DRINKING AND DRIVING

A literature study

(Shortened version)

R-77-6
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Voorburg, June 1977
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INTRODUCTION

The author has made a literature study concerning the knowledge of drinking and road safety and experience gained with drinking and driving legislation in other countries. The results of this study are given in the SWOV publication Drinking and Driving, of which this article is an abridged version.
That publication is the first in a series of SWOV reports on drinking and the dangers it involves in road traffic.
SWOV will shortly be issuing a report on Drinking Drivers. It contains the results of SWOV research into Drinking and Driving Habits in the years 1970, 1971, 1973, 1974 and 1975, and gives a detailed representative description of drinking by Dutch motorists during weekend nights in Autumn, both before and after introduction of the legislation on drinking and driving on 1st November 1974. It may be added that this research was possible thanks to the assistance of a number of police forces in this country.
Before Autumn, SWOV will issue a report on tests with various breath analysers as part of the research into Drinking and Driving Habits.
As (provisionally) the last in the series, a report will be published before the end of the year entitled Possibilities of Limiting the Dangers of Drinking in Road Traffic, a contribution to the discussion on possible measures and activities. This report comprises the provisional completion of SWOV research in the form of an interpretation of the research results, aimed at measures and activities which might be considered.

1. DRINKING AND ROAD SAFETY

In The Netherlands, the Central Statistical Office (CBS) gives the percentage of accidents in which the police have established that one or more of the road users concerned had been drinking. On the whole, however, the police do not use any aids to ascertain the degree of intoxication or the blood alcohol concentration. Hence, these official data give an incomplete and perhaps distorted picture. At most, they are indications of drinking.
Strictly speaking, therefore, it is not known in The Netherlands how many accidents and casualties are caused by drinking driving or how many fewer there might have been if road users drank less. To find this out, it is necessary to known exactly the percentage of people killed on the roads who had been drinking and what their blood alcohol concentration was as has been done in the United States in a number of research projects. Together with additional information on accidents an estimate could then also be made of the percentage of fatalities caused (in part) by drinking. In the USA the proportion can be estimated at about 35 per cent of all road fatalaties. In a number of European countries road accidents casualties' BAC's have been investigated too. Kielholz (quoted by Lutz & Leu, 1975) found positive BAC's for 41.8% of drivers admitted to hospital. Codling & Samson (1974) took a sample of deceased motorvehicle drivers and found a positive BAC for 20-30% of them. Hoffmann et al. (1975) took various samples among vehicle drivers admitted to hospital. They found a positive BAC for 50-60%. Bø et al. (1975) likewise investigated motor-vehicle drivers admitted to hospital; 52.6% had a positive BAC. Too little information is available, however, regarding the composition of the various samples. For the moment, it is best to take Codling & Samson's data as a basis, because they relate to deceased drivers. These data give the impression that the number of alcohol-related fatalities in Europe is relatively lower than in the USA. This does not necessarily mean that there are fewer drinking drivers in Europe than in the USA, because the percentage also depends on other factors determining road safety which may differ from country to country (such as road characteristics and traffic composition).

Apart from research concerning road fatalities, the drinking problem can also be defined by research into the drinking habits of a random sample of road users. There is more and more interest in this kind of research internationally, since such research makes it possible to establish the connection between blood alcohol concentration, road users' characteristics, circumstances, and so on. Repetition of the research can give the pattern of any changes in the situation. In the SWOV research into Drinking and Driving Habits, a national sample of motorists was taken during weekend nights for a number of years in succession. Their blood alcohol concentration and other data were recorded. In this way, it was possible to ascertain the percentage of motorists who had been drinking and how much. The influence of the time of day, day during the weekend, trip origin, age and sex of the motorists were also ascertained.

