AFRICAN DEVELOPMENT BANK GROUP

INDEPENDENT DEVELOPMENT EVALUATION





IMPACT EVALUATION OF AfDB-FUNDED GHANA FUFULSO-SAWLA ROAD PROJECT

APPROACH PAPER

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank Group
CODE	Committee on Operations and Development Effectiveness
DBST	Double Bituminous Surface Treatment
DID	Difference-in-difference
GHC	Ghanaian Cedis
GIE	Geospatial Impact Evaluation
GoG	Government of Ghana
IDEV/BDEV	Independent Development Evaluation
IE	Impact Evaluation
Km	Kilometer
M & E	Monitoring and Evaluation
PA	Project Area
PICU	Infrastructure and Urban Development Department
PIDA	Programme for Infrastructure Development in Africa
RDP	Rural Development Project
RRMIMP	Rural Roads and Markets Improvement and Maintenance Project
USD	United States Dollars

1. INTRODUCTION

The Independent Development Evaluation (IDEV) of the African Development Bank Group ("the Bank" or AfDB) intends to undertake an impact evaluation (IE) of AfDB-funded project in the transport sector as part of its 2019-2021 work programme.

This approach paper presents an initial blueprint for conducting the IE of an AfDB-funded project in the transport sector: the Ghana Fufulso-Sawla Road Project. The objective of the IE is to provide credible estimates of effects of the intervention on final target beneficiary communities and households. The purpose is to assess the impact of the intervention and support provided and derive lessons and recommendations to improve similar interventions in the future.

This document highlights the background and rationale of doing IE for transport project, and presents a succinct description of the selected road sector project in Ghana to be evaluated. It then presents the IE purpose and scope, the evaluation approach and methodology. The inception report (to be produced in a subsequent stage) will set out detailed methodology and work plan for carrying out this IE.

2. CONTEXT

2.1 The State of Road Infrastructure: African and Ghanaian contexts

Rapid population growth and its accompanying urbanization vis-à-vis high road infrastructure backlog have created a huge demand for transport infrastructure in Africa. While the road transport sub-sector remains the most dominant means of transportation – accounting for 80-90% of passenger and freight traffic – the bulk of the region's road network is unpaved, which in turn, limits peoples' access to "…basic education, health services, transport corridors, trade hubs, and economic opportunities" (African Economic Outlook, 2018).

Sub-Saharan Africa's total road network is estimated at 2.8 million kilometers (see **Table 1**). The majority of these roads are accounted for by Southern Africa, about 35%. Central Africa accounts for the least, just 12%. Of the total road network in the sub-region, only 28% is paved. Of the paved roads, just about half are in good condition. Overall, road access rate in Africa is just 34%, '…compared with 50% in other parts of the developing world, while transport costs are 100% higher' (PIDA, undated).

Overall, road transport outcomes in terms of physical condition of existing roads and the construction of new ones have seen moderate improvement in the last few decades thanks to increased commitment by most African governments to have in place specific road sector development policies and/or plans (Runji, 2015).

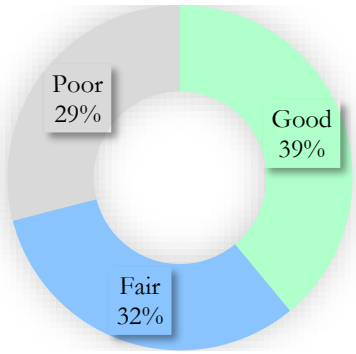
Table 1: Road Network in Sub-Saharan Africa

Region	Existing Network (km)	% Share	Paved Roads (km)	Paved Roads (% of total)	Paved Roads in good condition (%)	Road Network Density Per Population (km/1,000 persons)	Road Network Density Per Land Area (km/1000 km²)
Central Africa	344,083	12.1	79,139	23.0	58.7	2.1	36.5
Eastern Africa	850,710,	30.0	250,959	29.5	49.0	1.2	127.9
Southern Africa	998,334	35.3	353,410	35.4	47.8	5.5	99.8
Western Africa	638,982	22.6	116,934	18.3	43.2	2.3	83.7
Sub-Saharan Africa (Total)	**2,832,109**	**100.0**	**800,442**	**28.3**	**48.6**	**2.7**	**-**

Source: Urbanization and Industrialization for Africa's Transformation, UNECA, 2017 & Exim Bank of India Calculations

Most transport policies in sub-Saharan Africa tend to focus largely on the road transport sector because it is the most used means of transport. A review of the performance of transport sector policies in six countries – Ethiopia, Benin, Burkina Faso, Gabon, Ghana and Zambia – showed that the bulk of transport sector expenditure is devoted to the roads sector, ranging from 75% to 95% (Runji, 2015). For roads plans or policies, they often focus on expansion and maintenance.

Figure 1: Road Condition Mix in Ghana



Source: GoG, Ministry of Roads and Highways Medium Term Expenditure Framework (2018-2021)

Like many African countries, road transport dominates freight (98%) and passenger (95%) traffic in Ghana. Total road network as at 2017 was 72,381 km, of which trunk roads account for one-fifth while feeder roads make up the bulk, about 58% (see **Table 2**).

Table 2: Road Network in Ghana

Classification	Quantity (km)	% Share of Total Road Network
Trunk roads	14,873	20.5%
Urban roads	15,463	21.4%
Feeder roads	42,045	58.1%
Total	**72,381**	**100%**

Source: GoG, Ministry of Roads and Highways Medium Term Expenditure Framework (2018-2021)

Regarding the state of existing roads, about 39% are in good condition, 32% in fair condition and 29% in poor state (see **Figure 1**). Even though major roads are paved and are normally in good condition, the state of rural roads are bad (Asomani-Boateng, 2015), a situation that limits rural peoples' accessibility and constrains agricultural productivity. This is more pronounced in the northern zone of the country.

As such, accessibility remains high in southern Ghana compared with northern Ghana. This bias dates as far back as the early nineteenth century, where colonial governments de-prioritized the

construction of roads in the north of Ghana based on low commercial traffic (Dickson, 1968). This set in motion a path-dependent trajectory, where accessibility in northern Ghana is still low.

2.2 Accelerating investment in Africa's transport sector

Africa has witnessed steady progress in its economic growth and development pursuit in recent years. Total trade accounts partly for this growth, increasing from USD 235.5 billion in 2001 to USD 830.9 billion in 2016 – due to significant surge in freight and passenger traffic (Export-Import Bank of India, 2018). This has created the need for a continent-level concerted vision and action plan to take advantage of these gains and transform its economies. Cognizant of the low level of transport infrastructure vis-à-vis the need to improve physical connectivity and fully optimize the benefits of regional economic integration in the region, notable continent-wide frameworks have highlighted the importance of the transport sector. Aspiration 2 of the African Union's Agenda 2063[1] for example, highlights the importance of road infrastructure in particular, stating that:

> "By 2063, the necessary infrastructure will be in place to support Africa's accelerated integration and growth, technological transformation, trade and development. This will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed ICT and digital economy. A Pan African High Speed Rail network will connect all the major cities/capitals of the continent, with adjacent highways and pipelines for gas, oil, water, as well as ICT Broadband cables and other infrastructure. This will be a catalyst for manufacturing, skills development, technology, research and development, integration and intra-African trade, investments and tourism."

Similarly, the African Development Bank is stepping up efforts in addressing Africa's transport challenges through its Ten-Year Strategy (2013-2022) and High-5 agenda (2016-2025) designed to place the Bank at the center of Africa's transformation and to improve the quality of Africa's growth. The rationale for investing in infrastructure is that it will unlock the potential of the private sector, boost investment, and stimulate entrepreneurship. In 2017, the road transport subsector accounted for approximately 45% of total sector approvals (African Development Bank Group, 2018). This comprise the construction of national roads and major international corridors as levers for fostering regional trade and integration.

When it comes to closing the road infrastructural gap, the Bank and other continent-wide initiatives including the Programme for Infrastructure Development in Africa (PIDA) are banking on effective public-private partnerships and other co-financing mechanisms to address the road transport demand (PIDA, undated).

At the national level, many African governments are prioritizing transportation policy reforms and investing more in transport infrastructure particularly roads, as it remains the most dominant means of transportation in the region (African Economic Outlook, 2018; Brushett, 2005). Over the last two-decade or so, institutional reforms in the road subsector aimed at leveraging resources to

[1] Agenda 2063 exists to drive Africa's development trajectory for the next 50 years (2013 – 2063). It seeks to 'optimize Africa's resources for the benefit of all Africans. See Agenda 2063: The Africa we want, African Union Commission, 2015.

undertake maintenance and carry out public works, with many resorting to road funds for this purpose (Gwilliam, 2011).

Ghana, under its poverty reduction strategies (Ghana Poverty Reduction Strategies I & II) and the Ghana Shared Growth and Development Agenda I & II have attempted to address the issue of poor roads in the country. In particular, the Integrated Transport Plan for Ghana served as useful guide for the period 2011-2015.[2] In addition to the Consolidated Fund, concessionary loans and aid from development partners, Ghana is diversifying its financing mechanism by leveraging public-private partnerships and lately, the use of barter financing mechanism[3] to boost infrastructure development including construction of new roads and upgrade of old ones.

2.3 Bank Group Assistance to the Road Transport in Ghana

Between 1999 and 2018, overall Bank Group net commitments to Ghana's transport sector totaled UA 433.43 Million[4]. Of this, the road transport sector alone accounts for approximately 74% (UA 319.20 Million). The remaining 26% supported air transport projects.

Out of the UA 319.20 Million that was devoted to road transport sector, nearly 92% was invested in the road transport/highways subsector. This constitute nine projects, including the Fufulso-Sawla Road Project and one study (covering three roads).

2.4 Rationale of doing IE for Transport project

The AfDB's transport Department and BDEV used to conduct performance evaluation of roads project using mainly the before/after[5] or with/without[6] approaches in assessing the socio-economic impact of projects on beneficiaries. For road transport investments, the main economic benefits consist of savings in vehicle operating costs (such as fuel costs, vehicle maintenance), travel time, and reducing risk of accidents (Grootaert and Calvo, 2002). The Bank's performance evaluation assessed the direct outcomes on transportation variables (transportation costs and times, accessibility, etc.) and social variables (access to markets, health and education facilities, etc.). The most common limitations of these evaluations were that they lacked appropriate control zones, in that, results did not take into account unobserved factors influencing both project placement and outcomes, and that the evaluations did not follow the projects long enough to capture full impacts (van de Walle, 1999, 2001). Therefore, it becomes very difficult to establish a causal link between the project and the observed positive outcomes.

