WORLD HEALTH ORGANIZATION

ORGANISATION MONDIALE DE LA SANTE

DISTR.: GENERAL(E)

WHO/MNH/DAT/86.3 ✓
ENGLISH ONLY

WHO COLLABORATIVE PROJECT ON THE IDENTIFICATION AND TREATMENT OF PERSONS WITH HARMFUL ALCOHOL CONSUMPTION

REPORT ON PHASE I

THE DEVELOPMENT OF A SCREENING INSTRUMENT

John B. Saunders
Royal Prince Alfred Hospital
Sydney, Australia

and

Olaf G. Aasland
National Directorate for the Prevention of Alcohol and Drug Problems
Oslo, Norway

Prepared for the Division of Mental Health,
World Health Organization, Geneva
on behalf of the
WHO collaborative team of investigators

Investigators

Australia

Dr F.H. Burns Dr R. Reznik Dr J.B. Saunders	Drug and Alcohol Services and Department of Community Medicine, Royal Prince Alfred Hospital, Sydney

Bulgaria

Dr M. Boyadjieva	Department of Alcoholism, Suhodol, Sofia

Kenya

Dr S.W. Acuda	Department of Psychiatry, University of Nairobi, Kenyatta National Hospital, Nairobi

Mexico

Dr J.R. de la Fuente	Instituto Mexicano de Psiquiatria, Mexico City

Norway

Dr O. Aasland* Mr A. Amundsen** Dr J. Morland	National Directorate for the Prevention of Alcohol and Drug Problems, National Institute for Alcohol Research and National Institute of Forensic Toxicology, Oslo

USA

Dr T. Babor Dr H. Kranzler Dr R. Lauerman	Department of Psychiatry, University of Connecticut Health Centre, Farmington, Connecticut

Advisers

Dr J. Chick	Department of Psychiatry, Royal Edinburgh Hospital, Edinburgh, Scotland, UK
Dr R. Hodgson	Department of Psychology, Whitchurch Hospital, Cardiff, Wales, UK
Dr E.B. Ritson	Department of Psychiatry, Royal Edinburgh Hospital Edinburgh, Scotland, UK
Dr H. Skinner	Addiction Research Foundation, Toronto, Canada

WHO Secretariat, Division of Mental Health, Geneva

Ms K. Canavan	Technical Officer
Mr J. Ording	Senior Scientist (1981-1983)
Mr M. Grant	Senior Scientist (1983 onwards)
Dr N. Sartorius	Director

---

* Technical Focal Point
** Statistician

CONTENTS

1. SUMMARY

Alcohol-related disabilities are being seen with increasing frequency in both the developed and developing world. The health and social costs to individuals, to families and to national economies are considerable. There is widespread dissatisfaction with current treatment options. By the time persons present spontaneously to health and welfare agencies, dependence is often entrenched and disability severe. The prognosis of those with advanced problems is generally unfavourable. The traditional therapeutic response to such problems has been to establish in-patient programmes and yet evidence for their efficacy is lacking. A WHO Expert Committee reporting in 1980 emphasized the need for detection of persons with harmful alcohol consumption before health and social consequences had become irreversible and for investment in cost-effective strategies that could be applied in primary health care settings.

The aim of the present study was to develop a simple instrument to screen for persons with early alcohol problems that was suitable for use by health workers in both developing and developed countries. It is linked to an investigation of methods of early intervention for persons so identified.

The screening instrument has been devised on the basis of responses to a detailed assessment interview conducted in persons attending representative health care facilities in six participating countries: Australia, Bulgaria, Kenya, Mexico, Norway and the USA. Persons currently having treatment for alcoholism were excluded from the analysis as were abstainers. In the assessment, questions were asked on medical symptoms, past medical history including trauma, the level of alcohol consumption, the frequency of drinking and of intoxication, alcohol-related problems, alcohol dependence and the person's perception of an alcohol problem. A clinical examination was performed and biochemical and haematological tests were undertaken.

During 1984-85, 1905 subjects were recruited by the six participating centres. Nine hundred and thirteen were in the category of "drinking patients" after alcoholics and abstainers had been excluded. The scales within the assessment instrument that consisted of questions referring to alcohol had high intrascale and test-retest reliability and validity, whereas those consisting of medical symptoms (with no direct reference to alcohol) and of findings on clinical examinations had generally lower reliabilities and did not correlate highly with alcohol consumption. Biochemical and haematological tests also showed a generally low or non-significant, correlation with alcohol intake. Principal components analysis indicated that most of the alcohol-specific scales were located on a dominant first principal component and were separate from the non-alcohol specific scales.

A ten-item "core" screening instrument has been devised. Only questions that refer specifically to alcohol have been selected and this has been based on their representativeness for particular scales across all centres. The core instrument contains three questions on the amount and frequency of drinking, three questions on alcohol dependence and four on problems caused by alcohol. Each item is scored from 0 to 4 and the range of possible scores is from 0 to 40. Using a score of 11 or more to denote a "positive" case, 80% of persons with hazardous alcohol consumption were correctly classified, and 89% of those with a non-hazardous intake were correctly assigned. It was acknowledged that a disguised screening procedure would be advantageous in certain situations and, accordingly, a second "clinical" screening procedure was devised. This consists of two questions, five items on clinical examination, and a blood test, the serum GGT. The sensitivity and specificity of this instrument are lower, though it performed well in one centre.

It is envisaged that the 10-item "core" instrument could be included in lifestyle assessment procedures which enquire about other "risk factors" such as tobacco smoking, diet and drug use. It is also possible for health workers to add questions to the basic instrument that are considered particular relevant for their country or health care facility.

2. INTRODUCTION

2.1 THE EXTENT OF ALCOHOL-RELATED HARM

Alcohol-related disabilities are among the major public health problems of the modern world and, in most countries, have increased steadily in prevalence over the past 30 years (World Health Organization, 1980). Excessive alcohol consumption may have adverse effects on a person's physical health, psychological and social well-being, and may cause major distress to the family and disruption to the community. The range of disabilities is greater than that seen with any other dependence-producing substance.

The adverse effects of alcohol are both acute and chronic. Acute toxicity may lead to respiratory depression, road accidents, violence and other traumas. Chronic excessive use has many deleterious social consequences and may lead to many forms of physical disease including irreversible liver and brain damage. These problems affect both the developed and developing world and there is evidence that they are increasing most rapidly in the developing world (World Health Organization, 1980; Walsh & Grant, 1985). Surveys from Australia, France, Germany and the United Kingdom have indicated that 30-70% of patients in hospital have a harmful alcohol intake and in half the cases alcohol is the direct cause of the patient's illness (Williams, Burns & Morey, 1978; Jariwalla, Adams & Hore, 1979). Alcohol-related cirrhosis of the liver has become the third commonest cause of death among men aged 25-64 years in New York State (Department of Health, New York, 1979) and is among the ten most common causes of premature death in many countries in North America and Europe. Alcohol-related traffic accidents account for up to 50% of road fatalities.

2.2 PROGNOSIS AND TREATMENT APPROACHES FOR ADVANCED ALCOHOL PROBLEMS

2.2.1 Prognosis

The prognosis for patients with advanced alcohol dependence is generally unfavourable. Their mortality rate over a 5 year period is between 4 and 10 times that of age-sex matched cohort from the general population. Within 10 years one-third of patients with severe dependence who were attending a public sector facility were dead (Vaillant, 1983) and another one-third continued to drink heavily. The outlook for patients with physical sequelae such as cirrhosis of the liver and brain damage is also generally poor. Only 20-30% of patients with decompensated alcoholic cirrhosis survive the first 5 years (Saunders, Walters, Davies & Paton, 1981). Patients with advanced degrees of alcohol-related brain damage such as Korsakoff's syndrome, show little or no recovery of cognitive function and often require hospital or nursing home care for the rest of their lives.

Although an overly pessimistic view is inappropriate - Vaillant (1983) demonstrated that nearly one-third of severely dependent persons can achieve a fairly stable abstinence after 7-10 years - given the financial constraints on health services, especially in developing countries, it can be argued that intensive treatment of severely damaged people is not the most appropriate use of resources.

2.2.2 Management of the advanced case

By the time they present to health care facilities many alcohol-affected persons have already suffered serious social disruption and health damage. In most developed countries, specialized in-patient treatment units were established in response to the needs of such patients. Typically these programmes involved admission for several weeks and provided intensive therapy along psychotherapeutic and behaviour modification lines. Despite the considerable investment in such facilities there is little evidence that overall they are cost-effective.

Of the forms of treatment used in more severely alcohol-dependent persons, intensive behaviour modification therapy and treatment with alcohol-sensitizing drugs have each been shown in a limited number of controlled trials to be beneficial in the short term (Sobell & Sobell, 1978; Fuller, 1984). Many persons who have recovered from alcohol dependence attribute their recovery to intensive involvement with Alcoholics Anonymous and it can be argued that this is the most cost-effective treatment modality for this group. However, the

majority of studies have failed to show any benefit from particular types of intervention for patients with advanced problems. A most rigorously conducted trial in the United Kingdom (Edwards et al., 1977) showed no difference in outcome between patients who had received an intensive multimodal treatment programme compared with those who, following assessment, were given a relatively simple session of advice.

Complex treatment programmes also have the disadvantage that they tend to perpetuate the belief that "alcoholics" are a separate species who require special and complicated treatments. The effect of this philosophy has been to draw attention away from persons with less severe alcohol problems who, numerically, are a far more significant group. And yet a report commissioned by WHO in 1981 indicated that many developing countries were creating specialized in-patient facilities, despite their doubtful efficacy and high cost. Although not wishing to abandon promising new approaches to the management of persons with advanced problems, many investigators considered that a shift in emphasis towards intervening at an earlier stage was more worthwhile.

