

Working Paper 02-06  
November 2002

**Traffic Safety Diagnostic and Application  
of Countermeasures for Rural Roads in Burkina Faso**

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# **Traffic Safety Diagnostic and Application of Countermeasures for Rural Roads in Burkina Faso**

## **Abstract**

The Government of Burkina Faso has recently been conducting important governmental and macro-economic changes, aiming at encouraging the economic growth of the country. In order to maintain this growth, the Government has put in place a transportation program to improve the efficiency and safety of the road network. This paper documents the study carried out in 2000 on the safety improvement of rural roads in Burkina Faso. The primary objectives of the study were to prepare an assessment of traffic safety problems and to propose several countermeasures to reduce the number and severity of collisions on rural roads. To accomplish these objectives, a large sample of rural roads were visited and evaluated; all accident data and important socio-economic variables were collected; and key staff members from various governmental and private agencies were interviewed. The results of the study have shown that traffic safety problems in Burkina Faso are multidimensional, involving inefficient traffic safety management and policy, inadequate road networks, untrained drivers and defective vehicles. Several traffic safety countermeasures have been proposed for immediate, short- and long-term application. The most important countermeasures consist of creating a new institutional framework with which to improve the management of traffic safety and to train the key personnel who will be responsible for implementing traffic safety countermeasures. In the short term, the proposed countermeasures are mainly related to roadway infrastructure improvements and better enforcement tools. In the long term, the proposed countermeasures include the review of current highway traffic laws, their application, the evaluation of countermeasures already in place, and the improvement of driver training.

*Keywords:* Safety, developing countries, rural highways, policy, accidents, Burkina Faso.

## Résumé

Le gouvernement du Burkina Faso a entrepris récemment des changements gouvernementaux et macroéconomiques pour encourager la croissance économique du pays. Dans le but de maintenir cette croissance, le gouvernement a mis en place un programme de transport pour améliorer l'efficacité et la sécurité du réseau routier. Ce document rapporte les résultats d'une étude réalisée en 2000 sur l'amélioration de la sécurité sur les routes rurales au Burkina Faso. Le premier objectif de l'étude a été de préparer une évaluation des problèmes de sécurité routière et de proposer des mesures pour réduire le nombre et la sévérité des accidents. Pour atteindre cet objectif, un important échantillon de routes rurales a été visité et évalué; toutes les données sur les accidents disponibles et sur des variables socioéconomiques ont été cueillies; des membres clés des agences gouvernementales et privées ont été questionnés. Les résultats de l'étude montrent que les problèmes de sécurité routière au Burkina Faso sont multidimensionnels. Plusieurs mesures sont proposées pour des applications immédiates, de court et de long termes. La plus importante mesure consiste à créer un nouvel encadrement institutionnel pour améliorer la gestion de la sécurité routière et pour former le personnel responsable. D'autres mesures concernent l'infrastructure, la surveillance routière, la révision des lois sur la circulation routière et la formation des conducteurs.

*Mots clés :* Sécurité routière, pays en développement, routes rurales, accidents, politiques, Burkina Faso.

## **Introduction**

The Government of Burkina Faso has been conducting, over the last 10 years, important governmental and macro-economic changes aiming at encouraging the economic growth of the country. In order to maintain this growth, the Government has put in place a transportation plan (known as PASEC-T) to improve the efficiency and safety of the transportation network. This program has mainly focused on the construction and rehabilitation of the network. Unfortunately, this program has not put a strong emphasis on the reduction of crashes occurring on the network. Since road accidents have important adverse effects on the economic growth, the Government of Burkina Faso, in 1999, solicited outside partners to prepare a traffic safety study for rural roads. The Canadian International Development Agency (CIDA) agreed to finance the project and mandated a consulting firm in Montreal to carry out the study.

The primary objectives of this study were to conduct a diagnosis of traffic safety problems and propose a series of countermeasures that would allow a substantial reduction in the number of crashes on rural roads within two years of their application. The secondary objective aimed at preventing or minimizing the increase in the predicted number of crashes, despite the fact that traffic flow is likely to increase in the long run. A multidisciplinary team consisting of traffic safety experts, traffic engineers, statisticians, epidemiologists, economists and transportation policy analysts carried out the study in 2000. The team collected all available data such as accident statistics and important socio-economic and demographic variables; visited a large sample of rural roads; and interviewed key personnel from different governmental and private agencies.

This paper documents the results of the study aiming at improving the safety of rural roads in Burkina Faso. The paper is divided into four sections. The first section describes the characteristics of the rural road network. The second section summarizes the characteristics of crashes occurring on this network. The third section describes the results of the assessment of traffic safety problems. The last section presents the proposed countermeasures.