In contrast to Monitoring and Evaluation (M&E) performance indicators that examines whether project targets have been achieved and estimate the contribution of interventions to changes in

[2] See https://new-ndpc-static1.s3.amazonaws.com/Caches/publications/2016/05/03/ITPGhana_Vol+01+Integrated+Transport+Plan+2011-2015.pdf

[3] The Government of Ghana in 2018 signed a barter trade agreement with the SINOHYDRO group from China. Per the agreement, Ghana will leverage its Bauxite deposits to offer USD 2 billion worth of Bauxite to SINOHYDRO group. In return, SINOHYDRO group will construct roads, bridges, interchanges among others. http://ghananewsonline.com.gh/ghana-sinohydro-barter-deal-is-best-module-to-address-infrastructural-challenges-govt/

[4] Based on Bank internal database – SAP database as of 31 January 2019.

[5] Also known as Pre-test/Post-test Design

[6] Mainly used in Cost-Benefit Analysis

outcome trends, impact evaluation (IE) is structured to establish causality between a project or intervention and subsequent outcomes (See Box 1). IE answers the question: how would outcomes such as participants' well-being have changed if the intervention had not been undertaken?

Establishing causality is important to be able to act on the right factors in order to improve the quality of life of the people of Africa; through specific projects or policy reforms. The key rationale is about improving operations and guiding policymaking.

Accordingly, to some extent, "…those who are involved in practical development work whether nationally or internationally face demands for 'impact evaluation (DFID, 2015)[7]"

Box 1: Definition of Impact Evaluation

Rigorous impact evaluation studies are analyses that measure the net change in outcomes for a particular group of people that can be attributed to a specific program using the best methodology available, feasible and appropriate to the evaluation question that is being investigated and to the specific context.

Source: 3ie, 2008, Foundation Document

The objective of socioeconomic impact analysis is to assess the magnitude and distribution of both direct and indirect outcomes. The direct outcomes consist of increased transportation-related outcomes (transportation costs and times, accessibility, etc.) and social-related outcomes (access to markets, health and education facilities) brought about by the infrastructure. The indirect outcomes consist of increased indirect welfare enhancing effects with a focus on improvements in household welfare (income, consumption and asset ownership). The roads may increase job opportunities and open up new sources of revenue, leading to a more diversified income structure.

In the past, IE activities in the Bank have been scanty and segmented. Only twelve projects with four operational departments (Human Development Department, Water and Sanitation Department, Agriculture Department and Financial Sector Development Department) including three initiated by IDEV (the complete list of projects considered for IE is in Annex 6) were subjected to Impact Evaluation.

As indicated in Annex 1, transport sector is lagging in terms of the Bank's IE studies. This situation is common in the development arena. Although transport (and ICT) represents about a third of MDBs lending, it accounts for only 0.4 percent (and 2.5 percent) of all IEs since 2000 (JDEff 2014[8])

3. THE GHANA FUFULSO-SAWLA ROAD PROJECT

3.1 Justification for the choice of Fufulso-Sawla road project

The project was selected after informal and formal discussions with the Bank's Infrastructure and Urban Development Department (PICU). PICU proposed a list of potential projects for impact evaluation, including: (i) Ghana Fufulso-Sawla road project; (ii) Côte d'Ivoire Riviera Marcory Toll Bridge; (iii) Botswana/Zambia Kazungula Bridge project; (iv) DRC Priority Air Safety project (PPSA), and (v) Cameroun/Congo Ketta-Djoum road project.

Taking into consideration all, including the evaluability of the project baseline, the completion year and the nature of impact (micro or macro), the Ghana Fufulso-Sawla road project was selected due to its unique project design compared to the conventional approach to road construction. Out of the projects implemented in Ghana, the Fufulso-Sawla project stands out as flagship in terms of

[7] Impact Evaluation A Guide for Commissioners and Managers, Department for International Development, May 2015

[8] Journal of Development Effectiveness, 2014

its inclusive all-in-one integrated package, providing a holistic response to the socio-economic needs of the beneficiary districts.

Indeed, traditionally, road transport sub-sector projects especially with construction supported by the Bank have tended to be implemented as stand-alone interventions. That is, the design of these projects focused purely on constructing roads. In recent years however, this has changed, where in addition to the construction of roads, other complementary community development interventions are incorporated as part of the intervention package.

The Ghana - Fufulso-Sawla Road is one such project, which aimed at implementing other socio-economic infrastructure (water, health, education and social protection) besides the construction of 147.5km road. For instance, as part of the ancillary works, the project sought to increase access to potable water, improve local market infrastructure as well as facilitate women groups' access to agro-processing equipment and marketing opportunities.

Given that the project is located in a region that is largely rural and poor, evaluating its impact on the project beneficiaries alongside the ancillary interventions will offer useful lessons on the effectiveness or otherwise of such complementary projects. More importantly, findings from this evaluation should provide useful lessons about the poverty-reduction impacts of this form of road sub-sector interventions.

3.2 Description of the intervention

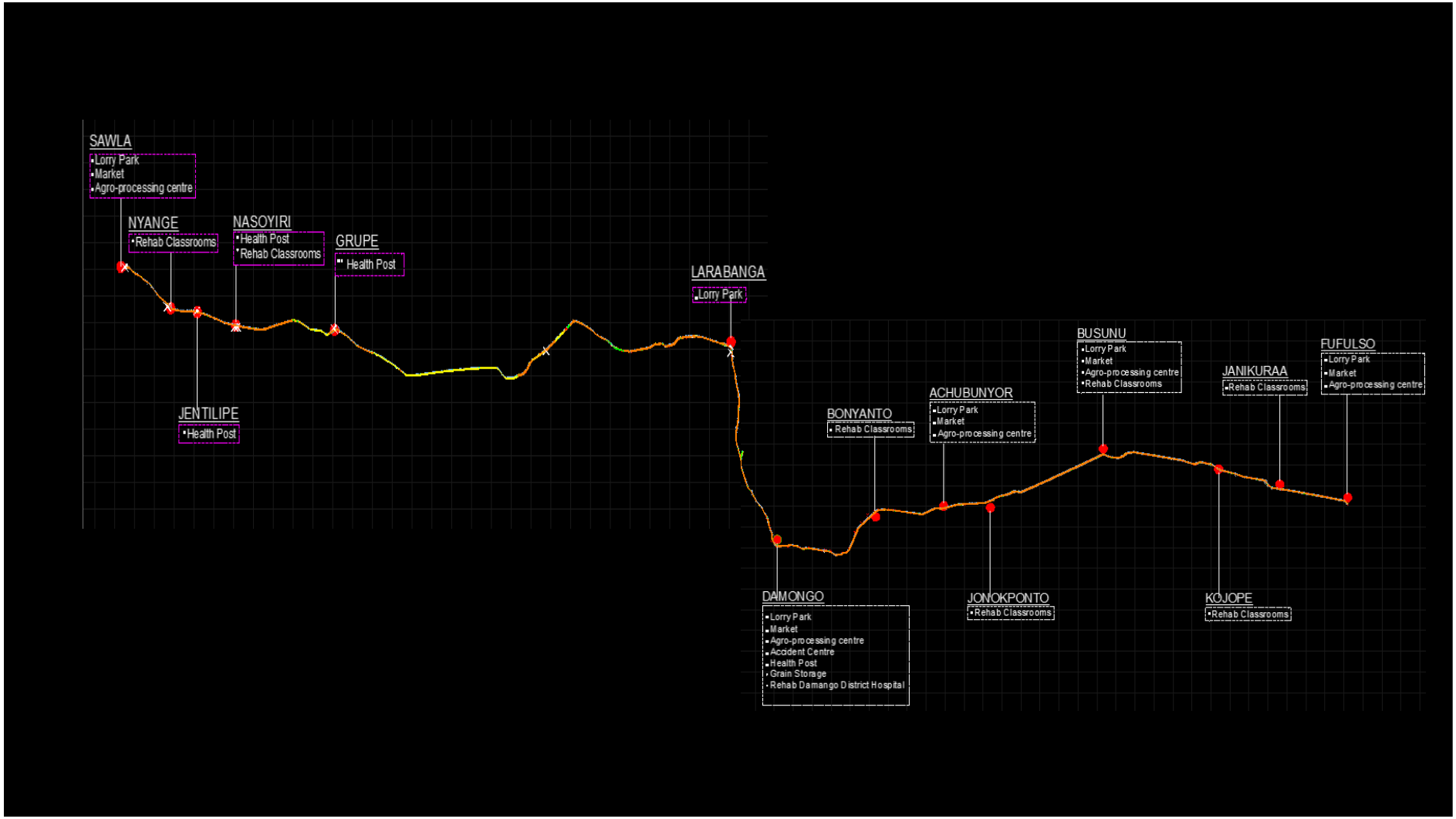
The main objective of the project is to enhance accessibility along the Fufulso-Sawla road and improve livelihoods in the project area of influence. The project consists of five main components: (i) Road Construction Works (including construction of 147.5 km of road between Fufulso and Sawla with line drains at major settlements along the road) (ii) Ancillary Works (including building and rehabilitation of key socio-economic infrastructures such as boreholes, schools, (Community-Based Health Planning and Services (CHPS) compound, markets, and lorry parks) (iii) Studies (iv) Project Management and (V) Compensation and Resettlement.

The road project (See Figure 3 and Annex 2) is located along a transit corridor linking landlocked countries (Burkina Faso, Mali and Niger) in the north to the coastal Tema Port in Ghana and providing access for improved trade between Ghana and its northern neighbors. The retained design solution was a Double Bituminous Surface Treatment (DBST) standard of a 7.3 m two-way one lane single carriageway plus 2.5 m shoulders on each side of the carriageway. The project implementation period was 2011-15.

The project sought to address development constraints caused by poor road infrastructure in the Northern Region of Ghana, which is one of the most impoverished and isolated regions of the country. It aims at constructing the 147.5 km of road between Fufulso and Sawla as well as key socio-economic infrastructure. Indeed, in order to address key developmental challenges faced in the Project Area (PA) in the northern part of Ghana, additional interventions aside the main road corridor works included access roads, hospitals, schools, markets, water supply, etc. which generates positive benefits to all aspects of human development (See Figure 2). The ancillary works/services carried out are detailed in Annex 3.

As per the PAD, the primary and direct project beneficiaries of the project include the inhabitants in the immediate vicinity of the road. The other project beneficiaries include diverse stakeholders at local, regional, national and international levels. The road corridor's immediate vicinity is inhabited by an estimated population of 30,000; of whom 50.8% are women.

Figure 3: The road project and ancillary works/services carried out



3.3 Socio-economic profile of the project's target area

The 147.5 km long Fufulso-Sawla Road traverses three districts in the Northern Region[9] of Ghana: Central Gonja, West Gonja and Sawla-Tuna-Kalba. Together, these districts constitute a population of 272,467, out of which 78% reside in rural areas (Ghana Statistical Service, 2013). With the exception of the Central Gonja district which has only its third largest town along the road, the capital towns of the West Gonja and Sawla-Tuna-Kalba districts are traversed by the road. The road corridor's immediate vicinity is inhabited by an estimated population of 30,000, of whom 50.8% are women. These constitute the direct beneficiaries of the project. Other beneficiaries are people from other parts of the Northern Region, traders and road transport operators and travelers from the Upper East and West Regions as well as Burkina Faso, Mali and Niger.