2.3 CONCEPTS OF ALCOHOL-RELATED DISABILITIES

Before discussing strategies for early intervention it is appropriate to review the diagnostic classifications and terminology used to describe alcohol-related disabilities. Both the concepts and the terminology used have changed considerably over the years of WHO's involvement in this field. Approaches to screening, diagnosis and treatment have also, not surprisingly, tended to reflect the prevailing beliefs about the nature of the disorder.

For much of the first half of this century, problems resulting from alcohol use were regarded as complications of a unitary disease "alcoholism" which was considered to have a predominantly genetic basis and a predictable natural history. The disease concept reached its apogee with the description by Jellinek (1952) of his typology of alcoholism in which he recognized five distinct sub-species. The disease concept had a strong influence on the development of treatment programmes in Anglo Saxon countries, with the concentration on specialized units, a goal of total abstinence from alcohol and close links with Alcoholics Anonymous.

The concept of the unitary disorder was criticized by many workers in Europe and in developing countries who saw it as an unnecessary attempt to force a constellation of very diverse problems into a disease entity. Many European workers favoured the concept of a complex of alcohol-related disabilities that was associated with a certain level of alcohol consumption, the "terrain éthylique" of Ledermann (1956). This has developed into the "disaggregation approach" proposed by many epidemiologists and sociologists.

Medical practitioners, especially in North America, were pre-occupied with devising more scientifically acceptable definitions of alcoholism. The National Council on Alcoholism proposed one in 1972 which was based on the disease concept. In 1980 the American Psychiatric Association, in their Diagnostic and Statistical Manual of Mental Disorders (DSM-III), made the distinction between "alcohol abuse" and "alcohol dependence". The criteria for alcohol abuse were threefold:

(i) continuous or episodic use of alcohol for at least one month;

(ii) social complications of alcohol use; and

(iii) either psychological dependence (e.g. compulsion to drink) or pathological patterns of alcohol use, or both.

For the diagnosis of alcohol dependence, the additional criterion of either tolerance or experience of withdrawal symptoms was required. However, these diagnoses were still conceived as "all or nothing" ones; they did not allow for any gradation of severity.

A major conceptual advance was provided by Edwards and Gross (1976) in their description of the alcohol dependence syndrome. This arose out of detailed clinical studies of the symptomatology of persons experiencing problems from alcohol and of alcohol withdrawal states. The dependence syndrome was conceived as a psychobiological state characterized by a reorientation of life around alcohol, an awareness of a compulsion to drink and drinking to

avoid the discomfort of its absence. Seven elements of the "core" syndrome were described. A distinction was made between this "core" syndrome and the broader range of problems that result from harmful drinking which were termed "alcohol-related disabilities" or "alcohol-related problems". These terms have been incorporated in the WHO lexicon (Edwards, Gross, Keller, Moser & Room, 1977). A crucial point is that both the alcohol dependence syndrome and alcohol-related disabilities are considered to exist in a continuum of severity.

Although the concept of the alcohol dependence syndrome and alcohol-related disabilities has gained wide acceptance in many countries, there is still no universal consensus about the terminology and conceptual basis for describing problems related to alcohol. Many still favour a unitary disease concept. In the present investigation a disaggregation concept underlaid the statistical approach used though modifications were necessary as the analysis progressed.

The terms "harmful alcohol consumption" and "hazardous alcohol consumption" used in the present study are relatively new ones and are included in the provisional recommendations for classification in the 10th revision of the International Classification of Diseases. "Harmful alcohol consumption" denotes the consumption of alcohol that is causing harm to the mental health or physical well-being of the individual. "Hazardous alcohol consumption" is defined as a level of alcohol consumption or a pattern of drinking that is likely to result in harm should present drinking habits persist.

2.4 PRINCIPLES OF SCREENING AND EARLY DIAGNOSIS

Screening is now undertaken for many physical and psychiatric disorders and is an accepted part of health care. The term "screening" was defined by the US Commission on Chronic Diseases as: "The presumptive identification of unrecognized disease or defect by the application of tests, examinations, and other procedures which can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not".

It must be emphasized that screening tests are not intended to be diagnostic but serve to identify those who should proceed to a more detailed assessment, as a result of which the diagnosis will be either confirmed or refuted according to currently accepted criteria. Screening is applicable to disorders which are either "present" or "not present", or which, like hypertension, exist as a continuous scale of disease or disability.

Before screening can be endorsed for a particular disorder a minimum requirement is that there is significant benefit to health and well-being from the condition being detected and treated at an earlier stage than had the person presented spontaneously for treatment. Many sets of criteria have been devised to assess whether a particular condition merits a screening approach. Among them are:

(1) the condition should be an important health problem;

(2) there should be a recognizable latent or early symptomatic stage;

(3) treatment at the pre-symptomatic or early symptomatic stage of the condition should favourably influence its course and prognosis, and therefore be preferable to no treatment;

(4) there should be an agreement on who should be treated;

(5) such treatment should be generally available;

(6) there should be a suitable screening test for detecting the latent or early symptomatic stage;

(7) the cost of identifying cases, diagnosing and treating them should be economically feasible within the budget for medical care as a whole.

(Adapted from Wilson & Jungner, 1968).

Clearly, alcohol-related disabilities do not fulfil all these criteria. The multiple nature of these problems, the lack of consensus on their genesis, and on how they should be diagnosed and treated, represent major difficulties. However, alcohol-related disabilities are not unique in this respect and other health problems to which similar strictures apply have been considered suitable targets for screening and early treatment.

Evidence to be presented in Section 2.6 shows that the rewards from screening and early intervention for alcohol problems are considerable, more so than for treating advanced dependence or disability. The crucial requirement, that treatment be preferable to no treatment, has therefore been fulfilled, at least in two of the first studies of this type (Kristenson et al, 1983; Chick, Lloyd & Crombie, 1985).

2.5 SCREENING AS APPLIED TO ALCOHOL-RELATED DISABILITIES

2.5.1 Alcoholism questionnaires

The first screening instruments used in the detection of alcoholism derived from the work of Jellinek (1946) who conducted a survey of members of Alcoholics Anonymous and identified a series of questions which most characterized the experience of alcohol problems in those subjects. He suggested the need for an expanded and improved assessment instrument.

The concept of screening for alcoholism was popularized in the 1960s and since then many different instruments have been introduced. The most widely used, the Michigan Alcoholism Screening Test ("MAST") is now available in several versions, of varying length and existing in both interviewer-administered and self-administered formats. The questions in the original 25-item version (Selzer, 1971) were selected on the basis that they discriminated most satisfactorily between subjects who had received a clinical diagnosis of alcoholism and hospitalized non-alcoholic psychiatric in-patients. The MAST correctly identified 98% of the alcoholic group and only 5% of the control group were so classified.

Many of the items in the MAST refer to complications of advanced psychosocial disturbance or dependence, or concern the subject's own perception of his alcohol problem. Two of the questions are:

(i) Have you ever attended a meeting of Alcoholics Anonymous (A.A.)?

(ii) Have you ever had delirium tremens (D.T.s)?

Such questions will not identify persons at an early stage of harmful alcohol consumption. The limited usefulness of the MAST as an early detection instrument was indeed suggested by the findings of Selzer's original work: a positive diagnosis was given to only 55% of persons convicted of drunken and disorderly behaviour and only 11% of motor vehicle drivers whose licences were under review because of an alcohol-related offence. In a community study Saunders & Kershaw (1980) found that the MAST correctly identified only 50% of problem drinkers. Although the MAST may be a satisfactory instrument to screen for "alcoholism" as was clinically defined by Selzer, it is not an appropriate instrument for detecting the larger group of persons with harmful alcohol consumption who are not in the "alcoholic" category.

Other questionnaires designed to detect alcoholism include the "CAGE" (Ewing, 1984) and the MacAndrew Scale. They are discussed in reviews by Murray (1977) and Jacobson (1983).

2.5.2 Screening for excessive alcohol consumption

2.5.2.1 Quantity-frequency questionnaires have been employed in many research studies to elicit quantitative information about alcohol intake. Typically they contain questions on:

(i) the usual frequency of drinking in a certain period of time (a week or a month);

(ii) the type of alcoholic drink taken;

(iii) the usual quantity of each drink consumed per day.

From this information are calculated such measures as the average daily alcohol intake, the usual minimum and maximum intakes, the usual frequency of drinking and the cumulative consumption during the reference period.

As a screening tool this approach has been little employed. Barrison et al. (1982) combined quantity-frequency questions with the four "CAGE" questions (Ewing, 1978) in a survey of patients admitted to a general hospital. They reported that patients found the questionnaire easy to complete, it could be read by optical recognition techniques and they concluded that it was an appropriate instrument to employ in large scale screening programmes. Further validation would be valuable.

2.5.2.2 Alcohol assays. Blood, urine and breath alcohol analyses are used as diagnostic tests in clinical practice to confirm recent heavy alcohol consumption in patients with clouding of consciousness, and for medico-legal purposes in countries where it is a statutory offence to drive a motor vehicle with a blood alcohol concentration over a certain limit. The alcohol concentration reflects the amount of alcohol recently ingested and the time that has elapsed since the last drink. Estimates of the quantity and timing of alcohol consumed can be only approximate. It provides no information about the chronicity of drinking or of any associated problems, although if the level of consciousness of the subject is taken into account, the presence of tolerance (and likely dependence) can be judged. For example, a blood alcohol concentration exceeding 40 mmol/l (approximately 200mg per 100ml) in a person who appears non-intoxicated indicates a degree of tolerance compatible with chronic excessive alcohol consumption. It is commonly used in the United States of America as a criterion to determine whether a drunk driver should be regarded as an alcoholic.

