MINUTES OF THE MEETING
HUMAN SERVICES AND AGING COMMITTEE
50TH LEGISLATIVE SESSION
HOUSE OF REPRESENTATIVES

The meeting of the Human Services and Aging Committee was called to order by Chairman R. Budd Gould on January 6, 1987, at 1:00 p.m. in Room 312-D of the State Capitol.

ROLL CALL: All members were present.

CONSIDERATION OF HOUSE BILL NO. 24:

Rep. Jerry Nisbet, House District # 35, sponsor of the bill, stated that the bill would reinstitute a mandatory helmet law for motorcyclists and quadricyclists on the public roadways of Montana. He then presented a video tape showing the findings of a study done by the University of Southern California regarding the effectiveness of protective helmets.

PROPONENTS:

MYRNA OMHOLT, President of Montana H.E.L.P., an organization which offers assistance to head injured people and their families, was the first witness to testify. She stated their organization was supporting HB # 24 because they have dealt with the trauma of head injury and if one person could be spared the agony of head injury by the passage of this bill, no value could be placed on the decision to vote in favor of the bill.

DR. KENNETH EDEN, Helena, spoke in favor of the bill. He related a personal experience with a patient who sustained a fatal head injury after being involved in a motorcycle accident. He stated that one of the arguments is that people should have the freedom of choice whether or not to wear a helmet, but in his capacity as a physician he had been asked to review applications for health benefits, disability benefits, and for dependent children who no longer have a parent to provide for them. He remarked that those are public monies that could be better used if those people had not been injured so severely.

TIM MC CAULEY, Helena, spoke in favor of the bill. He concluded his testimoney by stating in addition to saving lives, this legislation might result in fewer costs to the State of Montana, thereby resulting in better funding for basic services.

COLONEL BOB LANDON, Chief Administrator of the Montana Highway Patrol was the next witness to speak in support

of the bill. He pointed out since 1979 that 90% of the fatalities of people involved in motorcycle accidents were not wearing helmets. See EXHIBIT # 1.

ROBERT RYAN, Helena, was the next witness to appear in support of the bill. He read a prepared statement concerning the motorcycle accident that his 23 year old son had had. He stated that the medical cost for his son had reached over $200,000 and that taxpayers of the state of Montana were paying the medical costs for an unnecessary injury. He urged the passage of the bill.

JIM MANION, who represented the Montana Automobile Association testified next in support of the bill. He reported that prior to the passage of the bill requiring motorcyclists to wear helmets there was a 6.62 per cent motorcycle fatalities for every 10,000 motorcycles registered in Montana, and while the law was in effect, the death rate dropped to 3.4 per cent per 10,000 motorcycles registered, and after the repeal the rate went back up to 6.56 deaths per 10,000 motorcycle registrations. He stated that having done a poll of the MAA membership, 79 per cent indicated that they supported legislation requiring all motorcyclists to wear helmets, and 14 per cent indicated they did not.

JAMES F. AHRENS, President of the Montana Hospital Association, was the next witness to appear in support of HB # 24. He stated that in his representation of hospitals they are accutely aware nationally that the number of head injuries can be radically decreased if a rider or passenger are wearing protective head gear. He stated that the Association would like to suggest the amendment that the fine for the first offense be raised from not less than ten dollars ($10.00) to not less than fifty dollars ($50.00) nor more than one hundred dollars ($100.00). He said a stronger fine for a first conviction would be an incentive to the motorcyclist to purchase protective headgear at the onset rather than paying the ten dollar ($10.00) fine. See EXHIBIT # 2.

JERRY LOENDORF, representing the Montana Medical Association, noted that he had appeared on this bill when it was first passed in 1973 and at every bill attempted to amend it or amending it since. He said that the argument that was always heard regarding this bill was that there was an imposition upon a person's individual freedom. He then named the many services that would be provided a person

experiencing a motorcycle accident at an ample cost to society today, so in asking the bare-headed motorcyclist to wear a helmet, we are asking them to give up very little freedom in exchange for a substantial benefit to society.

DAVID LACKMAN, Montana Public Health Association, stated they consider HB # 24 necessary legislation. Se EXHIBIT # 3.

BARBARA BOOHER, Executive Director and Chief Lobbyist for the Montana Nurses Association, representing 1400 nurses across the state of Montana, stated they concurred with the previous testimony and urged passage of HB # 24.

JUDY GOUCHÉR, Helena, Administrative Assistant at Montana Independent Living Project, and the mother of a daughter who was injured in a motorcycle accident beseeched the committee to support the bill.

JANE HAYNES, Great Falls, mother of a son who was injured in an accident. She testified that although her son had been wearing a helmet, which she showed to the committee, he sustained brain stem damage and a broken jaw, but without one he would have been dead. A copy of her testimony in support of HB # 24 is included as EXHIBIT # 4.

AL GOKE, Administrator of the Highway Traffic Safety Division of the State of Montana, submitted a summary of accident history in the state, see EXHIBIT # 5. He concluded by stating in his studies of all the research he has conducted which have both positive and negative impacts on traffic safety in our state, he cannot find any reason not to require motorcyclists to wear helmets on public streets.

OPPONENTS:

DAL SMILIE, Helena, commented on the number of citizens who were in attendance at the meeting along with the press. He stated there are about 50,000 titled road going motorcycles in the state of Montana. He said he always wears a helmet because he personally believes they are safer, however 75% of the people who do ride are opposed to such legislation. He then made reference to the social burden theory, and questioned why motorcyclists were singled out. He submitted a copy of his testimony, see EXHIBIT # 6.

JAMES BUCK, Helena, spoke in opposition to the bill.

J. ROBERT GREEN, interim state co-ordinator for ABATE of Montana, which stands for American Bikers Aiming for Education was the next witness to appear in opposition to the bill. He reported on the variance of criteria of safety standards for helmets. See EXHIBIT # 7.

RICHARD FIELD, a motorcycle safety instructor, stated that the motorcycle helmet legislation is a band-aid approach to the problem. He said that education is the answer.

BERNIE ORTMAN, Helena, rose in opposition to the bill. He also suggested legislating automobile awareness for motorcycles.

TOM TAYLOR, Butte, electronics engineer, passed out a report, see EXHIBIT # 8, "The Effect of Motorcycle Helmet Use on the Probability of Fatality and the Severity of Head and Neck Injuries". He stated the data provided in the report was prepared by the National Highway Traffic Safety Administrator, U. S. Dept. of Transportation. He reviewed the highlights of the report, and concluded his testimony by saying we need education and awareness programs, and if the legislators want to spend money productively, those are the areas they need to address.

MICHAEL DUNN, Bozeman, read an exerpt from his prepared statement stating this legislation is saying to him that he is not competent to make his own decisions and must be protected from himself. He then read the newspaper report concerning negligent homicide charges being dropped against a man who had been involved in a vehicle-motorcycle accident. See EXHIBIT # 9. He opposed the bill.

JIM BYER, Missoula, also rose in opposition to the bill.

ROD SANDALL, petroleum geologist, said he has many friends who enjoy visiting Montana on their motorcycles, and we don't need harrassing rules to keep tourism out of Montana in these hard economic times. He stated that none of the surrounding states require helmets and it would be extremely oppressive for us. He then proposed an amendment, "It shall be a mandatory felony, attempted murder charge for all drivers who are found at fault in an accident involving motorcycle and bicycle riders who obey the laws and are innocent victims. See EXHIBIT # 10.

BOB KOVACICH, Butte, teacher at Butte Middle School, stated according to the University of Utah Speech and Hearing Clinic helmets can also cause accidents because of problems such as moderate to severe hearing loss. He quoted Road Rider magazine as saying that helmets cause heat fatigue, that temperatures will reach 130 degrees within a helmet condusive to heat exhaustion and heat stroke causing subsequent slowness to the ability to think coherently or react quickly. He said helmets also promote physical fatigue, they weigh on an average of two and a half to three and a half pounds each. As an example he said the Virginia State Troopers are no longer required to wear their comparatively feather light "Smokey the Bear" caps while on patrol because they gave them stiff necks and headaches. He said that studies made by Dr. D. M. Coleman, Rhode Island Hospital prove that serious and fatal neck injuries increased by 75% in in first year of mandatory helmet usage in that state. He said that Rhode Island and Maine have since repealed their helmet laws. He concluded his testimony in opposition to HB # 24 by saying the U. S. Dept. of Transportation states that 90% of the helmets tested off the shelf are defective.

JEFF WUERL, Helena, testified next against the bill. He said as a motorcycle mechanic he need to be able to listen to the bike in order to be able to determine mechanical difficulties.

PATRICIA WHERLEY, Three Forks, passed out copies of statistics on motorcycle death rates in the United States, see EXHIBIT # 11. She read her prepared statement, see EXHIBIT 11-A in opposition to HB # 24.

DOUG WOODAHL, Missoula, displayed three helmets to the committee, stating that one of them was a replacement of a supposedly approved helmet that was recalled. He read his prepared statement in opposition to the bill, see EXHIBIT # 12.

CHAIRMAN GOULD advised the people who were not able to testify today because of the time limitation, they could leave their testimony with the secretary and it would be distributed to the committee before they take executive action on the bill. There were thirteen additional opponents.

REP. NISBET closed by commenting on the number of opponents who testified that they do wear their helmets, but the fact remains that according to the statistics for 1982-83, 80%

of the motorcyclists who were involved in accidents, wore no helmets. He said he has a copy of the HURT report, and would be glad to share it with any of the committee members. He stated it was very adequately documented the single most critical factor for preventing or limiting the seriousness of injury is wearing a helmet. He mentioned the compelling state interest and exclaimed the statistics and evidence before the committe support the fact there is a cost that becomes the responsibility of state and local government to pick up.

QUESTIONS FROM THE COMMITTEE:

REP. SIMON questioned Rep. Nisbet why tri-cycles were not included in the bill along with motorcycles and quadricycles. Rep. Nisbet replied they just weren't.

REP. SIMON queried Rep. Nisbet about standards for the protective headgear. Rep. Nisbet responded that the same standards that apply to the helmet law for individuals under 18 would apply in HB # 24.

REP. CODY asked Rep. Nisbet if there were any accurate statistics as to how many motorcycle injuries have ended up on the SRS budget. Rep. Nisbet replied he had been unable to obtain that information.

REP. PATTERSON questioned Rep. Nisbet about the lack of an effective date in the bill. Rep. Nisbet stated it would automatically become effective October 1, 1987.

REP. KITSELMAN had a question for Jim Manion from the Montana Automobile Association, since he wasn't available, he asked an open question regarding what the demographics were on the MAA poll. Chairman Gould said if he could answer for Mr. Manion it would be certain that the questionaire was sent to automobile owners and not motorcycle owners.

REP. SANDS questioned Al Goke how many states have motorcycle helmet laws. Mr. Goke replied that 19 states have laws that apply to all ages and that 24 states, including Montana have laws that apply to varying ages and that 18 is the common age in those 24 states and that 7 states have no law. He then asked Mr. Goke if his statistics show any correlation between fatality rates in those states that have mandatory helmet laws and those that don't. Mr. Goke answered that some of the data he had presented had some summary information on what has been observed in those states that

had helmet laws and repealed them and then returned to a helmet law. He said the experience without question is there is somewhere between a 30 and 50% reduction in fatalities with helmet laws.

REP. SANDS asked as a question of public policy, how to address the issue of why should we require helmets for motorcycle riders as opposed to rodeo riders, skiers and other people. Mr. Goke explained that the majority of motorcycle riders that get in an accident are injured and if we want to reduce motorcycle fatalities then the evidence is clear that a helmet will help.

REP. NELSON asked an open question. He said that being most of the testimony had been from accomplished motorcycle riders, he wondered if there were any statistics to show whether the accident rate occured in the expert or in the amateur rider catagory. Todd Westlie, Missoula, volunteered to answer Rep. Nelson's question. He said that the majority of fatalities occur among new riders. Dal Smilie agreed that the beginning riders have most of the wrecks, and they are already protected under Montana's existing law.

REP. NELSON then asked if the bill were not directed more at the amateur rider than the expert. Rep. Nisbet responded that he had not directed the bill towards any age group, but at anyone who rides a motorcycle. Dennis Miller stated that there are not many new entry level riders right now and said he was opposed to the bill.

CHAIRMAN GOULD called for further questions from the committee, seeing none, he closed the hearing on HB # 24. He stated the committee would take executive action on the bill at 1:00 p.m. on Thursday, January 8, 1987.

ADJOURNMENT: There being no further business, the meeting adjourned at 2:55 p.m.

REP. R. BUDD GOULD, CHAIRMAN

DAILY ROLL CALL

HUMAN SERVICES AND AGING COMMITTEE

50th LEGISLATIVE SESSION -- 1987

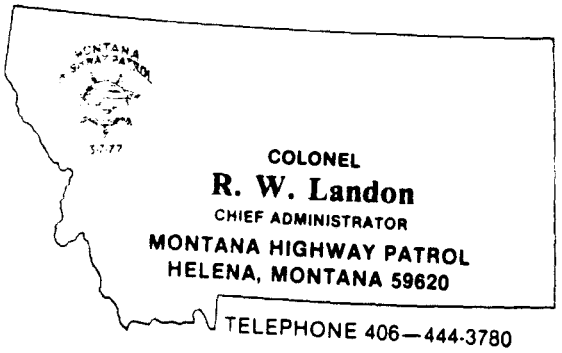
Date JAN 6, 1987

NAME	PRESENT	ABSENT	EXCUSED
REP. BUDD GOULD, CHAIRMAN	✓		
REP. BOB GILBERT, VICE CHAIRMAN	✓		
REP. JAN BROWN	✓		
REP DUANE COMPTON	✓		
REP. DOROTHY CODY	✓		
REP. DICK CORNE'	✓		
REP. LARRY GRINDE	✓		
REP. STELLA JEAN HANSEN	✓		
REP. LES KITSELMAN	✓		
REP. LLOYD MC CORMICK	✓		
REP. RICHARD NELSON	✓		
REP. JOHN PATTERSON	✓		
REP. ANGELA RUSSELL	✓		
REP. JACK SANDS	✓		
REP. BRUCE SIMON	✓		
REP. CAROLYN SQUIRES	✓		
REP. TONIA STRATFORD	✓		
REP. BILL STRIZICH	✓		

EXHIBIT # 1
DATE Jan 6, 1987
HB 71: 24

MOTORCYLCE ACCIDENTS
MONTANA

YEAR	ACCIDENTS	KILLED	HELMET NOT USED	INJURED	MOTORCYCLE REGISTRATIONS
1970	291	8		249	24,881
1971	454	18		393	30,140
1972	471	25		523	34,894
1973	486	9		536	37,133
1974	471	13		510	39,951
1975	430	15		461	39,619
1976	404	20		416	41,000
1977	458	9		483	47,200
1978	545	23		560	54,592
1979	596	20	13	632	27,392
1980	674	24	22	688	35,455
1981	656	24	21	688	35,470
1982	547	18	15	594	33,585
1983	557	24	15	618	33,278
1984	525	27	22	598	31,145
1985	461	34	31	487	29,697



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HURT STUDY
Motorcycle Accident Cause Factors and Identification of Countermeasures

Findings, Recommendations and Proposed Countermeasures

This research study was conducted by H.H. Hurt and staff at the Traffic Safety Center of the University of Southern California and is a recognized landmark piece of motorcycle safety research. Essentially, an in-depth, on-scene investigation was performed on 900 motorcycle accidents in the Los Angeles area. Additionally, Hurt and staff analyzed 3600 motorcycle traffic accident reports in the same geographic area.

Data concerning the general motorcycle riding population was also collected at 505 of the accident sites relative to the time-of-day, day-of-week and environmental conditions that matched the accidents. These exposure data enable the reader to make comparisons and determine factors which are over-represented.

The final report itself is several hundred pages in length and should be a resource document in the motorcycle safety professional's library. The information which follows is simply what was found in the study, the recommendations and the proposed countermeasures, and it provides you with a succinct source of information.

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The entire document is available through the National Technical Information Service, Springfield, Virginia 22161.

42. Injury severity increases with speed, alcohol involvement and motorcycle size.

43. Seventy-three percent of the accident-involved motorcycle riders used no eye protection, and it is likely that the wind on the unprotected eyes contributed in impairment of vision which delayed hazard detection.

44. Approximately 50% of the motorcycle riders in traffic were using safety helmets but only 40% of the accident-involved motorcycle riders were wearing helmets at the time of the accident.

45. Voluntary safety helmet use by those accident-involved motorcycle riders was lowest for untrained, uneducated, young motorcycle riders on hot days and short trips.

46. The most deadly injuries to the accident victims were injuries to the chest and head.

47. The use of the safety helmet is the single critical factor in the prevention of reduction of head injury; the safety helmet which complies with FMVSS 218 is a significantly effective injury countermeasure.

48. Safety helmet use caused no attenuation of critical traffic sounds, no limitation of pre-crash visual field, and no fatigue or loss of attention; no element of accident causation was related to helmet use.

49. FMVSS 218 provides a high level of protection in traffic accidents, and needs modification only to increase coverage at the back of the head and demonstrate impact protection of the front of full facial coverage helmets, and insure all adult sizes for traffic use are covered by the standard.

50. Helmeted riders and passengers showed significantly lower head and neck injury for all types of injury, at all levels of injury severity.

51. The increased coverage of the full facial coverage helmet increases protection, and significantly reduces face injuries.

52. There is no liability for neck injury by wearing a safety helmet; helmeted riders had less neck injuries than unhelmeted riders. Only four minor injuries were attributable to helmet use, and in each case the helmet prevented possible critical or fatal head injury.

53. Sixty percent of the motorcyclists were not wearing safety helmets at the time of the accident. Of this group, 26% said they did not wear helmets because they were uncomfortable and inconvenient, and 53% simply had no expectation of accident involvement.

54. Valid motorcycle exposure data can be obtained only from collection at the traffic site. Motor vehicle or driver license data presents information which is completely unrelated to actual use.

55. Less than 10% of the motorcycle riders involved in these accidents had insurance of any kind to provide medical care or replace property.

Helmet dispute persists

By STEVE SHIRLEY
Gazette Helena Bureau

HELENA — A little past midnight one night this summer, the loudspeaker at St. Peter's Hospital in Helena announced a "Code 99" emergency alert.

Dr. Kenneth Eden, who was in another part of the hospital, ran to the emergency room. Outside the room, large pools of blood coated the floor. Inside, half a dozen nurses, two physicians and two ambulance attendants stood around a stretcher where a young woman lay dead.

