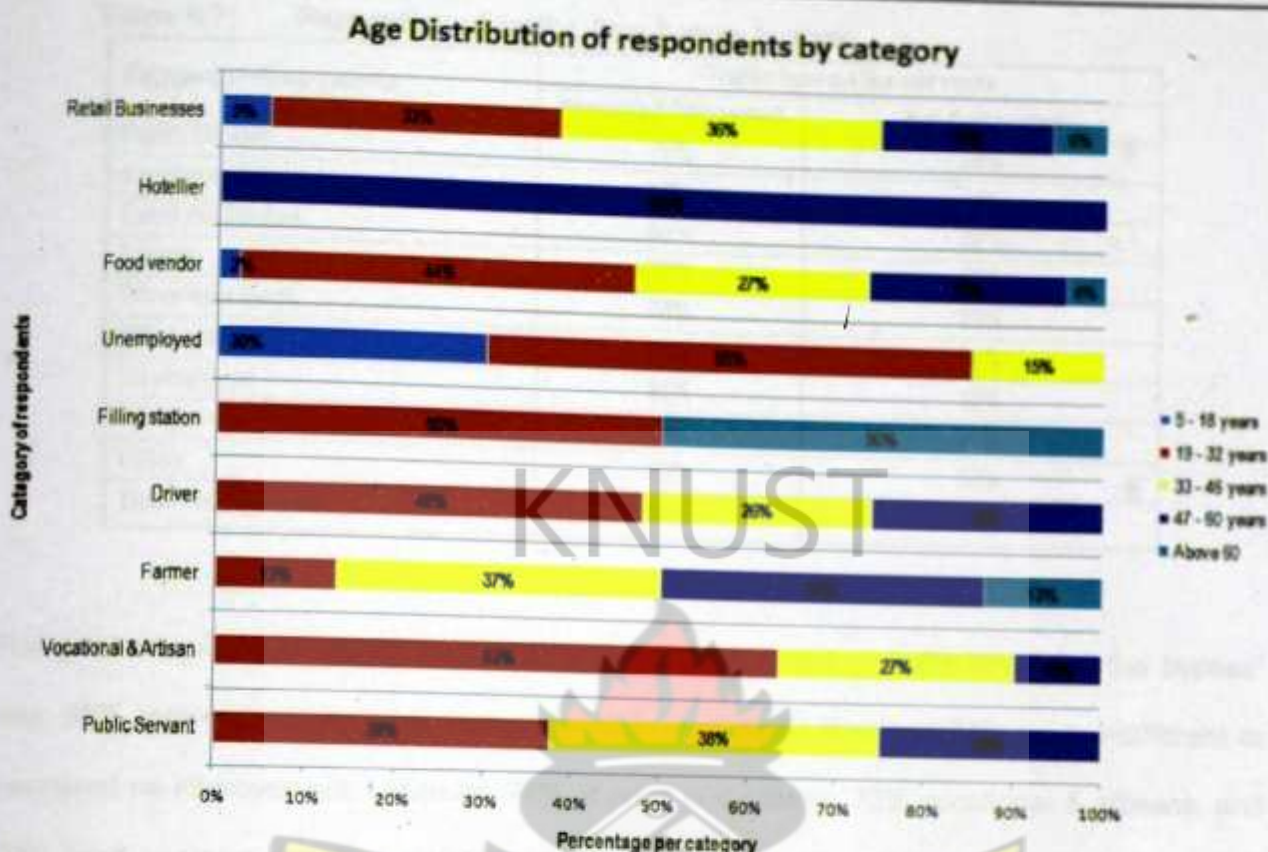


Figure 4.2: Age distribution of respondents by category

4.3.2 Community perception on traffic flow on the old route

The respondents were asked a series of questions concerning traffic flow on the old route before and after the bypass to assess their perception on congested traffic flow. Altogether, 64% of respondents perceived that there was traffic congestion or more vehicular presence in the communities before the construction whilst 36% believed that traffic was free flowing or could not assess the effect. Table 4.7 summarizes the perception of various categories of respondents on traffic congestion before the bypass.

78% of drivers, 68% retail businesses, 53% food vendors and 50% filling station operators and hotel operators respectively reported that the road was more congested before the bypass was constructed. It is important to note that the businesses are sited along the old road and therefore may have better recollection.

Table 4.7: Perception of traffic flow before bypass

Category of Respondents	Traffic flow on the old route	
	Perceived Congested	Not Congested
Public Servant	75%	25%
Vocational & Artisan	56%	44%
Retail Businesses	68%	32%
Farmer	60%	40%
Driver/Auto Mech.	78%	22%
Filling station	50%	50%
Un employed	65%	35%
Food vendor	53%	47%
Hotels	50%	50%
Total Respondents	64%	36%

The general opinion of respondents concerning "improvement of traffic flow after the bypass" was; 66% reported some visible improvement in local traffic flow and 34% were indifferent or perceived no improvement. However, 74% of retail businesses, 73% vocational & artisans, and 69% food vendors reported visible and significant improvement in traffic movement. The summaries are shown in Table 4.8.