As a screening test, as opposed to a diagnostic one, the blood alcohol concentration is of limited value. Hamlyn et al. (1975) found 26% of patients with alcohol-related liver disease had alcohol detectable in blood. However, less dependent patients attending a screening programme are likely to voluntarily abstain from alcohol for some hours before a blood test is taken. The blood alcohol concentration is likely to be zero. In an industrial survey only 17% of subjects who admitted to a daily alcohol consumption exceeding 80g had alcohol detected on urine analysis (Saunders, 1982). Blood or urine alcohol assays are potentially of much greater value in screening persons involved in accidents where the likelihood of alcohol being detected is at its greatest. Breath analysis is a convenient screening procedure: the accuracy of modern methods is such that they have replaced blood or urine analyses for medico-legal purposes in some countries. An alternative method of screening, which is especially useful where a breath sample cannot be taken satisfactorily, is the use of the "alcohol dipstick". A spot of serum (or other body fluid) is placed on a dipstick containing reagents that change colour when exposed to alcohol. This provides a useful semi-quantitative method of estimating the blood alcohol concentration (Kapur & Israel, 1984).

2.5.3 Biochemical and haematological markers of alcohol consumption

Biochemical liver function tests have been used in the detection of alcohol-related liver disease for some 20 years but it is only since the early 1970s that they and certain haematological tests have been found to correlate with excessive alcohol consumption in the absence of end organ damage. The value of these markers has been the subject of intensive study in recent years.

The relationship with chronic alcohol consumption was first identified in clinical populations of alcoholics. Elevation of the serum gamma glutamyltransferase (gamma GT) activity in heavy drinking individuals was described in the early 1970s (Rosalki & Rau, 1972). Gamma GT is a hepatic enzyme that is inducible by chronic alcohol consumption; a value up to 200 iu/l is explicable on this basis alone, though higher levels usually indicate damage. The sensitivity of gamma GT for hazardous alcohol consumption varies considerably according to the setting, from 80% in gastroenterological units to 30-50% in a psychiatric hospital (Bernadt, Mumford, Taylor, Smith & Murray, 1982) and in the general community (Chick, Kreitman & Plant, 1981).

Serum transaminases have also been employed as markers of excessive alcohol consumption. Unlike gamma GT an abnormal result usually indicates hepatic damage. The sensitivity also varies from 60% in gastroenterology units to 30% or less in psychiatric hospitals and the general community.

An increase in erythrocyte mean cell volume (MCV) in alcoholics was described by Wu, Chanarin & Levi (1974). It is caused by a toxic effect of alcohol on erythrocyte precursors in the bone marrow; folate deficiency may be responsible in a minority. The range of its sensitivity for heavy alcohol consumption is even more extreme than some of the other laboratory tests, from 80% (Wu et al., 1974) to 2% in a psychiatric hospital (Bernadt et al., 1982). More recently described markers of excessive alcohol consumption include HDL-cholesterol and uric acid.

Within 3-4 years of the abnormalities being described in alcoholics, correlations between self-reported alcohol intake and biochemical and haematological results were evident among persons attending mass screening programmes. Among the first was a study of British men participating in a private health screening programme (Whitehead, Clarke & Whitfield, 1978). Five of the tests employed, serum gamma GT, serum aspartate aminotransferase (AST), serum uric acid, serum triglyceride levels and MCV showed a progressive rise with increasing levels of alcohol consumption. Among persons attending a health screening programme in Australia, Whitfield, Hensley, Bryden & Gallagher, (1978) showed that the prevalence of abnormalities of serum gamma GT and MCV increased in a stepwise fashion as daily alcohol intake increased. Papoz et al. (1981) confirmed that serum gamma GT and MCV were significantly and independently correlated with daily alcohol intake and that the combination of the two markers was more discriminatory than either alone. Three quarters of the group of persons drinking at least 80g of alcohol per day were correctly assigned on the basis of these two tests.

Several investigators have used combinations of biochemical and haematological tests to distinguish heavy drinkers or "alcoholics" from lighter drinkers. Using discriminant analysis, up to 90% of persons can be correctly allocated (Ryback, Eckhardt & Faulter, 1980; Bernadt et al., 1984; Shaper et al., 1985). However, as was clearly demonstrated by Clark, Holder, Mullet & Whitehead (1983) the predictive value of the positive test battery falls when it is used to try to distinguish heavy drinkers from a random population sample as opposed to assigning "alcoholics" and lighter drinkers into their correct groups.

2.5.4 Instruments to measure alcohol dependence

Following the description of the alcohol dependence syndrome investigators developed questionnaires to assess its severity. The first such instrument was the "Severity of Alcohol Dependence Questionnaire" ("SADQ") described by Stockwell, Hodgson, Edwards, Taylor & Rankin (1979). This has subsequently been revised to a shortened 20-item questionnaire (Stockwell, Murphy & Hodgson, 1983). Other questionnaires include the Alcohol Dependence Scale ("ADS") described by Skinner & Allen (1982), and the Edinburgh Alcohol Dependence Schedule ("EADS") described by Chick (1980). All these questionnaires grade the severity of alcohol dependence on a continuous scale, taking into account the dimensional nature of the dependence syndrome. No attempt is made at classifying patients into "dependent" or "not dependent", but rather into one of a number of grades of dependence. As such they are not fundamentally screening instruments but assessment ones.

2.5.5 Psychosocial consequences of drinking

Questions on the psychological and social consequences of drinking comprise the majority of items in the "MAST" and similar alcoholism questionnaires. In the 10-item Brief MAST, four refer to social consequences of drinking. Of the 19 questions on alcoholism in the "Schedule for Affective Disorder and Schizophrenia", nine concern social complications such as violence, separation or divorce, dismissal from a job, neglecting responsibilities or being charged by the police for alcohol-related offences.

2.5.6 Medical history

2.5.6.1 Physical complaints have been rather ignored as possible indicators of excessive drinking. They are common in heavy drinkers and not confined to those who have developed the well recognized physical complications such as cirrhosis, pancreatitis or neuropathy. Among the most frequent symptoms are non-specific gastrointestinal complaints such as nausea, retching and vomiting, dyspepsia, heartburn, weight loss and diarrhoea. Some (e.g. nausea and retching) indicate hangover symptoms and the autonomic hyperactivity associated with this; others indicate intrinsic gastrointestinal dysfunction or disease.

Subjective symptoms and medical history were included among the alcoholism indicators of Wilkins (1974). In a later assessment (Skinner, Holt, Sheu & Israel, in press) medical history items were less accurate in distinguishing problem drinkers from social drinkers than clinical examination.

2.5.6.2 An innovative approach to detection is the "trauma scale" devised by Skinner et al. (1984). The development of this scale was stimulated by the finding that a high proportion of heavy drinkers have rib fractures visible on chest radiographs (Israel et al., 1980; Lindsell, Wilson & Maxwell, 1982). The "trauma scale" comprises five questions concerning:

(i) experience of fractures or dislocations;

(ii) injuries in road traffic accidents

(iii) head injuries

(iv) assaults or fights

(v) injuries after drinking

Two or more positive answers are said to indicate the likelihood of a drinking problem. Using this criterion, 70% of patients that had drinking problems were identified correctly.

2.5.7 Clinical examination

Screening for alcoholism on the basis of the physical examination was pioneered by the French physician, Le Gô. On the basis of his experience in screening over 1 million French railway workers, he developed an instrument, the "Le Gô Grid" on which is recorded an assessment of physical signs and some subjective complaints (Le Gô, 1976). The physical signs include tremor of the hands, lips and tongue and the physical appearance of the skin, tongue and conjectivae (the "cardinal signs"), together with the presence of hepatomegaly, the consistency of the liver, blood pressure and weight and certain subjective symptoms (the "secondary signs"). A score is computed and one of three or more is considered a "warning sign" of alcoholism.

Although this procedure has been used extensively in France and other European countries, it has had little impact on the English-speaking world where the association between signs such as facial telangectasia and heavy alcohol consumption is hardly recognized. The merits of the Le Gô approach were investigated by Babor and colleagues (1983), who found a good correlation in an inter-rater reliability test between the findings of expert and non expert physicians. There was, however, less correlation between the Le Gô score and the severity of alcohol dependence.

Soft tissue trauma is also seen frequently in persons with drinking problems (Woeber, 1975). Among the signs most suggestive of heavy alcohol consumption and episodes of intoxication are bruises, especially if they are of different ages (indicating recurrent trauma), and scars, particularly facial ones.

2.5.8 Composite instruments

Bearing in mind the many and varied effects of alcohol there are grounds for thinking that an instrument based on a number of screening devices would be advantageous. Firstly, a composite instrument would avoid the assumption that one particular scale was highly correlated with all components of alcohol-related harm. Secondly, introduction of physical complaints into a questionnaire may enhance its acceptability to respondents and if such symptoms were highly correlated with alcohol consumption the screening instrument might be in a totally disguised form. The third advantage of a composite instrument is that the clinician would be aware of possible problems in a number of different domains. This might speed the assessment and diagnostic process.

Among such instruments that have been introduced are the Munich Alcoholism Test ("MALT") (Feuerlein, Ringer, Kufner & Antons, 1979). Composite scales have great discriminatory power in distinguishing alcoholics from non-drinkers or non-problem drinkers (Feuerlein et al., 1979) especially if employed in a logistic regression procedure (Skinner et al., 1984). Their usefulness in detecting persons with lesser degrees of problem drinking (the focus of the present study) has not been established.

2.6 THE BENEFITS OF EARLY DETECTION AND INTERVENTION

Strong support for the worth of screening and early diagnosis comes from the Malmö Preventive Medicine Programme (Kristenson & Hood, 1984). This programme involves mass screening of young and middle aged men. It was established in the early 1970s to screen for cardiovascular risk factors in an effort to reduce the morbidity and mortality from coronary heart disease. An offshoot of this programme was the screening of participants for harmful alcohol consumption. This was done on the basis of results for serum gamma GT. Subjects with values in the top decile on two successive occasions completed a questionnaire on drinking habits. Those who fulfilled the criteria for alcohol problems (excluding alcoholics or persons with severe problems) were randomised into a "treatment" or "control" group. The treatment group were advised to reduce their alcohol consumption, received counselling in methods to achieve this and were given feedback of their laboratory results periodically. The control group were told that their raised serum gamma GT was probably related to their drinking and they were advised to reduce this; they were given no further therapy. In the succeeding five years the rate of hospitalizations among those who received counselling was only 39% of that of the control group and their mortality rate was halved.