There was barely a scratch on her body from the neck down. But in the right upper half of her skull was a gash where blood flowed and air bubbles collected.

Frustrated and angry, Eden sat down a few minutes later to write an impassioned letter to Gov. Ted Schwinden. It said:

"In my opinion, and in the opinion of many people there, this young woman died in part because of her own (choice) in not wearing a helmet, but also because of legislative cowardice and irresponsibility ... To not have a helmet law in this state is the logical equivalent of allowing drunk drivers on our highways. This young woman's death was probably unnecessary and can in no way be construed as an issue of individual rights."

THE ISSUE OF individual rights is at the center of the debate over mandatory helmet laws. Cyclists take the libertarian approach, arguing that helmet laws infringe on their freedom of choice. But health-care and law-enforcement officials counter that cyclists' freedom of choice infringes on taxpayers who must foot the medical bills of those who suffer head injuries.

So far, Montana lawmakers have sided with the cyclists. In 1977 they scrapped a law that required cyclists over age 18 to wear helmets. Earlier this year they rejected a bid by Rep. Gerald Nisbet, D-Great Falls, to restore the old law.

Nisbet said he'll probably reintroduce the bill if he returns to the Legislature. If so, he'll have more ammunition from this year's motorbike-accident statistics.

They show that, by the end of August, 30 people had died in Montana in motorcycle accidents. Although the year is not yet over, that's more deaths than any entire year since 1972. Records are available for years before then, but it's doubtful that there ever were more than 30 deaths in one year.

STATE OFFICIALS blame many fatalities on the lack of a helmet law. They note that, before the helmet law in 1971 and 1972, 6.2 motorcyclists died for every 10,000 cycles registered in Montana. While the law was in effect from 1974 to 1976, the death rate was 3.9 for every 10,000 registered motorcycles. After the law was repealed the rates climbed back to 6.56 deaths.

Meanwhile, of the 22 motorcyclists killed by head injuries in 1983 and 1984, 16 weren't wearing helmets.

Motorcycle buffs haven't disputed the state statistics, but refer to national studies that they say leave open the question of whether helmet laws save lives.

Helena attorney Dal Smilie, who sits on the board of directors of the American Motorcycle Association, points to a 1977 study by the U.S. Department of Transportation's Highway Traffic Safety Administration that reported there is "no significant difference" in fatality rates of states that do and don't have helmet laws.

"While I agree that helmets are safer," he said, "the statistics do not show a compelling reason to mandate a compulsory law opposed by so many Montana citizens."

Smilie, who wears a helmet when he rides, believes the best answer is a motorcycle safety-training program that reaches new cyclists who have higher accident rates.

NO ONE HAS statistics on how many people suffer brain damage in cycling mishaps and survive. State officials can only say that they are scattered around the state, living in group homes, private homes, nursing homes or the state hospital at Warm Springs. (One brain-injury victim at Warm Springs had two motorbike accidents, both times without a helmet.)

There also are no readily available statistics that detail how much it costs to treat these people. But it's safe to say that it costs the public hundreds of thousands of dollars annually.

Missoula physician Susan Bertrand, a rehabilitation specialist, estimates that a brain-damage victim can spend two or three months in a hospital intensive care unit at a cost of $100,000. Another six months of hospitalization after that can cost $150,000 more.

Meanwhile, a major insurance company has estimated the average cost of treating a severely brain-damaged person as follows: $50,000 to $100,000 for the first year; $50,000 to $75,000 for the second year; $40,000 to $60,000 for the third year; $15,000 to $25,000 for the fourth year; and $12,000 to $15,000 each year after that.

Treatment can continue for years. Once a person who suffers brain damage has stabilized, he can have a normal life span.

"These people have every potential to live long, and that will be costly for society," said Linda Geiger, a nurse who coordinates a Missoula treatment center for brain-damage victims. Four of the patients under her care suffered brain injuries in motorbike mishaps.

MANY MEDICAL officials are frustrated by the resources devoted to patients who never recover.

"I don't care as a doctor about what has to be spent if they (accident victims) get better," said orthopedic surgeon Douglas Woolley of Missoula. But, he said, he does care if the state spends money and the patient shows no signs of improvement. "And that's what we often do with head injuries."

Who picks up the tab for medical treatment? Usually not the victim.

According to the state Highway Traffic Safety Division, injured cyclists pay only about 6 percent of their hospital bills. The rest is covered by health-insurance settlements and tax-supported programs such as Medicaid and county medical funds.

But society's costs don't end at the hospital. Many brain-damaged victims rely on government programs such as Medicaid and Social Security.

"The same social-burden argument would require legislation to require helmets on rodeo cowboys, skiers, bicyclists, auto and tractor drivers," Smilie said.

Proponents of helmet laws counter that the laws no more abridge anyone's freedom than do laws that require water skiers to wear life preservers and welders to use protective eye shields.

Presumably, the debate will continue in the next legislative session if Nisbet has his way.

Once again, motorcycle enthusiasts will contend that the state's helmet law shouldn't be changed because they should have a freedom of choice. And once again, Nisbet and others will ask if the state can afford not to change it.

Do helmets cause accidents?

Here are some of the common arguments against helmet laws, followed, where applicable, by responses of law-enforcement and health-care officials.

•Helmets cause accidents by interfering with vision or hearing.

A typical helmet reduces the field of vision only about 3 percent. While helmets reduce the sound of safety signals, they also reduce the sound of the motorcycle, making it easier to hear other sounds.

• Helmets are uncomfortable and inconvenient.

• The rush of air helps relieve the discomfort on warm days.

• Helmets can cause injuries that otherwise would not have happened, such as neck injuries.

Studies of motorcycle accidents by the U.S. Transportation Department and others say, not so. One study of 900 motorbike mishaps in the Los Angeles area found only four minor injuries caused by a helmet.

• Most helmets aren't built to withstand much impact. Ninety percent of them fail to meet performance standards set by industry specifications.

Studies show that helmets are effective.

•Seventy percent of all motorcycle accidents involve two vehicles, and many car and truck drivers fail to watch out for cyclists.

Law-enforcement officials agree that many motorists don't watch for cyclists, but say that's all the more reason for cyclists to wear helmets.

•A poll of cyclists showed that three-fourths of them don't want a compulsory helmet law, but most of them wear helmets anyway.

Helmet use drops off in states that repeal helmet laws. Also, 80 percent of the cyclists involved in Montana accidents in 1982-83 weren't wearing helmets.

• Courts in Illinois and Nevada have ruled helmet laws unconstitutional.

The U.S. Supreme Court and 34 high state courts have said that states may enact helmet laws to protect individuals and the public.

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New law needed

There is a great philosophical debate over whether motorcyclists should be required to wear helmets.

Motorcyclists say the helmets are uncomfortable and hot. Bikers like the feel of the wind in their hair. Helmets obstruct their vision. Helmets cause injuries.

But mostly, motorcyclists object on principle. It is nobody's business whether they wear helmets. Government intervention in private lives is bad enough without adding helmet laws to the list.

We eat food prepared to government standards. We drive cars designed to meet federal safety and pollution laws. We live in houses built to code on lots approved by master plans. We drive on highways constructed to government specifications and fly in airlines that meet Federal Aviation Administration regulations.

When we dust roses with pesticides, the chemical has been tested and approved by the government. When we swim in motel pools, we expect them to be clean according to government standards.

Enough is enough! Government will not tell us that we must wear helmets!

Montana's helmet law requires juveniles to wear head gear. Adults are free to feel the wind in their hair and the bugs on their teeth.

The cads who would like to take that freedom away from bikers offer Jefferson's argument that one man's right to swing his fist ends at the point of his neighbor's nose.

If the bikers truly paid the price of their folly, so be it. But they don't. When a biker scrambles his brains, the public pays.

So much for the philosophy. Let's take a look at economics.

According to the state Highway Traffic Safety Division, injured cyclists pay only about 6 percent of their hospital bills. The rest is covered by health-insurance settlements and tax-supported programs such as Medicaid and county medical funds.

After they are released from the hospital some receive Medicaid and Social Security payments for the rest of their lives.

The costs are high. A major insurance company estimates that first-year costs for a brain-damaged person run from $50,000 to $100,000; second-year, $50,000 to $75,000; third year, $40,000 to $60,000; fourth year, $15,000 to $25,000, and $12,000 to $15,000 each year after that.

Bikers' philosophical arguments against the helmet law make no sense. If they were playing only with their own lives, their point might be valid, but they are not. Once the biker's fist slams into the public's economic nose, public rights take precedence over individual foolishness.

The Legislature waffles while people die or are so badly injured they never fully recover. The Legislature plays cagey with lobby groups while the public pays the bill.

It's time for the Legislature to put an end to the fight

The Billings Gazette

Gazette opinion

Helmets for bikers

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When we dust roses with pesticides, the chemical has been tested and approved by the government. When we swim in motel pools, we expect them to be clean according to government standards.

Enough is enough! Government will not tell us that we must wear helmets!

Montana's helmet law requires juveniles to wear head gear. Adults are free to feel the wind in their hair and the bugs on their teeth.

The cads who would like to take that freedom away from bikers offer Jefferson's argument that one man's right to swing his fist ends at the point of his neighbor's nose.

If the bikers truly paid the price of their folly, so be it. But they don't. When a biker scrambles his brains, the public pays.

So much for the philosophy. Let's take a look at economics.

According to the state Highway Traffic Safety Division, injured cyclists pay only about 6 percent of their hospital bills. The rest is covered by health-insurance settlements and tax-supported programs such as Medicaid and county medical funds.

After they are released from the hospital some receive Medicaid and Social Security payments for the rest of their lives.

The costs are high. A major insurance company estimates that first-year costs for a brain-damaged person run from $50,000 to $100,000; second-year, $50,000 to $75,000; third year $40,000 to $60,000; fourth year $15,000 to $25,000, and $12,000 to $15,000 each year after that.

Bikers' philosophical arguments against the helmet law make no sense. If they were playing only with their own lives, their point might be valid, but they are not. Once the biker's fist slams into the public's economic nose, public rights take precedence over individual foolishness.

The Legislature waffles while people die or are so badly injured they never fully recover. The Legislature plays cagey with lobby groups while the public pays the bill.

It's time for the Legislature to put an end to the fight before it gets a bloody nose, too.

Helmet law life saver

Motorcyclists should accept that

Guest columnist

Steve Apgar

Having read the Dec. 6 letter from J. R Green in which Green advises that studies indicate that helmets may cause severe injury or death in some cases and that helmet laws are not effective, I felt it was time to state some facts that might help those who feel, as Green does, that we need more public awareness and perhaps even a public forum. As a Motorcycle Safety Foundation certified instructor, former Police motorcycle officer and former Emergency Medical Service ambulance attendant, I would like to cite first-hand experience as well as statistics that are a part of the record.

First of all, it is not fair to say that all motorcycle accidents are placed in the same category. Montana accident summary reports list over 250 categories that apply to all aspects of the motorcycle accident. All of the causes are listed, and it really makes little difference when the final category shows that three to five times more riders are killed or hurt because they did not wear a helmet. If you feel the issue needs to be studied, then I suggest a review of Department of Transportation contract study No. HS-5-01160. The 1981 study was conducted by the University of Southern California and was an in-depth, on-scene investigation of more than 4,000 motorcycle accidents. The final report is several hundred pages in length and is considered an important resource document for the motorcycle safety professional.

The findings show that one-fourth of the motorcycle accidents involve only the motorcycle and that the other three-fourth involved collision with another vehicle. In the two-vehicle accidents, it was determined that the failure of motorists to detect and recognize motorcycles in traffic is the predominating cause of motorcycle accidents. (This is the basis for the law requiring motorcyclists to ride with their lights on despite the fact that it may interfere with their personal freedom.) The causes are not nearly as important as the findings in regard to injury and helmets: 98 percent of the riders in multiple vehicle accidents received some kind of injury, the most common cause of death being head and chest injuries. The study showed that helmeted riders showed significantly lower head and neck injuries and that the motorcycle helmet provided a spectacular reduction of head and neck injury. No element of accident cause could be attributed to helmet use and the report stated that research showed no reason for any motorcyclist to be without a safety helmet.

I, too, am in favor of better rider education and liability insurance. Unfortunately, this will not mean that the insured educated rider will not split his skull open when his helmetless head strikes the pavement for whatever unfortunate reason. I have seen the aftermath of many motorcycle accidents, some minor and some involving multiple fatalities. I have talked to ICU nurses who have told me about the unit containing only motorcycle rider victims who were not wearing helmets.

If the insurance companies have to pay under a mandatory insurance plan for head injury motorcyclists, I assure you that they will get the money in increased premiums for all. There are plenty of victims in institutions who believed that they should have a right to let the wind blow through their hair. There are more than 30 this year in Montana who will no longer have individual freedom because they have been the victims of motorcycle accidents, most were helmetless.

Even though I disagree with the need for more studies or public forums on a very simple issue that is easy to solve with facts, I would come to a public forum. I would arrive with facts, accident data, photos, statements from doctors, nurses, riders who wear helmets and owe their lives to them, as well as riders who were victims without helmets and now will swear by them. After reviewing it all, it would be very clear that wearing a helmet is something that every rider owes those who pay and those who care. If he likes himself, then he also owes it to himself. I'll come to your forum. I might even ride my motorcycle to it. I'll be the one with the helmet, gloves and boots, my headlight will be flashing and I'll probably be wearing orange so you can see me before you turn in front of me. On my way, I'll be watching every car and every intersection, because I also know that on the average, I will have just 1.9 seconds before a collision.

Steve Apgar is currently involved in accident investigation.

Helmet dispute persists

By STEVE SHIRLEY
Gazette Helena Bureau

HELENA — A little past midnight one night this summer, the loudspeaker at St. Peter's Hospital in Helena announced a "Code 99" emergency alert.

Dr. Kenneth Eden, who was in another part of the hospital, ran to the emergency room. Outside the room, large pools of blood coated the floor. Inside, half a dozen nurses, two physicians and two ambulance attendants stood around a stretcher where a young woman lay dead.

There was barely a scratch on her body from the neck down. But in the right upper half of her skull was a gash where blood flowed and air bubbles collected.

Frustrated and angry, Eden sat down a few minutes later to write an impassioned letter to Gov. Ted Schwinden. It said:

"In my opinion, and in the opinion of many people there, this young woman died in part because of her own (choice) in not wearing a helmet, but also because of legislative cowardice and irresponsibility. ... To not have a helmet law in this state is the logical equivalent of allowing drunk drivers on our highways. This young woman's death was probably unnecessary and can in no way be considered as an issue of individual rights."

THE ISSUE OF individual rights is at the center of the debate over mandatory helmet laws. Cyclists take the libertarian approach, arguing that helmet laws infringe on their freedom of choice. But health-care and law-enforcement officials counter that cyclists' freedom of choice infringes on taxpayers who must foot the medical bills of those who suffer head injuries.

So far, Montana lawmakers have sided with the cyclists. In 1977 they scrapped a law that required cyclists over age 18 to wear helmets. Earlier this year they rejected a bid by Rep. Gerald Nisbet, D-Great Falls, to restore the old law.

Nisbet said he'll probably reintroduce the bill if he returns to the Legislature. If so, he'll have more ammunition from this year's motorbike-accident statistics.

They show that, by the end of August, 30 people had died in Montana in motorcycle accidents. Although the year is not yet over, that's more deaths than any entire year since 1972. Records are available for years before then, but it's doubtful that there ever were more than 30 deaths in one year.

STATE OFFICIALS blame many fatalities on the lack of a helmet law. They note that, before the helmet law in 1971 and 1972, 6.62 motorcyclists died for every 10,000 cycles registered in Montana. While the law was in effect from 1974 to 1976, the death rate was 3.9 for every 10,000 registered motorcycles. After the law was repealed, the rates climbed back to 6.56 deaths.

Meanwhile, of the 22 motorcyclists killed by head injuries in 1983 and 1984, 18 weren't wearing helmets.

Motorcycle buffs haven't disputed the state statistics, but refer to national studies that they say leave open the question of whether helmet laws save lives.

Helena attorney Dal Smilie, who sits on the board of directors of the American Motorcycle Association, points to a 1977 study by the U.S. Department of Transportation's Highway Traffic Safety Administration that reported there is "no significant difference" in fatality rates of states that do and don't have helmet laws.

"While I agree that helmets are safer," he said, "the statistics do not show a compelling reason to mandate a compulsory law opposed by so many Montana citizens."

Smilie, who wears a helmet when he rides, believes the best answer is a motorcycle safety-training program that reaches new cyclists who have higher accident rates.

NO ONE HAS statistics on how many people suffer brain damage in cycling mishaps and survive. State officials can only say that they are scattered around the state, living in group homes, private homes, nursing homes or the state hospital at Warm Springs. (One brain-injury victim at Warm Springs had two motorbike accidents, both times without a helmet.)

There also are no readily available statistics that detail how much it costs to treat these people. But it's safe to say that it costs the public hundreds of thousands of dollars annually.

Missoula physician Susan Bertrand, a rehabilitation specialist, estimates that a brain-damage victim can spend two or three months in a hospital intensive care unit at a cost of $100,000. Another six months of hospitalization after that can cost $150,000 more.

Meanwhile, a major insurance company has estimated the average cost of treating a severely brain-damaged person as follows: $50,000 to $100,000 for the first year; $50,000 to $75,000 for the second year; $40,000 to $60,000 for the third year; $15,000 to $25,000 for the fourth year; and $12,000 to $15,000 each year after that.

Treatment can continue for years. Once a person who suffers brain damage has stabilized, he can have a normal life span.

"These people have every potential to live long, and that will be costly for society," said Linda Geiger, a nurse who coordinates a Missoula treatment center for brain-damage victims. Four of the patients under her care suffered brain injuries in motorbike mishaps.

MANY MEDICAL officials are frustrated by the resources devoted to patients who never recover.

"I don't care as a doctor about what has to be spent if they (accident victims) get better," said orthopedic surgeon Douglas Woolley of Missoula. But, he said, he does care if the state spends money and the patient shows no signs of improvement. "And that's what we often do with head injuries."

Who picks up the tab for medical treatment? Usually not the victim.

According to the state Highway Traffic Safety Division, injured cyclists pay only about 6 percent of their hospital bills. The rest is covered by health-insurance settlements and tax-supported programs such as Medicaid and county medical funds.

But society's costs don't end at the hospital. Many brain-damaged victims rely on government programs such as Medicaid and Social Security.

