# USE OF THE HELMET RETENTION SYSTEMS IN THE NETHERLANDS

## INTRODUCTION

In literature high numbers of helmets that came off during accidents are reported. Percentages range from 7 to 36%: e.g. Pedder et al., 1979; White, 1980; Otte, 1980. Because only a part of these cases could be explained by (mechanical) failure of the retention systems of the helmets a survey of the use of these systems by moped riders and motorcyclists was undertaken in the Netherlands.
For a careful inspection of the use of the retention system the motorized two-wheel rider had to be stopped. More than 1000 moped riders and 1000 motorcycle riders were interviewed and their helmets examined.

## METHOD

On several places scattered all over the Netherlands moped riders were interviewed when they had to stop for a traffic light.
Motorcycle riders were interviewed when entering the parking places of several motor cycle events e.g. the European Championship in Assen and the Veronica Beach Cross in Scheveningen.
The use of the retention system was defined in the following categories:

LOOSE:      The retention system was not used at all.
TOO LOOSE:  The retention system was used but in such a way that the chin-strap could be easily pulled over the chin. If there was a chincup available the use of the system was always defined as too loose.
FASTENED:   The retention system was used and the chinstrap could not be pulled over the chin. Even if the retention system is used the buckle may be improperly fastened.

## RESULTS

The group under study is considered as a representative sample of the Dutch moped and motorcycle riders.

## USE OF THE RETENTION SYSTEM

### Moped riders

It appeared that 15% of the moped riders did not close the retention system at all, 50% closed the system too loose and 10% did not properly use the buckle (Table 1).

| USE OFF | N | | | % | | |
| THE | USE OF THE | | | USE OF THE | | |
| | BUCKLE | | | BUCKLE | | |
| RETENTION | | | TOTAL | | | TOTAL |
| | | IM- | | | IM- | |
| SYSTEM | PROPER | PROPER | | PROPER | PROPER | |
| LOOSE | . | 171 | 171 | . | 15.4 | 15.4 |
| TOO LOOSE | 483 | 73 | 556 | 43.4 | 6.6 | 50.0 |
| FASTENED | 350 | 36 | 386 | 31.4 | 3.2 | 34.7 |
| TOTAL | 833 | 280 | 1113 | 74.8 | 25.2 | 100.0 |

Table 1. Use of the retention system by use of the buckle. Moped riders.

### Motorcycle riders

The use of the retention system by the motorcycle riders was better (Table 2). A possible explanation for this behaviour (stated by the motor-cycle riders spontaneously) is the average higher speed of the motorcycles in comparison with the mopeds. Helmets that are not fastened well will come off during the ride.

Of the motorcycle riders 2% did not close the system, 13% did close the system but too loose and 1% did not use the buckle in a proper way.

| USE OFF THE RETENTION SYSTEM | N | | | % | | |
|---|---|---|---|---|---|---|
| | USE OF THE BUCKLE | | TOTAL | USE OF THE BUCKLE | | TOTAL |
| | PROPER | IM-PROPER | | PROPER | IM-PROPER | |
| LOOSE | - | 24 | 24 | - | 2.3 | 2.3 |
| TOO LOOSE | 140 | 12 | 152 | 13.3 | 1.1 | 14.4 |
| FASTENED | 861 | 19 | 880 | 81.5 | 1.8 | 83.3 |
| TOTAL | 1001 | 55 | 1056 | 94.8 | 5.2 | 100.0 |

Table 2. Use of the retention system by use of the buckle. Motorcycle riders.


## THE USE OF THE RETENTION SYSTEM BY TYPE OF SYSTEM

Many different retention systems exist. For this project nine different types were defined. But for the analyses only the two major types were distinguished: 'strangle' ('Double D' and 'Sliding Bar') and 'pushbutton' systems. One of the results of this study is the knowledge that all chin-straps equipped with a chincup were closed. Therefore these helmets were excluded from the further analysis of the use of the retention systems as presented in this paper.

### Moped riders

The use of the retention system by moped riders is shown in Table 3.
A selection from the group under study has been made (no chincups, only integral or jet helmets, only 'strangle' and 'push button' systems).
There is a significant difference (T test: t= 4.35, df=887) in the use of the buckle between the users of an integral helmet and of a jet helmet:

21% of the integral helmet users did not close the buckle in comparison with 10% of the jet helmet users.