Similar encouraging results have come from a study of patients admitted to medical wards in a general hospital in Edinburgh (Chick, Lloyd & Crombie, 1985). In the group who received intervention, the alcohol problem score was significantly lower at one year compared with the control group. The intervention group showed a significant reduction in serum gamma GT from the time of admission which was not observed in the control group. It does seem therefore that the most important criterion for recommending a screening and early intervention approach for alcohol-related disabilities, namely that treatment confers benefit for those selected by the screening process, has been fulfilled.

2.7 CONCLUDING REMARKS

A huge variety of screening and assessment instruments for alcoholism, excessive drinking and various types of alcohol-related harm is currently available. However, many of them are now out-dated because their derivation was constrained by the concepts of alcoholism as a disease that prevailed at the time they were developed. Furthermore, few instruments have been tested in different countries and many require complex and costly laboratory technology which is not readily available in the developing world.

3. BACKGROUND TO THE STUDY

3.1 WHO AND ALCOHOL RESEARCH

WHO's involvement in the field of alcohol-related problems dates back to the earliest days of the Organization. It achieved prominence in the 1950s when the "WHO definition" of alcoholism was formulated by E.M. Jellinek. Jellinek, who served as a consultant at that time, also made notable contributions to the description of various subtypes of alcoholism and methods to estimate its prevalence. In more recent years, with the swing away from the disease concept of alcoholism to an emphasis on the multidimensional nature of alcohol problems, WHO has taken a strong public health perspective and has channelled its attention towards prevention and control measures. In Resolution WHA32.40, the Thirty-second World Health Assembly recognized "that problems related to alcohol and particularly to its excessive consumption, rank among the world's major public health problems." More direct involvement with intervention approaches came with the study "Community Response to Alcohol-Related Problems" which took place between 1976 and 1983, (Rootman & Moser, 1983; Rootman, 1983). This study involved collecting normative data on alcohol intake, drinking behaviour and attempted to enhance the effectiveness of community approaches to alcohol problems.

From this study arose a concern to develop improved methods for detecting persons whose alcohol consumption was causing harm and for developing cost-effective methods of treatment that were suitable for use in primary care facilities. A considerable body of evidence had suggested, by this time, that there were limitations to research which focused exclusively on methods of treating persons with advanced dependence or severe harm. Similarly, specialized treatment facilities for the severely damaged drinker, which were being created in a number of developing countries, did not represent the most effective use of its resources since they absorbed a high proportion of the funds available for helping persons with alcohol-related problems. These facilities were often of limited accessibility to the majority of the population and there seemed little possibility of establishing a network of such units within the available budget of developing countries.

A likely explanation for the continued development of specialized facilities was the dearth of knowledge about the management of alcohol-related problems at an early stage. WHO recognized an urgent need for the exploration of methods of detecting persons with harmful alcohol consumption before health and social consequences become serious and irreversible, and disability established, and to develop intervention strategies that can be applied in primary contact settings. The WHO Expert Committee reporting in 1980 emphasized that "further investment in treatment should be concentrated on developing inexpensive and cost-effective services".

3.2 INCEPTION OF THE PROJECT

The present project arose in the first instance from discussions between WHO staff and investigators based in research institutes in Oslo, Norway. These discussions brought together interests in developing a method of assessing the prevalence of alcohol-related problems in clinical populations, and a concern for the development of a simple instrument to screen for early alcohol problems that was suitable for use by health care workers in both the developing and the developed world. It was closely linked with a proposed investigation into methods of early intervention for harmful alcohol consumption. The two studies were brought together by WHO under the overall project title of "Identification and Treatment of Persons with Harmful Alcohol Consumption".

To summarize the reasons why existing screening instruments were considered to be flawed and why new ones were necessary:

(1) The questionnaire items of most instruments were derived from questions that discriminated best between established "alcoholics" and "normal" drinkers or non-drinkers. The sensitivity of such instruments in detecting persons with drinking problems at an earlier or lesser stage was either unsatisfactory or unknown.

(2) There was an assumption, not empirically based, that there was a gradation of symptoms and problems from subjects with early stage problems to those with advanced alcoholism. The possibility that certain symptoms or clinical features might be confined to early stage problem drinkers or that they might be masked by other features in the alcoholic group was overlooked.

(3) Many instruments were strongly influenced by cultural perceptions of alcohol-related harm - the unitary disease concept common in North America, the focus on physical sequelae in many European countries and the concern with periodic bout drinking in the Nordic countries. Apart from the "MAST" and "CAGE", few instruments had been employed outside their countries of origin and when they had, were usually extensively modified. A truly cross-national instrument that had application in different countries and cultures was not available.

(4) Procedures such as the "Le Gô Grid" which relied on physical examination might limit the utilization of the procedure to medical practitioners.

(5) Biochemical and haematological tests require complex technology which is expensive and often unavailable in the developing world. Many composite schedules and procedures requiring a battery of laboratory results would require a computer based technology to derive the probabilities of an individual having a harmful alcohol intake.

(6) Some instruments require specific training in psychology or psychiatry and could not be used by many primary health care workers.

It was therefore agreed that a multi-centre study, coordinated by WHO, should attempt to develop and test a simple instrument to screen for persons with early signs of alcohol-related problems, and that this instrument should be suitable for use by health workers in both developing and developed countries.

4. THE STUDY POPULATION

4.1 PARTICIPATING CENTRES

The six centres were located in Australia, Bulgaria, Kenya, Mexico, Norway and the USA. These countries were chosen to represent the developed and developing world and, with obvious limitations, different continents, cultures and political and economic systems. Each centre was responsible for recruiting subjects from suitable health care facilities, which were not necessarily part of the institution in which the centre was sited. The participating centres are shown in Table 1.

TABLE 1
PARTICIPATING (COORDINATING) CENTRES

Country	Coordinating Centre	Institution	City
Australia	Drug & Alcohol Services & Dept. of Community Medicine	Royal Prince Alfred Hospital	Sydney
Bulgaria	Dept. of Alcoholism	Institute of Neurology and Psychiatry	Sofia
Kenya	Dept. of Psychiatry University of Nairobi	Kenyatta National Hospital	Nairobi
Mexico	Instituto Mexicano de Psiquiatria		Mexico City
Norway	National Directorate for the Prevention of Alcohol & Drug Problems		Oslo
USA	Alcohol Research Center, Dept. of Psychiatry	University of Connecticut Health Center	Farmington

4.2 DESCRIPTION OF HEALTH CARE FACILITIES WHERE RECRUITMENT TOOK PLACE

4.2.1 Type of facility selected

Since the emphasis of this project was on screening for harmful alcohol consumption in primary care and clinic settings, and not in in-patient facilities or specialist referral centres, the investigators were asked to select suitable health care facilities where recruitment of the main sample would be undertaken. Investigators were allowed discretion to recruit subjects from a number of different primary health care facilities as they considered appropriate. The facilities where recruitment of the main sample took place are listed in Table 2. In addition, some centres undertook to recruit additional sub-samples of alcoholics and abstaining persons from other sources (see Section 5).

TABLE 2
HEALTH CARE FACILITIES WHERE RECRUITMENT TOOK PLACE

Country	Health Care Facility	Institution	City
Australia	Emergency Department	Royal Prince Alfred Hospital	Sydney
Bulgaria	Outpatient clinics	Medical Academy	Sofia
Kenya	Outpatient clinics	Kenyatta National Hospital	Nairobi
Mexico	Emergency departments and general hospitals		Mexico City
Norway	General practice and general hospitals	Throughout Norway	
USA	Inpatient & Outpatient services	John Dempsey Hospital	Farmington, Ct.

4.2.2 Description of health care facilities selected: Australia

Royal Prince Alfred Hospital is a 1200-bed teaching hospital of the University of Sydney situated in an inner city suburb. It is a tertiary referral centre for the state of New South Wales. The main sample was recruited in the Emergency Department which serves an average of 130 patients per day from the local area. Many referrals from other hospitals are also routed through the Emergency Department but not in the section in which the study was based which caters for ambulant persons. In view of this, it was considered to conform to a primary health care facility. Some demographic characteristics of the catchment population of the local area served by the hospital are given in Table 3. A particular feature of the population is the high proportion of migrants: 37% are foreign-born and a total of 27% are of non-English-speaking backgrounds. Approximately 5% are aboriginal.

4.2.3 Bulgaria

Patients were recruited from outpatient clinics of the Medical Academy of Sofia. The Academy consists of several separate institutions of which the Institute of Neurology and Psychiatry in Suhodol (which includes the Department of Alcoholism) is one. The institutes of the Medical Academy provide health care for residents of Sofia and specialist medical services for people from throughout Bulgaria as well as city residents. Details of the catchment population are given in Table 3.

4.2.4 Kenya

The Kenyatta National Hospital is the principal teaching hospital of the University of Nairobi and is situated 3 kilometres from Nairobi City centre. It is the only teaching hospital in the country, and it incorporates the Faculty of Medicine of the University of Nairobi. Kenyatta National Hospital also functions as the national referral hospital as well as the catchment hospital for Nairobi City which now has an estimated population of one million people. In addition to in-patient services, the hospital operates a very busy emergency department, filter clinics and specialized out-patient clinics.

Most of the patients who participated in the study were recruited from the Adult Filter Clinic (80%), the Emergency Department (10%) and the Acute Observation Wards (10%). The filter clinic handles an average 800 patients per day and is a facility where patients walk in without prior appointment or referral. Because of the large number of patients with minor psycho-neurotic disorders who attend the filter clinic, a daily psychiatric filter clinic manned by psychiatric residents also operates in the area, receiving referrals from the Medical Officers. The filter clinic at Kenyatta National Hospital is therefore a Primary Heath Care service for the majority of Kenyans living in and around Nairobi. The majority of known alcoholics (60%) were recruited from the Psychiatric Hospital 9 kilometers away. Abstainers were all healthy volunteers from among the hospital staff or relatives accompanying patients to hospital or those presenting for routine medical examination who did not drink alcohol. Nearly 5% of the population are of Asian extraction and just over 2% are European. Further details of the catchment population of the hospital are given in Table 3.