Apart from the unemployed and farmers, almost all other categories of respondents perceived some improvement. It is important to note that, the sample sizes for farmers, hotels and filling stations were small.

These results are however, consistent since those who perceived the before condition as congested did appreciate that there has been improvement in traffic flow after the bypass.

The significant reduction in traffic volume after the bypass accounts for the perceived relief in traffic congestion indicated by the respondents and captured in Plate 3 below

Table 4.8: Perception of Local Traffic Movement after Bypass

Category of Respondents	Improvement in traffic flow on old route	
	Improvement Visible	No improvement seen
Public Servant	50%	50%
Vocational & Artisan	73%	27%
Retail Businesses	74%	26%
Farmer	40%	60%
Driver/Auto Mech.	61%	39%
Filling station	50%	50%
Unemployed	35%	65%
Food vendor	69%	31%
Hotels	100%	0
Total	66%	34%



PLATE 3 : Empty road space evidence of free flowing traffic after bypass

4.3.4 Community Perception on Traffic Safety

From interviews conducted along the old route **82%** of respondents perceived the level of safety on the highway before the construction of the bypass to be low. As shown in Table 4.8, 100% of Filling Station Operators and Hoteliers perceived safety to be low before the bypass though their number is statistically insignificant, 85% of retail business, 83% of drivers, 96% of food

vendors had the same opinion. This perception is confirmed by the relatively high number of accidents recorded before the bypass.

Majority of respondents (95%) perceived the level of safety to be high after the bypass. From the summaries shown in Table 4.9, 100% of vocational & artisans, filling station operators and hoteliers perceived the level of safety to be high. This assertion is supported by the reduction in the number of accidents recorded after the bypass whereby there was a reduction in three-year before and after accidents from 221 to 52 respectively.

Table 4.9: Perception of safety Before and After bypass

Category of Respondents	Responses			
	Before Bypass		After Bypass	
	High	Low	High	Low
Public Servant	50%	50%	88%	13%
Vocational & Artisan	22%	78%	100%	0
Retail Businesses	15%	85%	96%	4%
Farmer	33%	67%	93%	7%
Driver/Auto Mech.	17%	83%	83%	17%
Filling station	0	100%	100%	0
Unemployed	25%	75%	95%	5%
Food vendor	4%	96%	96%	4%
Hotels	0	100%	100%	0
Total of Respondents	18%	82%	95%	5%

4.3.3 Impact on Retail Business sales

272 business owners and managers answered a series of questions concerning the impact of the bypass on their sales. The number of respondents in each category and percentage distribution is as follows:

Category of Business	Vocational & Artisans	Retail Businesses	Farmers	Driver/ Auto Mech.	Filling Station	Food Vendors	Hotels	Total
Number of Respondents	41	129	30	23	2	45	2	272
%age of Total Businesses	15%	47%	11%	8%	1%	17%	1%	100%

To begin with, these respondents were to indicate if their businesses depended on non-resident through traffic. Their responses are summarised in Table 4.10:

Table 4.10: Dependency of Business on non-resident through traffic

Responses	Category of Business							
	Total Respondents	Vocational & Artisans	Retail Businesses	Farmers	Driver / Auto Mech.	Filling Station	Food Vendors	Hotels
Traffic Dependent	91%	83%	94%	93%	87%	100%	91%	100%
Not Traffic Dependent	9%	17%	6%	7%	13%	0%	9%	0%

On the whole 91% of respondents believed their businesses depended on non-resident through traffic. 94% of retail businesses are traffic dependent whilst 6% are not. The follow up question sought to determine whether the highway influenced the choice of business location of respondents. The responses summarised in Table 4.11 indicated that 57% of retail businesses would still have located at their present location even if they knew of the bypass and 64% of Food Vendors would have done the same, while 61% of auto-oriented businesses (categorised as drivers) would not have located along the old route if they had known.

Table 4.11: Highway and Choice of Business Location

Category of Businesses	Would you have located your business here if you knew of bypass?	
	Yes	No
Vocational & Artisan	49%	51%
Retail Businesses	57%	43%
Farmer	63%	37%
Driver/Auto Mech.	39%	61%
Filling station	50%	50%
Food vendor	64%	36%
Hotels	50%	50%
Total Respondents	56%	44%

From the table, it can be deduced that even though more farmers, retail businesses, food vendors perceived that their businesses has been impacted adversely by the bypass: they would have still located in the towns. This could be due to their home location. There were more auto mechanics who would not have located in the town with prior knowledge of the bypass. Such people have the possibility of "Retail Business Flight".