Agriculture is the mainstay of these three districts. The road traverses an important agricultural area which accounts for over 25% of total food production in the Northern Region of Ghana. Located along the road corridor are some of Ghana's important tourist attractions such as the Mole National Park[10], the Larabanga Historic Mosque, and the Mystic Stone.

Despite their vast resources and potential, the three districts along the road corridor are amongst the most deprived areas in Ghana. The incidence of household poverty is high across the three districts: Central Gonja (61.2%), West Gonja (52.7%) and Sawla-Tuna-Kalba (62.5%) (Ghana Statistical Service, 2015). Regarding access to social services, only 30% of households along the road have access to safe water. This is far below the Northern regional and the national averages of 58.0% and 57.1% respectively. Majority of households rely on unsafe water sources such as dug-out dams for drinking water, most of which dry-up during the dry season. This has contributed to a high prevalence of water-borne diseases in the project area.

Prior to the project, the three districts along the road have only one medical doctor based in Damongo. The districts had on average, a doctor-patient ratio of 1: 29, 394, nearly thrice the national ratio of 1: 10,380. Educational infrastructure in many communities along the road are either inadequate or in a deplorable state with some classes held under sheds and trees. Net primary school enrolment is moderate with an average of about 65%. This is still below the national average of about 84%.

3.4 Impact Pathway of Fufulso-Sawla Road Project

The Fufulso-Sawla Road project was designed to affect a broad range of economic and social outcomes of primarily the inhabitants in the immediate vicinity of the road as well as diverse stakeholders at local, regional, national and international levels. The why and how the project will affect these outcomes is presented below and summarized in the logic model and theory of change (see Annex 3). It will be refined during the inception phase.

The Bank, along with the Government of Ghana (GoG), provided funding to (i) construct the Fufulso-Sawla Road and (ii) build and rehabilitate key socio-economic infrastructures such as boreholes, schools (rehabilitation), Community-Based Health Planning and Services (CHPS) and

[9] Two new regions – Savannah and North East – have been carved out of the Northern region after voting in favour of a referendum in December 2018. Thus, the three districts are located in the Savannah region.
[10] This is a 4,840 km² reserve for over 400 species of animals including elephants, buffaloes, wild pigs, apes and birds. See 2010 Population and Housing Census: Regional Analytical Reports – Northern Region.

an accident center, markets and lorry parks, as well as access roads to health centers and touristic attractions.

With high quality road transport infrastructure constructed and socioeconomic infrastructure built and rehabilitated, the expected direct effect of the intervention will be: (i) reduced travel time and cost; (ii) increased traffic flow on the road; and (iii) increased access to socio-economic services (education, health, water supply, accident center, markets and lorry parks, and touristic attractions). The assumptions are: (i) effective regulatory framework is established to ensure infrastructure is properly maintained through controls (e.g., Axle Load); (ii) availability of funding for maintenance; (iii) public servants and maintenance service providers are trained in operation and maintenance (O&M) of transport infrastructure to improved management of transport sector; and (iv) beneficiaries have sustained access to improved services.

In addition, having efficient road and socioeconomic infrastructure will strengthen trade and tourism by enhancing mobility and accessibility in the project area. This will in turn: increase revenue generation (for example through the agro-processing equipment provided to selected women's agro-processing groups); and promote local tourism with catalytic effect on private sector development and youth employment.

Finally, if service providers of drinking water and health deliver sustained quality services to the beneficiaries, improved access to services (clean drinking water, health and education) resulting from the project will transform the lives of beneficiary communities, particularly, women and children.

Ultimately, these outcomes can then serve as long-term engines to economic growth and poverty reduction, if sustained over time.

It is important to mention that, the impact of the project will be heterogeneous across individual characteristics and geographical location. Indeed, the level of benefit derived from the project will depend on the capacity to access the infrastructure built or rehabilitated and the ability of the individual to make the most of it. For example, the closer the recipient is to the road, the greater the benefit will be.

3 LITERATURE REVIEW: ROAD PROJECT IMPACT

3.1 Road Transport and Economic Development

The last few decades have witnessed notable increase in the rate of road network in developing countries. A constellation of factors account for this. First, poor road conditions or the lack thereof, tends to hinder economic growth, raise the cost of transportation, and limit international competiveness and domestic trade (Brushett, 2005). The second relates to the need for governments to respond to the yawning transport infrastructural backlog in these countries. Thirdly, and most importantly, the growing realization that investment in transport infrastructure, including roads, can deliver significant impacts well beyond economic development. Several studies have for example, found positive relationships between transport infrastructure and economic growth (Grootaert and Calvo, 2002).

Road infrastructure, just like other transport investments, are crucial for structural transformation of economies. They tend to trigger spillover effects in industrial services

development (Berg, Deichmann, Liu and Selod, 2017). In the context of Africa, this assertion bodes well with the continent's structural transformation agenda even though compared to other regions, the region is still lagging when it comes to roads infrastructure.

In low-income countries, investments in road transport in particular are seen as vital poverty reduction strategy. Wantchekon and Stanig (2015) found that high transportation costs are the main drivers of poverty in Africa, and the absence of road (isolation) might turn for instance soil quality into a curse. Road generates positive externalities for rural development and agricultural productivity. In rural areas, roads are seen as fundamental catalysts for breaking the poverty trap by increasing agricultural productivity and spurring the development of non-agricultural economic activities. In rural Africa for example, road infrastructure, just like services such as irrigation, makes a significant contribution to agricultural production especially in the areas accessing inputs services and accessing output markets for agricultural produce (Pinstrup-Andersen and Shimokawa, 2007; Gwilliam, 2011). Grootaert and Calvo (2002) for instance contend that rural roads in particular increase agricultural production and catalyze alternative non-farm jobs. To this end, road investments are seen as pro-poor investment as they tend to benefit the poor more (Khandker, Bakht and Koolwal, 2009).

The degree of impact of road transport infrastructure on poverty reduction depends to a large on the type of intervention. For instance, in the case of highway construction, economic benefits maybe lower given the agrarian nature of rural economies (Rephann and Isserman, 1994). Conversely, feeder roads by their nature tend to serve the rural poor and can directly affect poverty reduction (Khandker et al., 2009).

Benefits that arise from road transport investments can be varied, including "…opening rural areas to external markets, providing employment through road construction and maintenance, and enhancing access to needed public services" (Asomani-Boateng, Fricano and Adarkwa, 2015:357-358). Some classify these benefits into human capital, market access and labor activities channels (Gachassin, Najman, and Raballand, 2010) while others group them under growth, inclusion and sustainability dimensions (Teravaninthorn and Raballand, 2009). In a meta-analysis of the socio-economic impact of rural roads, Grootaert and Calvo (2002) also classified the benefits of rural roads to include creating opportunities; empowering rural people and enhancing their economic and social security.

While all of these seek to affirm the business case for investments in road infrastructure in particular, realizing these positive outcomes that road transport investments are purported to bring depends on a variety of factors. One such factor has to do with the sustainability of financing. The absence of a sustainable financing mechanism has the tendency to affect road maintenance and upgrade programs. In developing countries, factors such as poor capacity of transport ministries, poor design, procurement lapses, weak governance, and high fuel prices tend to undermine the impacts of road transport projects (Asomani-Boateng et al., 2015). In some instances, political economy issues including political patronage – which are quite rife in developing countries – have been found to affect procurement decisions for road transport contracts, which in turn, affects the potential outcomes of such interventions (Berg et al., 2017).

Enhancing efficient implementation and management of road sector interventions requires effective complementarities, between transport policies and with other sectors (Teravaninthorn and Raballand, 2009). Traditionally, road transport subsector projects especially with construction have tended to be implemented as stand-alone interventions. That is, the design of these projects focused purely on constructing roads. In recent years however, this is changing, where in addition to the construction of roads, other complimentary community development interventions are incorporated as part of the intervention package.

3.2 Evaluation Methods

Impact evaluation aim is to answer the question: What is the causal effect of road project intervention on the socioeconomic development of beneficiary communities and households. The main challenge of identifying the causal effect is to capture only the effect directly attributable to the road project and ancillary works, which requires eliminating all other factors that may affect the observed outcomes but are not related to the project.

Impact assessment methods make it possible to separate, through the identification of a counterfactual, changes attributable to the project from those generated by other external factors occurring during the same period. Answering the counterfactual question requires identifying comparison group(s) (group who do not receive an intervention) and comparing them with the treatment group (the group who receives the intervention).

a) From an unobserved counterfactual to a comparison Group

The idea of the counterfactual is very useful, but it is impossible to observe what would have happened in the absence of the treatment (whatever the project). Assuming that the IE intends to measure the impact of a road project (treatment) on the income of populations in the project area. In the case of a counterfactual analysis, the effect of the treatment is defined as the difference between the average income of the populations of the project area after the construction of the road and what would have been their average income in the absence of the project.

In practice, counterfactual analysis deals with the issues by comparing the outcomes in a treatment group that benefit from a project with outcomes in a comparison group that does not benefit from the project. The comparison group should be comparable in all … to the average treatment group so that the same project should have the same impact as that observed in the treatment group. The existence of a comparison group is not obvious: if there is a group exactly similar to the treated group, why the road was not built in this area? Is the treatment group really the same in all, or is it really different from some unobserved characteristics that led to not building the road in this area? And if the comparison group differs in its unobserved characteristics – for example, socio-cultural aspects – to what extent are the differences in trajectories observed between the treated and comparison groups due to the construction of the road and not to the reasons that led to the decision to build the road specifically at that location?

To deal with these issues, the analyst uses different evaluation methods: Experimental, quasi-experimental and non-experimental.

b) Impact Evaluation method

Experimental methods use lotteries and other random selection devices to create a comparison group, called the control group. This protocol would have consisted in our case for example to randomly choose the location of the route in a list containing all the potential routes. The road selected to be built formed the treatment group, while the road that remained unpaved served as the control group. The procedure used to select the two groups guaranteed that the two groups of road were comparable. When the comparison group and the control group are large enough, the fact that they are randomly drawn from the same population makes them statistically similar and all characteristics that could be related to the outcome of interest are equally distributed among the control and treatment groups. Experimental methods are considered as the gold standard of impact evaluation because they require fewer assumptions to establish the comparability between treatment and control groups. It also assures that treatment and control groups are statistically equivalent and comparable to one another, and different only in the receipt of the intervention.

In practice, this method is rarely used because it can create ethical or political problems to exclude otherwise eligible beneficiaries from the intervention. Such a method might be practically possible if a road project is intended to be implemented in two phases. The selection of first phase areas could be done randomly, thus creating a natural experiment to assess the impact of the road. All control areas then receive the intervention in the second phase. This might avoid the ethical or political problems created by excluding beneficiaries. (Grootaert and Calvo, 2002, p21).