In describing drinking drivers' characteristics, the most appropriate category for road safety research is drivers with a high blood alcohol concentration involved in a collision. But hardly any data are available about these. Another category of drivers which can form the subject of research is those convicted of driving while intoxicated. Data for this category are easier to collect than for the former. Dutch research regarding persons convicted of driving while intoxicated shows that this category, both before and after conviction, had committed more traffic offences than another group of drivers comparable in age, sex and occupational aspects. Another Dutch project investigated whether, among persons convicted of driving while intoxicated, there is any difference between those who repeat the offence and those who do not. Whether there is any difference can best be deducted from a combination of their criminal records, their ages and occupational aspects. Nevertheless, their behaviour is too unpredictable for practical purposes.
Research in other countries (mainly in the USA) covering various groups of drivers with a high blood alcohol concentration does not yield any coherent pattern. Some researchers stress the resemblance between the various categories, while others point out the differences. There are, however, sufficient indications that the results of research relating to persons convicted of driving while intoxicated cannot simply be applied to all drivers running a greater accident risk through having a hig BAC.

2. LEGAL BAC LIMIT

In Great Britain, a legal limit of 80 mg alcohol per 100 ml blood was introduced in 1967. This is often quoted in the literature as a successful measure against driving while intoxicated. In certain cases, the police were given the power to demand a breath test in order to make a rough assessment of the BAC. If grounds existed, the breath test was followed by a blood test. Prior to introduction of the limit, there was an extensive publicity campaign.

Immediately after the Act became operative, there was a steep drop in the number of motorists killed at nighttime. Four years later, however, the number was back at the level before the Act. As to the number of daytime fatalities, the differences before and after the Act were not as obvious (Figure 1). The minor differences in daytime may be caused by unknown factors which may also have played a part at nighttime. For this reason, nighttime fatalities are shown in Figure 2 also as percentages of the totals for daytime and nighttime. These percentages show about the same pattern as the index of nighttime fatalities (Figure 2). As regards the number of drivers killed who had more than 80 mg/100 ml, there was a decrease in daytime immediately after the Act took effect. But then there was a gradual return and four years later the prelegislation level was reached again. During nighttime hours the Act had a pronounced impact during the first year after it became law. In subsequent years, however, there were both big increases and decreases (Figure 3).

A number of questions therefore remain regarding the effect of the British Act on drinking-driving and on the accident rate. There is general agreement, however, that several years after the new Act was introduced its effect had become practically nil (see the various figures).

The effect of the publicity campaign in Great Britain when the limit was introduced has also been examined. There proved to have been little change in attitudes towards the Act and the police after the limit was introduced. People already knew a lot about the Act, but were even more aware of it after its introduction. In addition, more drivers were able to state how much alcohol they believed corresponded to the legal limit. The amount they believed they could safely drink

themselves did not change, nor did their habits as regards the places where they did their drinking. It is reasonable to assume that the impact of the legislation is not determined by drivers realising the greater accident risk after drinking. It is more a consequence of their assumption that they run a greater chance of being caught by the police and of being punished if they drive after drinking. When, in due course, it turns out that the chance of detection is not as great as they at first thought, the former behaviour returns. The fact that young drivers have not benefitted from the publicity accompanying the introduction of the legislation has also been offered as a partly explanation.

In other countries where a legal limit has been introduced (Canada, France, Australia), the impact was much less than in Great Britain, as far as can be ascertained. In certain cases, therefore, a legal limit does have an effect while in others it does not. It is thus important to examine the factors that play a part in this.

2.1. Level of legal limit

An important factor is the level of the legal limit. In choosing a legal BAC limit, it must first be known what the risk is of being involved in a road accident after drinking. The effect of drinking on the risk on road accidents can be investigated by comparing a group of accident-involved drivers with a group not involved. The blood alcohol concentration is then the most important research variable. Drivers with alcohol in their blood are found to run a greater accident risk than those without. Moreover, the accident risk increases more rapidly as the BAC becomes higher. The form of this relationship may, however, differ and depends on driver characteristics such as drinking habits and age (Figure 4) and circumstances such as time and place. It is not therefore possible simply to indicate a specific limit above which it is inadvisable to drive with a view to road safety. On the whole, however, a pronounced increase in accident risk is observed when the BAC is between 50 and 100 mg/100 ml.