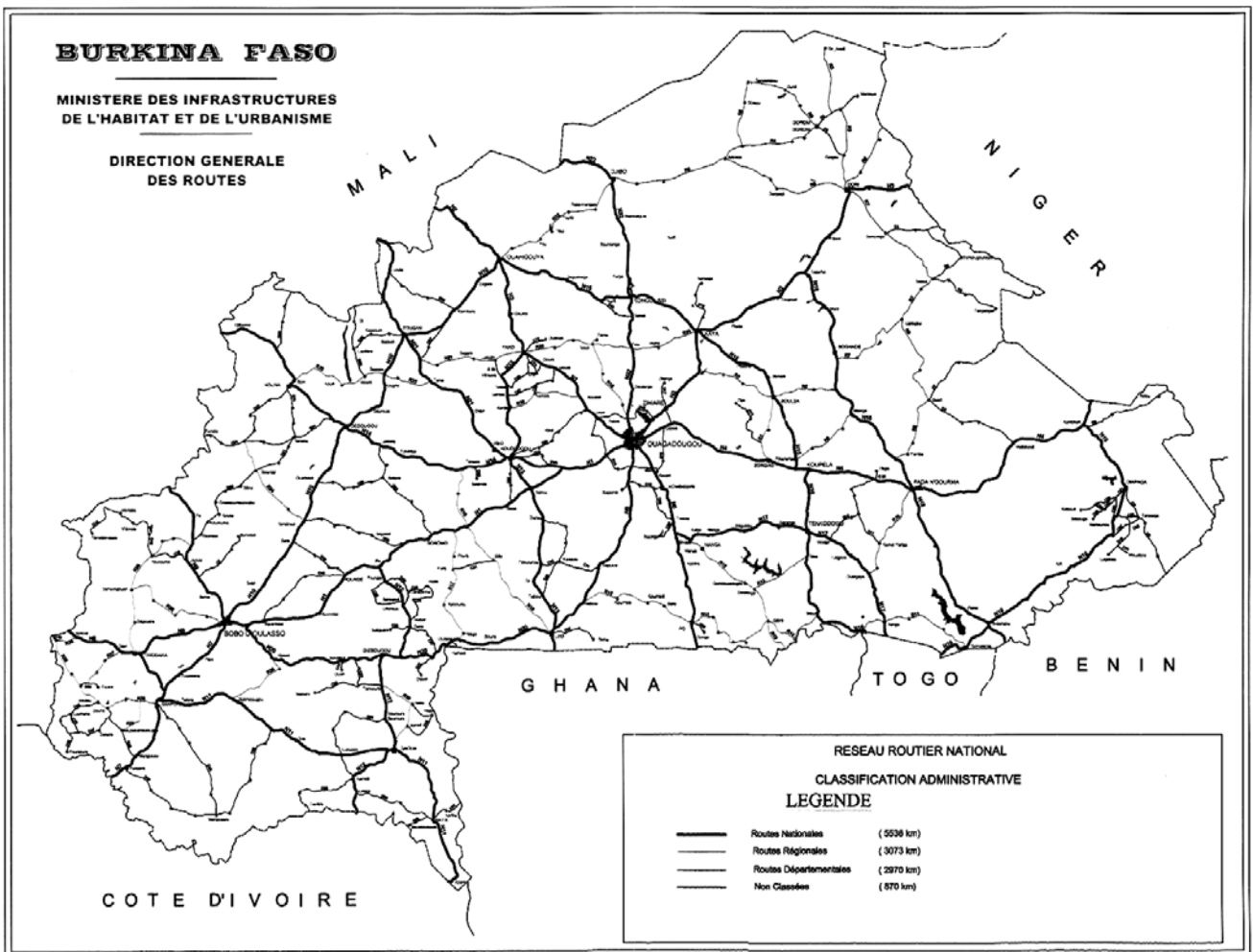
## **Characteristics of Rural Road Network**

Burkina Faso is a country located right at the heart of Western Africa, near the southern border of the Sahara Desert. It is bounded by the Ivory Coast, Ghana, Togo and Benin to the South, Niger to the West, and Mali to the North and East. The surface area of the country is approximately 274,000 km<sup>2</sup>. The population was estimated to be around 10.5 million in 1996 (see 1). The Burkina Faso's economy is primarily driven by the agricultural industry. According to Cloutier (2), the

Gross Domestic Product (GDP) in Burkina Faso was about \$796 (US) per person in 1996, which makes Burkina Faso one of the poorest countries in the world. In fact, the United Nations ranked, based on the Human Development Index, Burkina Faso at no. 172 out of the 175 countries that were evaluated with the newly developed index (2).

The total length of the rural road network is approximately 58,450 km. From this number, only 12,450 km are maintained by the General Directorate of Roads (GDR) (*Direction Générale des Routes*). Figure 1 depicts the rural road network in Burkina Faso. The rural network is classified into four categories: 1) National Roads (NR), 2) Regional Roads (RR), 3) Departmental Roads (DR), 4) and Unclassified Roads. The maintained network includes 155 roads, all identified by a different route number. Only 10 of these roads are either fully or partially paved (3).

**Figure 1. Rural Road Network in Burkina Faso (3)**



Traffic counts are manually recorded twice a year by the GDR, once in May and once in November. A total of 270 temporary traffic-counting stations are used to collect the data. For National Roads, traffic counts are recorded at several locations along the route. The data are collected for a 24-hour period and are separated by vehicle type. Unfortunately, the data does not include mopeds, pedestrians, cyclists or other similar two-wheel vehicles, which represent a good proportion of traffic on rural roads.

Table 1 summarizes the average daily traffic (ADT) for the 10 most important national roads. The statistics are based on the data collected in 1998 and 1999. Table 1 shows that NR01 has the highest vehicular traffic. This outcome is not surprising, since RN01 links the capital Ouagadougou to the second largest city in Burkina Faso, Bobo-Dioulasso. RN07, linking Bobo-Dioulasso to the border of Ivory Coast, has the second highest ADT.