In addition, business owners were asked for their opinion concerning the impact that the bypass had on their sales. The alternative responses provided were not defined in terms of specific monetary amounts, but rather on perception of individual respondents. The summary of responses are presented in Table 4.12

Table 4.12: Perception of Impact on Retail Sales

Responses	Category of Business							Total Respondents
	Vocational & Artisan	Retail Businesses	Farmer	Driver/Auto Mech.	Filling Station	Food Vendors	Hotels	
Increase in Sales/ Customers	2%	0	0	17%	0	0	0	2%
Decrease in Sales/ Customers	71%	89%	93%	78%	100%	84%	100%	85%
No effect	27%	11%	7%	4%	0%	16%	0%	13%

Majority of respondents (85%) perceived that their sales/customers had decreased, 2% thought their sales/customers have increased and the remaining 12% perceived the bypass had no effect on their sales/customers. From the table, 89% of retail businesses, 94% drivers, 84% food vendors had experienced reduction in sales/customers after the bypass.

Two hundred and twenty-eight (228) Business respondents who had indicated decrease in sales were asked the follow up question "what are you planning to do next?" Summarised in Table 4.13 are their responses.

From the Table, 57% of the respondents said they will remain at their present location and business, 15% said they were planning to relocate to the bypass, 11% indicated they wanted to relocate to somewhere else in Ghana. Despite the fact that a high percentage of retail businesses (89%) have registered reduction in sales, majority of them do not intend to move from their present location or change business. Similarly, 67% of farmers and 49% of food vendors intend to remain in their old business and location.

These decisions of the majority of businesses not to follow the bypass may be attributed to the fact that most of the retail businesses are shops owned by natives coupled with the fact that, the bypass which passes through a rural area is far from the boundaries of these communities and without facilities such as light and water and easy access to transport for commuting to do business without relocating homes.

Table 4.13: Intended action due to reduction in sales

Category of Businesses	Responses				
	Relocate to the bypass	Change business & remain at location	Remain in the old business & location	Relocate to another place in GHANA	Not decided
Vocational & Artisan	20%	17%	41%	15%	7%
Retail Businesses	15%	9%	60%	11%	5%
Farmer	23%	3%	67%	7%	0
Driver/Auto Mech.	13%	0	65%	5%	17%
Filling station	0	0	50%	0	50%
Food vendor	11%	18%	49%	13%	9%
Hotels	50%	0	50%	0	0
Total	15%	10%	57%	11%	7%

4.3.4 General perception of bypass

All categories of respondents were asked the question *"what benefits have the communities derived from the bypass?"* From a list of possible benefits attributable to a bypass provided, 48% of the respondents identified only improved safety, 42% felt the communities did not benefit in any way at all from the bypass. The trend of responses are summarised in Table 4.14. From the Table, only 1% of respondents view the bypass as an opportunity of revitalizing the community. This may be due to the fact that the bypass is still in its early years.

Also summarised in Table 4.15, is respondents' assertion to the statement that *"the highway bypass has negatively affected the town"*. Majority of respondents (87%) were of the view that the bypass has negatively affected the communities whilst 5% of the respondents could not tell. Some of the negative impacts cited by respondents who perceived the bypass had adversely affected the communities included: reduction in sales, stagnant growth, increased poverty, increase in unemployment, long distance travel difficulties coupled with higher fares and inadequate maintenance of the old route.

Table 4.14: Percieved Benefits of Bypass to Communities

Category of Respondents	Responses							
	Improved local traffic flow / less traffic congestion	Improved safety	Revitalized the community	Reduced air & noise pollution	No benefit	Less traffic congestion & Reduction in air & noise pollution	Improved safety & reduction in air & noise pollution	Less traffic congestion, Improved safety and Reduction in air & noise pollution
Public Servant	13%	0	0	0	38%	13%	13%	25%
Vocational & Artisan	0	59%	0	0	37%	0	5%	0
Retail Businesses	1%	52%	2%	1%	36%	1%	5%	2%
Farmer	3%	37%	0	3%	57%	0	0	0
Driver/Auto Mech.	9%	26%	0	0	65%	0	0	0
Filling station	0	0	0	0	100%	0	0	0
Unemployed	0	57%	0	0	38%	0	0	5%
Food vendor	0	57%	2%	0	39%	0	2%	0
Hotels	0	50%	0	0	50%	0	0	0
Total	2%	49%	1%	1%	42%	1%	4%	2%

Table 4.15: Perception of Negative Impact of bypass on Communities

Responses	Category of Respondents									
	Public Servant	Vocational & Artisan	Retail Businesses	Farmers	Driver/Auto Mech.	Filling station	Un employed	Food vendors	Hotels	Total
Yes	75%	93%	88%	90%	83%	50%	85%	84%	100%	87%
No	13%	5%	9%	7%	4%	0	5%	9%	0	8%
Not Sure	12%	2%	3%	3%	13%	50%	10%	7%	0	5%

4.4 FOCUS GROUP INTERVIEW

4.4.1 EADA Personnel

Three focal personnel were interviewed from the EADA. It was aimed at assessing the EADA's perception of the impact of the bypass on the EADA and the community at large by asking structured questions. The Municipal Finance, Economic Planning and the Town & Country Planning officers provided answers in separate interviews.