The choice of the BAC limit cannot simply be based on the relationship between BAC and accident risk. In addition, the practical possibilities of detecting and prosecuting offenders against the legal limit must be taken into account. The main point in this is the method of measuring the blood alcohol concentration. The police must have good screening methods also to detect drivers whose BAC is just above the permitted limit.
In order to increase the number of offenders detected, it will have to be possible to measure the alcohol concentration simply and quickly. The time elapsing between detection and conviction can also be shortened by this means. This will have a favourable effect on compliance with the law. The effect of penalties is probably greater the shorter the time is between offence and conviction. An increase in the number of detected offenders might, however, overload the courts and so act as a limiting factor on law enforcement. Other factors are police views on the danger, extent and nature of driving while intoxicated, what terms police and public are on, and the number of man-hours the police can spare. In any case, police action can have considerable influence on road users' drinking habits in general and on the impact of a legal BAC limit in particular.
Lastly, allowance must be made for the possibilities that exist of making it clear to road users how much they can drink without exeeding the limit and the extent to which exeeding it puts their own safety and that of others at risk; the 50 mg/100 ml limit in The Netherlands will be exceeded by a substantial number of motorists at nighttime without their feeling that their driving ability is diminished.

2.2. Impact of penalties and treatments

One purpose of penalties is to have an effect on the offender (the special deterrent effect). An important aspect is the relationship between the degree of punishment and the chance of the offence being repeated. In The Netherlands, however, no difference in the change of repetition has been found, even between regions with a pronounced difference in the measure of punishment.
The use of some form of treatment instead of the customary punishment has been increasing in recent years in The Netherlands and other

countries. So far, however, no pronounced differences in the chance of repetition of driving while intoxicated have been found as between punishment and treatment, neither in American nor Dutch research.

Few drivers with a high BAC come into direct contact with the police. In order to reduce the number of such drivers, therefore, measures with a general deterrent character are needed in the first place: i.e. measures that mainly affect the category as a whole. Possibilities of investigating the general deterrent effect of penalties are slight. In The Netherlands, it has been examined by comparing two regions with widely different degrees of punishment: the West of the country, where on average 83 per cent of those found guilty were sent to prison unconditionally, and the East of the country, where the proportion was 24 per cent. Comparison during weekend nights of a random sample of motorists in the West and the East, however, did not disclose any difference in BAC. Moreover, the motorists proved to have hardly any idea of the degree of punishment which is used.
It is possible, however, if the risk of detection is increased that the role of the penalty will become more important. On the other hand, a severe penalty combined with a large number of offences is likely to make the police more cautious in detecting offenders.

3. FINAL OBSERVATIONS

International literature on drinking and driving has yielded knowledge on measures which might supplement the legal BAC limit introduced in The Netherlands in 1974. In particular, thought must be given to measures enabling more offenders against the Act to be detected and convicted. Nevertheless, further research is needed on a number of aspects. The most important of these is the relationship between blood alcohol concentration and the accident risk, depending on circumstances and driver characteristics. Data on this can be obtained by supplementing research into the drinking habits of a random sample of drivers as is carried out in The Netherlands and in other countries with other investigations. For instance, investigation of the blood alcohol concentration and other data of drivers involved in traffic accidents during the same period of time. In order to facilitate such investigations, the blood alcohol concentration of everyone involved in traffic accidents should be checked as a matter of routine.
Such a measure would make it possible to give findings of the number and nature of alcohol-related accidents, the mode of road usage, the circumstances and road users' characteristics, and also the changes that take place in these.