**Table 1. Average Daily traffic (ADT)  
for the 10 Most Important National Roads  
(1998 and 1999)**

| <b>Road Number</b> | <b>Maximum ADT</b> | <b>Minimum ADT</b> | <b>Average ADT</b> | <b>Number of Sections</b> |
|--------------------|--------------------|--------------------|--------------------|---------------------------|
| RN01               | 1354               | 521                | 808                | 7                         |
| RN07               | 771                | 392                | 564                | 4                         |
| RN04               | 1035               | 186                | 528                | 8                         |
| RN02               | 661                | 144                | 353                | 5                         |
| RN05               | 837                | 115                | 337                | 5                         |
| RN09               | 629                | 94                 | 309                | 5                         |
| RN03               | 772                | 18                 | 280                | 8                         |
| RN16               | 630                | 34                 | 251                | 11                        |
| RN14               | 423                | 15                 | 122                | 7                         |
| RN06               | 346                | 11                 | 101                | 5                         |

(Data provided by GDR)

Table 2 summarizes the total number of vehicles by type for the maintained rural network. In this table, the vehicle types are grouped into four categories: passenger cars, buses, trucks and others. Table 2 shows that about 54% of the vehicular traffic are passenger vehicles. Heavy vehicles, such as trucks and buses, account for about 45% of the traffic. It should be pointed out that two-wheel vehicles are not included in this table. The proportion of heavy vehicles is substantially higher than the percentages found on highways located in industrialized countries (see [4](#)). The values presented in Table 2 are national averages and may vary from one road to another.

**Table 2. Number of Vehicles by Type  
Using the Rural Maintained Network (1998-1999)**

|   | <b>Passenger Cars<sup>1</sup></b> | <b>Buses<sup>2</sup></b> | <b>Trucks<sup>3</sup></b> | <b>Others<sup>4</sup></b> | <b>Total</b> |
|---|-----------------------------------|--------------------------|---------------------------|---------------------------|--------------|
| Total vehicles (1998-1999)<br><i>4 counting periods</i>   | 73 328                            | 30 782                   | 31 473                    | 1 028                     | 136 611      |
| Percentage  | <b>54 %</b>                       | <b>22 %</b>              | <b>23 %</b>               | <b>1 %</b>                | <b>100 %</b> |
| 1 = Passenger Cars, Pickup Trucks, SUVs<br>2 = Minibus, Buses<br>3 = Trucks with 2 and 3 axles, Tractor-Trailers<br>4 = animal-power vehicles, etc. |                                   |                          |                           |                           |              |

(Data provided by GDR)

### **Characteristics of Crashes**

This section describes the characteristics of crashes occurring on the rural road network. This was achieved by conducting an exploratory analysis of the reported crash data. At this point, it is very important to warn the reader about the issue related to underreported crashes. Similar to what is observed in other developing countries, a substantial portion of crashes is not reported to governmental authorities. The magnitude of the problem in Burkina Faso is currently unknown. While conducting the exploratory analysis, it has been discovered that many crashes are settled between the parties involved in the collision and are therefore not reported. This predicament is also compounded by the problems related to the data collection process. These problems are described in greater detail in the next section.

The Traffic Safety Brigade (TSB) (*Brigade de la Prévention Routière*), a directorate of the National Police (NP) (*Gendarmerie Nationale du Burkina Faso*), is exclusively responsible for collecting information related to crashes occurring on rural roads. At the crash scene, the police officer collects relevant information in a notepad and fills out the accident report once back at the police station. A copy of the accident report is then sent to the General Directorate of Terrestrial and Maritime Transportation (GDTMT) (*Direction Générale des Transports Terrestres et Maritimes*). Once the directorate receives a copy of accident report, it is coded electronically into a database program known as SIAAC.

Table 3 presents the number of total and injury-related crashes reported to authorities, as provided by the GDTMT. This table shows that, between 1995 and 1999, about 250 crashes were reported annually. In addition, the exploratory analysis indicates that about 70% of crashes are classified as causing injury, which twice the percentage is found in developed countries (5). The high percentage of fatal and non-fatal injury crashes can be attributed to under-reported crashes and the higher number of injured occupants per crash (e.g., no seat-belt laws, higher number of occupants per vehicle especially in buses, minivans and trucks, etc.).

**Table 3. Number of Reported Crashes by Severity (1995-1999)**

| <b>Year</b> | <b>Total Crashes</b> | <b>Fatal and Non-Fatal Injury Crashes</b> | <b>Percent Injury</b> |
|-------------|----------------------|---|-----------------------|
| 1995        | 72                   | 50  | <b>69,4 %</b>         |
| 1996        | 117                  | 63  | <b>53,9 %</b>         |
| 1997        | 244                  | 193                                       | <b>79,1 %</b>         |
| 1998        | 265                  | 190                                       | <b>71,7 %</b>         |
| 1999        | 258                  | 171                                       | <b>66,3 %</b>         |
| Total       | 956                  | 667                                       | (avg.) <b>69,7 %</b>  |

(Data provided by GDTMT)

Table 4 summarizes the number of crashes by route number. This table shows that more than 60% of all crashes occur on NR01, NR02, NR04, NR05 and NR07 respectively. However, these roads are also the ones with the highest traffic flow (see Table 1).



**Table 4. Number of Crashes by Route Number (1995-1999)**

| <b>Road Number</b> | <b>Number of Crashes</b> | <b>Percent</b> |
|--------------------|--------------------------|----------------|
| RN04               | 203                      | 21,23 %        |
| RN01               | 190                      | 19,87 %        |
| RN07               | 71                       | 7,43 %         |
| RN02               | 66                       | 6,90 %         |
| RN05               | 47                       | 4,92 %         |
| RN22               | 38                       | 3,97 %         |
| RN03               | 37                       | 3,87 %         |
| RN09               | 32                       | 3,35 %         |
| RN16               | 30                       | 3,14 %         |
| RN14               | 26                       | 2,72 %         |

(Data provided by GDTMT)

Table 5 shows the proportion of vehicles involved in a crash. The table illustrates that buses, trucks and two-wheel vehicles are involved in more than 60% of all crashes. Passenger cars are involved in 31% of crashes. By comparing the values found in Table 5 with the ADT data presented in Table 2, it can be shown that crashes involving heavy vehicles are over-represented. Since Table 2 does not include two-wheel vehicles, the proportion of heavy vehicles is expected to be actually lower than the value currently displayed in this table; two-wheel vehicles are a popular mode of transportation in Burkina Faso. Hence, the ratio between crashes and ADT is likely to be above 1 for this category of vehicles. The analysis has shown that two-wheel vehicles are most often hit by passenger cars and sport utility vehicles (SUVs). The speed for this type of collision is an important contributing factor. In fact, vehicle speeds were collected at key locations on the rural network, and many vehicles were observed traveling at speeds above 80 km/h.

