



# Use of seat belts in rural Alberta: an observational analysis

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**Objective:** This paper details an observational study that estimates rates for wearing seat belts in rural Alberta and compares them with rates derived from a similar study conducted in 1999.
**Method:** Direct observations of drivers and front-seat passengers of 72 593 light-duty vehicles were carried out at 334 survey locations in communities with populations of fewer than 25 000, throughout northern, central and southern Alberta. In addition to seat belt use, information collected included vehicle type, gender of drivers and passengers and, at intersections controlled by a stop sign, whether or not the vehicle came to a complete stop.
**Results:** The results indicate that in 2001 in rural Alberta the estimated proportion of driver and front-seat passengers of light-duty vehicles using seat belts was 76.1%. When compared with 1999 data, this represents a 6.9% increase in seat belt wearing rates. The data was desegregated further to show differential wearing rates between drivers of different vehicle types, males and females, drivers and passengers, and between those who came to a complete stop at a stop sign and those who did not. The time of day in which data collection took place also had some influence on seat belt wearing rates.
**Discussion:** This study contributes valuable information to programs and initiatives that aim to increase the use of seat belts in rural Alberta.

**Objectif :** Cet article décrit une étude par observation au cours de laquelle on a estimé les taux de port de la ceinture de sécurité en milieu rural en Alberta et les compare aux taux dérivés d'une étude semblable réalisée en 1999.
**Méthode :** On a observé directement le conducteur et le passager avant de 72 593 véhicules légers à 334 points de sondage dans des communautés de moins de 25 000 habitants du nord, du centre et du sud de l'Alberta. Outre le port de la ceinture de sécurité, les renseignements recueillis portaient sur le type de véhicule, le sexe du conducteur et du passager et, aux intersections contrôlées par un arrêt, sur l'arrêt complet ou non effectué par le véhicule.
**Résultats :** Les résultats indiquent qu'en 2001, en milieu rural en Alberta, on estime que 76,1 % des conducteurs et des passagers du siège avant de véhicules légers portaient la ceinture de sécurité. Comparativement aux données de 1999, ces chiffres représentent une augmentation de 6,9 % du taux de port de la ceinture de sécurité. On a désagrégé les données davantage pour montrer les taux différentiels de port de la ceinture entre les conducteurs de différents types de véhicules, les hommes et les femmes, les conducteurs et les passagers, et entre ceux qui ont fait un arrêt complet et ceux qui ne l'ont pas fait. L'heure du jour à laquelle on a recueilli des données a aussi eu un effet sur les taux de port de la ceinture de sécurité.
**Discussion :** Cette étude produit de l'information précieuse pour les programmes et les initiatives visant à accroître le taux de port de la ceinture de sécurité en milieu rural en Alberta.

## INTRODUCTION

It has been established in several countries that motor vehicle crashes in rural areas are more common[1] and more likely to result in fatalities and serious injury[2–5] than those in urban areas. Over a decade of research and discussion has produced several explanations. Rural areas may not be as



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accessible to emergency service personnel, and response times increase as the distance from service centres increases.[6] Rural areas may simply not have access to the same level of medical resources as are available in non-rural areas.[7] However, explanations for this "rural disadvantage" may also include the individual behaviours of rural vehicle occupants, such as driving while under the influence of alcohol, a greater propensity of speeding on rural backroads,[2,8–11] and not using seat belts.[11]

Despite the controversy and debate over the mandatory use of seat belts while driving, the effectiveness of seat belts in saving lives and reducing injury severity is well established.[12–14] In fact, estimates of the potential extent of these reductions range from 39% to 60%, depending on vehicle type, size, and occupant seating position.[15–18] Thus, with no other change in driving behaviour, employing an occupant restraint can result in a 39%–60% reduction in the likelihood of receiving a serious or fatal injury if involved in a motor vehicle collision or crash. There are few other straightforward interventions that would bring about such benefits in terms of the economic and human cost of motor vehicle crashes. This is why there have been such diligent efforts by many different organizations and institutions concerned with road safety to improve wearing rates, decrease non-wearing rates and decrease misuse of seat belts.

