

Ghana - Transportation

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Overview

Identification

COUNTRY

Ghana

EVALUATION TITLE

Transportation

EVALUATION TYPE

Independent Evaluation

ID NUMBER

DDI-MCC-GHA-IE-TRANS-2020-v03

Overview

ABSTRACT

The evaluation of investments in the road infrastructure of Ghana has three main components:

1. Recalculation of the Economic Rates of Return (ERRs) for the project using Highway Design and Management (HDM-4). The results of the HDM-4 analysis show the ERR of the N1 Highway is 22.6 percent; the ERR of the Trunk Road Activity is 4.9 percent; and the overall ERR for the Feeder Roads Activity is 0.4 percent.

2. Performance evaluation of the roads investments,, including studying road maintenance practices, who is using the roads and whether reductions in transportation costs are shared with users. Key results include: (1) Road upgrades led to reduced transportation costs, including major reductions in traffic congestion on the N1; (2) there is some evidence of increased competition in freight and passenger transport, through an increase in the frequency of service and more modes of transport, but (3) road maintenance needs in Ghana far exceeds funds available for maintenance, which may limit the sustainability of the investments in the longer term.

3. Impact evaluation using satellite imagery and secondary survey data. Results show that communities located along improved roads experienced greater asset growth compared to similar communities along roads that were not improved.

EVALUATION METHODOLOGY

Other (Performance Evaluation)

UNITS OF ANALYSIS

Community, households, administrative units; OTHER: road, trip

KIND OF DATA

Other

TOPICS

Topic	Vocabulary	URI
Transport	MCC Sector	

KEYWORDS

Ghana, Ghana compact, Roads, Infrastructure, Transportation, HDM-4, RED

Coverage

GEOGRAPHIC COVERAGE

The project took place on feeder roads in the Northern Region, Volta Region, Eastern Region and Central Region of Ghana, as well as the N1 highway in Accra and a trunk road in the Ashanti region.

UNIVERSE

Road users

Producers and Sponsors

PRIMARY INVESTIGATOR(S)

Name	Affiliation
Mathematica	

FUNDING

Name	Abbreviation	Role
Millennium Challenge Corporation	MCC	

Metadata Production

METADATA PRODUCED BY

Name	Abbreviation	Affiliation	Role
Mathematica	Mathematica		Independent Evaluator

DATE OF METADATA PRODUCTION

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DDI DOCUMENT VERSION

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MCC Compact and Program

COMPACT OR THRESHOLD

Ghana Compact (2007 - 2012)

PROGRAM

To address constraints to economic growth and poverty reduction, the first Ghana compact with the Millennium Challenge Corporation (MCC) aimed to reduce poverty through economic growth led by the agriculture sector. The compact funded three projects designed to increase agricultural production and productivity and enhance the competitiveness of high-value cash and food crops. These were the Agriculture, Transportation, and Rural Development projects. Improvements to transportation networks were funded by the Transportation and Agriculture Projects, including: (1) upgrading a key segment of the National Highway 1 (N1) in order to reduce bottlenecks between the Kotoka International Airport and the Port of Tema, (2) improvements to segments of a secondary, or trunk road in the Afram Basin, and (3) the rehabilitation of tertiary or feeder roads in eight districts.

MCC SECTOR

Transport (Trans)

PROGRAM LOGIC

The investment in Ghana's roads infrastructure was intended to support agribusiness development by expanding access to domestic and international agricultural markets. Roads improvements would reduce vehicle operating costs (VOCs) and travel times leading to increased and cheaper movement of goods and people on the roads. In turn, this would promote access to markets, increase investment, and increase the accumulation of human capital in order to increase the production and productivity of cash crops and the competitiveness of the agricultural sector in international markets. The N1 Highway activity focuses particularly on increased access to national and international markets for agriculture by addressing a major bottleneck near the Tema port within the region of Accra. The expected beneficiaries were road users (including transport operators and vehicle passengers) as well as farmers, who would receive increased cash crop revenue, and households living near the roads.