**Table 5. Proportion of Crashes by Vehicle Type**

| <b>Passenger<sup>1</sup><br/>Cars</b>       | <b>Buses</b> | <b>Trucks</b> | <b>Two-<br/>wheels</b> | <b>Animal<br/>Powered</b> | <b>Others</b> | <b>Total</b> |
|---|--------------|---------------|------------------------|---------------------------|---------------|--------------|
| 31 %  | 10 %         | 23 %          | 30 %                   | 5 %                       | 1 %           | 100 %        |
| 1 = same categories as presented in Table 2 |              |               |                        |                           |               |              |

(Data provided by GDTMT)

The exploratory analysis of the crash data has shown that more than 50% of all crashes involve only one vehicle. In effect, most of these crashes are ran-off-the-road. Two important contributing factors for this type of crash include the quality of the road surface (to be discussed in the next section) and the traveling speed. It should be pointed out that passenger cars hit more than half of the pedestrians who were killed or seriously injured.

Collisions involving two or more vehicles (passenger cars, SUVs, trucks and buses) occur most often near urban centers (55%), where the interaction between different vehicle types is greatest. On the other hand, single-vehicle crashes happen more often on road sections located between villages.

## **Diagnosis of Traffic Safety Problems**

The diagnosis of traffic safety problems in Burkina Faso has been accomplished by simultaneously evaluating all the components that have a direct effect on safety. First, the consulting team conducted a detailed analysis about how traffic safety is managed by the Government of Burkina Faso. The analysis included a critical review of all relevant traffic laws and their application by the TSB; the appraisal of the institutional framework currently used to manage traffic safety and the relevant qualification and experience of each staff member; an interview of all key personnel in the Government, the private sector, such as hospitals and insurance companies, and people living in villages located along rural roads; and, the collection of all important socio-economic and demographic variables from various governmental agencies. Second, the consulting team surveyed a substantial number of rural roads to collect information on the physical characteristics of the roadway, conducted a highway sign inventory, and assessed driving behavior. Finally, all the components related to the data collection process and the analysis of crash data were evaluated.

At the beginning of the project, several documents were reviewed in order to better understand typical traffic safety problems in developing countries. At the same time, many technical documents were also examined to evaluate how current state-of-the-art methods in traffic safety analysis could be used in this study (see 6, 7, 8, 9). Over the last 20 years, several studies have been performed on traffic safety problems in developing countries. The documents reviewed included research reports on policy, engineering and social costs (10, 11, 12, 13, 14). Other relevant documents were reviewed, but they were still confidential at the time this paper was written.

The entire study has been performed in collaboration with the Government of Burkina Faso. To this end, the GDTMT provided two directorate directors to assist

the consulting team during each step of the study. In addition, a special review committee with members coming from different governmental agencies and academia supervised the entire study. The committee members were able to provide very useful feedback at two key meetings. The excellent collaboration enabled the consulting team to fully understand all the important issues related to the diagnosis of safety problems and the application of countermeasures tailored for Burkina Faso. This collaboration is greatly appreciated.

The assessment has shown that traffic safety problems in Burkina Faso are multidimensional combining inefficient traffic safety management and policy, inadequate road networks, untrained drivers and defective vehicles. Each topic is treated separately below.

## **Management of Traffic Safety**

One of the most important factors that affect traffic safety is the lack of collaboration between different agencies and ministries within the Government. In Burkina Faso, the management of different components of the transportation system falls under the responsibilities of two ministries. The Ministry of Infrastructure, Habitat and Urbanism (MIHU) (*Ministère des Infrastructures, de l'Habitat, et de l'Urbanisme*) is responsible for the maintenance of the roadway infrastructure. On the other hand, the Ministry of Transportation and Tourism (MTT) (*Ministère des Transports et du Tourisme*) is the entity responsible for developing traffic laws, training drivers, and collecting crash data. Unfortunately, the collaboration between the two is deficient, which results in the inefficient use of available resources to properly manage the transportation network. For example, they do not share critical information such as providing traffic flow counts and physical characteristics of the rural network for safety analyses.

There are many traffic laws that currently exist to regulate the movement of goods and people on the transportation network. They include regulations for driver education, vehicle licensing, and the Highway Traffic Act (Code Rousseau). The critical review has shown that current traffic laws are inadequate to properly regulate the transportation network. For instance, there is no regulation for the mandatory use of seatbelts or helmets. The fines are currently too low to have a substantial impact on the behavior of drivers. The most important drawback, however, is in the application of the Act by the TSB. Unfortunately, police officers are not well equipped to properly apply the law. The TSB does not own any radar guns, breathalyzers or SUV vehicles (police officers still ride low-powered motorcycles or mopeds). It is also well-known that many drivers borrow good quality vehicle parts to successfully pass the mechanical inspection performed by

the Center for Vehicle Control (CVC) (*Centre de Contrôle des Véhicules Automobiles*).

The National Committee on Traffic Safety (NCTS) (*Comité National pour la Sécurité Routière*) is the agency responsible for the global management of traffic safety. This committee is supervised by the MTT. While the GDTMT, a directorate of the MTT, is responsible for the day-to-day activity related to traffic safety, the NCTS responsibilities are associated with the development of the National Traffic Safety Policy (e.g., introduction of new traffic laws, safety campaigns, etc.). The agency is basically a consulting organization to the Government. Its members include people from various ministries, the National Police, unions, and private organizations. The director of the GDTMT heads the committee. The NCTS has a general assembly, an executive office, several technical committees and meets once or twice a year.