Quasi-experimental impact evaluations differ from experimental evaluations in that they identify a comparison group not through randomization but by statistically matching comparison units with the treatment group or by tracking parallel trends between the treatment and comparison units. These types of approaches are often appropriate when randomization is not feasible due to practical or ethical reasons.

Quasi-experimental methods exploit unexpected events or ad hoc rules that govern the rollout of projects or selection of beneficiaries to measure their impact. A good example comes from discontinuous criteria that condition access to certain devices. For example, building a road reduces travel time and costs. However, the level of benefit depends on the location of the beneficiaries in relation to the road, the closer they are to the road, the greater the reductions. This approach makes it possible to distinguish individuals treated in terms of having received more or less important "doses" of treatment depending on their location. The most common quasi-experimental methods are Regression Discontinuity. In contrast to non-experimental methods, discontinuity regression models take into account the variation of the impact of the project across space. For example, in a typical binary treatment variable in a standard non-experimental method (e.g. using difference-in-differences), often the "treatment" group may be selected from within an arbitrary fixed radius – say 5 kilometers – of the project roads.

There are a number of methods to ensure rigorous matching in this type of evaluation, including: (i) matched comparison group designs; and (ii) Quasi-experimental difference-in-difference (DID) and (iii) non-equivalent control group

- **Matched comparison group**: Matched comparison group designs offer several methods for identifying a potential comparison group, often using the eligibility criteria for program participation. These may include location, demographic characteristics, and pre-program values of outcomes of interest. Matching is common for long-term impact evaluations

conducted after the program has started (or even after the program has ended). A successful LTIE using a matching design requires having data on both participating units and potential comparison units, on pre-intervention outcomes and important variables that are likely to influence participation in the intervention. As with all matching methods, identifying a credible comparison depends on the characteristics that are used in conducting the match. One type of a matched comparison group design is propensity score matching, which creates a comparison group by estimating the probability that participating and non-participating units would enroll in a program based on observable characteristics relevant to enrollment. The propensity score is computed for all units and used to estimate the counterfactual by matching comparison to treatment units (Gertler, Martinez, Premand, Rawlings, & Vermeersch, 2011).

In practice, matching methods are used to reconstruct the best possible comparison group for the treatment group in all observable dimensions (social, demographic, economic, geographic, etc.) and yet differ in their participation in the project that we want to evaluate. Robust results are obtained when the propensity score actually captures the probability of being treated. Depending on the context, this hypothesis may or may not be verified. If no baseline data at all can be obtained, one must rely on propensity score matching methods or instrumental variables estimation.

- **Difference of difference (DID):** This method identifies a similar population to that of the treatment group, and estimates the impact of a program by comparing the change in outcomes for the treatment group to the change in outcomes for the comparison group over time. With data on key outcomes for both groups before and after the program has started, evaluators estimate program impact by calculating the difference in key outcomes between the baseline and endline, and then comparing the two differences for the treatment and comparison groups. DID designs can be useful when baseline outcome levels differ between the treatment and comparison group. However, DID requires having baseline outcome values for the treatment and comparison groups, and must satisfy the assumption that outcomes for the comparison and treatment groups followed the same trajectory before the program started. The DID approach can use a wide variety of data sources beyond survey data, such as satellite imagery and administrative records. If baseline data are available or can be collected as part of the project, the clearly preferred method is that of double differences.

- **Continuous Treatment**. A much rarer approach in the literature is to define treatment in terms of continuous variables. The justification for this approach is that the effects of roads improvements are spatially mediated. Unlike some other kinds of interventions, roads improvements do not reduce travel times and costs for a well-defined set of beneficiaries in a uniform way. Rather, the extent to which travel times and costs are reduced depends on the particular location of the beneficiary, with some experiencing greater reductions than others depending on the importance of the road in travelling to destinations of interest. This approach distinguishes between treated individuals in terms of having received higher or lower "doses" of the treatment depending on their location (B Linkow, J Felkner, H Lee, 2015).

- **Non-equivalent control group**: Impact evaluation with non-equivalent control groups has been applied to transport projects. In that case, the evaluation would look at groups that do not share the same characteristics and rely on statistical methods to take these systematic differences out of the equation. Non-experimental methods are generally used when the treatment group has not been chosen randomly and when there is no incidental element that makes it possible to constitute two comparable groups. In this case, we rely on the richness of data to estimate what would have happened in the absence of a project. Two methods are generally used: matching methods and Difference-in-Difference.

In the literature, experimental and quasi-experimental methods are considered as the most rigorous because of their ability to address problems such as the endogeneity of road placement (Binswager et al 1993, Jalan and Ravallion 1998), to identify the best comparison group and take into account time-invariant factors and common trends that affect the control group and the treatment group (Ravallion 2007, Hansen et al 2011, Smith et al 2013, Nkonya et al 2014). However, non-experimental methods can serve as robustness or alternative solutions when it is not possible to implement experimental or quasi-experimental methods. The choice among these methods depends on the specific characteristics of the project to be evaluated and the availability of data.

3.3 Impacts of Road Projects: An Empirical Review

Measuring the long-term outcomes and impact of transport investments especially roads is complex and difficult. In particular, the impact of highway constructions or primary roads cannot be appropriated with a simplistic hypothesis as the impacts tend to be more 'subtle' and dependent on a number of factors: "…magnitude of the highway treatment, where it is, what it connects, what is near it, what is there, and the overall economic climate" (Rephann and Isserman, 1994:731). In some instances, the level of the economic development impact of highway construction is dependent on the 'openness' level of the region as well as the structure of the local economy.

Thus, given the constraints of selection biases and impracticality of using experimental approaches for assessing the impact of transport projects, quasi-experimental approaches are more favored (Grootaert and Calvo, 2002; Estache, 2010; Rephann and Isserman, 994; Teresa & Montalvo, 2011). In an instance where baseline data are available for both control and treatment groups, the double difference approach is normally used. This involves comparing outcome variables before and after the project for both treatment and control roads and appropriating the difference.

In situations where neither baseline data is unavailable nor no control roads identified at the pre-project level, Propensity Score Matching or Instrumental Variables approaches can be used (Grootaert and Calvo, 2002). In addition, in some rare cases, reflexive approaches are used, where treated households are asked how their participation or access to a road intervention has contributed to their welfare. The results from these approaches are only indicative of impact and not necessarily the contribution of the intervention (Grootaert and Calvo, 2002).

In spite of the challenges with data availability especially in developing countries – which largely constrains rigorous evaluation of the impact of road transport – a number of studies have since the

1990s sought to assess the positive impacts of road transport investments both at the macro[11]- and micro-levels, some yielding mixed results.

In Ghana, Asomani-Boateng et al. (2015) assessed the impact of roads on household welfare by collecting household survey in eighteen communities within the catchment of six road corridors in the Upper East, Upper West and Northern regions of Ghana. The study compared ex-post and ex-ante changes resulting from the roads programme and determined its impact. No comparable group or road was used in this case. They employed a case-study approach hinged on mixed methods to assess the impact of the Ghana Transport Sector Program Support I & II. The study's results showed significant impact on a number of outcome variables: economic growth (measured using household income) which increased substantially by 390.4% per household; increased crop outputs for farm households as well as increased their access to varying social services. Despite these positive impacts, they note that transport cost increased compared to the baseline data, citing financial constraints to undertake periodic maintenance, and lack of capacity as some of the reasons. They warn that failure to address the drivers of increased transport charges will undermine the sustainability of the impacts delivered by the programme.

In Cameroon, Gachassin, Najman, and Raballand (2010) utilized Three-Stage Least Squares to assess the impact of roads on poverty reduction. Results from the study revealed no direct impact on household consumption per se but rather found indirect impact on labor activities, including short-term employments during road construction and those that accrue from road maintenance activities.

In rural Ethiopia, Dercon et al. (2009) used secondary research approach to assess the impact of roads on rural farm incomes and poverty reduction. Data for the study was drawn from the longitudinal Ethiopian Rural Household Surveys. The representativeness of the survey at the rural level allowed for it use. To establish the impact of roads on rural incomes and poverty, they used a Generalized Methods of Moments: Instrumental Variables & Household Fixed Effects estimator. Using the same datasets but with specific focus on households practicing Ox-plough agriculture systems and accounting for the spatial effects of road infrastructure, Wondemu and Weiss (2012) utilized two models (fixed effect and the Hausman-Taylor estimators) to estimate the impact of roads on rural incomes. Dercon et al. (2009) found that increasing rural farm households' access to improved roads increased their consumption growth by 16%. Regarding poverty reduction, access to all-weather roads decreased the incidence of household poverty by 6.7%. In the same country, Wondemu and Weiss (2012) – using the same longitudinal data and accounting for the spatial effects of road infrastructure – found even higher positive impacts of road on rural incomes. Rural households' access to all-weather roads increased their incomes by 37% (using the Hausman-Taylor estimator) and 63% (using fixed effect estimator).

[11] Early attempts at estimating the impact of road transports, particularly highway constructions, focused largely on macroeconomic models. These approaches, popularized in the US, often relied on historical data of interstate highway projects to estimate the impact of highways on aggregate economic growth, mostly at the national, regional or county levels. However, there has been a shift towards more rigorous methodological approaches and more so a shift from area-based units of analysis to the use of households and individuals. This transition has arisen out of the need to go beyond the simple cost-benefit approaches to "…capture the full treatment effects of road development" (Khandker et al., 2009:719).

In South Africa, Anathi and Emeka (2017) used a macroeconomic model to assess the road investment returns to economic development. Data was derived from the South African Reserve Bank, Quantec database and Statistics South Africa (StatsSA) between 1990 and 2014. It used time series, econometric models cointegration and vector error correction model (VECM) to assess the return of transport investments on economic development. Anathi and Emeka (2017) found that road transport investment generates positive impacts on economic development in South Africa.

In Bangladesh, Khandker et al. (2009) used fixed effect estimator to assess the impact of roads improvement in rural Bangladesh. The study used household-level panel data for both treatment and control villages under the Rural Development Project (RDP) and the Rural Roads and Markets Improvement and Maintenance Project (RRMIMP) by the World Bank. Estimates were based on a host of variables including household income, expenditure, boys and girls school participation rates and poverty. The results showed that overall, the road improvement projects exerted significant impact on poverty reduction. For example, they found that in the case of the Rural Development Project, average returns to per capita consumption was between 6% and 16%. Both programs exerted relatively the same impact on poverty reduction over the 5-year period: 3-4% in the case of RDP and 5-6% in the case of RRMIMP.