There is also a significant difference (T test: t= 5.07, df=887) in the use of the buckle between the 'strangle' and 'push button' systems: 19% of the 'strangle' systems were not closed in comparison with 5% of the 'push button' systems. This is true for the integral as well as for the jet helmet users.

'Push button' systems are closed more often 'too loose' than is the case with the 'strangle' systems. This is true for the integral as well as for the jet helmets.

| USE OF RETENTION SYSTEM | INTEGRAL HELMET | | | JET HELMET | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|
| | STRANG | PUSHB | TOTAL | STRANG | PUSHB | TOTAL | STRANG | PUSHB | TOTAL |
| LOOSE | 22.0 | 5.8 | 20.8 | 10.5 | - | 9.8 | 19.1 | 4.5 | 18.0 |
| TOO LOOSE | 42.9 | 50.0 | 43.5 | 34.5 | 60.0 | 36.2 | 40.8 | 52.2 | 41.6 |
| FASTENED | 35.1 | 44.2 | 35.8 | 55.0 | 40.0 | 54.0 | 40.1 | 43.3 | 40.4 |
| TOT. % | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| N. | 613 | 52 | 665 | 209 | 15 | 224 | 822 | 67 | 889 |

(chincups, other retention systems, other type of helmet, unknown n= 224)

Table 3. The use of the retention system by moped riders by type of helmet and type of system (selection: no chincups, only integral and jet helmets, 'strangle' and 'push button' systems ).

Motorcycle riders

The use of the retention system by motorcycle riders is much better, only a small group of them (2.1%) didn't close the system. Therefore no split up by type of helmet has been made in Table 4. There appeared to be no difference in the use of the buckle between the two retention systems. Only 'strangle' systems were closed more often too loose than the 'push button' systems.

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|USE OF    |TYPE OF RETENTION        |
|RETENTION|          SYSTEM   | TOTAL  |
|SYSTEM    | STRANG.|PUSH B. |        |
|---------+--------+--------+--------|
|LOOSE     |   2.1  |   2.1  |   2.1  |
|---------+--------+--------+--------|
|TOO LOOSE|  13.6  |   8.8  |  12.5  |
|---------+--------+--------+--------|
|FASTENED |  84.3  |  89.1  |  85.4  |
|---------+--------+--------+--------|
|TOTAL  % |  100,0 |  100,0 | 100,0  |
|        N |   756  |   240  |   996  |
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(Other type of helmets, type of retention system and unknown: n=60)

Table 4. The use of the retention system by type of retention system. (selection: no chincups and only integral and jet helmets).

From further analyses of the data it is found that age and sex have a minor influence on the use of the retention system.

CONCLUSIONS

The results of this project indicate that the use of the retention systems of helmets especially by moped riders is not quite optimal in the Netherlands. A study by Schüler (1988) indicate a similar use of the retention systems in Federal Republic of Germany.

The results of this research also indicate that an improvement of the use of the buckle can be achieved for the moped riders when only 'push button' systems are used.
If all 'strangle' systems will be replaced by 'push button' systems a better use of the retention systems will result. The effect of this in the Netherlands is estimated under the following assumptions: using a helmet will reduce the risk of being killed by 40% and the risk of being injured

to the head by 30%. When the buckle isn't used helmets will come off in
80-100% of the cases. When the retention system is fastened 'too loose'
the same will happen in 25-50% of the cases.

The reduction in the number of killed moped riders when all helmets are
equipped with a 'push button' system will be 4 - 5%. For the motorcycle
riders this will be 1 - 2 %.
The reduction in the number of injuries to the head for the moped riders
will be 3 % and for the motorcycle riders 1%.
The reductions will be much larger if the assumption of the coming off
rate when using the system 'too loose' is lower.

If it can be achieved that closing the retention system 'too loose' is
hardly impossible the actual effect of wearing a helmet will increase even
more. The effects in the Netherlands can be estimated: a reduction in the
number of killed moped riders by 14 to 21 %; killed motorcycle riders by 3
to 6%.

And reductions for the injuries to the head by 10 to 15 % for the moped
riders and 2 to 4% for the motorcycle riders.

In another attempt to improve the use of retention systems an information
programme is developed in the Netherlands. In this programme attention is
also given, as a result of the abovementioned study, to the important
aspects to look for when buying a helmet, and to a proper treatment of the
helmet.

LITERATURE

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