4.2.5 Mexico

The Instituto Mexicano de Psiquiatria, a WHO Collaborative Centre, was the central coordinating unit for the Mexican study which was based on a primary health care centre, a general hospital and a specialized tertiary referral centre. Alcoholics were recruited from an alcoholism out-patient treatment centre operated by the institute. These facilities serve some of the inner areas of the metropolis of Mexico City. Details of the catchment population are given in Table 3.

4.2.6 Norway

In Norway the main sphere of activity was general practice (Aasland, Bruusgaard & Rutle, in press). Subjects for the main sample were recruited from ten general practices and six general hospitals throughout Norway. Most of the general practices and all the hospitals were in the larger towns and cities. There are no significant ethnic minority groups represented. Further details of the catchment population are given in Table 3.

4.2.7 USA

Subjects were recruited from several outpatient and inpatient treatment services within the John Dempsey Hospital, University of Connecticut Health Center. The outpatient services involved were the medical, surgical, psychiatric, dental, gynaecologic and neurologic clinics and the inpatient ones were medical, surgical and neurologic. The Health Center draws patients from throughout the State of Connecticut but in greater proportion from Hartford County. Blacks comprise 8%, Hispanic persons 5% of the population of Hartford County. Further details of the catchment population are given in Table 3.

TABLE 3
GENERAL DESCRIPTION OF CATCHMENT POPULATION

	Australia	Bulgaria	Kenya	Mexico	Norway*	USA	
Size of catchment area in km^2	53	1,194	684	312	386,975	1,915	
Total population in area	223,392	1,167,295	827,775	206,911	4,100,000	895,166	
Population density/km^2	4,215	977	1,210	662	13	421	
Age structure:							
% age 0-14	16.9	20.5	34.0	40.2	23.0	20.6	
% age 15-40	44.3	39.8	41.0	43.2	37.0	46.0	(15-44)
% age 41-60	22.8	26.7	11.0	12.4	20.0	21.9	(45-64)
% age 61 & over	15.8	13.0	2.0	3.9	20.0	11.6	(65+)

* whole country

4.3 SELECTION OF SUBJECTS

4.3.1 Inclusion criteria

The main sample was drawn from patients attending the nominated health care facilities who fulfilled the following criteria:

(i) aged between 18 and 55 years;

(ii) member of the majority ethnic group of the area;

(iii) physically well enough to participate in the study; and

(iv) able to understand and communicate in the agreed language.

Subjects were allocated into one of three groups according to their drinking habits, as follows:

(1) Alcoholics

These were defined as individuals who presented specifically for treatment of an alcohol problem and who had been drinking heavily for at least three years, or persons who were currently having treatment for a drinking problem.

(2) Non-drinkers

These were defined as subjects who were either total abstainers, or who drank alcohol on no more than three occasions per year, and who had never been treated for an alcohol problem. This was an optional group as it was appreciated that it might not be possible for all centres to recruit such individuals.

(3) Drinking patients

The remaining subjects were classified in this category. They included persons with a range of drinking habits from four drinks per year to the highest levels of intake but excluding those who were currently having treatment for an alcohol problem, or seeking such treatment.

4.3.2 Sampling frame

A quota sampling procedure was recommended to ensure adequate numbers of subjects in each sub-group. (Each centre was asked to recruit the following minimum number of subjects (Table 4)).

TABLE 4
RECOMMENDED MINIMUM SAMPLE

Age	Abstainers		Drinking Patients		Alcoholics	
	M	F	M	F	M	F
18-30	(Optional)		30	30	10	10
31-40	(Optional)		30	30	10	10
41-55	(Optional)		30	30	10	10
			90	90	30	30

Thus a minimum of 240 subjects was required. The maximum sample size recommended was 100 of each age-sex group for the patient group and 75 of each age-sex group for the alcoholics.

It was acknowledged that certain centres might have difficulty in recruiting the requisite number of alcoholics from the main sample and also the (optional) group of non-drinkers. To ensure that numbers were adequate, recruitment was permitted from other sources. Alcoholics were ascertained from alcohol treatment or detoxification units in Australia, Bulgaria, Kenya, Norway and the USA and abstainers were recruited from the membership of temperance organizations in Norway. These two groups were essentially control groups for the "drinking patient" sample from which the screening instrument was to be derived.

The decision about exact numbers of subjects to be recruited was the prerogative of the chief investigator of each centre. All investigators were asked to sample systematically across various times of the week and seasons of the year particularly where a fluctuation in alcohol-related attendances according to the time of day or season might be anticipated.

5. METHODS

5.1 DEVELOPMENT OF THE ASSESSMENT INSTRUMENT

A comprehensive assessment instrument was devised to enable demographic information, medical history and current symptomatology, alcohol and drug intake, drinking behaviour and experience of alcohol dependence and alcohol-related problems to be elicited and recorded in a systematic way. Details of findings on clinical examination and results of laboratory tests were also entered on to the proforma. The assessment instrument forms Appendix 1 to this report.

A preliminary instrument was devised by the Norwegian investigators (O. Aasland, A. Amundsen and J. Morland) and discussed at meetings with the other investigators and advisers in 1982-83. After modifications, a provisional instrument was prepared for the pilot study which took place in late 1983. Participating centres were asked to recruit 20 subjects in this phase and the instrument was modified, based on the experience gained in these interviews. Following this, investigators reconvened to ensure that the assessment was being carried out in a standardized way, as far as is possible in a cross-national study. In the main recruitment stage, the interview was conducted in English in Australia, Kenya and the USA, in Bulgarian in Bulgaria, in Spanish in Mexico and in Norwegian in Norway. The instrument was translated in the national language and then independently translated back into English to ensure accuracy of translation.

5.2 COMPONENTS OF THE ASSESSMENT INSTRUMENT

5.2.1 Section A: General information

The first section of the assessment instrument consisted of questions to elicit basic demographic information such as age, sex, marital status, living situation, occupation and socio-economic status. Occupation was coded according to a standardized, international occupational prestige scale, developed and validated by Treiman (1977). This scale provides prestige ratings of over 100 occupations and has cross-national compatibility in industrialized countries and the developing world. The type of health care facility the subject was attending was recorded, together with details of any accompanying persons. The primary, secondary and tertiary admission diagnoses were recorded, and coded according to the International Classification of Diseases, 9th Revision.

5.2.2 Section B: Medical symptoms

Since the screening instrument was designed for use in primary health care settings, a number of medical symptoms often associated with excessive alcohol consumption were included. Thus a cluster of possible withdrawal symptoms (nausea, vomiting, gas/flatulence, headache, tremor etc.) were incorporated together with other gastrointestinal and neurological symptoms. Questions on affective symptoms that may be associated with drinking (anxiety, depression, sleep disturbance) were also included. All these items were recorded on a frequency scale (never, less than monthly, monthly, weekly, daily or almost daily) with reference to the previous year. The medical history consisted of just three questions on liver disease, gastrointestinal haemorrhage and blood transfusions. A third area of interest was the history of trauma. Previous studies have shown high correlations between traumas like head injuries and broken bones, and the level of consumption (Skinner et al., 1984). The occurrence of three different traumas since the 18th birthday was ascertained, namely, head injury, road accidents and broken bones.

5.2.3 Section C: Level of consumption

In this section, questions were asked firstly on cigarette smoking, use of prescription drugs and about gain or loss of weight. Thereafter a detailed history of the level of alcohol consumption was taken. The approach used was different to that of previous interview schedules and also departed from the method of deriving the other alcohol-specific questions which were, mostly, modified from existing and validated interview schedules or questionnaires. It is well known from both surveys as well as clinical studies (Midanik, 1982) that self-reported alcohol consumption tends to be 40-50% lower than actual intake.

However, this difference seems to be relatively systematic and is probably based more on inadequacy of the questions and inability of subjects to remember exact quantities of alcohol consumed, than on deliberate underreporting, especially in non-alcoholic samples. For the assessment instrument, a choice had to be made between relatively simple, but in all likelihood, very approximate questions, and a detailed but more complicated and time-consuming way of eliciting an alcohol history. Since the level of consumption and frequency of intoxication were to be used as reference variables in many of the analyses, an effort was made to make these data as valid as possible within the available time. A two-pronged approach was used. First, three simple questions were asked about frequency of drinking (i) any alcohol, (ii) six drinks (60g alcohol) or more on one occasion and (iii) 12 drinks or more on one occasion. Then the subject was asked to define what for him, or her, was "low level", "medium level" and "high level" drinking, by the amount of alcohol consumed and the type of drinks taken. Then the frequency of drinking at each of these three levels during the last month was noted. If the last month was not "typical" the corresponding frequencies for a typical month were also recorded. The alcohol content of different beverages was recorded by percentage, making it possible to calculate the exact amount of alcohol (firstly in centilitres and then in grams of absolute alcohol by multiplying by its specific gravity, 0.793) that was consumed during the last month and during a typical month.

Although the schedule might appear rather formidable, the pilot interviews proved that it was possible, and all centres found the method relatively easy to apply.

5.2.4 Section D: Clinical examination

It was decided to include a number of clinical signs taken from the "Le Gô grid" as well as some others. Among the "cardinal signs" of this grid that were assessed were conjunctival injection, skin vascularisation, coating of the tongue and tremor of the hands, tongue and lips. The tongue was inspected, the liver palpated, and a record was made of any scars or bruises.

These items were recorded on a scale of severity from 0 (not present) to 3 (severe) according to predetermined criteria. Colour photographs of the conjunctival, skin and tongue signs were circulated to investigators at the outset of the study. Blood pressure was measured with the subject in the recumbent position with Korotkoff phase V being taken as the diastolic blood pressure. Height and weight were also measured.