In Vietnam, Mu and van de Walle (2007) used double difference approach alongside propensity score matching to assess the impact of rural roads improvements on local economic development and market development at the community level. The propensity score matching was computed on pre-intervention of co-variates. Mu and van de Walle (2007) found that roads upgrade yielded significant impacts on local economic activities and market development. For example, outcomes such as food availability responded positively to the intervention. The intervention also generated positive impacts on social outcomes such as primary school completion rates. Regarding market development, high impacts were observed for poorer communities than non-poor communities, even though for poorer communities, the degree of impact varied by proximity to the roads. The further away a poor community is to the road, the lesser the impact on local economic activities.

In Spain, Teresa & Montalvo (2011) followed Rephann and Isserman's (1994) approach albeit with slight differences bordering on the unit of analysis (segments of the road versus county) and the use of propensity score matching for their matching analysis. Teresa and Montalvo (2011) found no significant impact of converting Spanish national roads into highways on the attraction of new firms, implying that highways may not be useful strategies to pursue in economically lagging regions. The study showed for every 10km segment, the treatment effect ranged from 24 to 54 firms even though this result was found to be statistically insignificant.

In their impact study of new interstate highways on economic growth in non-metropolitan settings in the **United States**, Chandra and Thompson (2000) found out that new highways generate more economic growth effects in countries that directly benefit from the project than those who do not benefit directly from the intervention, with growth premium increasing by 6-8% over a 24-year period.

In the United States, Rephann and Isserman's (1994) used a quasi-experimental matching approach where treated regions were compared with a control group (which has similar characteristics as the treated region) by combining theoretical and statistical approaches in the

selection. This is a multi-stage process. First, the treated and untreated counties are matched based on similar economic and spatial characteristics. The resulting group of treated versus untreated counties is then matched by testing statistically (using t-test) pre-construction growth rates for both groups. Once this pre-test passes, then the post-tests are computed to assess the impact of highway intervention. They found that interstate highway roads benefits counties close to cities than in rural counties in the US.

In the case of the Songea-Makambako Road in Tanzania, baseline information was only available at the village and district levels, thus, ruling out the use of households as the basic unit of analysis. Thu, the study collected post-project information at the village and district levels and compared both situations focusing on output indicators such as traffic volume. To assess the socio-economic impacts, the study compared the volume of marketed crops between villages located within the catchment of the roads and those off the road, observing that the volume of marketed crops for on-road villages doubled compared to off-road villages.

In Morocco, the World Bank (1996) used double difference approach to assess the impact of the Fourth Highway Project. In this case, pre-project baseline and post-project surveys were conducted for both treatment roads and control roads – four roads each. It is important to note that one of the control projects was selected purposively. The study nonetheless found significant and varying benefits arising from paving rural roads.

In Bahia, Brazil, the World Bank (1997) assessed the socio-economic impacts of rural feeder roads projects. Given the fact that the intervention neither conducted baseline studies nor identified control roads prior to the construction of the roads, a retroactive approach was used to collect baseline information. This was then compared with post-project survey and the observed changed estimated. In other words, the study used a simple before and after to assess the impact of the project, raising concerns about the validity of the findings.

In a meta-analysis of road transport impacts, Estache (2010) found that rural roads come with several benefits for rural people especially for low-income households, noting however that rural roads, despite their importance, cannot be relied on as the 'silver bullet' for poverty reduction. In curbing corruption relating to transport infrastructure interventions, Estache (2010) notes that effective monitoring and accountability measures are crucial.

In recent years, some studies have tended to blend these approaches with Geographical Information Systems including recent approaches like **Geospatial Impact Evaluations**[12] (GIEs). Recently, under its Infrastructure Needs Program II (INP II), USAID in partnership with AidData undertook a GIE of 59 rural roads construction/rehabilitation projects in the West Bank/Gaza area. Results from this GIE showed significant impact on local economic output – using the remotely sensed nighttime light output as a proxy indicator.

[12] GIE is a quasi-experimental statistical approach that is used to estimate the effect of wide range of policy interventions normally associated with land cover values including road infrastructure, water resource management, urban development, and pollution control. Essentially, the GIE, makes use of high-resolution geospatial and remote sensing database that allows for statistical matching and the construction of control areas across a suite of demographic, environmental, and other geographic attributes. See https://www.brookings.edu/blog/future-development/2018/10/08/a-quiet-revolution-in-impact-evaluation-at-usaid/

Besides the quantitative approaches and methods, it is important to note that qualitative methods bring an added value in establishing the counterfactual of an intervention. Complementing quantitative approaches with qualitative methods – which normally asks beneficiaries perception of impact of the projects – can be helpful in triangulating quantitative findings (Grootaert and Calvo, 2002).

3.4 Measurement of Outcome/Impact Indicators

Channels by which the socio-economic impact of road projects – be it rural or urban, feeder or highway – can be measured vary by project objectives, design, and magnitude. Such channels or indicators can be at the output and outcome levels as well as be direct or indirect. These channels range from reduced transport fares through increased access to social services to improved social capital and gender effects. Annex 4 presents sample of indicators used for three empirical case-study based studies and two meta-analyses studies.

4 DESIGN AND METHODOLOGY FOR THIS IMPACT EVALUATION

4.1 Evaluation Questions

The evaluation questions for this IE are:

1 What is the net effect of the road on the intensity of the traffic, the travel time and the travel cost?
2 What is the net effect of the road and related ancillary works on household income, and employment, and access to social and economic services?
3 What causal factors have resulted in the observed impacts?
4 Has the intervention resulted in any unintended impacts?
5 Are the impacts of the projects differentiated by gender?
6 Which ancillary works/services have been particularly successful, and why?
7 What lessons can be learned from this intervention?

The questions will be fine-tuned after the scoping mission based on the specific outcome retained for this IE.

4.2 Evaluation Design and Methodology

Based on the objectives of this IE and drawing on the reviewed literature above, we propose to combine quasi-experimental approaches, with qualitative techniques. The evaluation approach will include:

- The estimation of the counterfactual by using quasi-experimental methods to create comparison group. In this case, the treatment and comparison groups should be sufficiently large to establish valid statistical inference.
- Collection of pre-intervention and post-intervention data in both comparison and treatment groups (depending on the availability of baseline data for treatment and comparison group), to compute the difference of difference.
- Inclusion of continuous treatment estimators as a way of corroborated the results. This is important in this case because the extent of impact is not experienced uniformly across space. The continuous treatment approach will take advantage of highly detailed and accurate GIS data to measure variation in the degree of impact with increasing accessibility.

- The ancillary works aim to increase the impact of the road on the outcomes. For example, the rehabilitation of schools will strengthen and increase the effect of the road on school attendance. Thus, the project Fufulso-Sawla project is equivalent to a combination of public policies (road alone, road + school, road + health center, etc.). Appropriate methodology will be developed during the inception phase to disentangle the effects of these combinations of public policies. Such a disentanglement will be important for policy recommendations on the use of integrated road.
- Inclusion of a matched difference-in difference approach as a further means of corroborating the findings. This approach is to estimate the difference-in difference model, but with the sample adjusted using propensity score matching.
- Incorporation of qualitative techniques will be incorporated to supplement and triangulate the quantitative findings and to respond to objective d) of the evaluation relates to the causal factors that have resulted in the observed impacts. They will enrich the quality of the evaluation results and aid in deeper interpretation of the results obtained from quantitative approaches, it will be necessary to include the qualitative method by shedding light on the process and causal relation.

The inception report will propose the precise combination of methods to be used in carrying out the evaluation.

4.3 Selection of the counterfactual

In the case of Ghana Fufulso-Sawla road where previously there were none, the control area has to be selected solely based on geographic and/or socioeconomic criteria. In practice, this will often mean selecting administrative entities used in the country's master sampling frame.

a.) Using comparison Roads as Counterfactual

Ghana's highways authorities have put in place a long-term development plan (2015-2035) for roads, construction and maintenance, in order to contribute to the balance of socio-economic development of the country. According to their research, a road condition mix of 70% good, 20% fair and 10% poor should facilitate the movement of people and goods at lower cost. The roads to be developed can be classified in two categories:

- Lateral corridors in the country to connect the main regional centers together;
- High traffic routes, cocoa areas and tourist sites.

The Fufulso-Sawla Road is part of the first category, it is a lateral corridor that connects Sawla to Fufulso but is also the fastest way to connect Tamale (the largest city in Northern Ghana and the Capital of the Northern Region) and Wa (Capital of the Upper West Region).

A good counterfactual to the Sawla-Fufulso road should therefore be:

- A lateral corridor;
- From 100 to 200km in length;
- Located between two international corridors;
- At the junction of two regional capitals of the country;
- Scheduled to be asphalted in Ghana's road development plan 2015-2035.

Apart from these geographical features, the choice of the counterfactual must take into account the socio-economic and demographic characteristics (income, education, population, average daily traffic, travel time before the project, etc.) of the area.

In view of these characteristics, the following five corridors seem to meet the criteria:

- Wa-Waisi, (150km)
- Tumu-Wa (140 km)
- Navrongo-Tumu (111 km)
- Tamale-Yendi (99 km)
- Bawlu-Bolgatanga (81 km)

The scoping mission should make it possible to collect more information, to explore other possibilities before making a final choice.

4.4 Sampling Strategy

The sampling strategy for households' survey will be defined in the inception report after the scoping mission.

4.5 Tentative Outcome Indicators for Impact Evaluation

This section describes the outcomes that could be assessed (See Table 3). Details on the related indicators, measurement, data source and method for data collection are presented in Annex 5.

Table 3: Projects outcomes

Direct outcomes	Intermediate Outcome	Long-term Outcomes
- Increased intensity of traffic - Reduced travel time - Reduced transport cost - Increased access to social services (health and education) - Increased access to market	- Reduced input cost of production - Increased agricultural production - Increased non-farm activities - Increased employment	- Increased household income - Increased SME revenue - Increased educational status - Increased health status

Based on table 3, the following indicators could be assessed:

Table 3: Projects outcomes' indicators

Social	Economic	Transport
- Poverty - Health - Education - Gender Issues	- Household Income and Expenditures - Employment - Crop production and marketing - Livestock production and marketing - Other income-generating activities - Tourist attraction - SME	- Transportation patterns - Frequency of travel - Mean of travel used - Village access to roads - The time takes for ambulance to arrive - Distance from households to paved-road network - Transportation costs - Availability of public transportation - Transport Safety

Adapted from Masahiro Nishimura, Niklas Sieber, and Sangui Wang, 2018. Impact Evaluation of road improvements and Rural Poverty - Baseline Survey in the Ningxia Liupanshan Area of the People's Republic of China.

The final selection of outcomes and indicators to assess will be made during the inception phase.

4.6 Data Collection and Management

To address the IE questions, four different datasets will be mobilized. These include: (i) a traffic dataset; the Settlement information survey; (iii) the Household Survey and (v) the Tourism Survey.