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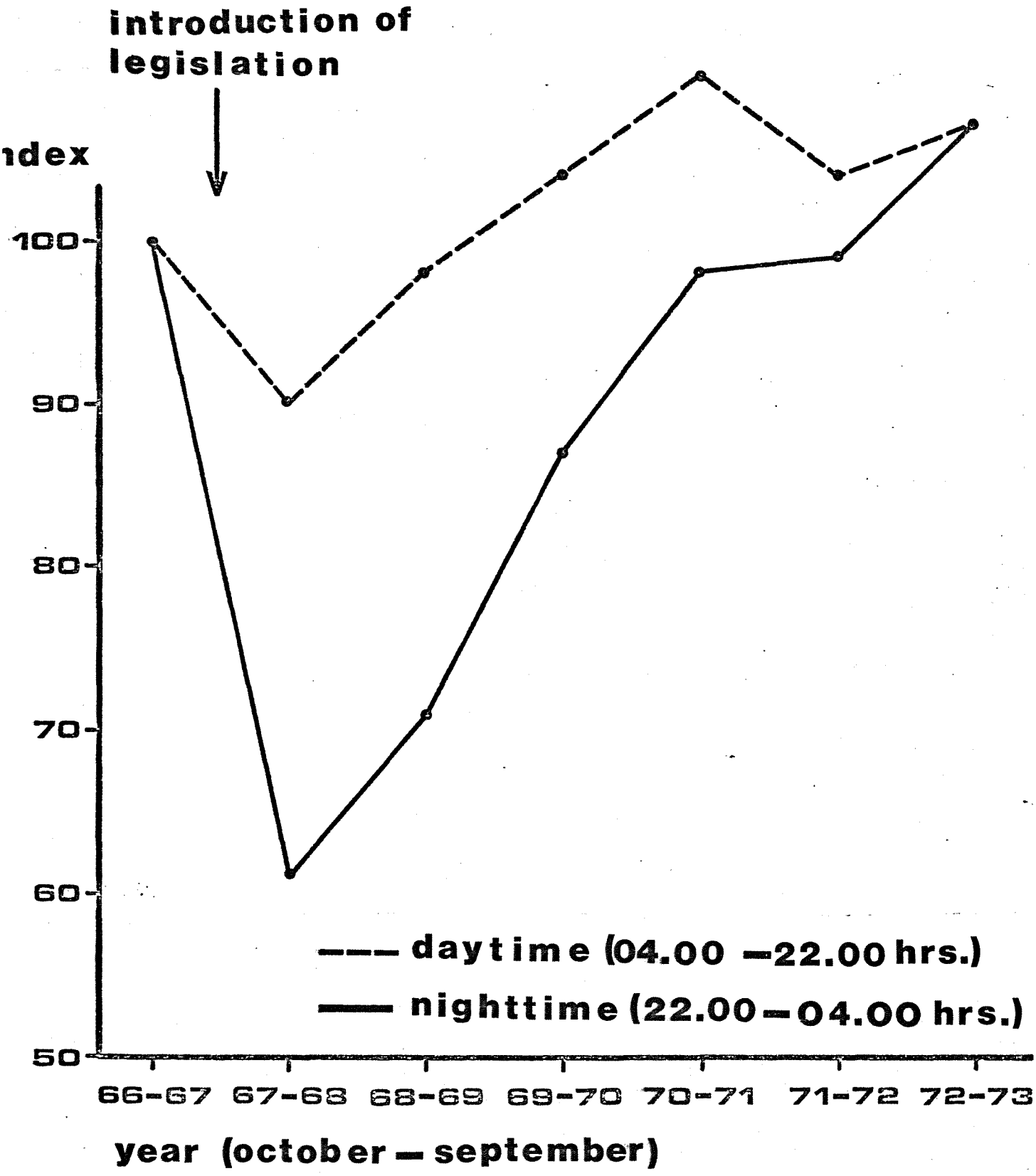
Figure 1. Index of numbers of motor drivers killed in Great Britain, in daytime and at nighttime (1966-67 = 100).

Figure 2. Trend in number of road fatalities at nighttime in Great Britain, presented as a percentage of all road fatalities, since 1966-67.

Figure 3. Trend in number of drivers killed having more than 80 mg/100 ml in Great Britain, presented as a percentage of all road fatalities, in daytime and at nighttime, since 1966-67.

Figure 4. Relationship between BAC, age and accident risk of males (accident risk with no alcohol concentration and age 35-55 = 1).


introduction of
legislation
ndex
100
90
80
70
60
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daytime (04.00 –22.00 hrs.)
nighttime (22.00–04.00 hrs.)
66-67 67-68 68-69 69-70 70-71 71-72 72-73
year (october – september)

Figure 1.