Generally, the three accepted that the bypass had reduced traffic congestion, improved safety as well as reduced air and noise pollutions. They however stated that traffic-dependent businesses such as foodstuff sellers, chop bar operators, mechanics and carpenters experienced reduction in sales, resulting in close downs or relocation and therefore reduction in the Assembly's Internally Generated Funds. They lamented on the difficulties in travelling outside the communities, exploitation of passengers by taxi drivers and the stagnant growth of the communities. They all mentioned the rehabilitation of the old route would attract small / light vehicles to the communities and bring back life.

4.4.2 Chiefs & Opinion Leaders

The "Krontihene" of Asiakwa and three Assemblymen were interviewed under the above focal group of Chiefs and Opinion Leaders. The "Krontihene" was happy for the bypass especially for the serene and peaceful environment the communities are now enjoying. In particular, the negative tag of "fatherless children" which was associated with citizens of Asiakwa has been erased. He attributed the reduction in accident in Asiakwa to the bypass. The loss of customers to Foodstuff sellers and change in travel pattern were mentioned as some of the negative impacts of the bypass. He suggested the rehabilitation of the old route and establishment of businesses to bring back life to the community.

The Assemblymen mentioned difficulty in transportation, "depreciation" of the communities and poverty as their main fears when the bypass was announced. They pointed out loss of employment especially for the women (foodstuff sellers and chop bar operators), exploitation by Taxis drivers and stagnant growth as the negative impacts from the bypass.

In Potroase, the assemblyman believes that the bypass had led to growing mistrust in marriages since the women (wives) who used to sell foodstuff from their farms by the road side under the watchful eyes of their husbands had to follow the road to Apedwa to sell their wares and

therefore exposed to the wits and caprices of other men. The assemblymen indicated rehabilitation of the old road to the standard of the bypass would bring back small cars to the road and hence, life and business to the communities. Evidence of the loss opportunity to trade by the roadside is shown in Plate 4.



Plate 4: Empty foodstuff stall between Kibi and Potroase

4.4.3 GPRTU & Drivers

For this focal group, the Station Officer of the GPRTU at Kibi and a group of drivers were interviewed. They think the long curve at Potroase was the main reason for the bypass but not traffic congestion. Section of the curve at Potroase is shown in Plate 5.

They however appreciated the free space and the reduction in accident on the road but were worried about the high rate of accident on the bypass. They mentioned the difficulties in travelling out of the communities on long journeys because there are no straight vehicles to Accra and Kumasi and therefore expensive. They however, believed, if the old route is rehabilitated most of the negative impacts will be minimized.



Plate 5: Section of old road showing the Potroase curve

4.4.4 Schools & Institutions

Five Junior High School Headteachers and the Project Accountant of the SOS Village at Asiakwa were interviewed for this focal group.

All the Headteachers were of the view that the bypass had resulted in reduction of accidents involving school children as well as vehicles using the highway. They could however not attribute the increase in school enrolment and attendance to the bypass. They believed that because of the adverse impact of the bypass on trading activities along the highway, some parents migrated out of town with their wards.

The SOS Village rest stop at Asiakwa, was once a vibrant rest stop for transit vehicles and a source of income to the SOS Village. The Project Accountant at the SOS village perceived the bypass to have adversely affected their sponsorship and revenue because the bypass has taken away the Rest Stop and their benefactors.



Plate 6: Empty Rest stop at SOS village (Asiakwa)

He mentioned difficulty in commuting between the regional capital and other parts of Ghana from Asiakwa as the reason most staff moved to live at Nsutam near Bunso on the main Accra-Kumasi road. They believe the rehabilitation of the old route and the development of a proper Lorry station at Kibi would provide regular and adequate transport to other parts of the country and bring back life on the old route.

4.5 ORIGIN DESTINATION SURVEY

An Origin Destination survey to establish the purpose of travel on the old route was carried out on the Kibi-Bunso section. The results are summarised in Table 4.16.

From the 469 trips surveyed, 43% of the trips were generated from the old route community only and 48% were attracted to the community.

Out of the 200 trips generated from the old route community, 92% (185 trips) are bound for other towns within the Eastern Region, 2% for Accra and 3% each for Kumasi and Koforidua.

On the other hand, out of the 223 trips attracted to the old route community only, 90% (200 trips) were generated from other towns within Eastern Region (in particular Bunso).

Table 4.16: Trip Production and Attraction (Kibi-Bunso Section)

Trip Production	Trip Attraction							%
	Old Route Community	Accra	Kumasi	Koforidua	Other Towns within E/R	Other Towns outside region	Total	
Old Route Community	0	3	6	6	185	0	200	43%
Accra	6	0	9	0	7	0	22	5%
Kumasi	1	1	0	0	2	0	4	1%
Koforidua	16	0	0	0	1	0	17	4%
Other Towns within E/R	200	6	3	1	15	0	225	48%
Other Towns outside region	0	0	0	0	0	1	1	0%
Total	223	10	18	7	210	1	469	
%age	48%	2%	4%	1%	45%	0%		

The traffic generated from Accra, Kumasi and Koforidua, accounted for 10% whilst about 35% were destined for Accra, Kumasi and Koforidua.

From the OD survey the old route community appears to be generating and attracting traffic.