5.2.5 Section E: Drinking habits

The questions in this section, with one exception, refer to symptoms of the alcohol dependence syndrome. As described by Edwards and Gross (1976) it consists of seven elements:

(i) narrowing of the drinking repertoire, that is a tendency for the drinking pattern to become stereotyped;

(ii) salience of drinking, such that drinking alcohol is given a greater priority than other activities;

(iii) subjective awareness of a compulsion to drink, including such phenomena as craving for alcohol and impaired control of alcohol intake once drinking has commenced;

(iv) increased tolerance to alcohol, reflected in the need to drink more alcohol than previously to achieve the desired effect;

(v) repeated withdrawal symptoms, including affective disturbance, tremor, nausea and sweating;

(vi) relief or avoidance of withdrawal by further drinking; and

(vii) rapid reinstatement of dependent drinking and of symptoms after a period of abstinence.

As the purpose of the study was to find which drinking habits could signify potentially harmful ways of drinking, items were selected from existing questionnaires (e.g. "SADQ", "EADS") that were considered to be good "early" indicators.

Thirteen of the 14 questions relate to six of the seven elements of the dependence syndrome (there was no question on reinstatement). The remaining question was on experience of alcohol-related amnesic episodes ("blackouts"). This is regarded as a classic "early warning" symptom. Blackouts occur commonly in dependent drinkers but also during episodes of heavy alcohol consumption in non-dependent drinkers, and are not a central feature of the dependence syndrome as described by Edwards and Gross. In contrast to the procedure adopted for most questionnaires of this kind, items were scored on a frequency scale: never (during last year); less than monthly; monthly; weekly; and daily or almost daily. All pertained to the last 12 months only. This made it possible to establish how often so-called "social" drinkers experience symptoms that are regular experiences for alcohol dependent persons.

5.2.6 Section F: Social consequences

In the next section subjects were asked about their experience of positive and negative emotional states after drinking and, following this, about social consequences of drinking and advice received to reduce or stop drinking.

There were two questions on positive feelings (happy, more friendly) and three on negative ones (depressed, angry, remorse) that had been experienced in the previous year. They were scored on a frequency basis. Among the social complications enquired of were injuries to self or others, legal problems and unemployment. Three questions referred to concern expressed or advice received about drinking from family, friends, persons at work, doctors or other health workers. Subjects were first asked about their lifetime experience of such complications, then specifically about the previous year. Subsidiary questions were asked to define the type of complication that had occurred.

5.2.7 Self-perception of alcohol problem

Following the comprehensive assessment of social consequences, subjects were asked about their perception of the consequences of their drinking. They were asked whether they considered they had an alcohol problem presently, whether they had experienced problems from alcohol in the past or whether they might develop problems in the future if their present level of consumption continued.

5.2.8 Annex to main schedule: identifying data

On a separate sheet, which was detached from the assessment instrument on completion of the interview, was recorded identifying data, provided consent was obtained from the subject to do this. The name, address, date of interview and whether the subject was willing to be re-interviewed was recorded, together with the name and address of a contact person. The annex was stored separately from the main schedule and no identifying information was entered on to computer data bases.

5.3 CIRCUMSTANCES PERMITTING OMISSION OF CERTAIN ITEMS

If persons reported no consumption of alcohol in the previous year, the detailed history of alcohol intake and the questions on dependence and positive and negative reactions to alcohol were omitted. However, enquiry was made of possible social consequences of drinking, as these referred to their lifetime experience.

5.4 LABORATORY TESTS

5.4.1 Selection of tests

At the end of the interview, a blood sample was taken (provided consent was forthcoming) for biochemical and haematological analyses. The biochemical tests were as follows - serum gamma glutamyltransferase (serum GGT), serum aspartate aminotransferase activity (ASAT), serum alanine aminotransferase activity (ALAT), serum HDL-cholesterol concentration and a blood alcohol concentration. A blood count was performed specifically to determine the erythrocyte mean cell volume (MCV).

5.4.2 Quality control and standardization of results

In order to minimize the variation due to differences in methods of biochemical analysis among the different centres, the following procedure was employed. Four sets of test sera, two "Seronorm" and two "Autonorm" (Nyegaard & Co. A/S, Oslo, Norway) were circulated (freeze dried) to the laboratories at the different centres. The test sera contained known activities of ASAT, ALAT and GGT and a known concentration of HDL-cholesterol. The real values, which were both within and above the reference range, were not known to the laboratories in the centres. The test samples were run several times on several days in each laboratory. Based on the results, the inter-assay, inter-sample and day-to-day variation for each laboratory could be checked. These variations were acceptable in all laboratories except in some cases with regard to HDL-cholesterol. Therefore, this measure was not included in the derivation of the screening instrument.

The results of this check on inter-centre variation of laboratory data were used in standardization of the results to the units used by Ulleval Hospital, Oslo, Norway. Such standardization was performed if the test results from one laboratory deviated systematically more than 15% from the results obtained at Ulleval Hospital. The following factors were employed:

TABLE 5
STANDARDIZATION FACTORS FOR ENZYME TESTS

	Australia	Bulgaria	Kenya	Mexico	USA
GGT	+	1.82	+	1.89	1.37
ASAT	+	2.56	1.25	+	1.61
ALAT	+	3.70	+	+	1.59

+ Original values used.

5.5 DERIVATION OF THE PROVISIONAL SCREENING INSTRUMENT

The starting point for the analysis was to classify items in the assessment instrument into logical groupings. As described earlier in this section, many were derived from existing questionnaires or procedures. Questions where alcohol was not mentioned (e.g. medical symptoms) were grouped separately from alcohol-specific items. The alcohol-specific questions were in turn grouped into conceptual domains such as alcohol dependence, psychological reactions to alcohol and alcohol-related problems. The classification of items used in the final analysis was as follows:

Non-specific domains

(i) Subjective complaints (question 17, sub-questions 42-64)
(ii) History of trauma (question 17, sub-questions 68-70)
(iii) Clinical examination (items 21-34)

Alcohol-specific domains

(iv) Negative alcohol reactions (questions 70, 73, 74)
(v) Positive alcohol reactions (questions 71, 72)
(vi) Alcohol problems ever (questions 75a, 76a, 77a, 78a, 79a)
(vii) Alcohol problems in the last year (questions 75b-d, 76b,d,e, 77b-d, 78b-d, 79b,c)
(viii) People showing concern (question 76c, sub-questions 17-22)
(ix) Alcohol dependence syndrome (questions 56-69).

Laboratory tests (items 86-88, 92, 94) were not aggregated in a scale but were analysed separately. Certain other questions (e.g. "Do you think you have an alcohol problem?") and variables such as blood pressure were also not grouped with others but entered as separate variables in the correlation matrix and principal components analysis to be described later.

All the analyses have been performed only on data gathered from the drinking patients. Analyses were performed separately for each participating centre. This was necessary not only because of the different source populations but also in view of the different sampling procedures employed. Aggregated data were used only for construction of the correlation matrix of all scales and for the principal components analysis.

In the assessment instrument items were scored in one of three ways:

(i) according to the frequency of their occurrence (never, less than monthly, monthly, weekly, daily or almost daily) using a five-point scale from 0 to 4);

(ii) according to the presence and severity of symptoms (not present, mild, moderate, severe) on a scale from 0 to 3);

(iii) positive or negative responses (No = 0, Yes = 1).

Responses in the first two categories thus have an ordinal level of scoring. For an optimal analysis the responses in the first category should probably be converted to true frequency scores, as was done for frequency of alcohol intoxication. As there did not seem to be a significant reduction in the reliability by using a simplified five-point scale this was adopted in all subsequent analyses for the sake of simplicity.

Items were selected for the provisional screening instrument on the basis of their representativeness for each domain across as many centres as possible, on the strength of the association of the domain with alcohol use and, for certain items, on the degree of their individual correlation with alcohol use. The analysis proceeded in a step-wise fashion. Firstly, some variables within a domain were eliminated either when a positive response was so uncommon (less than 2%) that no useful role in screening could be envisaged or where initial analysis had shown a zero or negative correlation with other items and with alcohol consumption. Secondly, for each remaining item within a grouping, the Pearson correlation coefficients for the score for the item with the combined score for remaining items were computed. For the sake of simplicity these are termed "item-to-total" coefficients in this report. Following this, step-wise multiple regression analyses were performed to ascertain which item in each scale had the highest partial correlation coefficient against the total score. The scale reliability (homogeneity) was assessed by computation of Cronbach's alpha. This criterion has a range of values from 0-1 where 1 indicates perfect homogeneity.

The correlation coefficients of the total scores of each scale and each of the three measures of alcohol intake were calculated in turn, to establish the strength of the whole domain as a marker of alcohol use. The correlation coefficients of individual items within a domain with the level of alcohol intake and frequency of intoxication were also calculated to check whether selected items were themselves related to alcohol intake.

Finally, the interrelationships of the various scales and other variables, such as laboratory tests, blood pressure etc. were analyzed by constructing a correlation matrix from the aggregate data and then by principal components analysis with Varimax rotation to achieve the terminal solution. Principal components analysis was performed on the aggregate data from all centres and also on that from the individual centres. Again, only the data from drinking patients were utilized.

5.6 STATISTICAL PROGRAMS AND COMPUTING HARDWARE

Data were entered via a Tandberg 2215 terminal on to a 20 MB hard disc (with 640 k RAM) on a Mycron 2000 microcomputer. The operating system was MP/M 86.

The data were structured in files using the statistical, filing and editing program "FOSS" (file-orientated-statistical system) (Amundsen, 1986). At the time of entry, range checks were performed automatically for every variable. "FOSS" includes all the statistical procedures necessary for the analyses performed in the present study. These included computation of Student's t test, the Chi square test, with Yates' correction as necessary, Pearson product-moment correlation, the biserial correlation, Cronbach's alpha for assessment of intrascale reliability, stepwise multiple regression analysis, construction of correlation matrices and principal components analysis.