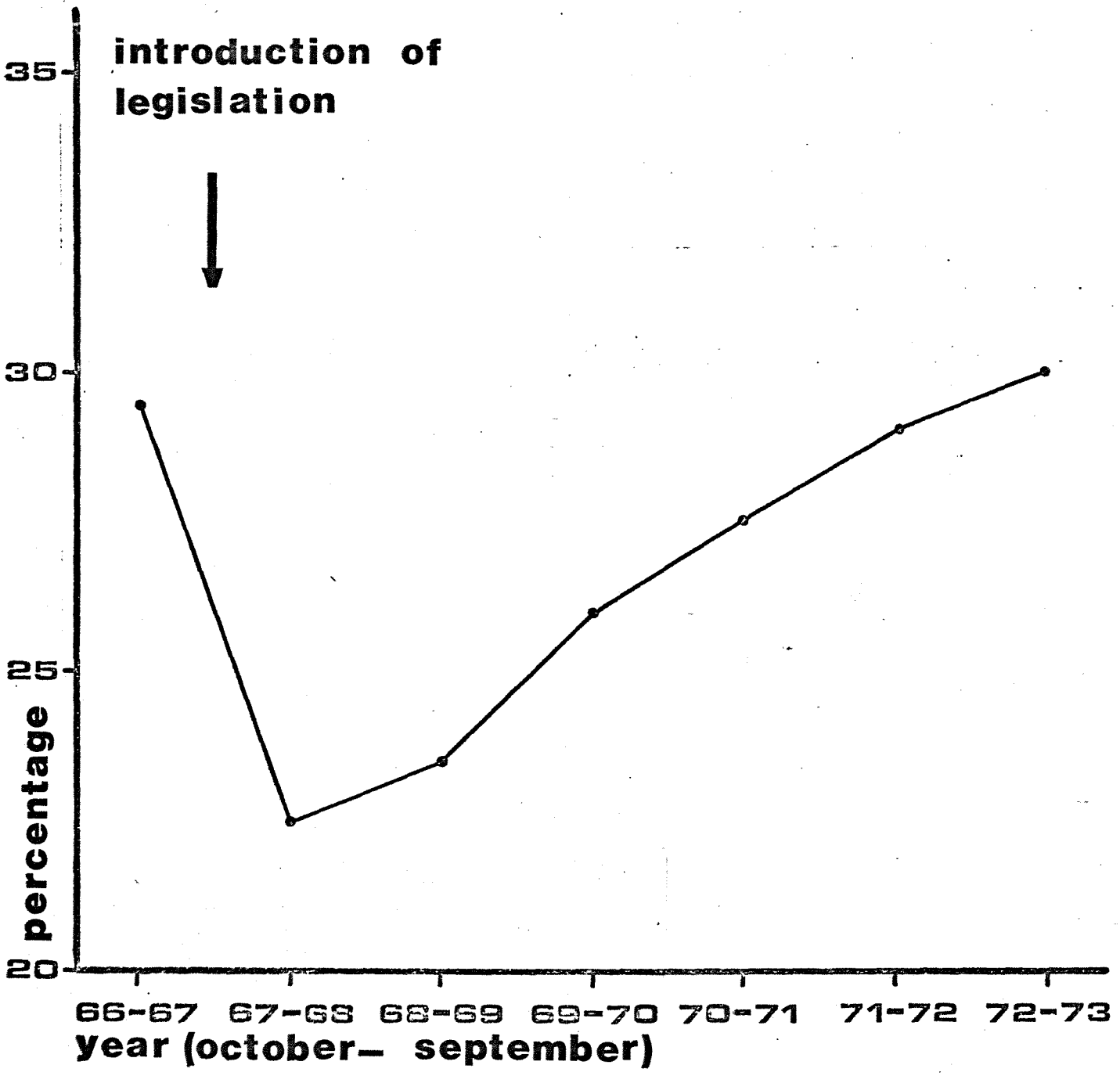