On July 1, 1987, after months of deliberation and despite notable public opposition,[19] legislation was passed in Alberta making it unlawful to occupy a moving motor vehicle without using an occupant restraint device. In the years following this legislation, provincial wearing rates reportedly increased — attesting to the effectiveness of health policy on individual behaviour.[20] However, despite this improvement, roadways remain a major instrument of injury and death in Alberta. In Alberta Transportation's 2001 Alberta Traffic Collision Statistics[21] it was reported that 19 000 non-fatal collisions injured 27 583 people. In the same year, 341 fatal collisions caused 404 deaths. Of these 341 fatal collisions, 253 occurred in rural areas, accounting for 74.2% of all fatal crashes. Furthermore, non-restraint users were represented more strongly than restraint users, in fatal and injury-inducing crashes.[21]

### *Recent background of seat belt initiatives in Alberta*

To address the issue of non-use of seat belts in rural Alberta the Royal Canadian Mounted Police (RCMP), working with the Alberta Occupant Restraint Program and its partners, implemented 3 selective traffic enforcement programs (STEPs), focused on seat belts, in 2000. Each STEP used a combination of education and enforcement strategies designed to increase awareness and to encourage rural Albertans to wear their seat belts. Enforcement activities included roadside stops and increased patrolling. To integrate these activities with national efforts, the RCMP adopted the objectives regarding occupant restraint of the Canadian Council of Motor Transport Administrators, Road Vision 2010. These objectives are to: 1) raise the rates of seat belt use to 95%; and 2) reduce the number of unbelted occupants killed or seriously injured by 40% by the year 2010.[22]

This study provides baseline data from the 1999 Alberta Rural Seat Belt Survey (ARSBS) and follow-up data from the 2001 ARSBS that can be used to evaluate the progress toward the objectives of STEP and other programs and initiatives aimed at improving the rate of wearing seat belts.

## Methods

### *National Survey of Seat Belt Use and Alberta Rural Seat Belt Survey*

Each year, Transport Canada, a federal government body that develops and administers policies, regulations and services relevant to the Canadian transportation system, conducts a national Survey of Seat Belt Use in Canada.[23] This annual project provides an estimation of seat belt use among Canadians. The similarly designed ARSBS only surveys the driver and front-seat passenger due to difficulties with surveying rear-seat passengers. This design ensures that: a) the sites selected for the survey will form a representative set of intersections for the survey of seat belt usage in Alberta, and; b) the survey results from Transport Canada's national survey and the ARSBS will be comparable. Furthermore, the same data collection method was used in the ARSBS as in the national survey.[24] This allowed us to achieve a similar degree of accuracy with the ARSBS as is achieved with the national survey. We compared data from the June 1999 ARSBS with the June 2001 ARSBS.

### *Study location*

Alberta is a province in Western Canada, occupying over 661 000 square kilometers of diverse landscape, including prairies, parkland, forests and

mountains. In 1996 Statistics Canada estimated the population of Alberta at 2.6 million, of which approximately 20% lived in rural areas.[25]

### *Sample*

Population is an accepted indicator for determining the rurality of communities, with lower populations indicating more rural communities.[26,27] For the purpose of this study, and within the Albertan context, communities of fewer than 25 000 inhabitants were classified as rural and included in the sample frame of the study. Thus, in terms of the Statistics Canada definition of a rural locale, the sample frame for this study included all urban areas with <25 000 inhabitants and all Census subdivisions with populations <1000.

To select the sample, the rural communities were identified by population stratum and Regional Health Authority (RHA) . Alberta is divided into 9 RHAs. Each RHA is responsible for local hospitals, public health programs, community health services, and delivering health care services to residents in the region. Five strata were delineated as communities with populations of <2500; 2500–4999; 5000–9999; 10 000–14 999; and 15 000–25 000. The sampling was multi-stage. First, all urban areas with a population of <25 000 within an RHA were included in the ARSBS. A sample of Census subdivisions with a population of <1000 were also selected for each RHA. Next, the intersections (sites) were selected randomly from each community. The number of sites was selected based on the population size of the community. Finally, the observation periods were selected randomly over the period of the survey for each site.