6. RELIABILITY AND VALIDITY STUDIES

In sub-samples of subjects the test-retest reliability and validity of the various domains of the assessment instrument were examined.

6.1 TEST-RETEST RELIABILITY

Random sub-samples of subjects from four centres (Australia, Kenya, Norway and the USA) participated in an assessment of the test-retest reliability (repeatability) of the instrument.

6.1.1 Subjects and methods

Sixty-two subjects (19 from Australia, 16 from Kenya, 9 from Norway and 18 from the USA) who were recruited in the first six months of data collection were re-interviewed and examined on a second occasion by an independent observer. All except 10 were drinking patients and they represented 9% of such patients recruited from the four centres. The identical assessment instrument was used and the time interval between interviews was between one and four weeks.

For the four scales subjective complaints, clinical examination, alcohol dependence and social consequences, a small number of representative items were selected and the scores on each item added together to form a scale which had a maximum score of 16. In addition, the reliability of the three frequency questions (how often was any alcoholic drink taken, how often 6 drinks or more, how often 12 drinks or more) was assessed, as well as the derived value of "consumption in a typical month".

Reliability was assessed by calculating the mean difference of the scores from the two assessments, the standard deviation of that figure and the kappa coefficient. The kappa coefficient is a generally accepted method of assessing inter-rater test-retest reliability. Values range from -1 (complete disagreement) to +1 (perfect agreement).

6.1.2 Results and discussion

There was no significant difference between the sub-samples and the remaining subjects in age, sex, occupation or mean daily alcohol consumption.

The parameters of reliability are depicted in Table 6. In general, there is good agreement between the two assessments for the alcohol specific questions. Acceptable kappa coefficients of about 0.4 to 1.0 were found for the six alcohol-specific items/scales in all centres with the exception of the frequency of 6/12 drinks in the Kenyan sample, and social consequences in the Norwegian one. However, the coefficients are derived from a sample of only eight subjects in both centres. The two non-alcohol-specific scales (subjective complaints and findings on clinical examination) had good test-retest reliability in Norway and the USA, but not in Australia and only for one (subjective complaints) in Kenya.

TABLE 6
ASSESSMENT OF TEST-RETEST RELIABILITY

	Australia				Kenya				Norway				USA			
	(n)	d	SD	K	(n)	d	SD	K	(n)	d	SD	K	(n)	d	SD	K
Subj. complaints (4 items)	(19)	0.84	0.74	0.17	(16)	0.56	0.70	0.43	(9)	0.33	0.47	0.53	(18)	0.50	0.69	0.45
Clinical examin. (3 items)	(19)	0.68	0.65	0.18	(16)	1.12	0.93	0.00	(9)	0.33	0.47	0.48	(18)	-	-	-
Dependence (3 items)	(19)	0.16	0.37	0.44	(8)	0.06	0.24	0.59	(8)	0.22	0.42	0.59	(18)	0.00	0.00	1.00
Social conseq. (4 items)	(17)	0.52	0.82	0.39	(8)	0.00	0.00	1.00	(8)	0.56	0.50	0.14	(17)	0.61	0.76	0.43
Frequency of drink. (max 4)	(19)	0.26	0.56	0.69	(8)	0.06	0.24	0.82	(8)	0.33	0.47	0.45	(18)	0.11	0.31	0.84
Frequency of 6+ dr. (max 4)	(19)	0.16	0.49	0.71	(8)	0.31	0.46	0.21	(8)	0.44	0.69	0.45	(18)	0.17	0.50	0.85
Frequency of 12+ dr. (max 4)	(19)	0.16	0.37	0.70	(8)	0.38	0.86	0.27	(8)	0.22	0.63	0.74	(18)	0.39	0.59	0.38
Cons. typical month	(19)	1.03	2.53	0.42	(16)	0.33	0.51	0.56	(9)	1.23	1.65	0.73	(18)	0.45	0.95	0.48

d : mean difference; SD : standard deviation of the mean difference; K : Kappa

The low test-retest reliability of the non-alcohol-specific scales in the Australian sample may reflect changes in symptomatology and clinical features during what was a longer interval between interviews (3-4 weeks) than in the other samples.

6.2 VALIDITY

The validity of the data was explored by comparing the answers to certain questions in the assessment interview of the subject with collateral information on the same items given by relatives or friends.

6.2.1 Subjects and methods

Collateral information was obtained regarding 87 subjects in three centres (21 from Australia, 49 from Mexico and 17 from the USA). The Australian sample was selected by random sampling of a consecutive group of 60 subjects recruited mid-way through data collection. The Mexican sample compared the first 50 subjects who were accompanied by a relative, while the USA sample represented 75% of a random sample of subjects who were asked to participate by nominating a collateral informant.

Permission to collect information from collateral sources was obtained at the initial interview and was indicated by a signed statement to that effect by the subject. The name and address of the collateral informants were recorded on the Annex to the Main Schedule. In Australia, they were asked to complete a self-administered questionnaire and to return it by mail to the investigators. In Mexico, they were interviewed face-to-face and in the USA interviews were undertaken by telephone. Bulgaria, Kenya and Norway could not participate in the validation exercise because of ethical or logistical restrictions.

Special questionnaires were devised which contained items that were essentially identical to those contained in the assessment instrument used in the main study. Some background information was collected about the collateral informant, and then some basic socio-demographic information (e.g., employment status) about the subject was sought, followed by an enquiry about the subject's medical symptoms ("subjective complaints"). Five questions on dependence were included. Quantitative questions on drinking were limited to frequency of drinking, and frequency of drinking 6+ and 12+ drinks. An example of an instrument used is given in Appendix 2 of this report.

The ten questions on subjective complaints were scored on a four point frequency scale, yielding a maximum score of 30. For the purpose of simplification, however, the aggregated score on these items was dichotomized between 5 and 6, and compared to the aggregated score of the same items from the original form. The aggregated scores of the five questions on dependence were compared to the original scores whereas the consumption questions were compared one by one. One of the questions on social consequences of drinking was included in the table (ever injured because of drinking?).

The data were compared in a similar manner to the reliability study.

6.2.2 Results and discussion

Subjects from all three drinking categories were included in this study. There was no significant difference in age, sex or socio-economic variables between subjects who took part in this study and the remaining subjects.

There was good agreement between the scores for the alcohol-specific and non-alcohol-specific items in the Mexican and USA samples. Acceptable kappa coefficients were obtained in every case (Table 7) with the exception of subjective complaints in the USA sample. Results in the Australian sample were less consistent, although the mean difference in scores was small.

TABLE 7
VALIDITY OF DATA BY COMPARISON WITH COLLATERAL INFORMATION

Scale/item	Australia (n)	d	SD	kappa	Mexico (n)	d	SD	kappa	USA (n)	d	SD	kappa
Subjective complaints (10 items)	(11)	2.36	3.26	0.74	(42)	2.02	5.83	0.43	(12)	1.33	5.99	-0.15
Alcohol dependence (5 items)	(14)	1.36	2.84	0.33	(40)	1.10	1.95	0.41	(13)	1.08	2.76	0.54
How often alcoholic drink?	(20)	0.00	1.22	0.40	(45)	0.07	1.05	0.41	(17)	-0.24	0.64	0.65
How often 6 drinks or more?	(18)	0.28	0.93	0.33	(46)	0.07	0.84	0.45	(16)	0.00	0.35	0.82
How often 12 drinks or more?	(21)	0.10	0.81	0.20	(49)	0.20	0.88	0.44	(17)	-0.24	1.11	0.75
How many cigarettes per day?	(21)	0.19	0.73	0.51	(49)	0.04	0.78	0.49	(17)	0.06	1.11	0.38
Ever injured because of drinking?	(21)	-0.10	0.29	0.61	(44)	0.05	0.30	0.69	(15)	-0.13	0.34	0.66

d : mean of collateral information minus patient score; SD : standard deviation of the difference

6.3 ASSESSMENT OF INDIVIDUAL ITEMS OF SCREENING INSTRUMENT

When items had been selected for the screening instrument (see Section 5), the reliability and validity of individual questions was examined. Results will be presented in Section 8.

7. RESULTS I. DESCRIPTION OF THE SAMPLE

7.1 CLASSIFICATION OF SUBJECTS

One thousand, nine hundred and five subjects were recruited by the six participating centres. Six hundred and seventy-eight (35.6%) were classified as non-drinkers. This group includes the total abstainers and those who had drunk alcohol on no more than three occasions in the previous year. Two hundred and ninety-seven subjects (15.6%) were classified in the "alcoholic" category and 913 (47.9%) were in the category we term "drinking patients". Most of the analyses presented here are based exclusively on data gathered from the last group and it is from the responses of this sample that the provisional screening instrument has been derived. Seventeen subjects from the total group had to be excluded because of incomplete data on alcohol use.

The number of subjects in each group, classified by country of origin is indicated in Table 8. The average number of drinking patients recruited per centre was 152, with a range of 79 to 206. As has been described (Section 4), certain centres specifically recruited abstainers and known alcoholics. The proportion of subjects in each group does not necessarily represent the prevalence of each drinking category in the centre of origin.

TABLE 8
STATUS OF SUBJECTS RECRUITED BY EACH CENTRE

Centre	n	Non-drinkers 678	Drinking patients 913	Alcoholics 297	Subjects excluded 17
Australia	239	43 (18)	163 (68)	26 (11)	7 (3)
Bulgaria	320	108 (34)	172 (54)	39 (12)	1
Kenya	291	153 (53)	79 (27)	56 (19)	3 (1)
Mexico	303	99 (33)	154 (51)	45 (15)	5 (2)
Norway	500	226 (45)	206 (41)	68 (14)	0
USA	252	49 (19)	139 (55)	63 (25)	1

Figures are numbers of subjects in each category and (in parentheses) percentages of the total number from each centre ("row percentages").