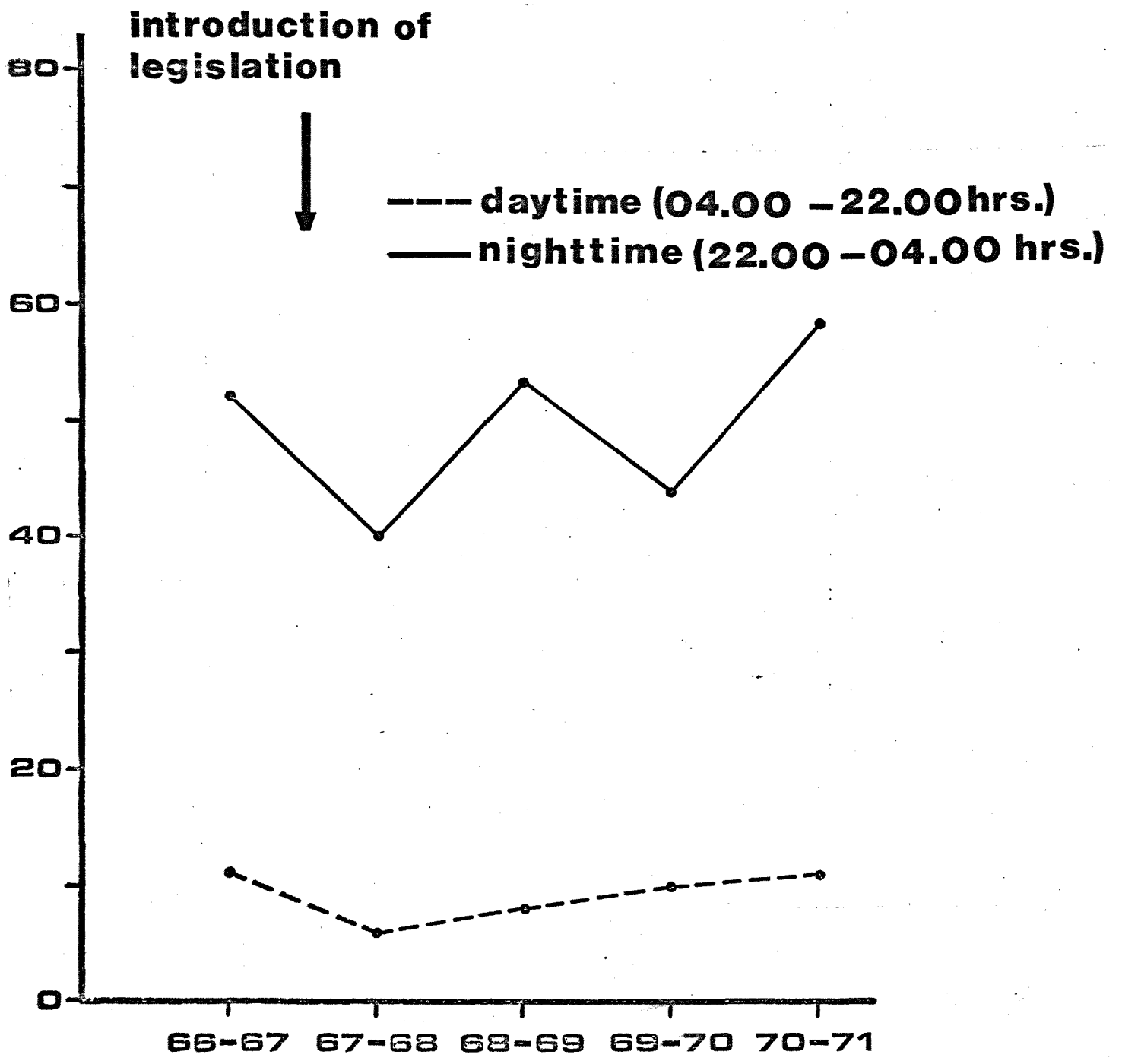