- **Traffic survey**: to analyze all issues related to the improvement of transport-related outcomes (reduction of travel time and travel cost);
- **Household survey**: to analyze the impact of the road and related ancillary works on the living conditions of the populations in the project area. In order to spatially differentiate the impact of the treatment, geolocated data will be required.
- **Settlement Survey**: to measure outcomes at the level of the village or town. Information to collect may include demographic information, utilities, transport, roads, agriculture, markets and their accessibility, prices, industry and construction, education health, etc.
- **Tourism survey**: to analyze the impact of the road and related ancillary works on tourism in the Mole Park

The data available include:

- Ghana Living Standards Surveys (GLSS-6 and 7), the Core Welfare Indicators Questionnaire (CWIQ), 2010 Population and Housing Census
- Ghana government agencies have generated GIS datasets for the entire country. These include detailed physiographic GIS datasets with complete country-wide coverage.
- Project Baseline data (Project appraisal mentioned the establishment of baseline situation)
- Origin-Destination (OD) surveys

5 AUDIENCE AND USERS OF THE EVALUATION

5.1 The Board

The evaluation will provide the Board with independent and evidence-based assessment of the impact of the AfDB-funded Ghana Fufulso-Sawala Road Project. It will also provide suggestions for potential improvement to better position the Bank in three of the five priority objectives[13], the "High 5s", namely, improving the quality of life for the for the people of Africa coupled with Industrialize and Integrate Africa priorities.

5.2 Senior Management

The evaluation can inform management's future decisions to scaling-up the Bank's efficiency and effectiveness in terms of developing high quality results on-the-ground with regards to integrated road interventions. The evaluation aims at strengthening the design, implementation, monitoring and evaluation of the Bank's transport strategies and interventions.

5.3 Operational Staff

By identifying what works, what does not work and why, the evaluation will provide lessons learned from experience in order to improve the design, implementation, monitoring and evaluation of

[13] To accelerate the implementation of its Ten-Year Strategy (TYS), in 2016 the Bank decided to focus on five priority objectives, the "High 5s": Light Up and Power Africa; Feed Africa; Industrialize Africa; Integrate Africa; and Improve the Quality of Life for Africans

new Bank's road interventions. The main intended users of the IE are the sector operations staff and managers of the Infrastructure and Urban Development Department (PICU) and the Regional Directors (including RDGE.3, RDGW.3, RDGC.1, RDGS.1, and RDGN.1) and Country Offices.

5.4 External Audience

The evaluation will be of interest to stakeholders who want to understand the Bank Group's approach on road interventions. This audience includes governments and policy makers, universities and the academic community in developed and developing countries, development partners and international organizations, and non-governmental organizations (NGOs), private sector and project beneficiaries. Although the evaluation will focus on the Bank Group and its support, it is likely to draw lessons that are useful to development partners. Many donors face similar issues in defining their support for WSS and AWM and can benefit from an evaluative report on the Bank Group's experience.

6 WORK PLAN, MANAGEMENT AND ARRANGEMENTS

6.1 Work Plan

The evaluation will be undertaken in FY19, with the CODE discussion expected to be scheduled in the last quarter of FY19. The work plan is expected to involve the following steps and timeline (see table 4).

Table 4: Tentative Timeline

Description of Tasks / Key Deliverables	Responsibility	Time Frame
Approach Paper	Evaluation Team	End-March 2019
Inception Report	Evaluation Team/ International Consultant	End-May 2019
Impact Evaluation Technical Report	Evaluation Team / Consultants	End –August 2019
Final Summary Report for CODE	Task Manager	End September 2019

7.2 Engagement and Quality Assurance Process

The evaluation team will maintain contact with Bank stakeholders (mainly operational complex) throughout the whole evaluation process. BDEV will circulate the approach paper, the technical Evaluation Report and the Final Summary Report to the Bank's stakeholders for comment and feedback. In doing so, BDEV will put together short briefs and/or power point presentations to communicate the key messages arising from the evaluation to facilitate interaction with stakeholders. In addition, BDEV will request PICU to nominate a reference person to facilitate daily contacts and support the process of gathering data and comments.

Internal and external peer reviewers (with experience in road sector IEs and transport sector policy) will review the evaluation product and provide comments on early drafts and on the final report.

7.3 Evaluation Deliverable

The final output for the evaluation will be the Summary Report for CODE.

7.4 Evaluation Management

The Task Manager for this Impact Evaluation is Joseph MOUANDA, Principal Evaluation Officer in BDEV.1 (Team Leader). Other team members include Eric KERE, Senior Evaluation Officer (Co-Task Manager), and Clement MENSAH, Junior Consultant – Research Analyst. Ms Ayari Henda, Archivist/Documentalist will provide administrative support.

Under the overall guidance of Foday TURAY, Division Manager, OIC, BDEV1 and Karen ROT-MUNSTERMANN, Acting Evaluator General of BDEV, the Task Manager will provide inputs and lead the work of the consultants and other team members, and will produce the final summary report to CODE.

The Team Leader will be responsible for organizing communication processes with stakeholders within and outside the Bank, with the support of the Knowledge Management Division (BDEV3). Jayne Tambiti MUSUMBA, Principal Knowledge Management Officer, will be in charge of leading the evaluation knowledge management, communication and dissemination strategy.

7.5 Communication and Dissemination

The objective of communication and dissemination is to ensure that timely and relevant evaluation information and knowledge are availed to stakeholders and that stakeholders are given the opportunity to provide feedback and interact with the evaluation team throughout the entire evaluation process. A set of communication and dissemination activities will be undertaken during and after the evaluation. During the evaluation, the evaluation team will deploy a strategy aiming at inter alia: (i) including the main stakeholders in decision making about evaluation design and implementation, (ii) informing about the evaluation activities and progress and (iii) communicating interim findings. After the evaluation, final findings will be disseminated. This will be done to support change and improvement, to show results and to demonstrate accountability and foster learning

The audience for the communication and dissemination include AfDB Board of Directors; Bank staff in the operations departments (PICU), in the country and regional offices, BDEV staff, the Banks evaluation community; implementing partners who include the Ghanaian national government and implementing agencies as well as development partners who financed transport interventions. Others who may find the evaluation useful include development agencies working in Africa and the academia. The preliminary communication and dissemination plan, below (See Annex 7) details how it will be carried out. A detailed communication and dissemination plan will be ready at the draft final report stage.

ANNEXES

Annex 1: Project's Ancillary Works/Services

The following are the ancillary works/services carried out under the above project:

- **Health Facilities**: The project includes rehabilitation and expansion of the main District Hospital at Damongo including the Out-Patient Department, fully equipped 40 bed male and 40 bed female medical wards, accident centre including an operating theatre, mortuary including 2 body storage refrigerators, autopsy, body holding and embalming rooms, rehabilitation of the X-Ray Centre and provision of 2 new X-Ray machines, provision of hospital equipment including an Oxygen Production Unit, an Incinerator for medical waste disposal, anesthesia machine, patient monitor, incubator, ECG Machine, hospital beds, sterilizers and other basic medical equipment, 2 ambulances as well as construction of covered walkways, parking areas and storm water drains.

- The project also included construction/rehabilitation of 8 main Health Centres along the project corridor (including water supply and sanitary facilities, provision of beds, stretchers, wheel chairs, maternity equipment, computers, motor cycles, bicycles and basic medical equipment). Also constructed were 11 two-bedroom Senior Nurses Quarters and 16 one-bedroom Junior Nurses Quarters including water supply and sanitary facilities, rainwater harvesting and solar panels for energy supply.

- **Education Facilities**: The project covered the construction/ rehabilitation of 9 Schools constituting 50 unit classroom blocks including water supply, urinals and toilet facilities (particularly for girls), kitchen blocks, basic furniture including desks, chairs, black boards and white boards and construction of 8 two-bedroom houses for head teachers and 16 one-bedroom houses for junior teachers including water supply and sanitary facilities, rain water harvesting and solar panels for energy supply.

- **Agriculture**: Construction of Mognori Bridge which links two feeder roads that were rehabilitated by another Bank funded project (Northern Rural Growth Programme) to better provide all weather access for transportation of agricultural inputs and produce; rehabilitation of the 2,000 m2 grain storage barn at Damongo with new roofing, side cladding and flooring, new sliding gates with aprons on both sides of the store for loading and offloading of produce; and access road to the Agric College in Damongo.

- **Water and Sanitation**: Previously, the communities within the project area relied on unsafe water sources such as ponds, dugouts, small earth dams and the raw White Volta River water for their sustenance. Twenty (20) boreholes with hand pumps were originally included in the contract to be drilled in the needy towns/villages in the PA. A total of 41 bore wells were also sunk - 36 bore holes provided with motorized pumps and solar panels for power generation and remaining 5 provided with hand pumps because of low yield. As a result of the failure by several drill attempts to obtain successful boreholes in the Fufulso area due to the rather very harsh hydrogeological terrain, a surface water treatment technology to supply safe water to these small communities was adopted. The water facility draws water from the White Volta River and purified through an Integrated Water Purification Plant installed close to the intake. Treated water from the plant is then pumped to an overhead tank constructed in the Fufulso town and subsequently distributed to public

standpipes within the community. Fufulso town and surrounding communities will have sufficient potable water from this scheme with capacity of up to 2,500 m3 supplying a population of up to 7,000 with the potential for further expansion to include more areas. The residual sludge from the water treatment plant is also treated and formed into pallets for use as fertilizer.