### *Data collection*

Our sample population for the ARSBS consisted of those individuals driving or riding in the front seat of vehicles travelling through a pre-determined rural road segment during selected 2-hour time periods between 7 am and 5 pm, Monday through Friday, between June 21 and June 25, 2001. A rural road segment refers to a section of road passing through a rural community. Selected sections were part of intersections controlled by stop signs or traffic lights. An observer was stationed at each selected rural road segment for the predetermined 2-hour time period between 7 am and 5 pm. The following information was recorded for each light-duty vehicle (generally a vehicle <10 000 lb gross vehicle weight) that passed through the road segment: classification of vehicle (passenger car, sport utility vehicle [SUV], light truck or van/minivan); driver's gender; whether or not the driver was wearing a seat belt; front-seat passenger's gender; whether or not the front-seat passenger was wearing a seat belt; and, if the intersection was stop sign controlled, whether or not the driver brought the vehicle to a full stop. This information was gathered by direct observation and recorded on a form designed specifically for this study.

### *Data analysis*

Univariate chi-squared analysis was conducted to determine differences in wear rates between the 2 years and driver/passenger characteristics. The level for statistical significance was established as $p < 0.05$.

## Results

A total of 89 962 light-duty vehicles were observed at 334 survey site locations in 130 communities within rural Alberta between the hours of 7 am and 5 pm during the 5-day survey period of June 18–22, 2001. The findings of the observational survey (see Table 1) indicate that the estimated proportion of driver and front-seat passengers of light-duty vehicles using seat belts increased by approximately 6.9% in the 2001 ARSBS from the 1999 ARSBS ($p < 0.001$), which is a relative improvement of 10.0% ($p < 0.001$).

In the 1999 data, the variables that had an impact on the rate of wearing seat belts were: whether the seat belt wearer was a driver or passenger, the type of vehicle surveyed, time of day, gender of the driver and/or passenger(s), whether or not the vehicle came to a complete stop at a stop sign controlled intersection, time of day and provincial location of the survey site. Although the rate of wearing seat belts increased overall between 1999 and 2001, these variables remained relevant to seat belt usage in 2001. Drivers were more likely to wear seat belts than passengers, and women were more likely to buckle up than men ($p < 0.001$). Occupants of minivans, SUVs and passenger cars were more likely to wear seat belts than occupants of light trucks and pick-up trucks ($p < 0.001$).

Drivers were more likely to wear seat belts in the afternoon than they were in the hours before 12 noon ($p < 0.001$). Finally, occupants of vehicles that came to a complete stop at an intersection controlled by a stop sign, were more likely to be wear-

ing their seat belts than occupants of vehicles that did not come to a full stop ($p < 0.001$). This table illustrates overall seat belt wearing rates, how the variables highlighted in the study affect wearing rates, and changes in these wearing rates between 1999 and 2001.

## Discussion

Estimates of seat belt wearing and non-wearing rates associated with crashes resulting in injury or fatality have been intensely debated. This is because many estimates are imbued with a few notable biases. Many studies use self-reporting as the means to establishing seat belt wearing rates.[28] There is a growing discontent within the research community regarding this method. Self-reporting may not be accurate, particularly in locations where seat belt wearing is legislated and punitive action is taken against non-wearers. Parada and colleagues suggest that the potential bias in self-reports is greater than that suggested by much national data, particularly in low belt use populations.[29] Reporting biases on behalf of police, emergency service personnel and crash investigators have also been recognized.[30–32] These professionals' assumptions about crash dynamics and human behaviour can lead them to report inaccurate information regarding the use of seat belts by vehicle occupants. For these reasons, direct observation is considered by some to be the most reliable form of collecting data on the use of seat belts.[33] Thus, despite the increased cost and time requirements incurred by this method, this study employed direct observation.

Transport Canada's 2001 national survey suggests that Canada's seat belt wearing rates for all occupants of light-duty vehicles have remained unchanged for the last 3 years, at 90%. Although 5 Canadian provinces have seat belt wearing rates exceeding 90%, only Manitoba and the 3 Territories have rates below Alberta's 85%.[23] Thus, in the Canadian context, the rate of wearing seat belts in Alberta is low. This study suggests that it is in the rural areas of Alberta, where the issue of not wearing seat belts needs to be addressed due to the low rates of use found there, relative to the province as a whole.