"The same social-burden argument would require legislation to require helmets on rodeo cowboys, skiers, bicyclists, auto and tractor drivers," Smilie said.

Proponents of helmet laws counter that the laws no more abridge anyone's freedom than do laws that require water skiers to wear life preservers and welders to use protective eye shields.

Presumably, the debate will continue in the next legislative session if Nisbet has his way.

Once again, motorcycle enthusiasts will contend that the state's helmet law shouldn't be changed because they should have a freedom of choice. And once again, Nisbet and others will ask if the state can afford not to change it.

Do helmets cause accidents?

Here are some of the common arguments against helmet laws, followed, where applicable, by responses of law-enforcement and health-care officials.

•Helmets cause accidents by interfering with vision or hearing.

A typical helmet reduces the field of vision only about 3 percent. While helmets reduce the sound of safety signals, they also reduce the sound of the motorcycle, making it easier to hear other sounds.

• Helmets are uncomfortable and inconvenient.

• The rush of air helps relieve the discomfort on warm days.

• Helmets can cause injuries that otherwise would not have happened, such as neck injuries.

Studies of motorcycle accidents by the U.S. Transportation Department and others say, not so. One study of 900 motorbike mishaps in the Los Angeles area found only four minor injuries caused by a helmet.

• Most helmets aren't built to withstand much impact. Ninety percent of them fail to meet performance standards set by industry specifications.

Studies show that helmets are effective.

•Seventy percent of all motorcycle accidents involve two vehicles, and many car and truck drivers fail to watch out for cyclists.

Law-enforcement officials agree that many motorists don't watch for cyclists, but say that's all the more reason for cyclists to wear helmets.

•A poll of cyclists showed that three-fourths of them don't want a compulsory helmet law, but most of them wear helmets anyway.

Helmet use drops off in states that repeal helmet laws. Also, 80 percent of the cyclists involved in Montana accidents in 1982-83 weren't wearing helmets.

• Courts in Illinois and Nevada have ruled helmet laws unconstitutional.

The U.S. Supreme Court and 34 high state courts have said that states may enact helmet laws to protect individuals and the public.

EXHIBIT #2
DATE 1-6-87
HB # 24

January 6, 1987

TESTIMONY OF MONTANA HOSPITAL ASSOCIATION IN SUPPORT OF HOUSE BILL 24

Chairman Representative Gould, Members of the Human Services and Aging Committee, for the record I am James F. Ahrens, President of the Montana Hospital Association. I am appearing here today in support of the passage of House Bill 24 - "An act requiring protective headgear for all motorcycle or quadricycle riders; and amending pertinent sections of Montana law."

In our representation of hospitals we are aware that nationally the number of severe head injuries can be radically decreased for both the operator and the passenger of motorcycles if at the time of the accident, they are wearing protective headgear.

While we have no specific concerns about the bill, if the committee is so inclined to want to present amendments, the Association suggests that the fine for first conviction be raised from "not less than $10.00" to "not less than $50.00 or more than $100.00". A stronger fine for first conviction will be an incentive to the motorcyclists to purchase the protective headgear at the onset rather than paying the $10.00 fine.

We would appreciate the committee's consideration of voting Do Pass on House Bill 24.

Thank you.

EXHIBIT # 3
DATE JAN 6, 1987
HB # 24

(This sheet to be used by those testifying on a bill.)

NAME: David B. Lackman DATE: Jan. 6, 1987

ADDRESS: 1400 Winne Avenue , Helena, MT 59601

PHONE: (406) 443-3494

REPRESENTING WHOM? Montana Public Health Association

APPEARING ON WHICH PROPOSAL: HB 24 (Nisbet et al) Headgear upon the head.
Tuesday, Jan. 6, 312 D Human Resources

DO YOU: SUPPORT? XX AMEND? _____ OPPOSE? _____

COMMENT: We consider this bill to be necessary legislation. The cost to Medicaide, hence the taxpayer, of injuries to motorcycle riders not wearing protective headgear is considerable. To maintain those cases requiring continuing care in Montana costs a minimum of $50,000. per year.

Motorcycle riders not wearing helmets are three times more likely to suffer fatal head injuries than those wearing helmets. The U.S. Dept. of Transportation estimates that if every motorcyclist wore a helmet, between 1,000 and 1,500 lives would be saved annually. Additionally, there is the saving of disabling injuries.

Much of the cost of injuries sustained in motorcyle accidents is borne by taxpayers. From California: Hospital costs per injured motorcyclist averaged $17,704. Seventy-two percent of that cost was paid by the State !

Thank you for your attention to this matter. We surely support the testimony of others given in support of this bill.

(Figures are from the Washington Post.) DBL

PLEASE LEAVE ANY PREPARED STATEMENTS WITH THE COMMITTEE SECRETARY.

I would recommend for your perusal Section FIVE of the Annual Report for 1985 of the MT Highway Patrol — This section deals with Motorcycle Accidents in Montana. It is truly hair-raising!

Additional fee Secretary! Do motorcyclists dislike Helmets? From Highway Patrol report: Accidents involving Motorcyclists: 352 not wearing helmets vs. 106 wearing helmets!

(This sheet to be used by those testifying on a bill.)

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ADDRESS: 1400 Winne Avenue , Helena, MT 59601

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EXHIBIT 3-A
DATE 1-16-87
HB #24

DEFINING PUBLIC HEALTH

During the 1983 legislative session, I was asked to define public health; especially the role of the laboratory. Some legislators wondered where I would next appear. They were confused; especially when I promoted the public health laboratory. My first involvement in this field was in 1929. After 55 years of concern in the field of public health, perhaps my testimonials were somewhat overdrawn. Now, I have again been requested to define public health- so here goes:

PUBLIC HEALTH is the art and science of preventing disease, prolonging life, and promoting physical and mental efficiency through organized community effort. This concerns the physical, social and economic well being of all persons. Of prime importance in this effort is the PUBLIC HEALTH LABORATORY. Virological, bacteriological, serological, and physical science testing is done for the prevention and control of communicable and other diseases.* Chemical, radiological, and microbiological testing is also done to assure the safety of water, air, and the physical environment.

* e.g. hereditable diseases

A more detailed discussion of public health may be found in:

Encyclopedia Brittanica, 15th edition 1974, Macropedia V. 15 pp 202-209

David Lackman, Legislative Lobbyist, Montana Public Health Association. January 19, 1983 - reprinted February 26,1985

EXHIBIT # 4
DATE Jan 6 1987
HB # 24

On Aug 13,1985 my son Max was involved in a motorcycle accident. He was riding on a dirt bike and we are not sure what caused the accident but they think the front tire locked up and caused the back wheel to come up and flip the bike over. Max was thrown over the handlebars and he landed face down on his head.

Max didnt have a mark on him when he got to the hospital but he had brain stem damage and a broken jaw.

Max was wearing a helmet at the time of the accident (I still have the helmet with the tire tracks where the motorcycle ran over his head.) The mouth piece was the only thing broken on the helmet.

I can remember when he bought his helmet and the price he paid for it. I thought it was awfully expensive and asked him why he got one that cost so much. He told me if he was going to ride he was going to have the best equipment he could get. He had better sense than his mother did. I thank God now that he felt the way he did.

In Max's case the helmet did not prevent serious injury but it did save his life.

Max has been going through therapy for 16 months now. My son still does not walk or talk. He is fed through a tube and is just begining to move his right arm and leg. It may seem to sound funny to say he is showing great progress but when I took him home in Feb of 86 they considered him a vegetable and he is doing so much they never thought he would and he is still in a improvement process. None of this would be possible if he had not been wearing a helmet.

People that say helmets are not necessary should visit their local hospitials. Im sure everyone of them has a person who has been involved in a motorcycle accident. They need to see the extent of damage they can receive and all the work it takes just to get some basic functions back.

We consider Max one of the lucky ones because most of his damage is motor control. His memory and mind doesnt seem to ge effected, which is unusual because they normally have long and short term memory loss. He was lucky in that way and Im sure it was because he had a helmet on.

I have seen people riding on motorcycles with small children on them and not even the children have helmets on. Someone needs to protect the children if their parent dont care enough to do it. They are too young to tell their parents they need a helmet and they are the ones who usually end up hurt or killed.

Seat belt laws are being inforced in many places and I truly beleive a helmet law should be passed. It would save many lives and prevent a lot of serious injuries.

Barbara J. Haynes
1125 1st Ave North
Great Falls, Montana
59401

EXHIBIT # 5
DATE Jan 6, 1987
HB #24
AL GOKE

MOTORCYCLE ACCIDENT FACTS

Highway Traffic Safety
303 N. Roberts
Helena, Montana 59620

I. Since the Helmet Law was repealed, motorcycle fatalities have been higher than in the years that the law existed.

In 1985 there were 34 motorcycle fatalities - the highest for any year.

Year	Motorcycle Fatalities	Motorcycle Registrations	Per 10,000 Registered Motorcycles	All Fatalities	Motorcycle Fatalities As % Age of All
1986	15	------	-----	222	6.8
1985	34	29,697	11.45	223	16.1
1984	27	31,145	8.99	238	11.8
1983	24	33,278	7.21	286	8.4
1982	18	33,585	5.36	254	7.1
1981	24	35,470	6.77	338	7.1
1980	24	35,455	6.77	325	7.4
1979	20	29,853	6.70	332	6.0

Persons killed/10,000 Registered Motorcycles:

Before Helmet Law	(1971-1972)	6.62
During Helmet Law	(1974-1976)	3.90
After Helmet Law	(1979-1983)	6.56

II. Other states that have repealed their Helmet Laws have experienced a similar increase in fatalities.

Motorcycle fatalities in the 14 states that repealed their laws during 1977 increased 41%, compared with 21% in states that retained their helmet usage.

In the 15 states without Helmet Laws that report whether cyclists involved in accidents were wearing helmets, deaths of helmeted cyclists decreased 20% between 1975 and 1977. But deaths of unhelmeted cyclists rose 169% in the same period.

III. Head injury was more often the cause of death among motorcyclists wearing no helmets.

Montana 1983 & 1984 Motorcycle Fatalities
Cause of Death

Helmet Used	Head	Head & Other	Other	Total
Yes	4	3	7	14
No	18	9	11	38
Total	22	12	18	52

Of the 22 motorcyclists killed by head injury, 18 were not wearing helmets.

IV. Helmets reduce the risk of head injury.

A 1977 study for the State of Maryland Legislature (A Review of Conflicting Reports Concerning the Safety of Motorcycle Helmets) found that: "of the studies reviewed which provided substantiated, or at least, supportable conclusions, the preponderance of the evidence is such that the following conclusions were made:

1. There appears to be sufficient documentation to support the hypothesis that the use of the motorcycle helmet is a major factor in the reduction of fatal head injuries.

2. There is sufficient evidence that, irrespective of speed, the motorcycle helmet does provide greater protection for the rider who uses one correctly."

Research studies refute the argument that helmets interfere with a cyclist's vision or hearing or that helmets increase neck injuries.

V. Opponents of mandatory Helmet Laws have said that knowledgeable motorcycle riders would wear them without being required by laws to do so.

1. During 1982-83, 80% of motorcyclists involved in Montana accidents did not have a helmet.

2. A Colorado study showed that after repeal of their Helmet Law, there was a decline in helmet usage from nearly 100% to less than 60%.

VI. Motorcycle accidents are costly to society.

Motorcyclists themselves pay only for a little more than 6% of their hospital bills. The remainder is from tax-supported funds and health insurance settlements.

In a study of Denver General Hospital medical bills, nearly 52% of all hospitalization costs were paid by tax-supported funds including the medically indigent fund, unpaid bills, medicare, etc. In six months, the bill to the taxpayer was over $40,000.

Quoting a Federal Judge who said in upholding the Massachusetts' Helmet Law, "From the moment of injury society picks the person off the highway, delivers him to a municipal hospital and municipal doctors, provides him with unemployment compensation if, after recovery, he cannot replace his lost job, and if the injury causes permanent disability, may assume the responsibility for his and his family's continued subsistence. We do not understand the state of mind that permits plaintiff to think that only he himself is concerned."

VII. Court decisions have upheld the constitutionality of helmet use law.

Thirty-four high state courts, plus the Supreme Court of the United States (Simon vs. Sargent), have said that such laws properly are within the police power to protect individuals and the general public.

VIII. There are a number of sound reasons for mandating helmet usage:

1. The public has an interest in motorcycle accident risks because of the costs that may accrue to society as a result of such accidents.

2. The increased risk or loss of control for the cyclist who does not wear a helmet and protective eye gear constitute a definite hazard to other motorists.

3. Mandating the use of helmets is no more an abridgement of freedom of choice than the mandate that life preservers be worn while water skiing, or that welders use protective eye shields.

MONTANA MOTORCYCLE ACCIDENTS

Motorcycle Accident Totals

	1981	1982	1983	1984	1985	Totals
Total Accidents	656	547	557	525	461	2746
Fatal Accidents	22	17	22	26	29	116
Injury Accidents	550	463	471	457	379	2320
Persons Killed	24	18	24	27	34	127
Persons Injured	688	594	618	598	487	2985

Helmet Use in Fatalities

	1979	1980	1981	1982	1983	1984	1985	1986	Totals
Not Used	13	22	20	15	15	22	31	10	148
Used	7	2	4	3	9	5	3	5	38
% Helmet Usage	35%	8%	16%	16%	37%	18%	8%	33%	20%

About 56% of all injuries are incapacitating when helmets are not used.

More persons are injured than there are accidents.

EXHIBIT # 2
DATE Jan 6, 1987
HB #24

TO: HOUSE HUMAN SERVICES COMMITTEE
FROM: DAL SMILIE
RE: HB-24

I am pro helmet useage but against helmet laws. Recent studies show that 56-80% of motorcyclists voluntarily wear helmets, only 11% of auto owners voluntarily wear seat belts. A recent American Motorcyclist Association poll shows that while most motorcyclists voluntarily wear helmets 75% are opposed to mandatory helmet laws.

There are 48,901 titled motorcycles in Montana and industry figures assume half as many off road motorcycles. Assuming one motorcycle to a household and an average of three persons to a family there are 220,056 Montanans with a motorcycle in the home. If 75% of those citizens and voters oppose a mandatory helmet law it should not be enacted unless there are compelling reasons, are there such reasons?

The U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) has long argued for mandatory helmet laws. However, NHTSA's Fatal Accident Reporting System (FARS) reported in its Motorcycles, Special Report, 1977, "There is no significant difference in the fatality rates of states requiring or not requiring the wearing of a motorcycle helmet".(p.72) A 1980 NHTSA helmet law report to Congress stated; "Adequate data are not available for precise comparisons between states of the effect of helmet laws on motorcycle fatality rates because or the inadequacies and lack of uniformity in state accient collection and reporting systems". A 1979 Utah Department of Public Safety study, Analysis of Motorcycle Safety in Utah, stated "average fatality rates per number of registrations over a ten year period is almost identical for motorcycles and passenger cars". Note that Utah had no helmet law during this period. While I agree that helmets are safer the statistics do not show a compelling reason to mandate a compulsory law opposed by so many Montana citizens.

Usually it is argued by proponents of such legislation that the failure to wear a helmet places a undue social burden on society to care for the injured. How safe must we become? The same social burden argument would require legislation to require helmets on rodeo cowboys, skiers, bicyclists, auto and tractor drivers, obviously tobacco products should be outlawed and exercise mandated. Joan Claybrook, ex chief of the NHTSA proposed a 35 mph speed limit to save more lives because crash safe cars could be built for that speed, do we need to be that safe? Motorcycles are less than 4% of registered vehicles and a 1974 NHTSA crash severity crash study shows that 24.9% of fatal and non fatal injuries were to the unhelmeted head in crashes but 39.6% of the same injuries occurred with unrestrained auto drivers. Clearly the social burden theory supports helmets for auto drivers, to do otherwise in the face of these

EXHIBIT #7
DATE JAN 6, 1987
HB #624

WITNESS STATEMENT

NAME J. ROBERT GREEN BILL NO. HB24

ADDRESS 2534 LEWIS LN DATE 1/6/87

WHOM DO YOU REPRESENT? ABATE of MONTANA

SUPPORT _____ OPPOSE X AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

Based on current available information including independant and government sponsored studies the value of a helmet is suspect, although they can be beneficial they can also cause injury and increase severity in some cases.

Cost to society has been brought up. In a democratic society where people had the freedom of choice to do as they please in terms of work, recreation, lifestyle how can government limit our individual and local actions

freedom of choice is a basis of the American system of government. Allow us that

EXHIBIT # 3
DATE Jan 6, 1987
HB # 24

The Effect of Motorcycle Helmet Use on the Probability of Fatality and the Severity of Head And Neck Injuries*

by

Jonathan P. Goldstein, Ph.D.
Department of Economics
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The Effect of Motorcycle Helmet Use on the Probability of Fatality and the Severity of Head and Neck Injuries

I. Introduction

The repeal or weakening of motorcycle helmet use laws in thirty-one states between 1976 and 1983 has generated a vigorous debate over the effectiveness of helmets in the prevention of fatalities and the reduction of injury severities. Statistical studies that have explored these issues have suffered from the lack of an accurate and detailed data set and, more importantly, have neglected to integrate causal models into their analysis. While the former problem has been alleviated by the extensive data collection techniques employed by Hurt et al. (1981a), the latter problem has not been addressed. The statistical techniques employed fail to control for the multifacted and interrelated factors involved in motorcycle fatalities and injuries and thus conflate the effects of such factors and erroneously assign them to helmet use.

The purpose of this paper is to develop, estimate, and statistically test three causal models for: (1) the probability of a fatality; (2) the severity of head injuries; and (3) the severity of neck injuries, where each dependent variable is conditional on the occurence of a motorcycle accident. A latent variable framework is employed in each case and particular

attention is paid to the effectiveness of helmets in each instance.

In contrast to previous findings, it is concluded that: (1) motorcycle helmets have no statistically significant effect on the probability of fatality; and (2) past a critical impact speed, measured by the normal component of velocity to the helmet, helmets increase the severity of neck injuries. It is also shown that helmets reduce the severity of head injuries. Thus, an individual or legislator is faced with a tradeoff between head and neck injuries in deciding whether or not to wear or mandate helmet use. Further analysis reveals that all possible combinations of the intensity of the tradeoff, defined in terms of the severity of head injuries forgone and the severity of neck injuries incurred from helmet usage, are equally likely.