PROGRAM PARTICIPANTS

Roads users

Sampling

Study Population

Road users

Sampling Procedure

We sampled 12 out of 40 feeder roads for traffic counts from within groupings of roads (referred to as strata) that were created based on the road's region, surface treatment, and traffic volume (high/low). A road was selected for the sample from within the strata with a probability of selection that depends on the length of the road relative to the total length of all roads within the strata. On an ad hoc basis, two important roads were selected with 100% certainty, and we document the rationale for this choice. The remaining 10 roads in the sample were allocated to strata to ensure that at least one road was selected from each strata.

We selected six roads for vehicle intercept surveys from the sample of roads that received traffic counts. The sample selection process for selecting roads for the vehicle intercept survey was purposive and met the following criteria:

1. Roads selected for the vehicle intercept survey also had been selected for traffic counts.
2. At least one road from each region was selected. In the case of Volta region, one road was from the cluster of roads built in the Hohoe district (northern Volta region) and another was from the southern part of Volta region.
3. The sample included the two important roads mentioned above.
4. The sample included at least one gravel road and at least one road with low traffic volume.

The vehicle intercept survey lasted three days per road, including both a market and nonmarket day. On the N1, we randomly sampled approximately 1,000 vehicles, or approximately 0.5 percent of all traffic moving in both directions along the road. On high-traffic feeder roads (more than 1,000 vehicles per day), we sampled 20 percent of all vehicles traveling along the road. For the trunk road and most feeder roads with a lower traffic volume, we sampled a larger proportion of vehicles. Actual sample sizes were 1,038 vehicles on the N1 (0.6 percent of Average Daily Traffic (ADT)), 976 vehicles on the trunk road (19 percent of ADT), and 4,236 vehicles across the six sampled feeder roads (or 11 percent of total ADT on these roads). Response rates are within the targeted range when accounting for surveys not being conducted in the evening or at night out of concern for the safety of enumerators. For vehicles carrying at least one paying passenger, one passenger from each vehicle was randomly selected for the passenger survey.

Deviations from Sample Design

Sample weights for the vehicle intercept survey were computed as the inverse of the probability of selection of the vehicle based on vehicle type and the frequency of that vehicle type in the traffic counts during the same time period. The weight variable is called "weight" and is used with the questions from vehicle intercept survey administered to all respondents. On some roads, in an effort to reduce survey nonresponse, we also conducted an abbreviated version of the survey with drivers who were especially reluctant to participate or who had already completed the full version of the survey at an earlier time. The weight variable for these questions is called "weight_complete" and is used with questions from the vehicle intercept survey that were administered during the full survey but not during the abbreviated survey.

Sample weights for the passenger survey were similarly computed as the inverse of the probability of selection of the passenger based on vehicle type, the frequency of that type of vehicle in the traffic counts, the percent of that vehicle type that were eligible (those to be carrying at least one paid passenger during the vehicle intercept survey), and the number of passengers in that vehicle. The weight variable "weight" and is used with the passenger data.

Response Rate

The response rate for the vehicle intercept survey was 89 percent of vehicles stopped. The response rate for passengers on the passenger and pedestrian survey was 95 percent of sampled passengers. No data was gathered on response and refusal rates for the N1 axle load survey. The overall response rate on the axle load surveys on feeder roads was 82 percent of vehicles stopped.

Questionnaires

Overview

Community (traffic and vehicle operating cost survey), Administrative (transportation agency key informant interviews), Household (vehicle intercept survey and focus groups)

Data Collection

Data Collection Dates

Start	End	Cycle
2018-10-01	2019-07-31	N/A

Questionnaires

Community (traffic and vehicle operating cost survey), Administrative (transportation agency key informant interviews), Household (vehicle intercept survey and focus groups)

Data Collectors

Name	Abbreviation	Affiliation
Daovtech Design Group		

Data Processing

Data Editing

Mathematica worked closely with a local data collection partner to train interviewers and closely monitor the data collection effort to identify challenges and address them while data collection was ongoing.

Upon receipt of the complete datasets, Mathematica conducted additional cleaning to code "other" responses, correct out of range responses, address item nonresponse and inconsistent skip patterns, and conducted merges between different datasets if necessary.

Other Processing

Data entry was conducted manually at the data collection firm's headquarters using a standardized Excel-based data entry template for surveys to reduce errors from out-of-range values and incorrect skip logic. Double data entry was conducted for all surveys and traffic counts, followed by correction of the final datasets to correct errors from the original entry.

Data Appraisal

No content available