The findings of this study have been useful, not only in estimating the magnitude of the non-compliance problem, but also in developing the understanding of seat belt wearing behaviour in rural

**Table 1. Seat belt wearing rates in rural Alberta by driver characteristics and observation year***

| | No. of observations | | % wearing seat belts | | | |
|---|---|---|---|---|---|---|
| Variables | June 1999 | June 2001 | June 1999 | June 2001 | % difference | % change |
| Overall† | 81 968 | 89 962 | 69.2 | 76.1 | 6.9 | 10.0 |
| ***Provincial location†*** | | | | | | |
| North Alberta | 34 135 | 39 804 | 70.5 | 75.7 | 5.2 | 7.4 |
| South Alberta | 47 833 | 50 158 | 67.5 | 76.7 | 9.2 | 13.6 |
| ***Occupant position†*** | | | | | | |
| Drivers only | 64 042 | 71 101 | 70.1 | 76.8 | 6.7 | 9.6 |
| Passengers only | 18 221 | 19 185 | 66.2 | 73.6 | 7.4 | 11.2 |
| ***Gender‡*** | | | | | | |
| Male | 45 597 | 48 955 | 62.5 | 70.0 | 7.5 | 12.0 |
| Female | 36 998 | 41 124 | 78.1 | 84.2 | 6.1 | 7.8 |
| ***Vehicle type*** | | | | | | |
| Passenger car | 34 773 | 37 117 | 76.0 | 81.7 | 5.7 | 7.5 |
| Van/minivan | 11 436 | 13 204 | 73.3 | 81.1 | 7.8 | 10.6 |
| Sports utility vehicle | 6 272 | 7 393 | 74.1 | 80.8 | 6.7 | 9.0 |
| Light truck and pick-up | 29 487 | 32 248 | 60.1 | 67.4 | 7.3 | 12.1 |
| ***Time of day‡*** | | | | | | |
| Before noon | 34 397 | 41 396 | 68.2 | 73.4 | 5.2 | 7.6 |
| Afternoon | 48 370 | 48 966 | 70.4 | 76.6 | 6.2 | 8.8 |
| ***Compliance with stop signs*** | | | | | | |
| Full stop | 36 218 | 34 966 | 74.5 | 80.3 | 5.8 | 7.8 |
| No full stop | 19 414 | 15 205 | 62.3 | 70.1 | 7.8 | 12.5 |

*Due to missing values all totals will not be the same.
†Excludes unknown vehicle type.
‡Includes unknown vehicle type.

Alberta, and the degree to which change has taken place in wearing rates over the period 1999 to 2001. The variables associated with wearing seat belts help us to understand the behaviour associated with wearing seat belts and to identify groups with a higher likelihood of not wearing their seat belts. For example, males and passengers are below average belt wearers and need to be specifically targeted by educational, awareness and enforcement initiatives. Drivers of pick-up trucks (they are the same as light trucks in the survey) are much less likely to wear their seat belts than drivers of other light-duty vehicles. This may be due to the nature of this vehicle type, which is regarded as farm machinery.[34] Thus, seat belt programs for light truck and pick-up truck drivers may also be approached as occupational and overall farm safety issues. Increased enforcement at pre-selected times during the day may be used to address lower rates of seat belt use before 12 noon rather than after.

The findings have also contributed greatly to an understanding of regional variations throughout Alberta, in terms of health regions and RCMP jurisdictions. This is significant because of the great geographical, political and socio-economic diversity that characterizes the province. Although provincial-level initiatives remain important in order to reach large population masses with the most efficient use of resources, these regional differences highlight the need for these approaches to be supplemented by more targeted, regional and community-development initiatives.

The survey results can supply useful evaluative information for seat belt related program and initiative planners in Alberta, but should be used in conjunction with other evaluation methods. The findings of this study cannot be used as a definitive mechanism to evaluate the initiatives associated with the RCMP's selective traffic enforcement programs, because, although there is a correlation between the intervention and increased seat belt wearing, no causal relationship between the two has been established. While wearing rates in rural Alberta are one important indicator of the effectiveness of efforts taken to increase wearing rates, there is a wide array of forces that could potentially have an impact on wearing rates. Evaluation approaches that emphasize the exposure of target populations to specific interventions, such as surveys and interviews, should also be considered. These approaches can be used as process and outcome measures, to both assess program effectiveness and pinpoint ways in which programs can be improved.

**Competing interests:** None declared.

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**Key words:** Rural populations; seat belts; observational survey

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