The NCTS was created by the Government with the aim of reducing the number of crashes in Burkina Faso. The underlying premise of the NCTS was to propose and coordinate traffic safety initiatives with the help of various governmental agencies. In its application however, the NCTS is unfortunately plagued by serious limitations. First, there is lack of communication, similar to what was described above, between the various committee members. In fact, there are members who are currently boycotting the annual meeting. Second, the budget allocated by the government to allow the committee to initiate traffic safety activities is too low (about \$5,000 US per year). Third, since the NCTS is only a consultation-based committee, it is not able to properly implement traffic safety projects.

The consulting team had the opportunity to assess the qualification of the people (6) who are currently managing traffic safety. Although some managers have graduate degrees (i.e., master's degree), nobody has any specific training in traffic safety. The majority of the managers obtained degrees in law, economics or political science. There is only one person who is trained as an engineer but not in civil engineering, a field related to the construction, maintenance, and operation of highways.

The data collection process currently has many shortcomings and needs to be completely overhauled. One of the important limitations includes important variables not collected at the crash site (e.g., turning maneuver, direction of travel, etc.) since they are not included on the accident report. Another limitation is related to the lack of a unique identification number that can be used to track down accident reports. The fields in the electronic database do not exactly match the ones used in the accident report. The most important shortcoming, however, concerns staff not being properly trained to use the database program and perform

proper data quality control. Overall, the assessment of the data collection process showed that the quality of the data was very poor.

## **Highway Infrastructure**

Two teams of traffic engineers and traffic safety experts visited and surveyed several highway segments located in rural areas. The results of these visits showed many critical deficiencies. First, the roadway infrastructure and highway signs were found to be problematic on many highway segments. Some examples include the following: no pavement marking are used to separate the traffic traveling in opposite directions on paved roads; there is a substantial number of missing highway signs (most are stolen by people living in rural areas); the traveling lanes and shoulders are plagued by dangerous potholes, which increases the likelihood of losing control of the vehicle; there are many steep sideslopes (side slopes ou sides lopes?) and roadside hazards not protected by barriers or guardrails, especially near bridges.

Second, there exist many restrictions that impede the flow of traffic near the entrance of cities and villages. Typically, these locations are used for commercial activities, where people set shops on each side of the road. This commercial activity often leads to parked vehicles partially obstructing the throughway and to high pedestrian crossings. This activity creates serious safety problems since many vehicles enter villages at high speeds. As a matter of fact, many of these sites were identified as “black spots” (this will be subject of a subsequent paper).

Third, the sharing of the limited highway space by different transportation modes has a direct influence on safety. In rural areas, the only way to travel between adjacent villages is usually by road. Thus, we find passenger cars, bicyclists, pedestrians, and animal-powered vehicles traveling together. In this situation, we have a mix of high- and low-speed vehicles, which increases the likelihood of a collision (15, 16). The survey teams witnessed first-hand many conflicting situations between different transportation modes. The presence of straying domestic animals on the roadway was also found to be a safety problem.

## **Driver Behavior**

The behavior of drivers traveling on rural roads is very disturbing. The survey teams noticed many drivers taking unnecessary risks, given the deficiencies related to the road and the vehicle. As discussed above, many vehicles were caught traveling in excess of 80 km/h on roads (85<sup>th</sup> percentile) where the surface conditions would warrant a driving speed below 40 or 50 km/h; speed readings (95

observations) were performed informally on road sections with different speed limits. It has been noted that, in many instances, drivers “play chicken” with one another. In one instance, the vehicle used by the main author was almost driven off the road by a bus driver who did not appreciate being overtaken.

One factor that explains the high proportion of injuries (see Table 3) is the non-use of seatbelts by the vehicle occupants. Although most vehicles have seatbelts, nobody wears them. As explained above, there is no law in effect on the mandatory use of seatbelts. Similarly, many vehicles, including trucks and buses, do not have enough seats for the number of occupants. According to the TSB, alcohol related crashes are also a major problem in Burkina Faso. The magnitude of the problem is unknown since the Brigade does not have the proper equipment to test the drivers who are suspected of drinking and driving.

## **Mechanical Condition of Vehicles**

The mechanical inspection of vehicles is mandatory in Burkina Faso. Depending on their type, vehicles must be inspected from every 3 months for commercial vehicles to once a year for passenger cars. Based on the visual surveys conducted while assessing various rural road segments and interviews with CVC officials, it is evident that many badly maintained vehicles are able to pass the mechanical inspection without a glitch. The survey found a substantial number of vehicles with black smoke coming from the tailpipe so dark that it created a safety hazard for the vehicles traveling behind, tractor-trailers with twisted frames, and trucks built from unrelated vehicle parts. As discussed above, many drivers borrow vehicle parts before going for the vehicle inspection at the CVC. Unfortunately, the Government of Burkina Faso is currently unable to prevent this problem.

Almost all commercial vehicles (i.e., buses and trucks) travel with loads far exceeding the physical capacity of the vehicle. The survey teams witnessed many trucks carrying loads at least as high as the truck itself. In other instances, many buses were seen with suitcases, freight and live animals on the roof. These vehicles have a center-of-gravity so high that any emergency maneuver will automatically lead to a severe crash. The main author witnessed an inter-city bus traveling much too fast and nearly losing control on NR01. A fatal bus crash with multiple deaths occurred on the same National Road the day the consulting team arrived in Burkina Faso.