The arguments in this paper are presented in five remaining sections. Section II presents an overview of existing statistical studies. The next section develops the basic model and its variants. Section IV discusses the data. Section V presents our results. Finally, Section VI contains our conclusions and their policy implications.

II. Overview

Existing statistical research on helmet effectiveness employs two alternative methodologies to analyze accident data. These techniques test the difference between death rates, injury rates, location rates of injuries, and severity rates of particular types of injuries. These rates are compared either for a similar period

of time before and after helmet law repeal or for helmeted riders and non-helmeted riders during a single time period subsequent to helmet law repeal.[1] In each case statistically significant differences are attributed to helmet use or non-use. Typical results associated with this literature are death and injury rates two to three times greater for non-helmeted riders and increases in occurence rates in repeal years that range from 19% to 63%.

The major limitation of previous studies is the lack of an effective control for other factors that concurrently determine death and injury rates. On one hand, helmet-non-helmet comparisons fail to consider differences in these two categories of riders. The most plausible hypothesis is that helmeted riders are more risk-averse and thus: (1) have lower pre-crash and thus crash speeds; (2) are less likely to be involved in accidents; (3) and are less likely to combine alcohol consumption and driving.[2] Such behavior rather than helmet use per se may dramatically reduce the probability of a fatality or the severity of an injury.

On the other hand, before and after designs fail to control for dramatic trends in the data. In particular trends towards: (1) lower median age of motorcyle owners; (2) higher average annual miles traveled; (3) lower average experience levels of riders; and (4) higher displacement machines, are not considered.[3] Given the relationships between engine displacement and potential speed, age and risk-aversion, and risk-aversion, crash speeds, and alcohol ingestion, simple before-after comparisons cannot be expected to isolate the effectiveness of helmet use.

In the next section we develop an econometric model that considers the determinants of the probability of death, and the severity of head and neck injuries. This approach allows us to isolate the individual effect of helmet use on the variables in question.

III. The Econometric Model

Variations of one basic model are employed for each of the three dependent variables considered. The classification of explanatory variables into three broad groups facilitates the development of the model. This typology consists of: (1) factors governed by the laws of physics; (2) physiological factors; and (3) human factors and operator characteristics. We consider each of these categories in order.

An informative method for understanding motorcycle trauma is to consider it as the result of uncontrolled mechanical energy transfer.[4] Motorcycle accidents result in serious injuries because of the speeds involved and the associated energy that the laws of physics tell us must be dissipated in the crash. In this light, the input energy and circumstances surrounding the dissipation of that energy are the crucial physical factors associated with injury severity.

Besides a measure of the energy transferred to the motorcycle operator--the potential for bodily damage--such factors as the compressibility or deformability of the impacted object, employment of a helmet as an energy handling device and the

engineering and design limitations of such devices must be considered. The compressibility of an impacted object determines the amount of kinetic energy utilized to deform that object and thus not available to injure the rider. Helmets, in turn, control or mediate within bounds the transfer of impact energy to the head. The current engineering design, safety standards, and production techniques applicable to motorcycle helmets place limits on the energy dissipating capacity of these protective devices.[5] If sufficient energy is involved to overcome these capabilities, damage to the head and possibly the neck may occur. This implies that the effectiveness of the helmet is mediated by the force applied to the helmet.

As a measure of input energy, we employ two variants of the kinetic energy of the motorcycle operator that results from a collision. The formula for kinetic energy can be expressed as $K = 1/2mv^2$, where m is the mass of the operator and v is the velocity assumed by that mass. Given the availability of data, two variants of the velocity variable are used. These variables are first approximations of v based on physical laws. The first measure (K1) is simply the crash speed of the motorcycle. In the alternative specification (K2), v is assigned either the relative impact velocity of the motorcycle and other crash-involved vehicle, or the motorcycle crash speed.[6] The former is assigned when the injury mechanism associated with the rider's most severe injury is the other vehicle, while the latter is employed in all other circumstances.[7] It is assumed that the dependent variable

is positively related to K1 and K2.

The effect of helmets is modelled through two variables: a qualitative variable, H, that distinguishes between helmet use and non-use and an interaction term, HI, constructed from the product of H and the normal component of impact velocity to the helmet. This specification implies that the overall effectiveness of the helmet decreases with impact speed. Helmet engineering considerations lead us to expect a negative coefficient for HI and a positive coefficient for H.

Finally, a compressibility variable is not included in our final specification. The results from estimated equations that include such a variable, not reported, find the coefficient to be insignificant in all cases.[8] Deletion of this variable from the appropriate equations results in changes in the coefficients and standard errors of all other variables that are negligible.

The physiological factors considered are the effect of age and alcohol consumption. Individuals can be considered to have an "injury threshold" which is based on physiological parameters. Those parameters in turn depend on an individual's age in such a manner that older people have a reduced resistance to injury.[9] Alcohol ingestion affects the severity of injuries in two ways. First, the presence of alcohol hinders not only the clinical diagnosis of injuries but the self-detection of injuries.[10] More importantly, the cardiovascular effects of alcohol significantly inhibit the process of homeostasis, especially the dynamic management of circulatory stability.[11] These two physiological

variables are respectively denoted by A and BA and the expected signs of their coefficients are positive.

Other physiological factors considered but not included in the final equations include drug involvement, and permanent physiological impairment. The estimated coefficients of these variables were statistically insignificant in all cases and deletion of these variables from the equations resulted in negligible changes in the remaining coefficients and their standard errors.

While many human factors and operator characteristics were analyzed, the final equations include only two: the amount of rider on-road experience, EX, and a binary variable, EA, which establishes whether or not (EA = 1, or EA =0) the rider had taken the correct evasive action for the particular accident situation. A special case of a linear spline, one where the slope of the linear segment beyond a critical experience level is constrained to be zero is used to model the experience variable. This implies that $EX = EX$ for $0 \leq EX < EX^*$ and $EX = EX^*$ otherwise, where EX^* is the critical experience level. This specification is theoretically justified by marginal returns from additional experience which approach zero past some critical experience level, but is also necessitated by the nature of the data (discussed below). The expected signs for the EX and EA coefficients are negative.

Other factors considered include driver training, the operator's past accident and violation history, the height and

weight of the operator, and whether or not the rider voluntarily separated from the motorcycle before impact. In all cases and in all equations the coefficients of these variables were statistically insignificant and their deletion did not alter in any significant way the remaining coefficients or standard errors.

Finally, in order to control for any influences of risk aversion not captured by K1, K2, BA, or H and thus to avoid specification bias, proxy variables such as income, number of children, marital status, and education were included in our equations. These variables were singularly and in all possible combinations statistically insignificant and were eliminated from the equations with the same results as other such variables. Also considered and eliminated in similar fashion were measures of traffic density and a coefficient of braking friction.

The major limitation of our specification is the exclusion, due to data limitations, of a variable that captures the quality and expeditious delivery of medical services. While the problem of specification bias is unlikely, the statistical and quantitative importance of such a variable cannot be established.

A. Fatality Model

In order to model the probability of a fatality, we define a dichotomous variable, D_i, where $D_i = 1$ if the operator died given that an accident occurred and $D_i = 0$ otherwise. We also specify a latent variable D_i^*, an individual's propensity to die conditional on the occurence of an accident. For notational simplicity and ease of exposition, we drop all references in the remainder of the

text to the conditional nature of the three dependent and latent variables. We assume that

$$D_i^* = X_i'\beta + \varepsilon_i$$

where X_i is a vector of independent variables, β is a vector of unknown parameters, and ε is a random error term. It is assumed that ε_i are i.i.d. drawings from $N(0,\sigma^2)$. In this model X_i includes K in one of its two forms, H, HI, A, BA, EA, EX and a constant term. D_i can now be defined in terms of D_i^* in the following manner:

$$D_i = 1 \text{ if } D_i^* \geq Z^*$$

$$= 0 \text{ if } D_i^* < Z^*$$

where Z^* is a threshold beyond which an individual expires. Given this specification the probability that $D_i = 1$ can be expressed as

$$P(D_i = 1|X_i) = F(X_i'\beta/\sigma)$$

where F is the standard normal distribution function. The maximum likelihood (ML) probit estimates for the parameters of this model are reported in section V.A. below.

B. Head Injury Severity (HIS) Model

In this model the dependent variable, HS, is the sum of squared severities for all head injuries sustained by the driver, where the severity of each injury is measured by the Abbreviated Injury Scale (AIS).[12] Although the dependent variable is continuous, the large number of limit observations,[13] suggest a Tobit specification. We define a latent variable, HS_i^*, the

sum of squared severities for all head injuries, and assume that

$$HS_i^* = X_i'\beta + \varepsilon_i$$

where β, X_i, and ε_i are as defined in the fatality model. HS_i can now be defined in terms of HS_i^* in the following fashion

$$HS_i = HS_i^* \text{ if } HS_i^* > 0$$

$$= 0 \text{ if } HS_i^* \leq 0$$

Given this specification the regression function can be written as

$$E(HS_i|X_i) = \beta[F(X_i'\beta/\sigma)X_i] + \sigma f(X_i'\beta/\sigma)$$

where f is the density function of the standard normal variable. The ML Tobit estimates for the parameters of this model are reported below.

C. Neck Injury Severity (NIS) Model

The dependent variable in this case is NS, the sum of squared severities for all neck injuries.[14] Given the large number of limit observations, a Tobit specification is utilized.[15] Let NS_i^* be the sum of squared severities from all neck injuries and assume that

$$NS_i^* = X_i'\beta + \varepsilon_i$$

where β and ε_i are defined as in the previous models. One additional explanatory variable (HW) is included in X_i. This variable is an interaction variable and is formed as the product of H and the weight of the helmet.

The inclusion of both the HI and HW interaction variables in

the neck equation are justified by the laws of physics. Impacts to the helmet are capable of causing a flexure or extension displacement (cervical stretch) of the neck and the prospect of a related neck injury. While a helmet may attenuate head impact and thus the extension-flexsion response of the neck, this result can only be expected to occur until some critical impact speed beyond which the energy absorbing capabilities of the helmet are surpassed. Beyond that speed, the added mass of the helmet increases the inertial and post-impact response of the neck and is theoretically related to the severity of neck injuries.[16]

Expressing NS_i in terms of NS_i^* we obtain:

$$NS_i = NS_i^* \text{ if } NS_i^* > 0$$

$$= 0 \text{ if } NS_i^* \leq 0$$

Given this specification the regression function can be written as

$$E(NS_i|X_i) = \beta[F(X_i'\beta/\sigma)X_i] + \sigma f(X_i'\beta/\sigma)$$

The ML Tobit estimates for the parameters of the model when HW_i is both included and excluded from X_i are reported below.

IV. The Data

The data used was collected from the on-scene in-depth investigations of 900 motorcycle accidents, in the Los Angeles area, supervised by Hurt et al. (1981a). Each accident was completely reconstructed and 1,045 data elements covering accident characteristics, environmental factors, vehicle factors,

motorcycle rider, passenger, and other vehicle driver characteristics, and human factors including both injuries and protection system effectiveness were recorded. The data was collected by a multi-disciplinary research team which insured more accurate and detailed information than is typically available from police and hospital records.[17]

A subsample of 644 cases was selected based on our twofold treatment of missing data. In general, cases with missing data on the independent variables were dropped from the sample. In the case where such a deletion would result in possible selection bias or the significant loss of data, missing values were assigned the mean value of the variable in question.[18]

As argued above, one limitation of the data directly affects the specification of our model. While the use of a linear spline to model the effects of EX is theoretically justified, it is also necessiated by the truncated range used to record that variable: values of EX > 96 months were assigned a value of 97. While different critical values of EX $\leq$ 96 were used, the best fit, occurred when EX^{*} = 96. While it was not possible to test critical points above 96 to determine if a better fit existed, the EX variable was insignificant in all but the HIS model. And deletion of this variable in other models had negligible influence on all results.

The definition, construction, units of measurement, and sample means for all variables in our final equations are contained in Appendix A.

V. Results

The results of the fatality model and the HIS and NIS models are respectively reported in Tables I, III, and IV. Estimates are based on the 644 cases remaining after the treatment of the missing values. For each model two equations corresponding to the two variants of K are reported. In the NIS model an additional two equations associated with the inclusion-exclusion of the HW variable are reported.

A. Fatality Model

The results in Table I reveal that the coefficients of all variables take on their expected signs. Both the H and HI variables are insignificant, indicating that helmet use has no statistically significant effect on the probability of death. The major determinants of the probability of a fatality are the kinetic energy imparted to the rider--the potential for bodily damage--and the operator's blood alcohol level. The results also reveal that the proper execution of evasive action, an individual's age, and experience level have no statistically significant impact on the probability of a fatality. Deletion of all insignificant variables with the exception of H and HI from the equation produces negligible changes in the remaining coefficients and their standard errors. Finally, on the basis of comparisons between the log of the liklihood function, l, equation 1 better fits the data.

The quantitative importance of the statistically significant

Table I - Probit Estimates of Fatality Model

Equation	Constant	H	HI	K1	K2	BA	A	EA	EX	l	x^2
1	-2.33[A]	-1.22	0.065	0.00010[A]		0.067[A]	0.017	-0.23	-0.0033	-90.32	67.93
	(-7.50)	(-1.45)	(0.80)	(4.86)		(3.49)	(1.59)	(-0.96)	(-1.02)		
2	-2.09[A]	-1.23	0.065		0.000050[A]	0.077[A]	0.015	-0.28	-0.0018	-95.53	57.52
	(-7.36)	(-1.43)	(0.78)		(3.85)	(4.31)	(1.46)	(-1.22)	(-0.61)		

t Statistics in parenthesis

[A]Significant at 1% level

variables is best understood through the total effects of relevant changes in those variables on the probability of death, holding all other variables at their sample means. Such results are reported in Table II.[19] A change in BA from 0 to 10 (sober to legally intoxicated in most states) increases the probability of a fatality dramatically from .0207 to .0853 or from .0233 to .1131 depending on which equation is employed. In the same vain, an increase in the relevant crash speed from 40 to 60 mph increases the probability from .0708 to .3632 or from .0446 to .1230.

Table II - Total Effects On $P(D = 1|X)$

		Eq. 1		Eq. 2	
Variable	Condition	$F(X'\hat{\beta})$	$\Delta F(X'\hat{\beta})$	$F(X'\hat{\beta})$	$\Delta F(X'\hat{\beta})$
All	$X' = \bar{X}'$	.0228		.0262	
BA	BA = 0	.0207		.0233	
			.0646		.0898
	BA = 10	.0853		.1131	
K	M = 5.01[a] V = 0 mph	.0091		.0166	
			.0071		.0051
	M = 5.01 V = 20 mph	.0162		.0217	
			.0546		.0229
	M = 5.01 V = 40 mph	.0708		.0446	
			.2924		.0784
	M = 5.01 V = 60 mph	.3632		.1230	

[a]The average weight and mass are respectively 161.19 and 5.01.

These results clearly establish that crash speed and the blood alcohol level of the rider are the most important determinants of fatalities, while helmets are shown to have no

statistically significant effect on the probability of survival.

B. Head Injury Severity Model

Parameter estimates associated with the HIS model are reported in Table III. As in the previous model, the statistically most significant determinants of the severity of head injuries are the rider's kinetic energy and blood alcohol level. In sharp constrast to the previous model, methods for the reduction of the gravity of head injuries exist. The most effective one is the energy absorbing capability of the helmet. The statistical significance of the H variable and insignificance of the interaction term (HI) imply that not only do helmets reduce head injuries, but they do so at almost all realtistic impact speeds to the helmet.[20] For example in equation 3 at the average impact speed of 10.13 mph to riders experiencing an impact to the helmet, HS is reduced by 12.68. Other deterrents to head injuries include execution of the proper evasive action and rider experience. A rider with the average level of road experience receives a 2.99 reduction in HS while the reduction for a properly executed evasive action is 5.31. Finally, as in the fatality model, equation 3 better fits the data.

C. Neck Injury Severity Model

The results associated with the NIS model are reported in Table IV. The inclusion of the HW variable in the equations results in four variants of the model. As in the previous models

Table III - Tobit Estimates of Head Injury Severity Model

Equation	Constant	H	HI	K1	K2	BA	A	EA	EK	σ	l
3	-9.97[A]	-17.24[A]	0.45	0.0016[A]		1.23[A]	0.13	-5.31[AA]	-0.068[AA]	20.58	-1275.6
	(-3.03)	(-3.58)	(0.95)	(5.98)		(4.48)	(1.07)	(-2.34)	(-2.09)		
4	-8.23[AA]	-17.34[A]	0.42		0.0010[A]	1.41[A]	0.12	-5.85[A]	-0.057	20.83	-1279.5
	(-2.54)	(-3.58)	(0.86)		(5.123)	(5.149)	(1.02)	(-2.56)	(-1.76)		

t Statistics in parenthesis

[A]Significant at 1% level

[AA]Significant at 5% level

K and BA are important determinants of injury severity, but in addition we find that <u>past a critical impact velocity to the helmet, measured by the normal component of velocity, helmet use has a statistically significant effect which exaccerbates the severity of neck injuries.</u> Using the point estimates in equations 5-8 and the average weight of the helmet (2.70), estimates of this critical impact speed are around 13 mph. Beyond this realistically attained critical speed the energy absorbing ability of the helmet which is capable of reducing the extension-flexsion response of the neck to head impacts are surpassed. Under these circumstances, the inertial and post-impact response of the neck are intensified due to the added mass of the helmet and neck injuries result. An impact to the head whose normal component of velocity is 20 mph will increase the severity of neck injuries by around 10. Equations 7 and 8 also reveal that marginal increases in helmet weight do not have a statistically significant effect on the severity of neck injuries. This finding along with the acceptance of the zero constraints in equations 5 and 6 imply that it is the added mass of a helmet and not its specific weight that is responsible for exacerbating neck injuries.