introduction of
legislation
35
30
25
20
percentage
66-67
67-68
68-69
69-70
70-71
71-72
72-73
year (october– september)

Figure 2.


introduction of
legislation
daytime (04.00 – 22.00hrs.)
nighttime (22.00 – 04.00 hrs.)
80
60
40
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percentage
66-67
67-68
68-69
69-70
70-71
year (october – september)

Figure 3.

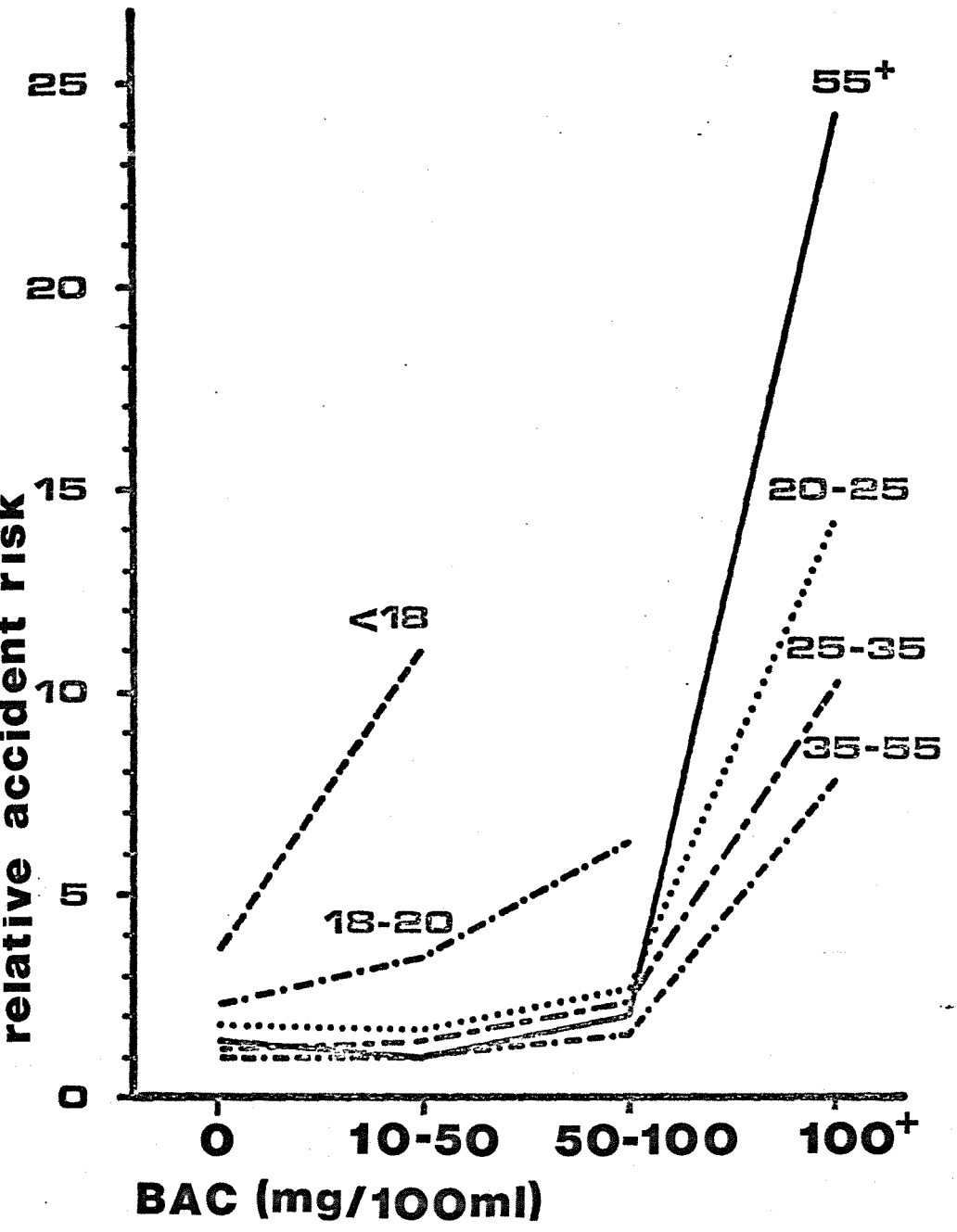
25
20
15
10
5
0
relative accident risk
55+
20-25
25-35
35-55
<18
18-20
0
10-50
50-100
100+
BAC (mg/100ml)

Figure 4.