The high percentages of traffic to and from the old route community were trips that were mainly destined to other parts but could only be executed through Bunso.

4.6 OBSERVATIONS

4.6.1 State of the road

Observations during the site visit show that the old route is not receiving adequate maintenance.

This was evidenced by overgrown roadside vegetation, washouts, high shoulders and and siltation captured in Plates 7, 8, 9 and 10.



PLATE 7: Poor roadside ditches



PLATE 8: Washout at culvert outlet (Potroase)



PLATE 9: Overgrown roadside vegetation covering road signs (Petroase)



PLATE 10: Siltation on road surface (Asiakwa-Kibi)

4.6.3 Roadside business

Part of the impact is the collapse of road side businesses in villages along the Kibi-Suhum section of the road. This is evidenced by the following scenes captured in Plates 11 and 12. Unlike previous times, the once vibrant and active food stalls have very few customers and not enough farm produce for sale. Plate 12 below shows that some of the people have even abandoned their stalls.



PLATE 11: Above & Below - Foodstuff Stalls at Akwadum after Bypass



PLATE 12: Above & Below - Empty Foodstuff stalls (Potroase – Odumase)

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

Findings from the results and discussions presented in Chapter 4 are summarised below:

- Average AADT on the Apedwa-Kibi section has marginally reduced by 14.6% after the bypass. However, HGVs along the section has significantly reduced by 67%. On the Kibi-Bunso section the average AADT has significantly reduced by 67.9% whilst HGVs are reduced by about 95%.
- Accident numbers on the Apedwa-Kibi-Bunso road after the bypass, has reduced by 76%, but hit-pedestrian collision type continued to dominate. Meanwhile ran-off road collision type which was absent before the bypass is emerging dominant.
- The once vibrant SOS rest stop at Asiakwa, satellite roadside markets and chop bars (food vendors) along the old route collapsed after the bypass. In addition, sales from retail businesses have been perceived to have reduced after the bypass.
- A great proportion of retail business owners are not considering relocating to the bypass.
- Despite the benefits the communities associated to the bypass, the bypass generally was perceived to have negatively impacted the communities.

5.2 CONCLUSION

The evidence presented in this report does not necessarily contradict conventional wisdom, but it does provide a more solid basis for the assumptions that are commonly made both from the literature and among the public.

1. Traffic flow

From the analysis of the three years before and after AADT values, the study concluded that the bypass has resulted in a significant transfer of traffic from the old route; thus reduction in traffic volume on the old route and a change in the traffic composition. The traffic mix is dominated by light vehicles (taxis) whereas HGVs are almost absent. The bypass has therefore served the purpose of transferring traffic from and reducing truck congestion on the old route which was also observed by respondents.

The diversion of through-traffic to the bypass has however resulted in a change in travel patterns. Thus most long distance travellers to and from the communities after the bypass have to use taxis to either Apedwa or Bunso before continuing their journey. This has brought some inconveniences to trip makers and additional trip costs.

2. Road accidents and traffic safety

The comparison of three years before and after bypass accident data revealed a significant reduction in the number of road accidents on the old route by 76%. Another conclusion was that, moving the traffic to the bypass has increased the attractiveness of the old road (streets) to pedestrians and allow for greater vehicular speed; thus the continual dominance of hit pedestrian collision type accidents after the bypass.

The reduction in traffic volume on the old route has also led to speeding of vehicles. This, coupled with the presence of overgrown roadside vegetation, sight distances are inhibited and road signs are shielded resulting in inadequate communication between the road and the driver; hence the emergence of run-off road collision type accidents on the old route.

3. Perceived impact on local business

From the analysis of the interview responses, it was concluded that old route communities believed the bypass has brought about reduction in sales for retail businesses, food vendors, hotels and fuel stations operators. The collapse of the SOS rest stop and subsequent loss of revenue to the SOS village are attributed to the construction of the bypass. In spite of the perceived negative impact on business, the businesses owners are not attracted to the bypass

The study further revealed that, the communities perceived the reduction in accidents as the main benefit of the bypass but believes the bypass has in total, negatively affected them; since the communities are less active, and retrogressing in development.

4. Other Social Impacts

In a community setting where superstition is upheld, it can be said that the significant reduction in accident rate after the construction of the bypass is highly appreciated to the extent that an old woman of Potroase is happy they are no longer accused of being responsible for accidents in the vicinity. The tagging of children from Aslakwa as "fatherless" is now a thing of the past; since the transit drivers who used to sleep in the community and took advantage of the women have been moved to the bypass.

Though the increase in school enrolment and attendance after the bypass could not be attributed fully to the bypass, it can be speculated that the low traffic situation in these communities has encouraged parents who hitherto would not have allowed their children alone to cross the highway to school to do so. The increase in school enrolment could also be attributed to the introduction of school feeding programme by government some years after the bypass was opened. However, the loss of opportunity to trade by the roadside can be said to also encouraged some children to stay in school and others to enrol in school.