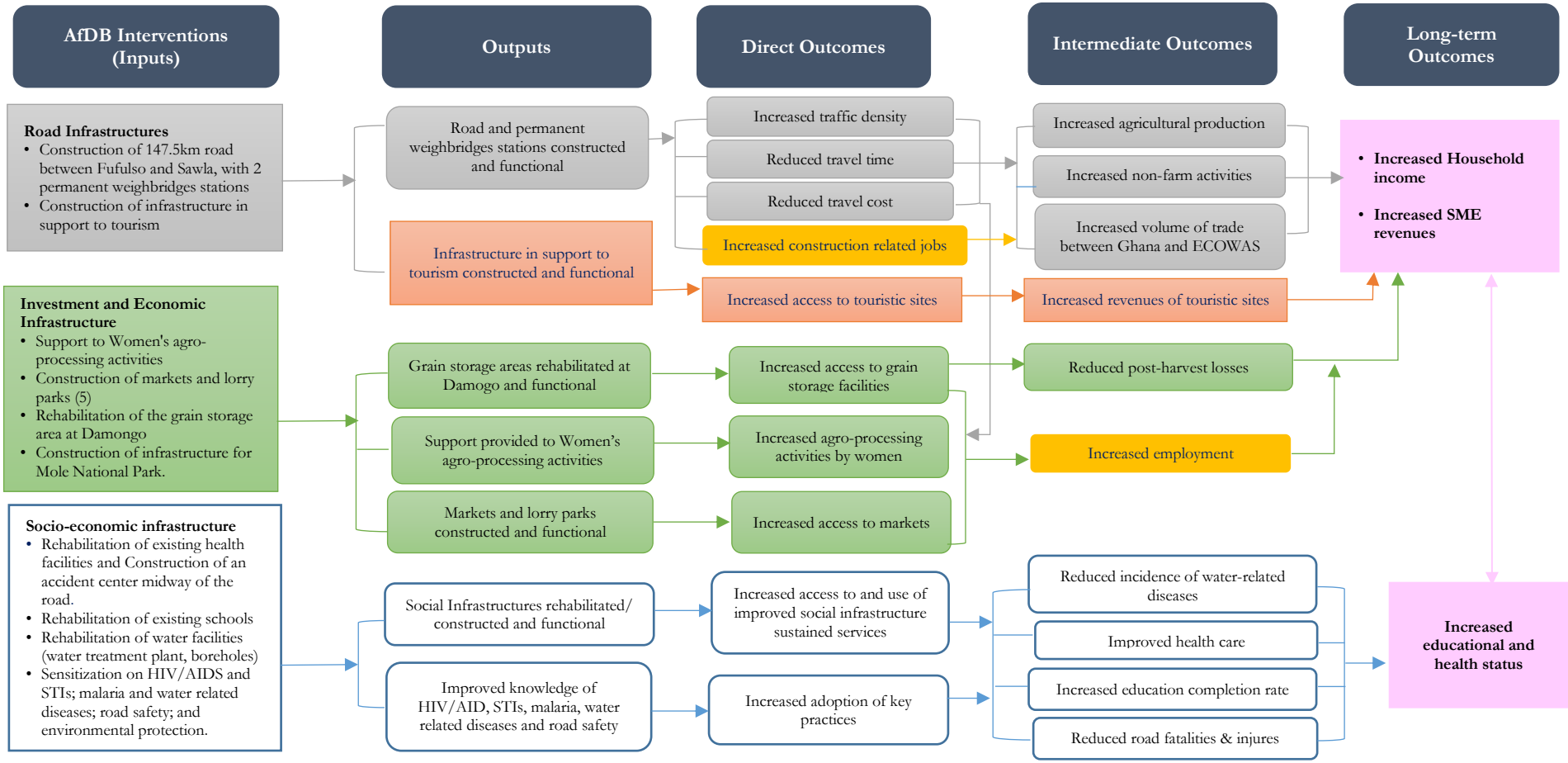
- **Trade and Regional Integration**: This incorporated the construction of 4 main markets each with 72 sheltered stalls at Fufulso, Busunu, Damongo and Sawla including water supply and sanitary facilities; construction of 4 main lorry parks approximately 5,000m2 surface area each with separate parking areas for heavy, medium and light vehicles located at Fufulso, Damongo and Sawla including toll booths and ticketing offices and construction of 2 Computerized Weigh in motion Bridge Stations.

- **Tourism**: Rehabilitation of a Conservation Museum at Mole National Park including over 6km of access roads, parking areas and 2 motorized boreholes with solar panels;

- **Safety, Environmental Protection and Health Sensitization:** As well as inclusiveness, the Project gave particular attention to Green Growth through provision of a total number of 86 solar panels for electricity supply for nurses and teachers quarters and operation of the 36 motorized boreholes. The project also incorporated use of alternative water supply through provision of up to 50 rainwater harvesting equipment. In addition to the re-instatement of borrow pits and grassing of road embankment slopes, the project also included planting of 20,000 trees spread across the constructed facilities and along the road corridor.

Annex 2: Theory of change

a.) Project Logical Model



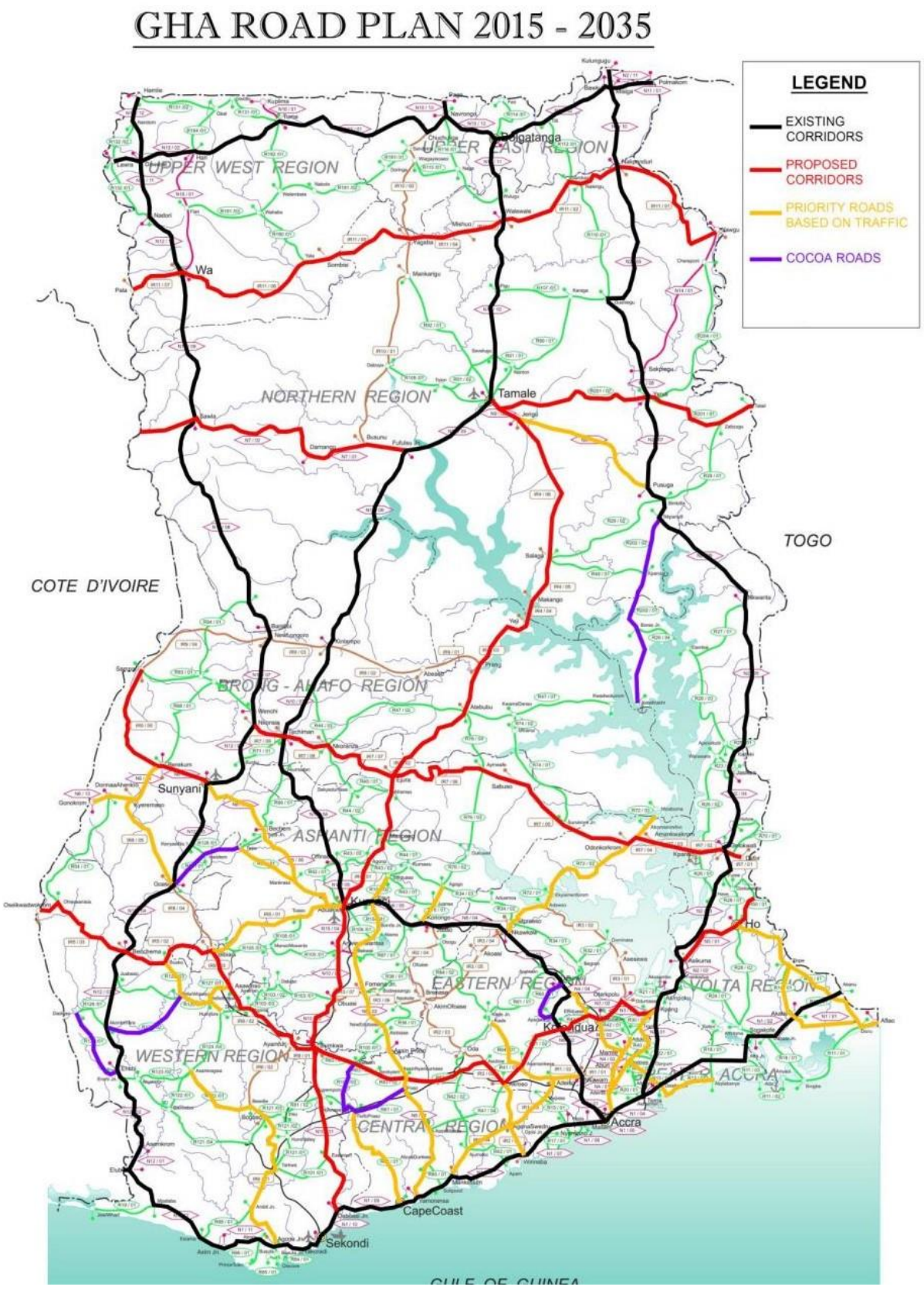
Main Assumptions	
Road	**Socioeconomic Infrastructures**
• Availability of funding for maintenance • Effective road preventive and maintenance • Axle Load Control • Improved management of the Transport sector • Improved management of border-crossing system improved	• Maintenance of socioeconomic infrastructures secured • Water quality tested • Increased access to improved sanitation • Improved management of water and health sectors • Affordability of services provided

	• Adoption of appropriate behavior by beneficiaries	• Regulatory framework for water sector (including tariffs) is established

b.) Project Adapted Logical Framework

AfDB interventions	Sectors	Outputs	Outcomes	Keys indicators	Source of data
• Construction of road between Fufulso and Sawla (147.5 km), long access roads and driveways to socioeconomic infrastructures (6 km) and 2 permanent weighbridges stations.	• Transports	• 147.5 km of road between Fufulso and Sawla • 6 km long access roads and drive ways to socioeconomic infrastructures • 2 permanent weighbridges stations	• Improved transportation • Reduction of transportation cost	• Traffic counts, • Vehicle speeds • Self-reported travel times • Household-level expenditure on transportation	• Traffic survey • Household survey
• Support to Women's agro-processing activities • Construction of markets and lorry parks in Larabanga, Busunu, Fufulso, Sawla and Damongo; • Rehabilitation of the grain storage area at Damongo • Rehabilitation of existing health facilities and Construction of an accident center midway of the road. • Sensitization of project area inhabitants on HIV/AIDS and STIs; malaria and water related diseases; road safety; and environmental protection. • Rehabilitation of existing schools • Construction of infrastructure (parking spaces, signposts and conservation museum) in support to tourism in the Mole National Park.	• Investment and economic infrastructures (industrial, employment and land)	• Markets and lorry parks were built in Larabanga, Busunu, Fufulso, Sawla and Damongo • The grain storage area at Damongo is rehabilitated • Access to agro-processing equipment and marketing opportunities were increased for women	• Increased Investment • Increase employment • land use change	• Number of industrial facilities • Household level employment (percentage of adults with regular work) • Change of the most common land use in the community • Change in types of agricultural crops (self-consumption food to commercial) • Change in commodity prices • Index of durable assets owned	• Household survey
	• Social (health, water and education)	• Existing health facilities and school are rehabilitated • Improved capacity on HIV/AIDS and STIs; malaria and water related diseases; road safety; and environmental protection	• Increased household income in the project area • Improved access to education • Improved access to health • Improved access to clean water	• Household income • Household consumption • School attendance • Number of guinea worm cases • Maternity mortality	• Household survey
	• Tourism	• Parking spaces, sign posts and conservation museum built in or around the parks	• Improved tourism	• Number of tourists visiting Mole Park	• Tourism survey

Annex 3: Project Road



Annex 4: Sample Outcome Variables Drawn from Five Studies

Paper	Outcome Variable (Y)	Data Source	Unit of Analysis
Case Studies			
c) Asomani-Boateng, R., Fricano, R.J. and Adarkwa, F., 2015. Assessing the socio-economic impacts of rural road improvements in Ghana: A case study of Transport Sector Program Support (II). *Case studies on transport policy*, *3*(4), pp.355-366.	**I. Productivity** measured as Food crop outputs; Household income & Household expenditure	Household Survey	Household
	II. Access to social and economic services measured using: - Weeks per year that the road is impassable - Travel time to the nearest market and school - Availability of public transport services - Transport charges to primary school facility - Health facility access	- Community level survey - HH and comm. level surveys - Passenger and vehicle operator survey - Field survey - Household and community level surveys	Household & Community
	III. Market network efficiency - Type of market transaction - Commodity prices of some selected produce which are representative of the study area - Unit cost of transporting passengers and goods to nearest market - Traffic on the road, both motorized and non-motorized transport - Volume of goods moved during two weekdays (one market and one non-market day) - Value of goods moved during two weekdays (one market and one non-market day)	- Field survey - Household and community level surveys - Passenger and vehicle operator surveys - Passenger/vehicle user and community level surveys - Passenger/vehicle user - Passenger/vehicle user	Household, Community & Passengers/ Vehicles
d) Dercon, S., Gilligan, D.O., Hoddinott, J. and Woldehanna, T., 2009. The impact of agricultural extension and roads on poverty and consumption growth in fifteen Ethiopian villages. *American Journal of Agricultural Economics*, 91(4), pp.1007-1021.	I. Rural farm income II. Poverty reduction	Panel Data: Rural Household Surveys	Household, Village-level
e) Khandker, S.R., Bakht, Z. and Koolwal, G.B., 2009. The poverty impact of rural roads: Evidence from Bangladesh. *Economic Development and Cultural Change*, 57(4), pp.685-722.	The transport costs of consumption; costs of agricultural inputs such as fertilizer; aggregate crop output and price indices, labor market outcomes for men and women, boys' and girls' school participation rates, and household per capita expenditure.	Household Survey Village-level surveys	Household, Village-level
Meta-Analysis			
f) Estache, A., 2010. A survey of impact evaluations of infrastructure projects, programs and policies. *European Centre for Advanced Research in Economics (ECARES) Working Paper*, *5*, p.2010.	**Rural Roads:** traffic, transit time, transport costs, accidents, local growth, local income level, household access rates to various social services, academic results, food availability, disease data, mortality, job creation, and number of SME creations.		