## Countermeasures

Several traffic safety countermeasures were proposed to the Government of Burkina Faso for immediate, short- or long-term applications. The complete list of countermeasures is summarized in Table 6. The most important and critical countermeasure was the introduction of a new national transportation safety policy. The aim was to create a new institutional framework that would allow the Government to properly manage traffic safety. Without this framework, most other countermeasures will be difficult to implement. The proposed safety policy consists of creating a new administrative agency, training the key personnel who will be responsible for managing traffic safety, providing adequate funding, and implementing a new crash data collection system. It is important to point out that the special review committee accepted all the proposed countermeasures. This committee provided valuable information that allowed the consulting team to propose a new policy tailored for the current political and economic climate in Burkina Faso.

**Table 6. Summary of Countermeasures**

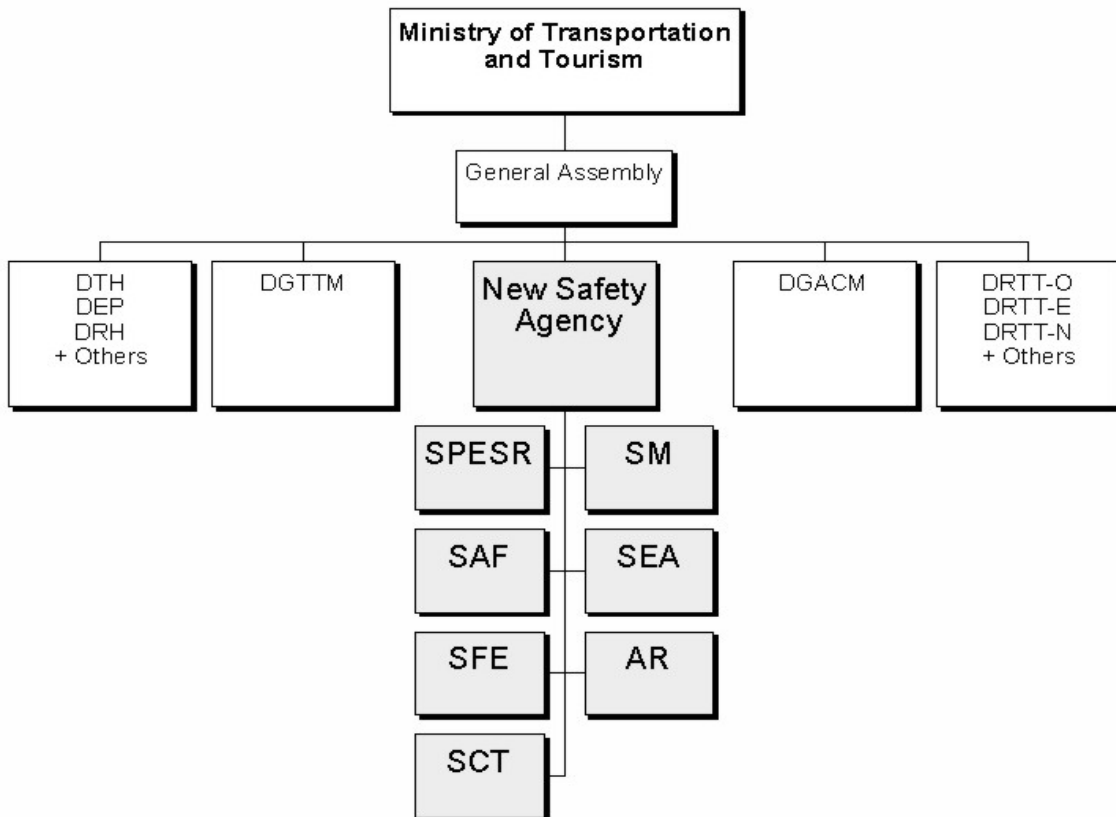
| Countermeasure                       | Category       | Action                   | Anticipated Impacts           |
|--------------------------------------|----------------|--------------------------|-------------------------------|
| <i>Immediate to Short-Term</i>       |                |                          |                               |
| Institutional Framework              | Institutional  | Study                    | Improving Government Response |
| Financing                            | Institutional  | Study                    | Improving Government Response |
| Training for Current Managers        | Institutional  | Implementation           | Improving Government Response |
| Data Collection Process              | Institutional  | Implementation           | Improving Government Response |
| Treatment of Hazardous Sections      | Infrastructure | Study/<br>Implementation | Improving Road Conditions     |
| Physical Enhancements: Villages      | Infrastructure | Study/<br>Implementation | Improving Road Conditions     |
| Physical Enhancements: Rural Network | Infrastructure | Study/<br>Implementation | Improving Road Conditions     |
| Traffic Signs Program                | Infrastructure | Study/<br>Implementation | Improving Road Conditions     |
| Pavement Markings                    | Infrastructure | Study/<br>Implementation | Improving Road Conditions     |