5.3 RECOMMENDATIONS

- ❖ The significant transfer of traffic from the old route to the bypass has resulted in increased pedestrian and greater vehicular speed along the old route, thus the predominance of hit-pedestrian accidents after the bypass. It is recommended that appropriate traffic calming measures are introduced in the bypassed communities by the Ghana Highway Authority.
- ❖ It is also recommended that the old road is rehabilitated and maintained adequately by the Ghana Highway Authority to improve safety and attract usage by transit small vehicles.
- ❖ After the bypass, the absence of an active lorry station in Kibi has been identified as a significant contributory factor to the change in travel pattern along the old route. It is therefore recommended that District Assemblies should develop lorry stations to improve local transport base of bypassed communities. Meanwhile the Ministry of Transportation should introduce adequate public transport buses in the corridor to assist commuters who have become captives in the patronage of taxis to Apedwa and Bunso.
- ❖ Increased signage of available businesses by business owners (Hotels), second cycle schools and Institutions (the SOS village), the tourist attractions in the communities (the Municipal Assembly) along the newly constructed route would improve the customer base and local economy and thus attracting small vehicles back to the road.
- ❖ With the construction of Nsawam and Nkawkaw bypasses in progress and the Anyinam and Konongo bypasses being envisaged, it is further recommended that the Ghana Highway Authority or the University commissions studies to adequately assess the before situations of communities earmarked to be bypassed. Thus establish benchmarks for future impact assessment.

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Appendix A: Vehicle Classification

Vehicle Category	Description
Light	
Cycles	
Motor Bikes	
Taxis/Cars	Taxis, private or hired and saloon or estate cars.
Pick-up/Vans	Pick-ups, station wagon, vans, jeeps, etc.
Small Bus	Mini buses and generally vehicles with sitting capacity up to 19
Medium	
Medium Bus/Mammy Wagons	Medium buses including those with seating capacity between 19 and 23. Mammy wagons being special trucks with wooden bodies for conveying goods.
Large Bus	34-seater buses and above
Light Truck	2-Axle Trucks with single rear wheels or 2-axle trucks less than ten tons with twin rear wheels
Heavy	
Medium Truck	2-axle trucks with twin rear wheels
Heavy Truck	3-axle trucks, including tankers.
Semi-Trailer (Light)	Semi-trailers with any configuration of 3-axes
Semi-Trailer (Heavy)	Semi-trailers with any configuration of 4-axes
Truck Trailer	Semi-trailers with any configuration of 5-axes
Extra Large Truck & Others	These are extra-large trucks with any configuration of 6-axes. Also includes tractors, bulldozers, graders or heavy agricultural or constructional machinery.

Source: Ghana Highway Authority- Planning Division

Appendix B: Questionnaire for Retail Business & Residents

QUESTIONNAIRE FOR HIGHWAY BYPASS IMPACT STUDIES - APEDWA BYPASS

A. GENERAL QUESTIONS

1. Name: 2. Location (Town):
3. Sex:: Male ☐ Female ☐
4. Age (Yrs): ☐ 5-18 ☐ 19 - 32 ☐ 33 - 46 ☐ 47 - 60 ☐ Above 60
5. What is your Occupation:
6. What Service do you provide?
7. In which year was your business established here:

B. IMPACT OF HIGHWAY BYPASS ON TRAFFIC FLOW & SAFETY

8. How will you describe traffic on the highway through town before the opening of the Bypass?
☐ Very Congested ☐ Somehow congested ☐ Free flowing
9. Since the opening of the bypass, will you say movement of traffic from local streets has improved?
☐ YES ☐ No
10. Before the opening of the bypass, how will you describe the safety of people crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low
11. After the opening of the bypass, how will you describe the safety of people crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low

C. IMPACT OF HIGHWAY BYPASS ON RETAIL SALES

12. How dependent is your business on non-resident auto traffic passing through town

- ☐ Very dependent ☐ Somehow dependent ☐ Not dependent

13. If you knew this community was to be bypassed, would you have located your business here?

- ☐ YES ☐ NO

14. How will you describe the effect of the bypass on your sales?

- ☐ Increase in Sales (or Customers) ☐ Decrease in Sales (or Customers) ☐ No effect

15. If your answer to question 11 is **Decrease in Sales** what are you planning to do next?

- ☐ Relocate to business the Bypass ☐ Change business & Remain at location ☐ Remain in the old & Location
☐ Relocate to another place in GHANA ☐ Not decided

16. What benefits in your opinion has the Community derived from the Highway Bypass?

(Tick as many as applicable)

- ☐ Improved local Traffic flow ☐ Less traffic Congestion ☐ Improved Safety
☐ Revitalized the Community ☐ Reduced Air & Noise Pollution ☐ No benefit

17. Will you agree to the statement that the highway bypass has negatively affected the town?

- ☐ Yes ☐ No ☐ Not sure

18. If your answer to question 14 is YES in what way?

Appendix C: Questionnaire for Municipal Assembly Focus Group

QUESTIONNAIRE FOR HIGHWAY BYPASS IMPACT STUDIES: APEDWA BY-PASS

FOCUS GROUPS: *Municipal Assembly Officials*

A. GENERAL QUESTIONS

1. Name : 2. Location (Town):
3. Sex:: Male ☐ Female ☐
4. Age (Yrs): ☐ 5-18 ☐ 19 – 32 ☐ 33 – 46 ☐ 47 – 60 ☐ Above 60
5. What is your Position?
6. How long have been living in this Community?
7. Was the assembly involved in the planning of the bypass? ☐ Yes ☐ No
8. Has the Bypass affected you in anyway? ☐ Yes ☐ No
9. If the answer to question 8 is Yes in what way?