Paper	Outcome Variable (Y)	Data Source	Unit of Analysis
	Highways: Transport costs, jobs, income, tax revenue, productivity of firms, diversification of firms and changes in the types of vehicles used.		
g) Grootaert, C. and Calvo, C.M., 2002. Socioeconomic impact assessment of rural roads: methodology and questionnaires. *Impact Evaluation report, INFTD, World Bank, Washington, DC.*	**Indicators for Socioeconomic Impact Assessment of Rural Roads** **Direct Effects:** *i.* ***Transport Project Output Indicators*** - Traffic density (vehicles per day, frequency of bus service) - Road passability (number of days of road closure) - Fares and costs (passenger and freight transport fares) - Transport patterns (number of trips, duration, mode of transport to selected destinations, by age and gender) Vehicle ownership (motorized and non-motorized vehicles owned) - Accidents (injuries and fatalities, by age and gender) *ii.* ***Transport Project Outcome Indicators*** - Access to education (school enrollment and drop-out, by gender) - Quality of education (absenteeism of teachers, availability of school supplies) - Access to health facilities (number of visits, by age and gender) - Quality of health facilities (qualifications of staff, availability of medical supplies) - Access to markets (frequency of visits by age and gender, products sold and bought) - Prices (prices of key commodities, agricultural inputs, land) - Time use of household members (time spent on fuelwood collection and other transport tasks, by age and gender) - Other (access to credit, migration patterns) **Indirect Effects: Welfare Outcome Indicators** - Impact on agricultural activities (crop mix, use of inputs, visits of extension agents) - Impact on non-agricultural activities (activity mix, off-farm employment) - Income structure (type of income sources) - Composition of expenditure (share of food, transportation) - Health status (incidence of illness, number of work days lost due to illness, by age and gender) - Education status (literacy, average years of education, by age and gender) - Social interaction (number of visits to other villages and cities, participation at social events, by age and gender) - Political participation (number of visits by government officials, participation in community or political events, by age and gender)		

Annex 5: Tentative Outcome Indicators for Impact Evaluation

Outcome	Indicator	Indicator Definition	Measurement Unit	Data Source	Method of Data Collection
Direct					
Increased traffic flow	Traffic volume	Total volume of traffic flows (vehicles) per week	Number	-Passengers & Freight	-Traffic Survey -Transport Indicator Database Survey Report -Observation
	Road passability	Weeks that road is impassable during raining season (April-October)	Number of weeks	-Drivers -Households	-Traffic Survey -Household Survey
	Public transport usage	Number of people using public transportation	Number	-Passengers & Freight	-Household Survey
Reduced travel time	Self-reported travel times	Number of km/hour travelled by passengers/freight	Km/hour	-Drivers -Households	-Traffic Survey -Household Survey
Reduced transport cost	Cost of transport fares	Household-level expenditure on transport	GHC	-Households	-Household Survey
Increased access to education	School enrollment	Rate of secondary school enrollment, by gender	Percent	-Households	-Household Survey
	Teacher retention	Rate of teacher retention, by gender	Percent	-Teachers	-In-depth Interviews
Increased access to health	Access to health facilities	Number of visits to health facilities, by gender	Number	-Households	-Household Survey
	Supervised births	Number of supervised births	Number	-Health facilities	-Health Records
Increased access to markets	Visits to markets	Frequency of visits to markets, by age and gender,	Number	-Farmers, market women, business owners	-Market survey -Household Survey
	Products sold and bought	Type and volume of goods traded	Type; Kg	-Market women and men	-Market Survey
	Travel cost to the nearest market	Unit cost of transporting passengers and goods to nearest market	GHC	-Farmers, market women, business owners	-Market survey -Household Survey
Increased employment	Employment resulting from road construction and maintenance	Number of people directly and indirectly employed in road construction and maintenance projects	Number	-Road contractor -District Assemblies in the project area -Ministry of Roads and Highways	-PCR -Interviews
	Household level employment	Percent of economically active population with regular work	Percent	Households	-Household Survey
Intermediate					
Improved household welfare	Household income	Total amount earned by household, by household headship	GHC	Households	-Household Survey
	Household wealth	Index of durable assets owned by household	Score	Households	-Household Survey
	Agricultural productivity/livestock production	Yield per Hectare of three predominant crops cultivated in the area/number of livestock	Kg/Number	Households	-Household Survey
Increased trade/ economic activities	Small enterprises established	Number of small enterprises established in communities within the vicinity of road, by Male/Female ownership	Number	SMEs	-In-depth Interviews -Community Survey -Focus Group
	Livelihood activities generated	Number of economic activities generated by household	Number	Households	-Household Survey
	Tourism Inflows	Number of tourists visiting Mole Park per week	Number/week	Mole Park Records	In-depth Interview
Land values	Rent	Cost per plot of land in communities within vicinity of road	GHC	Community survey	-Focus Group Discussions -Community Surveys

Annex 6: Impact Evaluation projects - Status as at March 2019

	Project Title	Country	Interventions	IE questions	Status as at March 2018
1.	Central Province Rural Water Supply and Sanitation (2003)	ZAMBIA	• Provide sustainable water supply and improved sanitation	• What is the impact of increased access to water and sanitation on rural health and education outcomes?	Project completed
2.	The National Water Development Program (2008)	Malawi	• Urban Water Supply and Sanitation • Market Centre and Rural Piped and Point Water Supply and Sanitation • Water Resources Management • Program Management and Capacity Building	• What is the impact of improved access to water and sanitation on several health outcomes including pre-mature deaths	Project completed
3.	Impact Evaluation of WASH interventions in Tanzania (2006), Led by IDEV	Tanzania	• Increased supply of water • Provision of sanitation facilities • Hygiene	• What is the impact of water, sanitation and hygiene interventions on health, education and labor market outcomes?	Project completed
4.	Impact Evaluation of WASH interventions in Ethiopia (2006), led by IDEV.	Ethiopia	• Increased supply of water • Provision of sanitation facilities • Hygiene	• What is the impact of water, sanitation and hygiene interventions on health, education and labor market outcomes?	Project completed
5.	Malawi HEST project (2012)	Malawi	• Merit based - Scholarships to university students	i. Evaluating the impact of Financing Type on Higher Education Outcomes in Kenya ii. Reducing inequality and poverty through need-based university loans iii. High education Attainment and Labour Market Participation	• Baseline data collected • Project dropped due to procurement delays
6.	Uganda HEST project (2012)	Uganda	• set up a multi-media studio and laboratories at the College of Education and External Studies of Makerere University • train staff on how to integrate ICT into teaching and learning	i. Effectiveness of teacher-training on learning outcomes ii. Using ICT in education to address equity iii. How do exposure to and use of ICTs in school affect future employment?	• Project dropped due to procurement delays •
7.	Kenya HEST project (2012)	Kenya	• Linking of education data • Provision of science-related equipment • Scholarship to teachers (PhD and masters)	▪ Evaluating the impact of Financing Type on Higher Education Outcomes in Kenya ▪ Reducing inequality and poverty through need-based university loans ▪ High education Attainment and Labour Market Participation • Evaluating the impacts of teacher training on access and quality of education • Evaluating the impacts of infrastructure on access and quality of education	• Project dropped since the government reallocated funds that were meant for impact evaluation to other things
10.	Inclusive basic service delivery and livelihood empowerment project: rebuilding the north east for shared prosperity (2017)	Nigeria	• Water supply • Sanitation • Hygiene	• What is the impact of water and sanitation interventions on health, education and labor market outcomes?	• Project delayed due to delays in effectiveness
11.	Interoperability of digital financial services in the West African Economic and Monetary Union, (2017)	WAEMU	• Interoperability of digital financial services	• What is the impact of interoperability of digital financial services on financial inclusion and well-being of populations?	• Project is ongoing
12	Impact Evaluation of Irrigation Development in Malawi led by IDEV.	Malawi	• Irrigation	• What net benefit is accrued to the beneficiaries as a result of these interventions?	• Project is ongoing

Annex 7: Preliminary Communication and Dissemination Plan

Knowledge product	Audience	Communication Channel	Communication product	Timeframe
Approach paper	• BDEV Management • Operations Dept. • Implementing agencies • Beneficiaries • Bank Regional & Country offices • RMC authorities Other evaluation & development partners	• Email • BDEV Website	• Approach paper document (PDF) • Evaluation Webpage	End March 2019
Inception Report	• BDEV Management • Operations Dept. • Implementing agencies • Bank Regional & Country offices • RMC authorities Other evaluations & DPs	• Email • Website • Physical postage of briefs	• Inception Report document • Inception Brief (fact sheet)	Mid May 2019
Draft/Final Technical Impact Evaluation Report	• Operations department • BDEV team • External reviewers	• Reference group meetings	• Draft Summary report document	End August 2019
Summary Impact Evaluation Report	• CODE members • Board Members • Operations Departments/ Country offices	• CODE Meeting • Email	• Summary Evaluation report document	End September 2019
Summary Impact Evaluation Report	• Bank Board and staff (headquarters, regional & country offices) • Implementing agencies • Beneficiaries • RMC authorities • Other evaluation & development partners	• Electronic & Print • ECoP meeting • Website and intranet • Email • Evaluation Matters • eVAL Blog	• Published Summary report • Briefs • Highlights • Infographics • Articles in evaluation matters • Blog	October to November 2019

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