| <b>Countermeasure</b>  | <b>Category</b> | <b>Action</b>            | <b>Anticipated Impacts</b>    |
|--|-----------------|--------------------------|-------------------------------|
| Repairs of Potholes  | Infrastructure  | Implementation           | Improving Road Conditions     |
| Treatment of Unpaved Roads (oil-based products)  | Infrastructure  | Implementation           | Improving Road Conditions     |
| Program to Increase the Night-Visibility of Road Users                                 | Road Users      | Study/<br>Implementation | Improving Road Conditions     |
| Promotion and Education <sup>1</sup>   | Road Users      | Study/<br>Implementation | Improving Driver Behavior     |
| Safety Campaigns <sup>1</sup>  | Road Users      | Study/<br>Implementation | Improving Driver Behavior     |
| <i>Mid- to Long-Term</i>   |                 |                          |                               |
| Safety Audits System   | Infrastructure  | Study                    | Improving Road Conditions     |
| “Positive Guidance” Study  | Infrastructure  | Study                    | Improving Road Conditions     |
| New Highway Section Identification System  | Infrastructure  | Study                    | Improving Road Conditions     |
| Enforcement (work, equipment, training, financing)                                     | Institutional   | Study                    | Improving Driver Behavior     |
| Improved Mechanical Inspections (CVC)  | Institutional   | Study                    | Improving Vehicle Conditions  |
| Program to Reduce the Borrowing of Legitimate Vehicle Parts                            | Institutional   | Study                    | Improving Vehicle Conditions  |
| Review of Current Highway Act  | Institutional   | Study                    | Improving Government Response |
| Evaluation of New Traffic Laws   | Institutional   | Study                    | Improving Government Response |
| Improved Driver Training Program   | Institutional   | Study                    | Improving Driver Behavior     |
| Promotion and Education <sup>1</sup>   | Road Users      | Study                    | Improving Driver Behavior     |
| Safety Campaigns <sup>1</sup>  | Road Users      | Study                    | Improving Driver Behavior     |
| <sup>1</sup> Different programs are implemented in the short-term and in the long-term |                 |                          |                               |



Two alternative institutional frameworks have been proposed to the Government. The first alternative proposes the creation of a new traffic safety agency that will be managed by the MTT (Figure 2). The new agency will be merged with the current CVC into one common entity and will be governed by a board of directors. It will have 7 technical departments. This institutional framework is currently being exploited in other developing countries, such as in Ivory Coast, and in some developed countries such as various department of transportations (DOTs) in Canada and the United States. This framework has been shown to work well, though an important governmental restructuring will be required before it will be implemented. In addition, a sizeable number of new employees will have to be trained to run day-to-day activities. Thus, it may be difficult to implement this alternative in the short term.

**Figure 2. 1<sup>st</sup> Proposed Alternative**



Note: Acronyms are for French titles

**Acronyms (translated):**

Safety Agency:

SPESR: Traffic Safety Planning Services

SM: Maintenance Directorate

SAF: Administration Department

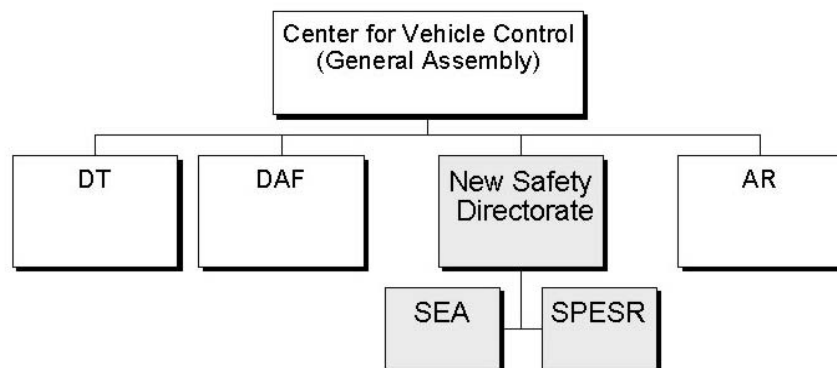
SEA: Department of Special Studies and Analysis  
 SFE: Personnel Training Services  
 AR: Regional Offices  
 SCT: Vehicle Inspection Services

Other existing agencies, departments or directorates:

DTH: Directorate of Tourism and Hotels  
 DEP: Planning and Studies Directorate  
 DRH: Department of Human Resources  
 DGTTM: General Directorate of Terrestrial and Maritime Transportation  
 DGACM: General Directorate of Air Transportation and Weather  
 DRTT, etc.: Regional Antennas (East, West, North)

The second alternative proposes the creation of a traffic safety directorate within the CVC (Figure 3). The new directorate will be smaller in scope than the agency proposed in the first alternative and will contain two technical services: one for crash analyses and another for safety planning and marketing respectively. This directorate will greatly benefit from the latest technological support available at the CVC. In addition, the Center is a financially independent agency since all the revenues are generated from the fees it collects. This independence should guarantee a steady source of income for the new directorate. However, the collaboration between the new directorate and other ministries or agencies may be problematic. This framework will be less flexible than the one proposed for the first alternative, since the directorate will not be as independent.

**Figure 3. 2<sup>nd</sup> Proposed Alternative**



Note: Acronyms are for French titles

## **Acronyms (translated):**

### Safety directorate:

SEA: Department of Special Studies and Analysis

SPESR: Planning, Evaluation and Promotion of Traffic Safety Services

### Other existing agencies, departments or directorates:

DT: Technical Directorate

DAF: Financial and Administrative Directorate

AR: Regional Offices

The final decision for the selection of the best alternative is in the hands of the Government of Burkina Faso. In either case, the new agency or directorate will be responsible for the management of traffic safety. It will collect and analyze crash data; conduct safety studies; recommend and propose countermeasures to improve safety; and will coordinate efforts to promote safety. Above all, it must be administratively independent and given sufficient funding. The agency will have authoritative power over other agencies for any traffic safety policies or safety-related projects.

The consulting team proposed several sources of financing in order to adequately fund the new institutional framework. Potential sources include direct subsidies from the Government, sharing the profits made by the CVC, the introduction of new taxes (e.g., gas, insurance, etc.), and using funds obtained from traffic offences. The reader is referred to the original document (3) to obtain additional information on the proposed sources of financing.

In order to effectively manage traffic safety, a new program must be put in place to educate the employees. This program is divided into two distinct phases. The first phase targets the staff currently working in traffic safety. It consists of sending a selected number of governmental employees to other countries such as Canada to attend a series of multidisciplinary seminars on safety management. The seminars would focus on the social, technological and behavioral factors affecting crashes, statistical analysis of crash data, and the application and evaluation of countermeasures to reduce the number and severity of crashes. At the completion of the seminars, the participants should have gained an extensive understanding of issues related to the management of traffic safety.