Reductions in the severity of neck injuries are achieved through helmet use but only when impact velocities to the helmet are below the critical velocity. The proper execution of evasive action is also an effective deterrent to neck injuries. While the coefficient of EX in this model takes on an unexpected sign, the coefficient is not significantly different from zero. Finally, on

Table IV - Tobit Estimates of Neck Injury Severity Model

Equation	Constant	H	HI	K1	K2	BA	A	EA	EX	HW	σ	l
5	-28.42*	-21.34*	1.58**	0.00081*		0.55**	0.21	-4.59	0.021		16.98	-409.98
	(-6.08)	(-2.58)	(2.02)	(2.83)		(2.02)	(1.71)	(-1.68)	(0.58)			
6	-27.60*	-22.59*	1.68**		0.00041**	0.70*	0.20	-5.24	0.032		17.33	-411.87
	(-5.94)	(-2.61)	(2.05)		(2.02)	(2.59)	(1.64)	(-1.88)	(0.87)			
7	-28.85*	-30.12**	1.61**	0.00080*		0.54**	0.23	-4.56	0.021	3.10	17.02	-409.90
	(-6.09)	(-2.09)	(2.02)	(2.82)		(1.99)	(1.81)	(-1.67)	(0.57)	(0.72)		
8	-28.00*	-26.18	1.63**		0.00040**	0.69**	0.22	-5.25	0.033	1.48	17.40	-411.84
	(-5.95)	(-1.76)	(2.01)		(1.96)	(2.54)	(1.70)	(-1.87)	(0.89)	(0.32)		

t Statistics in parenthesis

*Significant at 1% level

**Significant at 5% level

the basis of likelihood comparisons, equation 5 better fits the data.

The most important finding generated by the HIS and NIS models is that a tradeoff between head and neck injuries confronts a potential helmet user. Past a critical impact speed to the helmet, which is likely to occur in real life accident situations, helmet use reduces the severity of head injuries at the expense of increasing the severity of neck injuries. We now consider the qualitative nature of this tradeoff to discern if a helmet user forgoes either severe or minor head injuries in order to incur either severe or minor neck injuries.

D. The Nature of the Tradeoff

To gain insight into the nature of the head-neck injury tradeoff associated with helmet use, we specify and estimate two probit equations. The first considers the determiants of the probability that a rider's most severe head injury is either critical or fatal (AIS $\geq$ 5), while the second analogously considers a rider's most severe neck injury. In each respective case the vector of independent variables is the same as in the HIS and NIS models. We thus define HD = 1 if $AIS_{MH} \geq 5$ and HD = 0 if $0 \leq AIS_{MH} < 5$, where the subscript MH refers to the rider's most severe head injury. Analogously, ND = 1 if $AIS_{MN} \geq 5$ and ND = 0 if $0 \leq AIS_{MN} < 5$.[21] Given that HD and ND are conditional on the occurence of an accident, the sample size is the same as in the

previous models. The estimates for these basic equations are reported in Table V.[22]

These results indicate that the only statistically significant determinants of the probability that an individual's most severe head or neck injury will be severe (critical or fatal) is the rider's blood alcohol level and kinetic energy which is dominated by the crash speed. With respect to helmets, this finding implies that both helmeted and nonhelmeted riders are equally likely to have their most severe head and neck injuries classified as severe or minor. This further suggests that, ceteris paribus, an individual who decides to wear a helmet and who experiences an impact velocity to the head greater than the critical level may forego either severe or minor head injuries and incur either a severe or minor neck injury; all forms of the tradeoff are equally likely to occur.

VI. Conclusions and Policy Implications

From our empirical results we conclude that helmet use has no statistically significant effect on the probability of a motorcycle fatality and that helmet users face a tradeoff between reductions in the severity of head injuries and increases in the severity of neck injuries. It is also shown that all possible combinations of the intensity of this tradeoff are equally likely to occur. In addition, it is found that the major determinants of injury and death are speed and blood alcohol level.

If a major concern of policy makers is the prevention of

Table V Tradeoff Results

Equation/ Variable	Constant	H	HI	KI	BA	A	EA	EX	l	x^2
9/HD	-1.89[A]	-1.04	0.069	0.000074[A]	0.052[A]	0.0050	-0.21	-0.0049	-93.03	38.07
	(-6.54)	(-1.31)	(0.90)	(3.54)	(2.75)	(0.48)	(-0.93)	(-1.49)		
10/ND	-2.58[A]	-1.30	0.072	0.000093[A]	0.044	-0.0072	-3.73	0.0022	-23.46	30.32
	(-4.88)	(-0.40)	(0.22)	(3.22)	(1.62)	(-0.36)	(-0.13)	(0.35)		

t Statistics in parenthesis

[A]Significant at 1% level

[A][A]Significant at 5% level

fatalities, our results imply that helmet legislation may not be effective in acheiving that objective. Alternatively if the overall costs to society in the form of health care costs and lost productive output are at issue, our results imply that existing cost-benefit analyzes which fail to consider the injury tradeoff are inappropriate for policy guidance.[23] Until studies are adequately designed and completed, the passage of helmet use laws which may seriously jeapordize the health and earning capacities of an individual is not a viable policy option. Even in the event that cost-benefit studies show a net benefit to society from helmet legislation, the existence of externalities and high marginal disutilities associated with helmet use for all or a subset of motorcyclists may imply a net cost to the individual and thus raise questions about the redistribution of income resulting from helmet legislation.[24] Furthermore, alterations in driving behavior in response to mandatory helmet use laws, predicted by the theories of risk compensation and risk homeostasis, may dissipate the net benefits to society from regulation.[25]

Under these circumstances mandatory helmet use laws cannot be considered as an effective method to eradicate the slaughter and maiming of individuals involved in motorcyle accidents. A more viable policy approach would be two pronged. On one hand, policy must address the causes of motorcyle accidents. On the other hand, since all accidents are not preventable, policy must consider the major determinants of death and injury and effective methods for their reduction.

Although our empirical results do not shed light on the causes of accidents, other evidence leads us to suggest the following policies: (1) the education of the general driving public about the coexistence of heterogeneous road users; (2) the education of a younger and more inexperienced population of motorcyclists on the issues of accident avoidance and the proper use of all too often overpowered machines; and (3) stricter enforcement of drunk driving laws, an increase in the legal drinking age, and alcohol awareness programs, to reduce the accident rate.

With respect to the second type of policy, our results show that the major determinants of death and injury are speed and alcohol consumption. Policies aimed at the former problem range from stricter enforcement of speed limits to horsepower restrictions on the vehicle population.[26] In the latter case policy options are the same as those mentioned above. Finally, a viable alternative to helmets as a means for reducing the severity of head injuries exists. Mandatory driver training and education programs which emphasize the proper execution of evasive action in accident situations can effectively serve this purpose.

Appendix A

D — qualitative variable; D = 1 if operator died as a result of injuries sustained in accident, D = 0 otherwise $\bar{D} = 0.048$.

HS = $\sum_{h=1}^{N} (AIS_h)^2$ where N is the number of head injuries incurred.

$\bar{HS} = 3.56$.

NS = $\sum_{i=1}^{K} (AIS_i)^2$ where K is the number of neck injuries sustained.

$\bar{NS} = 0.638$.

K1 = $.5MV^2$, measured in foot pounds, where M (measured in slugs) = $\frac{WT}{g}$, where WT is the the weight of the operator measured in pounds and g is the gravitational constant measured in ft/sec^2. V is the crash speed of the motorcycle measured in ft/sec. $\bar{K1} = 3506.33$.

K2 = $.5MV^2$, measured in foot-pounds, where V is the relative velocity of the motorcycle and other vehicle. $\bar{K2} = 3793.39$.

H — qualitative variable; H = 1 if operator wore a helmet, H = 0 otherwise. $\bar{H} = 0.43$.

HI — interaction variable equal to product of H and I where I is the normal component of impact velocity to the helmet measured in miles per hour. $\bar{HI} = 3.64$.

A — age of operator measured in number of years. $\bar{A} = 26.25$.

BA — blood alcohol level corrected to time of accident, measured in number (integer) of hundredths of 1% of blood alcohol, $0 \leq BA \leq 31$. $\bar{BA} = 0.62$.

EA — qualitative variable, EA = 1 if evasive action was attempted by the operator and if the action was considered appropriate for the situation. $\bar{EA} = 0.33$.

EX — amount of street motorcycle riding experience in months. $\bar{EX}_* = EX$ for $0 \leq EX \leq EX^*$ and $EX = EX^*$ otherwise. $EX^* = 96$ and $\bar{EX} = 44.44$.

HW — interaction variable equal to product of H and W where W is the weight of the helmet in pounds. $\bar{HW} = 1.16$.

Appendix B

Variable	Equation 1 $\frac{\partial P}{\partial X_K}$	Equation 2 $\frac{\partial P}{\partial X_K}$
Constant	-0.13	-0.13
H	-0.066	-0.075
HI	0.0035	0.0040
K1	0.0000056	
K2		0.0000031
BA	0.0036	0.0047
A	0.00092	0.00090
EA	-0.013	-0.017
EX	-0.00017	-0.00011

Footnotes

[1]The before-after methodology is employed by Dare et al. (1979) and McSwain and Lummis (1980), while helmeted-nonhelmeted comparisons are found in Chang (1981), Dare et al. (1979), Heilman (1982), Hurt et al. (1981a, 1981b), Kraus et al. (1975) Luna et al. (1981) and Scott (1983).

[2]The systematic overrepresentation of nonhelmeted riders in accident samples is a manifestation of the relation between helmet use and risk-averse driving behavior. Dare et al. (1979; p. 14), Hart et al. (1975; p. 544), Heilman et al. (1982; p. 663), Hurt (1981a; p. 6), Mueller (1980; p. 590), and NHTSA (1980; p. IV-21) either document this occurence and/or discuss this relation. Scott (1983; p. 33) establishes the relation between alcohol use and helmet use.

[3]Data supplied by the Motorcycle Industry Council Inc. reveals that between 1976 and 1980 the percentage of total motorcycles 450cc and over increased from 21.9% to 37.8% and that the percentage of vehicles 750cc and over increased from 11.0% to 22.4%. Between 1976 and 1982 the average annual miles traveled per motorcycle increased from 1525 to 2955. Between 1975 and 1980 the percent of total motorcycle owners under the age of 18 increased from 16.2% to 24.6%, while the under 24 group increased from 38.1% to 48.9%.

[4]See Snively (1983).

[5]Federal Standard No. 218 requires that motorcycle helmets pass two distinct impact attenuation tests. The impacts are generated by a guided free fall that results in impact velocities of 11.66 and 13.40 mph.

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[6]Relative velocity is defined as $\sqrt{(v \cos \Theta + V)^2 + (v \sin \Theta)^2}$ where v is the crash speed of the motorcycle, V is the crash speed of the other vehicle and Θ is the angle of impact, where $0 \leq \Theta \leq 180$.

[7]It is assumed that the most severe injury is associated with the largest use of energy. Thus if another vehicle is involved in that injury, the rider's velocity must be calculated relative to the other vehicle. In all other cases, it is assumed that the rider does not impact another vehicle but rather a fixed object. Qualitatively and quantitatively similar results, to those reported below, are obtained for a third variant of kinetic energy--one which uses the relative velocity in all instances.

[8]Given that multiple injuries and thus multiple injuries mechanisms were reported compressibility was based on the nature of the injury mechanism associated with the operator's most

severe injury. A qualitative measure was used to distinguish between compressible and less compressible objects. The latter group included environmental factors composed of asphalt, concrete, metal, and wood along with the "hard points" of other vehicles as defined by Hurt et al. (1981a; coding appendix E). The former group included glass, water, soil, dirt, sand, and gravel and the "soft points" of other vehicles. The statistical results can be explained by the small variation in the compressibility of the typical objectives impacted in road accidents and the minimal amount of deformation (energy absorption) incurred by such objectives.

[9]A continuous relation exists between age and reduced pulmonary functions, reduced cardiovascular reserves, particularly under stressful situations, brittle bones (osteoporosis), rigid ligaments, and coexisting diseases which may complicate the process of homeostasis.

[10]See Baker and Fisher (1977) and Champion et al. (1975) and the references therein.

[11]Vasodilatation and the blocking of antidiuretic hormones are two such problems. See Champion et al. (1975) and the references therein for further discussion.

[12]The AIS developed by the American Association for Automotive Medicine (1976), classifies injuries using the following scores: zero, no injuries; 1, minor injuries; 2, moderate injuries; 3, severe injuries--no threat to life; 4, serious injury--life-threatening, survival probable; 5, critical injury--survival uncertain; and 6, fatal injury. Under this classification system, the cummulative effect of multiple injuries is measured by the sum of squared AIS.

Head injuries are defined as those occurring in the following regions: Basal, Frontal, Face, Mandible, Maxilla, Nasal, Occipital, Orbit, Parietal, Brain, Sphenoid, Temporal, and Zygoma. Alternative specifications of the HS variable which exclude different combinations of regions considered to constitute the face were tested and the results did not deviate qualitatively from those reported below.

[13]The lower truncation in this case is zero. Out of a sample of 644, 248 were nonlimit observations.

[14]Neck injuries are defined as those occurring in the following regions: the general cervical area, cervical vertebrae 1-7, and the foramen magnum. Alternative specifications of NS which include different combinations of the above regions and in some cases the throat region produce the same qualitative results.

[15]Out of a sample of 644, 68 were nonlimit observations.

[16]The average weight of the human head is 8-12 pounds while the average weight of the helmet used in our sample is 2.7 pounds. Thus the weight of the helmeted head increases by 23-34%. The helmet literature has paid little attention to the relationship between helmet use and neck injury. For example an analysis of the this relation has never been an objective of NHTSA research, see NHTSA (1980; p. II-5). The overall quality of the statistical analysis of this issue is significantly below that of the fatality and head injuries studies criticized above and empirical findings have supported both sides of the issue. Studies that suggest a positive relation are found in Bowman and Schneider (1980), N.Y.S. DMV (1969), Dare et al. (1979) and the references cited in Beier et al. (1983; p. 596) and Voge and Borowsky (1983; p. 606). Studies that support a negative or no relation include: McSwain et al. (1980), Hurt et al. (1981a, 1981b), N.Y.S. DMV (1979), Scott (1983), Bowman and Schneider (1980) and the references cited in Mueller (1980) and NHTSA (1980).

[17]For a detailed discussion of this methodology and its relative merits, see Hurt et al. (1981a, pp. 1-35).

[18]Variables for which missing values were deleted include H, EA, A, BA, rider height, weight, motorcycle crash speed, other vehicle crash speed, coefficient of breaking friction, traffic density, marital status, drug impairement, and precrash separation of rider from vehicle. Means were assigned in the following cases: EX, training, operator education, number of children, income, number of prior tickets and accidents, and the normal component of helmet impact velocity.

[19]Fatality rates per 100 accidents, reported in Dare et al. (1979), McSwain and Lummins (1980), and Scott (1983), range from .0109-.0292 and are consistent with our estimates of .0228 and .0262. Alternatively, partial derivatives, $\frac{\partial P}{\partial X_K}$, evaluated at sample means are reported in Appendix B.

[20]Using the point estimates in equation 3 and 4, the critical helmet impact speed beyond which helmets no longer reduce head injuries are 38.31 and 41.29 respectively. While such impact speeds are possible, experience shows that they are outside of the normal range (0-25 mph) of impact speeds, see Hurt (1981a, VI, Sec. 9).

[21]Different variants of HD and ND, where these variables are assigned a value of 1 either if AIS $\geq$ 3 or AIS $\geq$ 4 are tested. The results are qualitatively the same as those reported below.

[22]Exclusion of all insignficant variables with the exception of H, and HI in equations 9 and 10 produce the same qualitative results.

[23]See Mueller (1980), Hartunian et al. (1983), and Scott (1983).

[24]Deviations between individual costs and societal costs may result from the structure of insurance rates which tend to redistribute the high costs associated with high risk policy holders to all policy holders.

[25]See Peltzman (1975) and Wilde (1982). For the case of helmet laws, Adams (1983) offers empirical support for this hypothesis.

[26]Horsepower restrictions have been considered on the European continent, see Russo (1978) and the references therein.

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EXHIBIT # 9
DATE Jan 6, 1987
HB # 24

Prosecutors drop charge in fatality

A Billings driver accused of causing the death of a motorcyclist last June was cleared of negligent homicide charges Thursday in District Court.

Patrick W. Strickland, 35, of 1325 Colton Blvd., instead pleaded guilty to a separate charge of driving while under the influence of alcohol at the time of the fatal accident June 27.

Strickland had been charged in the death of Shannon Hague, 20, who died three days after his motorcycle collided with Strickland's vehicle on North 27th Street.

District Judge Diane Barz dismissed the negligent homicide charge against Strickland at the request of the Yellowstone County attorney's office.

Deputy County Attorney Dennis Paxinos said his office determined that its key eyewitness was unable to testify clearly about the facts of the case. He declined further comment.

Court records said Strickland pulled from the parking lot of the Red Door Tavern and struck Hague's motorcycle, which was southbound on North 27th Street.

Investigation showed that Strickland took no evasive action.

Hague tried to brake but couldn't stop, records said. The victim, who was not wearing a helmet, was declared brain-dead June 30.

Barz said she will sentence Strickland on the misdemeanor drunken-driving charge Jan. 15 after a presentence investigation is completed by the adult probation-parole office. The county attorney's office has indicated that it will make no sentence recommendation.

Strickland is free without bond.

EXHIBIT #
DATE 1-16-87
HB # 24

HB-24

Proposed amendment to HB-24
by Rod Sandahl 1025 8th ave. Helena

"It shall be a mandatory charge of Felony murder or attempted murder if the victim lives, against all drivers who are found at fault in an accident involving motorcycle or bicycle riders who are obeying the laws of traffic and are innocent victims."

TABLE 3 ALP-11

1973 MOTORCYCLE DEATH RATES BY STATE IN ORDER OF DEATH RATE 1/

EXHIBIT # 11
DATE JAN 6 1987
HB # 24

Rank	State	Death Rate 1/
1	South Carolina	14.30
2	Louisiana	13.81
3	New York	13.73
4	Connecticut	13.61
5	Mississippi	13.00
6	Kentucky	12.61
7	Illinois	11.70
8	Georgia	11.48
9	Tennessee	10.92
10	New Jersey	9.93
11	North Dakota	9.61
12	Indiana	9.32
13	North Carolina	9.01
14	Virginia	8.70
15.5	Vermont	8.67
15.5	New Mexico	8.67
17	Florida	8.47
18	Delaware	8.26
19	Arizona	8.16
20	Ohio	8.01
21	Michigan	7.95
22.5	California	7.78 - - - U.S. Average
22.5	Nevada	7.78 - - - U. S. Average
24	Maryland	7.44
25	Wisconsin	7.26
26	South Dakota	7.09

1/ deaths per

Rank	State	Death Rate 1/
27	Massachusetts	6.96
28	Texas	6.93
29	Arkansas	6.89
30	Pennsylvania	6.48
31	Missouri	6.19
32	Iowa	6.07
33	New Hampshire	5.96
34.5	Maine	5.79
34.5	Idaho	5.79
36	Minnesota	5.45
37.5	Utah	5.03
37.5	Alabama	5.03
39	Oklahoma	4.99
40	West Virginia	4.93
41	Nebraska	4.84
42	Colorado	4.76
43	Oregon	4.74
44	Wyoming	4.57
45	Rhode Island	4.56
46	Kansas	4.22
47	Washington	3.86
48	Alaska	3.54
49	Hawaii	2.92
50	Montana	2.42 ← LOWEST IN

IN 1973, BEFORE THE HEL
LAW!