B. IMPACT OF HIGHWAY BYPASS ON TRAFFIC FLOW & SAFETY

10. How will you describe traffic on the highway through town before the opening of the bypass?
☐ Very Congested ☐ Somehow congested ☐ Free flowing
11. Since the opening of the bypass, will you say movement of traffic from local streets has improved?
☐ YES ☐ No
12. Before the opening of the bypass, how will you describe the safety of people crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low
13. After the opening of the bypass,, how will you describe the safety of people crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low

C. GENERAL VIEWS OF IMPACT OF HIGHWAY BYPASS ON THE COMMUNITY

14. What were the possible negative impacts that the Assembly was concerned about when the bypass project was announced?

.....

.....

15. In your opinion, what types of businesses in town are adversely affected by the bypass:

.....

16. What businesses moved from town after the bypass to locate along the bypass?

.....

17. What businesses along the old route benefited from the bypass?

.....

18. Since 2005 how many new businesses have come to the Community?

19. Do you think the bypass has an adverse impact on the Assembly's revenue?

☐

Yes

☐

No

20. If the answer to question 17 is Yes in what way?

.....

21. What actions did the Assembly take to minimize the anticipated negative impacts?

.....

22. What actions did the Assembly take to maximize the anticipated positive impacts?

.....

.....

23. How will you describe the effect of the bypass on local transport in and out of town?

- ☐ Increase in local transport ☐ Decrease in Local transport ☐ No effect

24. What benefits in your opinion has the Community derived from the Highway Bypass?
(Tick as many as applicable)

- ☐ Improved local Traffic flow ☐ Less traffic Congestion ☐ Improved Safety
☐ Revitalized the community ☐ Reduced Air & Noise Pollution ☐ No benefit

25. How will you describe the effect of the bypass on Employment

- ☐ Increased ☐ Decreased ☐ No Effect

26. In your opinion, what is the greatest attraction for non-residents to the community?

- ☐ Tourist attractions ☐ Hospitals ☐ Schools
☐ Festivals Others

27. Since the opening of the bypass in 2005, how will you describe the rate at which non-residents come to the community (visitors/tourist)?

- ☐ Increased ☐ Decreased ☐ No Change

28. What are your current concerns/opinions about the bypass?

.....
.....
.....

Appendix D: Questionnaire for Chiefs/Opinion Leaders/Youth Groups

QUESTIONNAIRE FOR HIGHWAY BYPASS IMPACT STUDIES: APEDWA BY-PASS

FOCUS GROUPS: *Opinion Leaders/Chiefs/Youth Groups*

A. GENERAL QUESTIONS

1. Name : 2. Location (Town):
3. Sex:: Male ☐ Female ☐
4. Age (Yrs): ☐ 5-18 ☐ 19 - 32 ☐ 33 - 46 ☐ 47 - 60 ☐ Above 60
5. What is your position in the Community?
6. What is your occupation?
7. How long have been living in this community?
8. Was the Community involved in the planning of the bypass? ☐ Yes ☐ No
9. Has the Bypass affected you in anyway? ☐ Yes ☐ No
10. If the answer to question 8 is Yes in what way?

B. IMPACT OF HIGHWAY BYPASS ON TRAFFIC FLOW & SAFETY

11. How will you describe traffic on the highway through town before the opening of the bypass?
☐ Very Congested ☐ Somehow congested ☐ Free flowing
12. Since the opening of the bypass, will you say movement of traffic from local streets has improved?
☐ YES ☐ No
13. Before the opening of the bypass, how will you describe the safety of people crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low

14. After the opening of the bypass,, how will you describe the safety of people crossing the highway?

☐ Very high
 ☐ high
 ☐ Very Low
 ☐ Low

C. GENERAL VIEWS ON IMPACT OF HIGHWAY BYPASS ON THE COMMUNITY

15. What were the possible negative impacts that the Community was concerned about when the bypass project was announced?

.....

.....

16. In your opinion, what types of businesses in town are adversely affected by the bypass:

.....

17. What businesses moved from town after the bypass to locate along the bypass?

.....

18. What businesses along the old route benefited from the bypass?

.....

19. Since 2005 how many new businesses have come to the Community?

20. What actions did the Opinion Leaders/Chiefs take to minimize the anticipated negative impacts?

.....

21. What actions did the Opinion Leaders/Chief take to maximize the anticipated positive impacts?

.....

22. What actions did the Municipal Assembly take to minimize the anticipated negative impact of the bypass?

.....