The second phase, applicable in the long term, aims at training traffic safety specialists in various fields related to traffic safety, such as in public health, psychology, statistics, and civil engineering. For this phase, selected people will be sent to universities outside Burkina Faso to obtain graduate degrees in the related fields, thereby acquiring a thorough understanding of specific problems in traffic

safety. With these skills, they will be able to train the new agency personnel. Thus, the Government may not have to rely further on outside resources to manage traffic safety and conduct studies.

There is an important need, in the short term, to completely rework the data collection process. As part of this overhaul, a new accident report must be created in order to collect additional variables and improve the quality of the data. The proposed report should get input from both the TSB and the new traffic safety agency (or directorate). The overhaul of the collection process should include the acquisition of a new computer system and the creation of a database program specifically designed to store all the information recorded on the accident report. Computer analysts must also be trained to manage the crash data collection system efficiently.

One objective of the study was to reduce the number and the severity of crashes in the short- and long-term. To attain this objective, the proposed countermeasures have been regrouped into five categories: road infrastructure, enforcement, vehicles, transportation policy, and education. The staff currently in place can already apply some of the proposed countermeasures.

The countermeasures, which should have immediate positive effects on the number of crashes, are related highway infrastructure improvements. The proposed countermeasures are: the physical enhancement at city limits of villages to reduce vehicle speed and minimize conflicting maneuvers, the more widespread use of traffic signs (prevent theft) and pavement markings, the treatment of black spots identified in the study, and the evaluation and monitoring of treated sites to confirm the reduction in the number of crashes.

Enforcement is an efficient technique to improve traffic safety, as long as it is applied realistically and consistently. The role and financing of the TSB must first be reevaluated. It is proposed to introduce one or two specialized mobile units in order to increase the presence of the Brigade on the rural network. A greater visibility by the police is usually associated with better driver behavior (*17*). An effort should be placed on the enforcement of traffic laws regulating commercial vehicle activities, such as the mechanical inspections of vehicles and the assessment of proper driving permits.

In order to implement the above countermeasure successfully, the Government must re-examine the financing structure of the TSB. The mobile units must be provided with all the necessary equipment to perform their duties to the highest possible standards. The Government should buy 4x4 SUV vehicles, radar guns, and breathalyzers. Obviously, police officers must also be trained to use this

equipment properly. To improve quality of the fieldwork, it is strongly suggested to introduce monetary bonuses for field assignments successfully accomplished.

As discussed above, many vehicles, particularly tractor-trailers and buses, have important mechanical deficiencies. It is, therefore, important to substantially improve the mechanical condition of the vehicular fleet in Burkina Faso. In addition to the increased enforcement described above, the proposed countermeasures include the re-examination of all the technical criteria currently being applied to evaluate the mechanical condition of vehicles by the CVC, and the development of a statewide campaign, in collaboration with the Ministry of Justice, to minimize the borrowing of legitimate vehicle parts for the mechanical inspection. Enforcement alone cannot be successful without first educating the driving population (*18*).

The current Highway Traffic Act and all laws that have an effect on transportation policy must be reviewed and updated to reflect the current state of the transportation system (i.e., the driver, the road, and the vehicle). This review process is unlikely to be accomplished in the short term. It should focus on the broad dissemination of the Act in order to better educate the population, the improvement of the material taught in driving schools, on the process for obtaining a driver's license, on how enforcement is applied by the TSB, on better tools to train professional drivers, and on the harmonization of transportation-related laws with other countries in West Africa. Finally, new traffic laws should be studied, such as the mandatory use of seatbelts, prevention of driving under the influence of alcohol, and the introduction of a demerit point system to identify dangerous drivers.

The promotion of traffic safety can be an efficient tool, in the long term, to reduce the number of crashes. The proposed traffic safety agency/directorate should prepare safety campaigns aimed at both the political establishment (to educate and secure financing) and the population at large, including pedestrians and cyclists. The social component of study has shown that traffic safety ranks as one of the most important concerns for women living in rural areas. The woman is the person who is the most affected in the event a family member is killed or becomes seriously injured (e.g., financial responsibility). Thus, a lot of effort should be placed on educating people living in villages on proper safety behaviors. This could be accomplished by giving seminars to grade school teachers.

## **Summary and Conclusion**

Vehicular crashes have become one of the most important problems in developing countries since they can adversely affect economic growth and create important social costs. The Government of Burkina Faso, understanding the importance of this problem, has solicited outside partners to perform a diagnosis of traffic safety problems and develop a series of countermeasures aimed at reducing vehicular crashes on rural roads. The results of the study presented herein have shown that extensive traffic safety problems exist in Burkina Faso. There are deficiencies related to the management of traffic safety, the physical characteristics of the rural road network, the behavior of drivers, and the mechanical condition of vehicles. To reduce the number and severity of crashes, several traffic safety countermeasures have been proposed for immediate, short- and long-term applications. Two alternative institutional frameworks have also been proposed in order to improve the management of traffic safety. No matter which alternative is selected, key personnel must be trained adequately. In the short term, the proposed countermeasures are mainly focused on roadway infrastructure improvements and better enforcement technology. In the long term, the proposed countermeasures include the review of current highway traffic laws and the improvement in driver training. In the end, the success of the project and the implementation of its recommendations rely exclusively on the political will of the Government of Burkina Faso. Government officials now have the opportunity to become leaders in West Africa for the application of a well-managed traffic safety policy. Finally, The Government of Burkina Faso has recently accepted all the conclusions of the study and is currently looking for outside funding mechanisms to develop many of the countermeasures presented in this paper.

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