1/ Deaths per 10,000 registrations.

Motorcycle Deaths in Perspective

US Deaths per 1,000,000 Population *

Cause	Deaths
Heart Disease	3610
Cancer	1620
Stroke	1000
Autos	256
Cirrhosis of the Liver	160
Home Accidents	124
Suicides	117
Homicide	84
War - US ave. 1941-73	80
Workers at Work	71
Pedestrians by all Vehicles	52
Peptic Ulcers	46
Drowned	40
Hypertension	37
Poison by Gas	26
Septicemia	19
Surgical & Medical Misadventures & Complications	18
Anemias	15
*** Motorcycles ***	*** 15 ***
Construction Workers at Work	15
Firearms Accidents	8
Electrocution & Lightning	6
Syphillis & Other Venerable Diseases	2
Pedestrians by Motorcycles	0.7
Nuclear Power Operation (For 100 Plants, year 2000, predicted)**	1.5×10^{-4}

*Mostly from US Health Dept.

** From "Rasmussen" Report.

onclusion: The millions of dollars spent on forcing motorcyclists o wear helmets should logically be transferred to hazards far more eserving and far more a threat to life.

DEPARTMENT OF TRANSPORTATION

NEWS

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

FOR RELEASE THURSDAY P.M.
October 12, 1972

NHTSA -- 96-72
Tel. 202-~~426~~-9550

Almost 90 percent of the motorcycle helmets tested for the Government failed to meet the performance requirements set by industry specifications, the Department of Transportation announced today.

The Department's National Highway Traffic Safety Administration (NHTSA), said that 74 tests of 54 different model helmets showed that only eight complied with the standard set by the industry's American National Standards Institute. The tests were conducted by Dayton T. Brown, an independent laboratory.

The Safety Administration said the test results are not regarded as conclusive, but offer an initial attempt at comparison of the performance of safety helmets and illustrate the need for further examination.

"For this reason," said NHTSA Administrator Douglas Toms, "we have undertaken a program of retesting in larger quantities certain model helmets to provide conclusive evidence of performance. We also will be looking at the aging and environmental effect on Helmets.

IN 197

-more-

"Maximum protection of the motorcyclist is extremely important in order to decrease potential deaths and serious injuries resulting from head impacts," Toms said. "Last May, NHTSA proposed a new Federal Motor Vehicle Safety Standard which would require manufacturers of safety helmets to meet specific safety performance levels. We believe this standard should contribute substantially to our program for increasing highway safety which President Nixon has given top priority."

The Safety Agency said it started an investigation of protective headgear for motorcyclists in July 1971 after it received numerous reports that:

1. Helmet shells made of polycarbonate (molded thermoplastic) materials may be very susceptible to common chemicals and cleaning agents and exposure could degrade their protective ability.

2. Quality control among many of the helmet manufacturers appeared to be minimal.

3. Helmets were failing "prematurely" e.g., by cracking apart after falling off of shelves or receiving other hard impacts.

The NHTSA has decided to release the results of its first tests as a public service, even though its investigation, which will include the testing and retesting of new and used helmets, is continuing.

The 54 different model helmets used in the first test program were purchased at random from various retail dealers throughout the country. Four sample helmets of each model were subjected to tests in three performance areas -- impact attenuation (shock absorption), penetration (resistance to a pointed object), and retention (chin strap strength).

The NHTSA noted that a good or poor showing by a specific helmet model during the tests is not necessarily an endorsement or an indictment of a particular model. In general, however, test results indicate that helmets made of fiberglass performed 22 percent to 45 percent better as a group than those of polycarbonate material.

Good Article to read there

WHY HELMETS ARE INEFFECTIVE

Why do riders wear helmets? In 46 states it's the law. Most wear helmets in those states because they have to or get fined, usually heavily. (It's $10 on the spot to the patrolman or jail, in Wisconsin). But in still four states such as California, Iowa, or Illinois, by simple observation and counting, at most 25% of the riders wear helmets in the summertime. In the west, in California, I counted for two days every bike I saw on a trip and about 70% of the riders were wearing helmets. This means that riders put their helmets on when it is rainy or cold. Helmets make efficient rain hats. But in the hot summer weather, they are really uncomfortable. So riders leave them off. Another reason some riders wear helmets is for the police/authority image. Certain groups such as chopper riders never wear helmets (except by force) for the image of being care-free. Some riders may actually believe helmets can save their heads in accidents. Others may believe a helmet has some safety features but still do not want to wear a helmet because they feel it hinders vision and hearing and causes discomfort.

Although there has been mountains of publicity by the Government to wear helmets for safety, it is clear riders don't want to. They are being forced against their will to wear helmets in 45 states.

A book is available for the new rider called, The Beginning Rider Course, published by the Motorcycle Safety Foundation.[1] Chapter 7, for example, outlines how to anticipate and avoid potential points of conflict. These safety actions might take years for you to discover on your own. On page 7-2 however, the booklet states, "The most important piece of personal equipment for safe riding is the safety helmet. If you head is protected, you have adequate protection against serious head injury. For this reason, both you and your passenger must wear a helmet." (Emphasis in original.)

The above quotation is poppycock and downright dangerous. It gives the new rider a false sense of security, leading him to ride over his ability. The best and only protection against injury and death on a motorcycle is knowing how to ride defensively and within your ability. The curve presented earlier shows that enforced helmet wearing produces no beneficial effects on the accident rate and in fact actually causes deaths by masking the real problem of inexperience.

Why aren't helmets in general going to save heads in accidents? In theory helmets are supposed to protect in two ways. One, the helmet is supposed to absorb the energy of the impact through crushing, but not crush down to break the skull. The second intent is that the crushing of the helmet will decelerate the brain from impact velocity down to zero, at deceleration g's low enough to prevent concussion and other brain injury (assuming the helmet prevents crushing of the skull per item one). The above two jobs are a big order for a helmet that must operate within material limits and also meet certain human requirements: weight, thickness, visibility and hearing range, general comfort, and styling. Helmets generally weigh around 3 pounds. Thickness is at least 3/4 inches. If a person is prone to neck or head aches, a helmet will give him just that. The rotational inertia of the extra weight both slows down reactiontimes and contributes to neck and shoulder tiredness.

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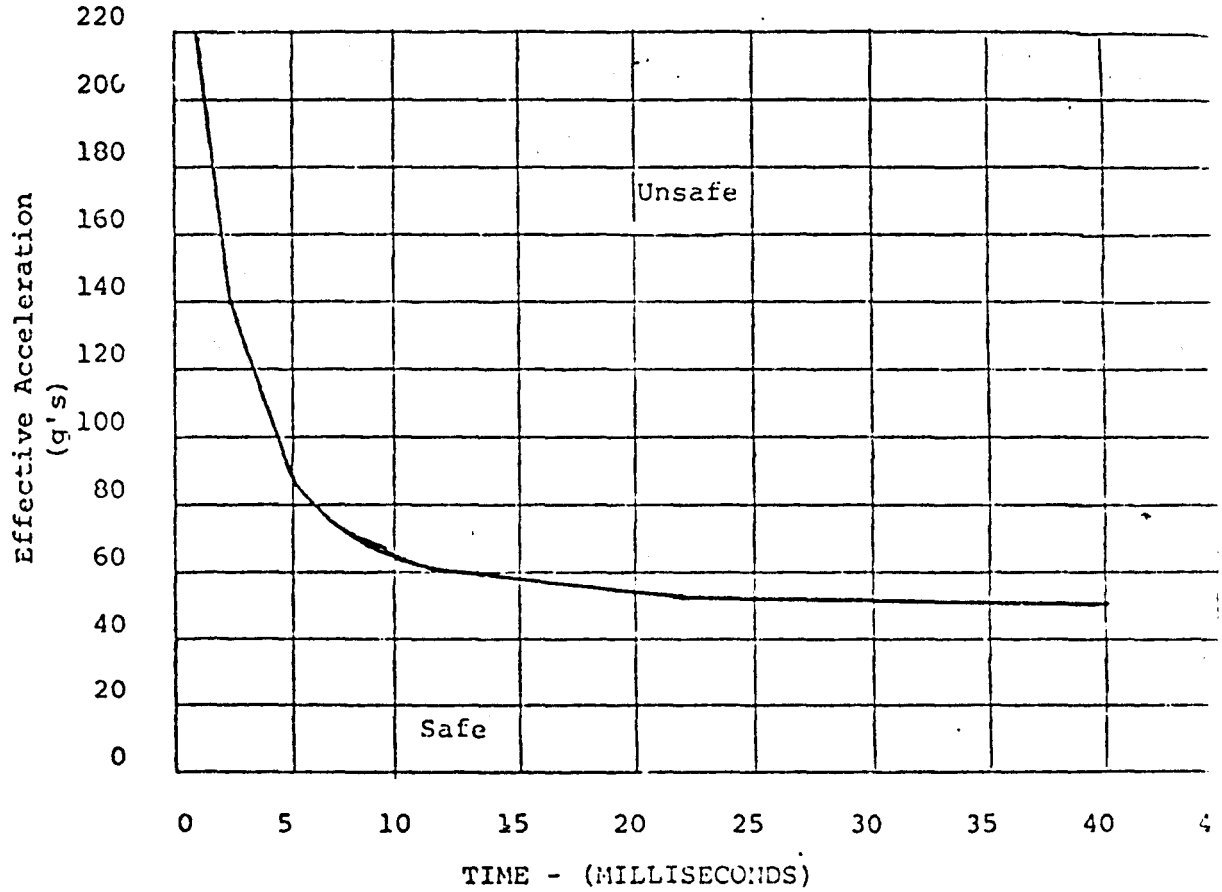
1. 1981 Connecticut [illegible]

Helmets in most states have to meet one or the other of specifications like the Z90 and the Snell Foundation. Stickers inside the helmet tell which tests supposedly were passed. Many helmets have several stickers and some with stickers may not be tested at all.[1] On the snell sticker is printed in fine letters "Some reasonable, foreseeable impacts may exceed this helmet's capability to protect against severe injury." Very beautifully put, these words should be printed in large letters on the outside of the helmet instead of hidden inside in tiny letters. As shown below, the level of protection is low, low. In practice and in theory the level can't be raised very much within the limits of foreseeable materials available and within the above-mentioned human factors.

The main impact test goes like this. A mock instrumented head is placed in the helmet and the approximately 11 pound outfit is dropped 6 feet or so such that about 66 foot pounds of energy must be absorbed safely. That is, the helmet must not crush so that the skull can be reached, and the deceleration on the mock head must be within the specified g limits.

First, the deceleration problem. On "safe" decelerations, the experts as usual disagree.[2] One expert presents the following curve:



1. "The American National Standards Institute does not conduct the Z90 tests. When you see a Z90 sticker in a helmet, you are taking the manufacturer's word for it that his helmets exceed these standards. ANSI does not police the manufacturers and even if one of a manufacturer's helmet passed the tests, it does not necessarily mean the one you buy does." Cycle News, Jan. 12, 1972.

2. "Performance Requirements for Motorcyclist Helmets." June 1970, prepared for the DOT.

Long duration "safe" impacts of over 10 milli-seconds (ms or 1/1000 second) is near 60 g's limit; short duration, up to 200 g's and higher. The Z90 specification gives a limit of 150 g's for deceleration time greater than 4 ms. The reference goes on to say, "However current head tolerance levels for "long-duration" accelerations should be set at from 40 to 80 g. Thus the 150 g requirement is also dangerous." Another page in the reference states, "The 40 g level would provide adequate protection for all forms of concussions." Page 6-13 defines safe decelerations: Peak accelerations of 200 g's, if the time of such acceleration, measured at the 80 g level, does not exceed 1 ms." In other words, there are a lot of numbers put out with meager evidence by the experts, ranging from 40 g's for long duration impacts (over 5 ms) to 400 g's for short (1 ms) durations. Now look at the actual g's in a motorcycle impact.

D = 1/2 vxt, where D is distance traveled, v is velocity at impact and t is time. This formula assumes the end velocity is zero, that is, in crushing the helmet about 3/4 inches, it goes from initial velocity of impact to final velocity of zero. How long does it take to decelerate?

$$t = \frac{Dx2}{v} = \frac{1/16 \text{ foot} \times 2}{20 \text{ ft/sec}} = 1/160 \text{ sec} = 6 \text{ ms.}$$

The 20 feet/second is 13.5 mph, the impact velocity at the test rig.[1] The 6 ms is what the experts call long duration and the g's shouldn't exceed 40 to be safe. What are the g's?

Decelaration = v/t, which is 20 divided by 1/160 divided by 32 to get g's. The answer, about 100 g's. So at the test rig, with an impact velocity of only 13.5 mph, the g's meet Z90 requirements but exceed the 40 g safe limit.

Now consider what happens at direct impacts of 30 mph, still quite conservative for a motorcycle accident. This is, of course, beyond the test. The mock head and helmet would have to be dropped from more than 6 feet to get a higher impact velocity. The helmet will crush through to your skull as shown below. But pretend the 3/4 inch helmet will hold and not crush your skull. At a 30 mph impact, 500 g's will result in about 3 ms. At 60 mph, 2000 g's at about 1.5 ms. (Remember that 400 g's at 1 ms are dangerous). You see the problem. Even if you could build a helmet within the 3/4 inches that would not crush through to your skull, the deceleration will get you. It is obvious that the test for helmets was devised backwards, not from safety, but from the real theoretical limit of materials and human considerations. If that is the limit, OK, say so, we shouldn't be lied to by the government.

Next, look at the problem of crushing the helmet through to your skull. Here is a real joker. I had long wondered why the test was performed with an 11 pound test rig of helmet and mock head, without a 160 pound body attached to the head. The government says that the impact velocity if independent of the weight. That is true, but the energy to be absorbed isn't independent of the weight. The energy that the helmet must absorb can be written, E = hxw = 1/2 w/g v. Energy is in units of foot-pounds and the test rig gives about 66 foot-pounds. Put a 170 pound body with the helmet instead of an 8 pound head, and let it drop the 6 feet (keep the 6 feet so the impact velocity will

---

1. $hxw = 1/2\ w/g\ v^2$, $v = h2g = 20$ ft/sec = 13.5 mph.

still be 13.5 mph) and you have over 1000 foot-pounds. At 1000 foot-pounds what about the poor helmet, or more to the point, what about the poor head? The helmet that just barely passed the 66 foot-pound test and perhaps just didn't crack your skull -- now -- pow! There goes your $40 helmet and million dollar head. And remembering the previous analysis on deceleration, add to this a 30 mph impact velocity instead of 13.5 and you might be dead twice - once from a crushed skull and once from deceleration g's. Actually some of the 1000 foot-pounds of energy (considering only 13.5 mph impact) will be absorbed by other weak links in your body such as neck and back. These may snap also depending on angles, etc. Also you might hit a hay bale and all the energy will be absorbed by the hay. Don't count on it.

In order to tell someone else the limitations of a helmet you have to understand it yourself. In summary, a helmet has 3/4 inches of material to crush on impact. Any more than 3/4 inches and human limitations of carrying the helmet and seeing and hearing, set in. In 3/4 inches the helmet must take an impact from impact velocity to zero without crushing to your skull and without excessive deceleration. To go from 13.5 mph (one standard test) to zero in 3/4 inches already exceeds safe g deceleration. A thicker helmet would give more stopping distance, hence less g's, but thickness is at a practical limit. If the impact is 30 mph, the problem is greater. If you put more than a head on the helmet (the standard test is with head only) the helmet must be tougher or thicker, if it is tougher it stops the velocity sooner and the g problem returns.

ABATE OF MONTANA
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TESTED & APPROVED
ABATE
Report

A Practical Case Against Helmet Laws!

The following points constitute some of the more important arguments derived from our lengthy study of the helmet issue. While this study continues, we believe the case presented here will stand as a fair representation of our opposition to the helmet requirement. The statistics cited here will be fully documented and factually supported in our forthcoming brief to the Transport Committee of the National Assembly:

Motorcyclist deaths are essentially the results not of failure to use protective helmets, but of motorcycle accidents. This fact should be obvious, but many sincere proponents of highway safety have been misled into concluding that the universal use of helmets would greatly reduce the high death rate, which in Quebec claimed the lives of 90 motorcyclists during the last year for which figures are available. Let's look at the facts:

1. Roughly 75% of all motorcycle accidents involve a rider having less than three months experience.

2. More than two thirds of all accidents involving a motorcycle and another motor vehicle are determined to be the fault of the other motorist—usually a case of automobile drivers ignoring motorcyclists, or, in some cases, consciously violating the motorcyclist's right-of-way.

3. Statistics from those states and provinces which have enacted mandatory helmet legislation reflect no demonstrable decrease in the ratio of deaths to accidents. On the contrary, many, many jurisdictions have shown a marked increase in the death rate following enactment of helmet laws. Overall deaths have decreased in a few areas, but only as the result of a decreased accident rate, due to strict driver education programs, etc., which were invoked along with the helmet requirement. As no one would argue that helmets prevent accidents, their usefulness can be determined statistically only by comparing the frequency of death when accidents do occur.

In California, which has never had a helmet law, exist the largest number of registered motorcycles in any state or province on the continent. Due to pleasant weather, many of these machines can be used throughout the year. Even so, California's motorcyclist fatality rate is a comparatively low annual figure of 72 per 100,000. New York, on the other hand, has its riding season severely limited by cold weather and snow. New York has enforced a helmet law since 1967, but still shows an alarming death rate of 136 per 100,000 motorcycles—almost twice the California figure, and appreciably higher than Quebec's fatality rate of around 120 per 100,000. While New York claimed a slight reduction in the number of deaths from head injury after passage of the helmet law, deaths due to neck injury increased by more than 100%! (Although we know of no study isolating this phenomenon, the probable causes of a higher incidence of broken necks are (1) the helmet's excessive weight, which combines during a fall with centrifugal force to produce a whiplash action, and (2) the tendency of some or all helmets to transmit otherwise non-fatal shocks to the spinal column, where death results.) Of course, California, New York, and Quebec cannot be compared directly with conclusive results. But it is obvious that if the helmet were of half the value some give it credit for, the above figures could not exist.