23. What actions did the Municipal Assembly take to maximize the anticipated positive impacts?

.....

24. How will you describe the effect of the bypass on local transport in and out of town?

- | | | |
|--|--|------------------------------------|
| <input type="checkbox"/> Increase in local transport | <input type="checkbox"/> Decrease in Local transport | <input type="checkbox"/> No effect |
|--|--|------------------------------------|

25. What benefits in your opinion has the Community derived from the Highway Bypass?
(Tick as many as applicable)

- | | | |
|--|--|--|
| <input type="checkbox"/> Improved local Traffic flow | <input type="checkbox"/> Less traffic Congestion | <input type="checkbox"/> Improved Safety |
| <input type="checkbox"/> Revitalized Community | <input type="checkbox"/> Reduced Air & Noise Pollution | <input type="checkbox"/> No benefit |

26. How will you describe the effect of the bypass on Employment

- | | | |
|------------------------------------|------------------------------------|------------------------------------|
| <input type="checkbox"/> Increased | <input type="checkbox"/> Decreased | <input type="checkbox"/> No Effect |
|------------------------------------|------------------------------------|------------------------------------|

27. In your opinion, what is the greatest attraction for non-residents to the community?

- | | | |
|--|------------------------------------|----------------------------------|
| <input type="checkbox"/> Tourist attractions | <input type="checkbox"/> Hospitals | <input type="checkbox"/> Schools |
| <input type="checkbox"/> Festivals | Others | |

28. Since the opening of the bypass in 2005, how will you describe the rate at which non-residents come to the community (visitors/tourist)?

- | | | |
|------------------------------------|------------------------------------|------------------------------------|
| <input type="checkbox"/> Increased | <input type="checkbox"/> Decreased | <input type="checkbox"/> No Change |
|------------------------------------|------------------------------------|------------------------------------|

29. What are your current concerns/opinions about the bypass?

.....

.....

Appendix E: Questionnaire for Heads of Schools/GES Focus Group

QUESTIONNAIRE FOR HIGHWAY BYPASS IMPACT STUDIES: APEDWA BY-PASS
FOCUS GROUPS - Heads of Schools /Ghana Education Service etc.

A. GENERAL QUESTIONS

1. Name: 2. Location (Town):
3. Sex: Male ☐ Female ☐
4. Age (Yrs): ☐ 5-18 ☐ 19 - 32 ☐ 33 - 46 ☐ 47 - 60 ☐ Above 60
5. What is your occupation?
.....
6. How long have you been working in this community?
.....
7. Has the Bypass affected you in anyway? ☐ Yes ☐ No
8. If the answer to question 7 is Yes in what way?
.....

B. IMPACT OF HIGHWAY BYPASS ON TRAFFIC FLOW & SAFETY

9. How will you describe traffic on the highway through town before the opening of the bypass?
☐ Very Congested ☐ Somehow congested ☐ Free flowing
10. Since the opening of the bypass, will you say movement of traffic from local streets has improved?
☐ YES ☐ No
11. Before the opening of the bypass, how will you describe the safety of School children crossing the highway?
☐ Very high ☐ high ☐ Very Low ☐ Low

12. After the opening of the bypass,, how will you describe the safety of School children crossing the highway?

☐ Very high ☐ high ☐ Very Low ☐ Low

C. GENERAL VIEWS ON IMPACT OF HIGHWAY BYPASS ON THE COMMUNITY

13. Before the opening of the Bypass in 2005, how will you describe the level of school enrolment?

☐ High ☐ Low ☐ Satisfactory

14. After the opening of the bypass in 2005, how will you describe the level of school enrolment?

☐ Increased ☐ Decreased ☐ No Change

15. If your answer to question 14 is INCREASED, what do you think might have contributed to that?

.....
.....

16. If your answer to question 14 is DECREASED, what do you think might have contributed to that?

.....
.....

17. Before the opening of the bypass in 2005, how will you describe Children attendance at school?

☐ High (Greater than 90%) ☐ Average (50-90%) ☐ Low (Less than 50%)

18. After the opening of the bypass in 2005, how will you describe Children attendance at school?

☐ Increased ☐ Decreased ☐ No Change

19. If your answer to question 18 is INCREASED, what do you think might have changed?

.....

20. If your answer to question 18 is DECREASED, what do you think might have changed?

.....

21. What benefits in your opinion has the Community derived from the Highway Bypass?
(Tick as many as applicable)

- | | | |
|---|---|---|
| <input type="checkbox"/> Improved local
Traffic flow | <input type="checkbox"/> Less traffic
Congestion | <input type="checkbox"/> Improved
Safety |
| <input type="checkbox"/> Revitalized
Community | <input type="checkbox"/> Reduced Air &
Noise Pollution | <input type="checkbox"/> No benefit |

22. How will you describe the effect of the bypass on Teacher Employment

- | | | |
|------------------------------------|------------------------------------|------------------------------------|
| <input type="checkbox"/> Increased | <input type="checkbox"/> Decreased | <input type="checkbox"/> No Effect |
|------------------------------------|------------------------------------|------------------------------------|