The role of a helmet in causing accidents cannot be underestimated. And, while we freely concede the ability of helmets to sometimes reduce injury once an accident has occurred, there can be no justification for the enforced use of a device intended to save lives, if that very device creates the situation wherein life is lost!

1. Helmets minimize the wearer's ability to hear. This may be an asset during high-speed driving, but in city traffic it is almost suicidal.

2. Vision is often reduced, as well. Glare from helmet face shields (now required by many jurisdictions) has been responsible for more than a few accidents, while others are caused by the occasional loss of peripheral vision.

3. The compulsory helmet is a constant inconvenience to any rider. For example, unless he continually carries two helmets, the rider may not pick up a passenger, even in an emergency. Also, the regular maintenance which high repair costs force most of us to perform ourselves is impossible when the rider's hearing is so impaired. Thus, the motorcyclist may be operating an unsafe machine simply because he is unaware of audible danger signals emitted by the carburetor, engine, drive train, brakes, or tires. And, during hot weather, motorcyclists will risk the accident that might be caused by perspiration running from beneath a helmet into the eyes. These

annoyances pose many hazards to the motorcyclist, since numerous highway safety studies have revealed that [illegible]ration, resentment, and preoccupation with petty discomforts greatly reduce any motorist's ability to drive safely and sanely

4. Although the Quebec law, like most helmet laws, sets down minimum manufacturing standards for approved helmets, unapproved helmets will remain on the market and will remain in use, due either to ignorance or to unlawful efforts to economize. Violation of the law, of course, cannot alone justify its repeal, but it should be recognized that approved helmet standards will be impossible to enforce, and that the use of "cut-rate" helmets will present the double threat of causing accidents and failing to protect the rider once an accident has occurred.

5. Probably the strongest and yet least appreciated argument against compulsory helmet use is the false sense of security which the helmet creates in its user. With the principal sensory organs enclosed in a tight shell of fiberglass and tinted plastic, the rider inevitably assumes a subconscious (or conscious) feeling of indestructibility. The degree to which this is a factor, of course, varies depending on the individual motorcyclist, his experience, and emotional make-up.

The Moral Case Against a Helmet Law

We believe in the individual's fundamental right to make decisions regarding his own conduct and well-being, with due regard for the rights of others. We feel that there can be no crime where there is no unwilling victim.

This position has been disputed in a few judicial tests involving the helmet law in the United States, although courts have also often ruled against helmet legislation. The theory of the "public burden" (namely, that the risk of injury involving public compensation, medical care, etc., removes this question from the realm of individual rights) has been invoked in support of mandatory helmet statutes. This, of course, was based on the assumption that helmet use invariably saves lives—an assumption which the facts not only fail to support, but directly refute.

Moreover, we believe that the "public burden" theory represents the greatest potential threat to individual liberty since the rise of National Socialism in pre-war Germany. This theory opens the legislative door to an Orwellian society in which the individual is compelled to wear suits of armour and stay indoors after dark—lest he become a "public burden" as a result of negligent accidents. The same theory could (and should, if it is applied against motorcyclists) be extended to ban such activities as swimming, skiing, skin-diving, mountain-climbing, boating, sky-diving, and flying. With the motorcyclist helmet law as precedent, it is not difficult to imagine golfers and sandlot baseball players being required to wear helmets in the near future. In Quebec, approximately twice as many hunters die annually from their own negligence as do motorcyclists from head injuries. Yet hunters are now being required to complete courses in safety before being licensed, while motorcyclists (whether safe or unsafe drivers) are forced only to wear helmets at all times.

Additionally, the helmet law inadvertently discriminates against motorcyclists. No such requirement is made of automobile drivers, the defence of this being that the automobile provides its own shell of protection. But the facts, again, dispute this: In the United States, approximately 28% of all auto fatalities are the results of head injuries, while the corresponding figure for motorcyclists is only 26%. In terms of raw quantity, these head injuries account for 15,400 dead automobile drivers and passengers, but only 520 motorcyclists. Rather than providing a "protective shell," the automobile claims most of its victims by crushing or colliding with the human occupant—or trapping him inside the "protective shell" and burning or drowning him alive. Even in the case of seat belts (a relatively minor inconvenience), few jurisdictions have seen fit to make their use compulsory.

Increased accidents and fatalities are commonly given as justification for compulsory helmet laws. But these accidents (as cited previously, 75% of all motorcycle accidents involve drivers with limited experience) are primarily the results of greater motorcycle popularity and availability among the very young. Thus, all motorcyclists—however safe, experienced, and responsible—are penalized for the mistakes of the irresponsible.

Accidents are specific and unique occurrences. And, as is the case with many laws, the state is singularly incapable of protecting the individual against the specific. It can provide some protection against the general, but in so doing needlessly penalizes thousands of citizens for the possible benefit of a hypothetical few.

In summation, we believe that the helmet is a most useful accessory, which can provide an added margin of safety in many instances. But, like snow tires, its universal application is not only useless, but potentially dangerous.

The helmet law is a classic case of treating symptoms (motorcyclist deaths) while almost ignoring the disease (a high accident rate, caused both by inexperienced riders and by media distortions of the motorcycling image, leading to a total disrespect for bikers by a large segment of the general motoring public).

Even if helmets were a cure-all for the problems of motorcycle safety (and they are not), it is only helmet use, rather than helmet legislation, that could save lives. And, for many reasons (not the least of them being a need to reverse the current trend toward public disrespect for the law, police, and law enforcement), we believe that this end could be better served by public education programs than by government edict.

Constructive Legislation: The Biker's Perspective

The following is a sampling of the measures we feel should be given legislative attention by the National Assembly. By no means do we propose to include here the full scope of motorcycle laws which should and should not be. These ideas are directed toward the common good, toward a better future for motorcyclists and the society around them.

1. Require a standard and adequate driver training course or skill in driving test for all motorcyclists seeking their first driver's license.

2. Limit operation of motorcycles by first-year drivers to machines not exceeding the 200cc displacement category. For second-year drivers, a 350cc limit should be imposed. (It is currently possible for a young rider with no experience whatsoever to purchase, register, and "drive" a motorcycle capable of accelerating from a dead stop to over one hundred miles per hour in less than twelve seconds. The same bike may have an obtainable top speed of 140 m.p.h.)

3. Require operational maintenance (inspections) of all vital mechanical components.

4. Provide stiff penalties for automobilists and other motorists convicted of willfully or negligently causing or facilitating a motorcycle accident. Each motorist registering an automobile should be required to read an information booklet on motorcycles and the rights of motorcyclists.

5. No legislation requiring or banning certain types of motorcycle equipment for motorcycles "in general" should be passed. Motorcycles vary from portable toys to coast-to-coast touring machines, from all-terrain vehicles to production road-racers. They have no more in common generally than do four-wheeled vehicles—busses, cars, moving vans, dune buggies, and oil tankers, road graders, or tractors.

6. Directional turn-signals, now mandatory for motorcyclists in Iowa, should not be required for principally off-road motorcycles. The presence of turn-indicators on trail bikes presents a serious hazard when driving through dense or overhanging foliage. These devices also lead to rider over-confidence on road machines, since the operator may wrongly assume that his signal has been observed by other motorists. Turn-signals should not be required for even street motorcycles until, over a two-year period, automobiles have been at fault in no more than half of all accidents involving motorcycles and automobiles. Until such time, it would be unwise to require signaling equipment on motorcycles when so large a segment of the motoring public does not observe motorcycles themselves.

We urge that legislative measures be undertaken as soon as possible to prevent motorcycle accidents, since statistics indicate that an overwhelming majority of accidents and fatalities are preventable, while only a quarter of total deaths are related to head injury. In fact, if the accidents caused by the inexperience of young motorcyclists and the thoughtlessness or incompetence of other motorists were eliminated, only seven percent of the current fatalities would remain. Removing from this total the deaths not caused by head injuries, and allowing for the present use of helmets in the absence of obligatory legislation, only a fraction of one percent of fatalities would remain, representing about one-half of one death! Surely the entire motorcycling public should not be burdened by a statute aimed at this mythical fatality, who is only half alive regardless! ■

Canadian Anti-Helmet Law Association

from 1966 to 1968 to helmet wearing. Their report states: "The underlying factor in the fatality decrease is that today's drivers are more experienced than were drivers two years ago because there are fewer new and inexperienced drivers." (Remember, this report was written in early 1969.)

Let's go to another example. The following is from an article "Protective Headgear for Motorcyclists" in the July 1969 issue of *Traffic Digest & Review*: "The National Safety Council reported that in the 30 states that require the wearing of helmets, deaths in 1967 decreased dramatically compared with 1966. The greatest drop, in New York, was 42%."

The claim is made that New York had the most dramatic drop in deaths by motorcycle accidents following a helmet-wearing law. If we can show that this is not so for New York, we've probably covered most of the other states also.

Incidentally, I am not trying to knock wearing helmets. I will show later that serious injuries to head and face appear to be reduced by helmets. I am trying to show that deaths and injuries are hardly affected by wearing helmets. I am trying to do this to uncover the real safety factors, increased motorcycle driving education and better licensing and driving tests. If we can stop the fights between the states and the motorcycle rider groups over helmet-wearing, and concentrate on better education and licensing requirements, we will have made big gains. It will allow the cycle groups to simmer down and concentrate on co-operating on better driving and licensing tests.

Back to New York. I have here "Research Report, Motorcycle Accidents 1969," by the New York State Department of Motor Vehicles. On Jan. 1, 1967, the helmet-wearing law in New York took effect.

The document contains the basic data in the table presented below. Before looking at the table, let's look at some quotes from the document. "In 1966, there were 85 motorcycle occupants who were killed, compared with only 51 in 1967. This represents a 40.2% reduction in the number of motorcyclists who were killed." Sounds great. But on another page we read, "In 1967 there was a dramatic increase of 39% in the total number of motorcycle accidents compared with 1966." Already you can plainly see that helmet-wearing had almost no effect on the number of deaths per number of accidents, since both went down by about 40%. The reduction in the number of accidents can't be credited to helmet-wearing! New York itself doesn't claim the reduction is due to helmet-wearing, but rather to other factors that are mentioned on still another page of the document. "The reduction of 39% in the frequency of motorcycle accidents may be related to the general safety-oriented atmosphere created by the Department of Motor Vehicles in the driving population. Posters, bulletins, and pamphlets had been distributed concerning motorcycle safety and explaining the new safety equipment requirements . . . It is reasonable to assume that part of the reduction in motorcycle accidents is the result of intensified law enforcement."

Now look at the chart on page 23. This chart does not appear in the New York document, but all the basic numbers are taken from it.

Several facts are apparent. Wearing helmets did not affect the number of fatal accidents per number of accidents nor the number of injury accidents per number of accidents. The number of accidents, as mentioned previously, dropped, indi- education. The real value of wearing helmets shows up here, where the number of head and face injuries were reduced by a larger percentage than were the number of accidents. However, note that the number of injury accidents per number of accidents remained about constant. This indicates that probably most accidents produced multiple injuries. Therefore, in 1966, an accident would be reported as a head or face injury even though other injuries were present. In 1967, with helmets, there were fewer head and face injuries, leaving the other injuries to be recorded. What this means, to me at least, is that helmets don't need to be the subject of legislation. Their incremental value is small compared with the good that comes from preventing accidents in the first place by education, training and safety publicity.

I personally usually wear a helmet and face shield while riding. If I have a minor spill I'd just as soon have the added protection for my face, not to mention that I don't like chewing on bugs. In a severe accident, a head-on with an automobile for example, a helmet isn't likely to do much good. There are too many other things that can happen to you to kill you. And at best a helmet is not designed for a real accident. A helmet with a mock head of 11 pounds is dropped from a height so that the force at impact is either 66 foot-pounds (Z90) or 88 (Snell). If you are thrown from your bike at 60 or 70 mph, it isn't only your head in that helmet, you're attached to it, another 150 to 200 pounds. Hit the concrete or the side of a car and it doesn't take much mathematics to show that there are more than even the 88 foot-pounds involved. *Cycle News*, on Jan. 12, 1972, had an article on helmet testing. It was concluded: "Few of them (helmets) will probably save you if the helmet makes direct contact with a telephone pole, curb, wall or auto- at any speed over 10 miles per hour, with your head inside." Think about this awhile, and you'll begin to see why wearing a helmet doesn't have much effect on the death rate per accident.

The testing of the helmet includes a chin strap pull of 300 pounds. Consider this. In New York, deaths due to broken necks went up by a considerable percentage after the helmet-wearing law. It would do well for states and safety organizations to investigate this factor nationwide and report the statistics. It is just possible that the strap in severe accidents has a tendency to break necks! One state's record for 2 years isn't enough to make this a positive claim. But surely it is worth investigating. It could call for a chin strap design that would at least break before the neck!

A record in favor of motorcycles compared with automobiles is in the category of pedestrians killed. In other words, how dangerous are motorcycles to *others*, that is, pedestrians? The only recent records available to me for a comparison are 1967 and 1968 in New York. The data are from the New York forms MV-144A for 1967 and 1968 and from the NY State Motor Vehicle Department Research Report, Motorcycle Accidents, No. 1969-12.

A pedestrian has about 4 times more chance of being killed by an auto than by a motorcycle per 10,000 drivers of each. A pedestrian has over 3 times more chance of being killed by autos per 1000 accidents, compared with motorcycles. Naturally, this fine record for motorcycles has nothing to do with wearing helmets.

The State of Pennsylvania sent me statistics for 1960 to 1970. A helmet-wearing law went into effect in Sept. 1968. After a rise in the number of deaths since 1960, in 1969 the deaths went down. *But so did the number of accidents by almost the same percentage!*

A brief look at the State of Michigan statistics. In March 1967, a helmet law went into effect. Early in 1968, the law was declared unconstitutional. In Sept. 1969, the helmet-wearing law was again put into effect. The same story comes out again.

Of the years shown here, only 1967 had a helmet-wearing law effective most of the year. The deaths dropped, but so did the accidents, so that deaths per 100 accidents remained the same. The years 1968 and 1969 were essentially non-helmet-wearing years, and the deaths per 100 accidents actually went down. Nothing can be gained here in favor of helmet wearing.

As for California, from *News*, issued by the California Highway Patrol, May 22, 1970, we can read: "Motorcycle registration in California has risen 128% in the past 5 years.

but the number of motorcycles involved in fatal and injury accidents rose only 48% in the same period." In an accompanying letter, the Highway Patrol stated that their (present) method of recording fatalities does not distinguish between motorcycles and other motor vehicles. Thus I was unable to put together any statistics for California.

In summary, regarding the states' records, I was unable to find any that upheld the contention that wearing helmets reduced the number of deaths, given that so many accidents happened. All other states that responded either had no data, or the data were so incomplete that nothing could be made of them. Other states included their motorcycle statistics with those of automobiles.

The next area that requires investigation to put the problem in perspective is the automobile driver vs. the motorcycle rider. Is motorcycling really as unsafe compared with auto driving as the helmet-wearing proponents would have us believe? It is my contention that it is not, but I cannot prove it since the states do not keep the right statistics for motorcyclists. Consider this. In 1969, in the U.S., the number of fatal accidents per 10,000 drivers shows automobiles with about 4.8, while motorcycles show about 8.7. (Keep in mind that many states do not have records that could be used for the motorcycle rate, and therefore, as the National Safety Council informed me, considerable extrapolation must be used from states where records are kept.) There is a factor, however, that is not considered in these figures. Look at the accompanying curves of drivers' ages.

Of all the states I asked for a breakdown of motorcycle owners by age [illegible] reported. said such data were not available. New York, for example, explained that it would require an expensive computer-run to get out this information, and it could not be done. However, such information is kept for automobiles, and the National Safety Council adds it all up. From the curve, note that half the auto drivers are under 40, half above. Half of the motorcyclists in the State of Washington are under 24! (The Research Report, No. 1969-12, of New York, shows that over 70% of motorcycle riders involved in fatal and injury accidents are in the age group under 24, for 1966-67.) I think if you look about you in any locality, you'll see this is probably true. Most riders are younger. A booklet titled "Policies and Guidelines for Motorcycle Education," by the National Education Society of Washington D.C., reports the median age of motorcyclists as 22, which is in line with the Washington data. If you look at the automobile driving record of the age group containing the 22-year-olds, you'll find that the fatal accidents per 10,000 drivers is 11.5! In other words, younger, more inexperienced automobile drivers have a high fatal accident record also, higher than the motorcycle average. And most motorcycle riders are young! It would be interesting to compare the under-24-years-of-age accident record of motorcyclists with the under-24 record of auto drivers. From the data I could get, it is apparent that the difference might be very little or non-existent.

In each state, the government should be encouraged to keep complete records of motorcycle accidents and to break down the statistics by age groups. It may well be that the long-time riders of motorcycles are just as safe as the long-time drivers of equally careless and dangerous. We must not allow the state lawmakers to make vague statements, as did the California sponsor of the helmet law, that the rate of fatal cycle accidents is 200% higher than those involving automobiles. *We must force them to take into account the age groups*, which brings out the experience factor. An experienced rider doesn't zigzag around cars, he rides defensively, that is, he backs away from an aggressive car driver, even if he is "right." He doesn't barrel it down the highway between two rows of stopped cars, as did a young rider in my city a short time ago, and zoom out into the intersection head-on into a fast-moving fire truck (which was why the cars were stopped). A helmet doesn't make much difference here; the rider is dead with or without a helmet.

It is up to rider organizations to use statistics properly in favor of motorcycles. Unfortunately, in court cases on the helmet laws, most arguments presented against the laws are emotional rather than factual. The motorcycle groups argue about freedom of choice and the right to ride with bugs in their teeth if they want to (most helmet laws if not all require shields or goggles also). It's about time the motorcycle groups analyzed the statistics for themselves and presented them in an orderly fashion. I'm not against voluntary wearing of helmets, as I said before, but this subject of forced wearing obscures the real safety gains that are made by education, licensing, testing, and safety publicity. The fact is that in the several states analyzed here it cannot be shown that helmets had any effect on the rate of death and injury accidents, whereas it can easily be shown that education and training does have a dramatic effect in reducing the number of accidents and hence the number of deaths and injuries.

New York

	Automobiles		Motorcycles	
	1967	1968	1967	1968
Licensed drivers	6,400,000	6,700,000	67,200	75,600
Accidents	389,600	409,200	3210	3598
Ped. Accidents	26,327	27,000	148	168
Ped. Killed	814	888	2	2
Ped Killed per 10,000 drivers	1.2	1.3	0.3	0.26
Ped. Killed per 1000 accidents	2.1	2.1	0.6	0.55

Michigan

Year	1966	1967	1968	1969
Registrations	81,136	89,366	100,185	125,629
Number of Accidents	2723	2272	3614	3963
Deaths	104	86	122	138
Deaths per 100 Accidents	3.8	3.8	3.4	3.5

To summarize:

1. Helmet-wearing *does not* dramatically (if at all) reduce the number of deaths or overall injuries on the basis of number of accidents.
2. Helmet-wearing *does* appear to reduce the possibility of serious head and face injuries.
3. The number of motorcycle accidents (and consequently the number of deaths and injuries) is dramatically reduced by a combination of rider education, stricter licensing and driving test requirements, safety publicity, and law enforcement.
4. The states must be forced to keep statistics on motorcycles, including by age groups, so that important factors can be isolated and regulated, especially training and education for new and younger auto drivers and motor-

EXHIBIT # 11-A
DATE JAN 6 1987
HB # 24

WITNESS STATEMENT

NAME [redacted] L. Wherley BILL NO. 24

ADDRESS Box 303 - Three Forks - Mt. DATE 1-6-87

WHOM DO YOU REPRESENT? self

SUPPORT _____ OPPOSE ✓ AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

1.) 1973 reports showed that Montana ranked 50th in the U.S. of motorcycle deaths.

2.) When New York enforced a helmet law- they showed a slight reduction in the number of deaths due to head injuries, but an increase of more than 100% in death due to neck injuries.

3) Reports by NHTSA - of 74 test of 54 different model helmets showed only 8 complied with the standards set by the industry's American National Standards Institute. Almost 90% of helmets tested failed.

4.) States that implemented motorcycle safety courses showed a reduction in deaths

5.) ~~It~~ How many times must we come up to Helena and protest & win to not have a mandatory helmet law. The many have out voiced the few.

EXHIBIT # 12
DATE JAN 6 1987
HB # 24

WITNESS STATEMENT

NAME Doug Woodall BILL NO. 24

ADDRESS 415 Mount Ave, Missoula, Mont DATE 1/6/87

WHOM DO YOU REPRESENT? Myself, Excellence in Motorcycle Mechanics

SUPPORT _____ OPPOSE X AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

On Many occasions, test Riding of a customers vehicle will entail Not wearing a helmet so that particular noises complained of by the customer can be located. Many of these noises have turned out to be safety related. By this I mean the customer could have been seriously injured had the noise gone unattended. Should I be subject to being fined for breaking a law while carrying out this duty?

I.E. Wheel Bearings, speedometer drive gearboxes, broken spokes, drive chains about to break, etc.

Increase of Accidents per # of Registration could be compared to the capability of the currently available machinery as well as whether or not there was a helmet law in effect.

CS-34

① Mechanics Position

② "Verification of Quality of Helmets"

③ Problem of Federal Regulation of Eyeglasses for "Safety" concerning lens thickness & Safety Glass.

Agricultural worker crossing Road from one field to another.

quadricyclists?

Does any of the accident data gathered on the tape Not apply to automobiles in similar situation?

Bold Could of all people should know how important hearing can be to an individual.

The Intelligence of the Rider is the "Only" thing between him and a disastrous accident, not a helmet.

Downhill skiing should probably be made illegal.

EXHIBIT 13
DATE 1-16-87
HB #324

Hawaiian GIs get reamed by their CO

Never kid yourself into thinking that the fact that you are ready to fight and die for freedom entitles you to have any.

This message was rammed home to bikin' members of the 25th Infantry Division stationed in Hawaii when their commanding officer, Major General Claude Kicklighter, threatened to prosecute any GIs in his command if they were caught riding a bike without wearing a helmet — *on or off the base.*

Following are excerpts from Kicklighter's "General Order Regarding the Wear of Motorcycle Helmets Off-Post:

1. The purpose of this general order is to set forth standards of conduct for military personnel assigned or attached to the 25th Infantry Division concerning the wear of motorcycle helmets off-post.

2. During the last three years, eight Division soldiers have been seriously injured or died as a result of motorcycle accidents. Four of the soldiers were not wearing helmets while riding their motorcycles off-post.

3. Repeated studies have proven that motorcycle accidents are usually the fault of automobile drivers rather than motorcycle drivers. Motorcyclists are less protected than automobile drivers and normally suffer more severe injuries when involved in an accident. Head injuries are the most common cause of motorcycle fatalities. For this reason, all personnel driving or riding as a passenger on a motorcycle, motor scooter, or similar motorized vehicle on-post are required to wear a properly fastened helmet.

4. Motorcycle helmets have been proven to prevent fatal head injuries when worn, yet the state of Hawaii does not require drivers or passengers of motorcycles who are 18 years or older to wear helmets off-post. For this reason, pursuant to this letter, I am ordering all soldiers in the 25th Infantry Division subject to my authority as General Courts-Martial Convening Authority to wear a safety helmet whenever and wherever they either operate or ride on a motorcycle, motor scooter, or similar motorized vehicle. The helmet will be properly fastened under the chin and meet the standards of one of the following:

a. The Shell (sic) Memorial Foundation.

b. The ANSI Z90.1-1971.

c. Federal Motor Vehicle Safety Standard Number 218.

5. Violations of the provisions of this order provide a basis for disciplinary action under the Uniform Code of Military Justice for personnel subject to its provisions. Violations of this order may be prosecuted under Article 92, or other appropriate Articles of the Uniform Code of Military Justice, and administrative action may be taken in accordance with applicable directives.

A quick reading of the above manifesto tells you more than you'll ever want to know about the military mind. For one thing, General Kicklighter conveniently ignores the fact that just as many serious injuries were suffered by soldiers wearing helmets as by those who weren't. Also, in contravention of U.S. traditions of civilian control over the law, the generalissimo assumes he is better qualified to judge what's best for bikers on Hawaiian highways than that state's legislature. And, if all that wasn't enough, he also makes the outrageous statement that "Motorcycle helmets have been proven to prevent fatal head injuries," which they most certainly have not. Maybe somebody ought to show him the "helmet facts" printed below.

A helmet law fact kit

Nineteen hundred eighty-five is almost upon us, and with it, new legislative sessions for lawmakers throughout the United States. Those of you living in states with mandatory helmet laws will be renewing the battle to win your freedom of choice. The rest of us have to fight to keep our freedom. Here, from ABATE of Georgia, is a list of helmet facts every lawmaker should be made aware of.

— State accident statistics verified by the AMA and the Motorcycle Safety Foundation show that Iowa, Wisconsin, South Dakota and Kansas are the four safest states to ride in. None of them mandates lids for adults.

— The federal Department of Transportation has admitted that no helmet on the market can reject impact stress above 13 miles per hour.

— In one DOT test, 90% of all helmets tested were defective.

— A study by the University of Utah Speech and Hearing Clinic found helmets restrict hearing and distort sound direction, thus creating confusion.

— The American College of Surgeons says that improperly taking a lid off an injured person may cause paralysis.

— Dr. D. M. Kuland of Rhode Island Hospital reports that a concussion with no fracture can be caused by a helmet and lead to massive internal head swelling.

— In 1980, states *with* helmet laws had 9.59 deaths per 10,000 bike registrations. States *without* such laws had 9.20 deaths per 10,000 registrations.

— Rhode Island had a 166.7% increase in bike-related fatalities after putting its 1971 helmet law into effect.

— Automobile drivers and passengers suffer a far greater number of head injuries than bikers, but no one is suggesting they should be forced to wear helmets.

— Serious and/or fatal neck injuries in New York state increased by 75% during their helmet law's first year.

— In New Jersey, deaths soared 340% after a lid law passed.

— Temperatures can reach 130 degrees inside a helmet.

— Bikers voluntarily use helmets 60% of the time anyway; cagers only use seatbelts 10% of the time.

— A study by the Utah Highway Safety Department showed helmet usage does not significantly affect the severity of head injuries.

— The State of Kansas Health and Environment Department reported that it could find no evidence of increased motorcycle fatalities after repeal of helmet laws.

— Testing at the University of Technology in Sothenberg, Sweden, established that helmets slide only two thousandths of a second before grabbing. Such sudden stopping of the helmet twists the head and may cause the brain to move inside the skull, rupturing arteries and causing permanant brain damage.

Harley wins industry praise for hi-tech production lines

Harley-Davidson's brand-new "materials-as-needed" approach to building bikes is winning the company much praise from others in the manufacturing community.

Formerly considered a blacksmith shop in the age of automation, Harley is showing the world that you don't have to eat fish heads and rice to operate an assembly line in an efficient and innovative manner.

That doesn't mean, of course, that we can't learn a thing or two from the sushi-and-soy-sauce set. Harley executives freely admit that the MAN system they've developed is an improved version of the Japanese Kanban method of inventory management and quality control.

As we told you before, the MAN system relies on strict coordination between Harley parts suppliers and in-house parts-and-accessory-building departments to insure that every bit and piece required to build a bike arrives at the right place on the assembly line at just the right time. Production is scheduled so that the part required may be in construction at the same moment the bike it will go on is moving down the line. At exactly the right time and place, they meet up for assembly.

Using flow-processing instead of the old batch-processing (building a bunch of shit and storing it) method, H-D has been able to dramatically reduce setup times. Making gas tanks, for example, used to require four weeks of retooling. Now it takes two days.

A highly complimentary article in the trade magazine *Material Handling Engineering* noted that the MAN system enabled Harley to reduce its break-even point by 32%, cut its investment in inventory from $23 million to $8½ million and, most important to bikers, produce a better product. Warranty claims have dropped substantially and a dealer quality audit found a 24% decrease in bike defects.

EXHIBIT
DATE 1-16-87
HB #24

WITNESS STATEMENT

NAME Todd G. Westlie BILL NO. 24

ADDRESS 121 Short St., Missoula DATE 1/6/87

WHOM DO YOU REPRESENT? Self

SUPPORT _____ OPPOSE ✓ AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

EXHIBIT
DATE 1-6-87
HB #24

WITNESS STATEMENT

NAME Shannon Bolton BILL NO. HB24

ADDRESS 2414 Eaton Missoula, MT 59801 DATE 1-6-87

WHOM DO YOU REPRESENT?

SUPPORT ____ OPPOSE X AMEND ____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

I have been riding a motorcycle for twelve years, both off road and road machines. I have worn helmets in my younger days, mostly when I was riding dirt bikes. I feel that helmets restrict the awareness level and sensory imput available to the operator of the motorcycle. I do not think that by forcing riders to wear helmets the State of Montana would reap a justifiable ~~increase~~ ~~or~~ reduction of lost income. The choice of whether or not to wear a helmet should be left up to the rider and not government. Most importantly I hope you folks realize how strongly we feel about the helmet law and your duty to represent how we feel about it.

Since Ive been sitting here listening I have not heard one person talk about

CS-34

EXHIBIT
DATE 1-16-97
HB #24

WITNESS STATEMENT

NAME Tom Charney BILL NO. 24

ADDRESS 1020 Burton St Missoula DATE

WHOM DO YOU REPRESENT? Self

SUPPORT OPPOSE X AMEND

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

I am graduate of U of M and rider of 18 years. I read anything I can about helmet safety. as near as I can tell When you put one of those heavy, hot restrictive things on your head + then fly into an immovable object the added weight makes your neck break. No head injury ~~spine~~ fatality is then recorded but no one is keeping track of the neck-related deaths.

also I urge each of you on the committee to get a hold of a helmet + wear it around for a few minutes Since you are the ones that might make me wear one you ought to know what it is like. Thanks

CS-34

EXHIBIT
DATE 1-6-07
HB # 24

WITNESS STATEMENT

NAME Dal Smilie BILL NO. 24

ADDRESS 1127 5TH Ave DATE 1/6/07

WHOM DO YOU REPRESENT? Self

SUPPORT _____ OPPOSE ✓ AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

EXHIBIT
DATE 1-16-87
HB #24

WITNESS STATEMENT

NAME LARRY Franzen BILL NO. 24

ADDRESS 908 5th Deer Lodge DATE 1/6-87

WHOM DO YOU REPRESENT? SELF

SUPPORT _____ OPPOSE ✓ AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

EXHIBIT
DATE
HB

WITNESS STATEMENT

NAME James S Beyer BILL NO. 24

ADDRESS 3610 S. 7th W. Missoula DATE 1/6/87

WHOM DO YOU REPRESENT? self

SUPPORT _____ OPPOSE X AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

EXHIBIT [redacted]
DATE [redacted]
HB # 24
HELMET

WITNESS STATEMENT

NAME Tom Vermillion BILL NO. # 24

ADDRESS 819 Kentucky Deer Lodge DATE Jan 6.

WHOM DO YOU REPRESENT? Many

SUPPORT _____ OPPOSE X AMEND _____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

EXHIBIT
DATE 2-1
HB 124

WITNESS STATEMENT

NAME Jeff Wuerl BILL NO. HB24

ADDRESS 104 Benton Helena DATE

WHOM DO YOU REPRESENT? self

SUPPORT ____ OPPOSE X AMEND ____

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

Comments:

VISITORS' REGISTER

HUMAN SERVICES AND AGING COMMITTEE

BILL NO. 24 DATE 1-6-87

SPONSOR NISBET

NAME (please print)	RESIDENCE	SUPPORT	OPPOSE
Myma Ornhold	Helena	X	
Judy Goucher	Helena	X	
Dal Smilie	Helena		X
Dick Field	Helena		X
J. Robert Green STATE COCA'S ABATE OF MONTANA	BILLINGS		X
Tom Taylor	Butte		X
Ruth Dryman	B. He		X
Bob Kovacich	Butte		X
Doug Woodall	Missoula		X
Tom Carney	Missoula		X
Robert L. Ryan	Helena	X	
Chris Spolar	Butte		X
DALE GUMMER	BUTTE		X
Bill Boggs			X
Dan Sagg	Butte		X
Manuel Madrid	Butte		X
Mark Solo	Butte		X
John Miller	Missoula		X
Michael Maguire	Butte		X

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR WITNESS STATEMENT FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

VISITORS' REGISTER

HUMAN SERVICES AND AGING COMMITTEE

BILL NO. 24 DATE 1-6-87

SPONSOR MELCET

NAME (please print)	RESIDENCE	SUPPORT	OPPOSE
Darcy L Stergis	Butte		X
James Boyd	Missoula		X
Ken D Olsen	Missoula		X
Shannon Bolton	Missoula		X
Albert G. Ge	Helena	X	
Dave Kanamy	Helena		X
BRUCE WETHERBY	MISSOULA		X
Col R.W. Landon MHP	Helena	X	
Thom Jans	Helena		X
Todd G. Hafstlie	Missoula		X
Tony Johnson	Deer Lodge MT.		X
Charlie Dawson	" "		X
Windy Meyer	Helena MT		X
Larry Pranzen	Deer Lodge MT		X
Roy Wherley	Three Forks MT		X
Roger Meyer	Helena MT.		X
Patricia J. Wherley	Three Forks, MT		X
Dick Ravalli	HELENA		X
Sherry Crider	Helena		X

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PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

VISITORS' REGISTER

HUMAN SERVICES AND AGING COMMITTEE

BILL NO. HB# 24 DATE 1-6-87

SPONSOR NISBET

NAME (please print)	RESIDENCE	SUPPORT	OPPOSE
Dale Johnson	Anaconda		X
Jeff Wuerl	Helena		X
Sid Miller	Boulder		X
John Arnold	Anaconda		X
Ted Avery	Anaconda		X
Jack Davis	Helena		X
Jim Beyer	Missoula		X
Dirk Reister	Helena		X
Leonard Frazer	Deer Lodge		X
Daniel C. Peters	Livingston		X
Tim Morley	Anaconda		X
Gary L. Murphy	Livingston		X
Bill Schad	Livingston		X
Tom Vermillion	Deer Lodge		X
Gina Price	Helena		X
Thomas Dickson	Helena		X
Lloyd Hirder	Helena	X	
David Lackman	"	X	
Bernita "	"	X	

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VISITORS' REGISTER

HUMAN SERVICES AND AGING COMMITTEE

BILL NO. HB# 24 DATE 1-6-87

SPONSOR Nisbet

NAME (please print)	RESIDENCE	SUPPORT	OPPOSE
K. V. EDEN, MD	1030 LeGrande Cannon Helena	✓	
Kay K Lewis	3220 3rd Great Falls		✓
Phil Crowell	Box 1685 Boz MT		✓
[illegible]	1000 17th Bozeman		✓
Steve Boore	715 Applegate Rd Helena		✓
Mike Flanagan	1000 Ninth Bozo/And		✓
[illegible]	Helena		✓
[illegible]	Bozeman		✓
[illegible]	Bozeman		✓
[illegible]	Helena 1030 N. Last Chance		✓
[illegible]	Bzmn.		✓
Butch Turk	514 Sherwood Mssla 59802		✓
[illegible]	1125 1st Ave N Gt Falls	✓	
[illegible]	1324 5th Ave N.W. GF	✓	
Karl Spohar	Butte		✓
Bob Fleagle	Butte		✓
Barb Booher	MT Nurses Assoc.	X	
John Delano	self	+	

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VISITORS' REGISTER

HUMAN SERVICES AND AGING COMMITTEE

BILL NO. 24 DATE 1-6-87

SPONSOR Nisbet

NAME (please print)	RESIDENCE	SUPPORT	OPPOSE
Rod + Susan Chord	Missoula, Mont.		X
Joan Simonson	Helena, Mt		X
Dwight Simonson	Helena, MT		X
Rod Sandahl	102 S 8TH Helena		X
Shelton Crider	4725½ 2nd Ave Helena		X
Mickey Hines	1002 Cheyenne Dr Helena		X
Dennis S Miller	Box 8A Clancy		X
Norma L Bennett	46 S Howie/ Helena, MT		X
Jerome T Loendorf	Helena, Mt.	X	
Jean Thomson	Helena	X	
Kit C[illegible]	Helena		X
Steve Yeates	HELENA		X
Sharon Robbins	Helena	X	
Don L Christy	Helena		X
Roberta Dalle	Helena		X
Dori Wilson	Great Falls		X
Kathy Bryant	Great Falls		X
Rick DeDecker	86 S. Clark Butte		X
Tim McCauley	Libby,	X	

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR WITNESS STATEMENT FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.