7.2 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF THE DRINKING PATIENTS

7.2.1 Age and sex distribution

The quota sampling procedure followed in all countries (except Australia where a random sampling procedure was adopted) ensured that comparable numbers of males and females were recruited in the three age groups. The age and sex distribution of the drinking patients, classified by centre of origin, is presented in Table 9.

TABLE 9
DISTRIBUTION OF THE DRINKING PATIENTS
BY AGE AND SEX ACCORDING TO CENTRE OF ORIGIN

Age Range	n	Australia		Bulgaria		Kenya		Mexico		Norway		USA	
		M	F	M	F	M	F	M	F	M	F	M	F
		107	56	141	30	60	19	85	69	99	107	76	63
18-30	334	43	45	27	40	28	32	47	41	28	36	36	46
31-40	311	24	27	29	40	42	53	34	32	41	42	34	30
41-55	267	33	29	44	20	30	16	19	27	30	22	30	24

Figures are column percentages M = males; F = females

7.2.2 Marital status (Table 10)

Fifty-three per cent of the drinking patients were married (this ranged from 39% in Australia to 75% in Kenya), 32% were single (ranging from 11% in Kenya to 46% in Australia), 13% were divorced and 1% were widowed. There was no significant difference between the sexes with regard to marital status.

TABLE 10
MARITAL STATUS OF DRINKING PATIENTS

Centre	n	Single	Married	Divorced	Widowed
Australia	163	46	39	14	1
Bulgaria	172	25	62	12	1
Kenya	79	11	75	13	1
Mexico	154	35	55	9	1
Norway	206	31	57	11	
USA	139	36	40	22	2

Figures are row percentages.

7.2.3 Educational level (Table 11)

Nearly all the drinking patients had received at least primary level education in five of the six countries and 70% had been educated to secondary level (Table 11). The overall level of literacy was high; 15% of Kenyan subjects were illiterate as were 1% of the Bulgarian and Mexican subjects. Illiteracy was not encountered in the other three centres.

TABLE 11
LEVEL OF EDUCATION AMONG DRINKING PATIENTS

Centre	No Schooling	Primary School	Secondary School	Technical Training	College or University	No Answer
Australia	1	17	58	10	15	0
Bulgaria	0	30	24	23	17	6
Kenya	14	43	27	8	8	1
Mexico	3	25	10	23	40	0
Norway	1	13	13	41	31	1
USA	0	14	37	6	43	0

Figures are row percentages

7.3 PRIMARY DIAGNOSES (Table 12)

The primary diagnoses of the drinking patients were extremely varied and there were no consistent associations with ICD group diagnostic categories. The diagnoses tended to reflect the setting in which the study had been carried out: for example, 44% of the Australian subjects had presented with an injury, not surprisingly for an Emergency Department sample. Likewise, 52% of the Bulgarian patients had presented with an injury, while 44% of the Kenyan patients had a psychiatric primary diagnosis, reflecting the specialty of the principal investigator. Approximately 60% of the Mexican sample had attended for a periodic health assessment; hence most were classified in the "other diagnosis" category. There was a more even range of diagnoses from the other two centres (Table 12).

TABLE 12
PRIMARY DIAGNOSES OF DRINKING PATIENTS

	Infections	Neoplasia	Metabolic Disorders	Psychiatric Disorders	Disorders of Nervous System	Circulatory Diseases	Respiratory Diseases	Digestive Diseases	Skin Diseases	Musculo-Skeletal Disorders	Injuries	Other or No Information
Australia	2	1	2	1	6	4	6	5	2	6	44	21
Bulgaria	16	1	1	0	3	2	8	9	1	5	52	1
Kenya	15	1	4	44	0	5	6	6	5	2	2	10
Mexico	3	0	10	8	1	3	0	7	1	0	1	66
Norway	4	3	2	10	1	8	11	6	3	19	6	27
USA	3	1	1	5	7	4	9	14	3	8	9	35

Figures are row percentages

7.4 ALCOHOL CONSUMPTION

In this section, an analysis is presented of the alcohol consumption of the drinking patients, and for comparison, of the alcoholics too.

7.4.1 Mean daily alcohol intake

7.4.1.1 Drinking patients

The mean daily alcohol intake of the drinking patients over a typical month was remarkably similar in four of the six centres - Australia (27g), Bulgaria (30g), Mexico (23g) and the USA (25g) (Figure 1). The exceptions were Norway, where the comparatively low intake of 10g/day was recorded (which may reflect the relative abstemiousness of most people and the traditional pattern of periodic drinking) and Kenya where the average intake was 97g/day. The distribution of intakes was unimodal in most centres and, after logarithmic transformation, relatively symmetrical (Figure 1). The modal values for consumption were 4-10g/day or 10-30g/day in four countries. Asymmetrical distributions were found for the samples from Mexico where nearly 30% of subjects had an intake below 4g/day and Kenya, where a relatively high proportion (16%) of drinking patients had an intake of 220g/day or more and who presumably had a substantial, albeit previously undiagnosed, drinking problem. The male drinking patients had significantly higher alcohol intakes than their female counterparts in all centres (Table 13).

TABLE 13
SEX DIFFERENCES IN ALCOHOL INTAKE OF DRINKING PATIENTS

	Australia		Bulgaria		Kenya		Mexico		Norway		USA	
	M	F	M	F	M	F	M	F	M	F	M	F
Consumption in a typical month (g/day)	33.7	11.1	32.1	13.9	106.4	60.0	36.6	5.8	15.4	5.2	33.0	13.5
Consumption in the last 30 days (g/day)	32.0	9.1	14.9	3.0	53.5	25.0	34.1	4.9	12.5	5.2	27.9	12.5
Frequency of having 6 drinks or more on one occasion (occasions per year)	70.5	19.4	49.4	18.4	104.4	77.5	38.8	4.6	26.2	3.0	32.7	13.3

7.4.1.2 Alcoholics

The daily alcohol intake of the alcoholic groups also showed little variation from country to country (Figure 1) with the mean daily intake in five centres ranging from 183g to 239g. The exception was Bulgaria, where the comparatively low intake of 119g/day was recorded. This is unexplained.

The distribution of intakes (Figure 1) showed considerable variation from centre to centre despite the similarity in mean daily intake. However, except for the Bulgarian patients, approximately 70% or more had an alcohol consumption exceeding 80g/day. A small proportion (under 10% in most countries) reported intakes of under 30g/day. Presumably they had reduced their consumption from a higher level in the past, though this is not established from the present investigation.

7.4.2 Frequency of intoxication

The frequency of drinking six drinks or more (60g plus) on one occasion is depicted in Figure 2. Among the drinking patients this was lowest in Norway (mean of 14.2 occasions per year) and highest in Kenya (97.9). It showed a modest correlation (r=0.34) with mean daily alcohol intake.

With the exception of those from Bulgaria and Norway, half or more of the alcoholics had six drinks or more on a daily basis.

7.4.3 Alcohol dependence

There was considerable variation in the mean severity of dependence among the drinking patients in the six countries (Figure 3). The dependence score was highest in the Kenyan sample and lowest in the Bulgarian and Norwegian ones. The relative scores of the national samples tended to reflect mean daily alcohol intake. The mean dependence scores among the alcoholics ranged from 22.8 to 37.7 (out of a total possible score of 56).

7.4.4 Alcohol problems ever

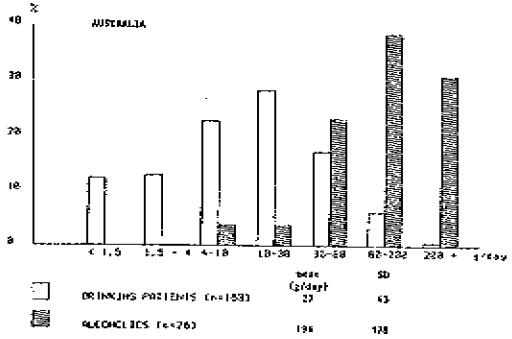
The mean scores and distribution of scores for this scale are depicted in Figure 4. The scores among the drinking patients in different countries tend to reflect the mean level of alcohol consumption, as would be anticipated. The Norwegian drinking patients had a low mean problem score and the Kenyan patients a high one. Against this overall pattern the Bulgarian patients had an exceptionally low problem score. The scores for the alcoholics were relatively uniform. Again, the Bulgarian subjects had the lowest problem score.

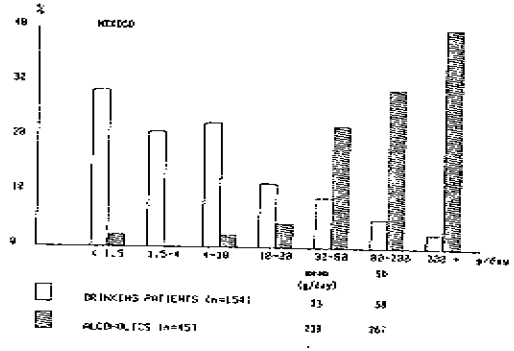
7.4.5 National differences in scores for the scales used

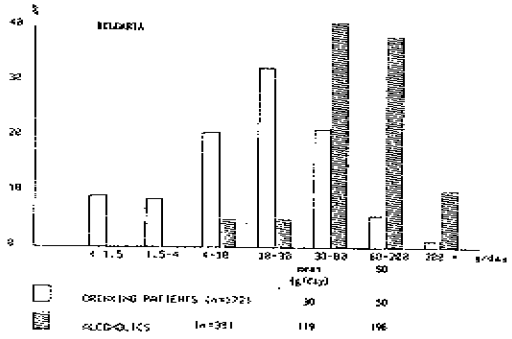
Figure 5 shows the deviations from the cross-national means for some of the scales. The Kenyan sample in general has above average scores while the Bulgarian and Norwegian ones have below average scores. The scores for the Australian, Mexican and American samples are, in general, average.

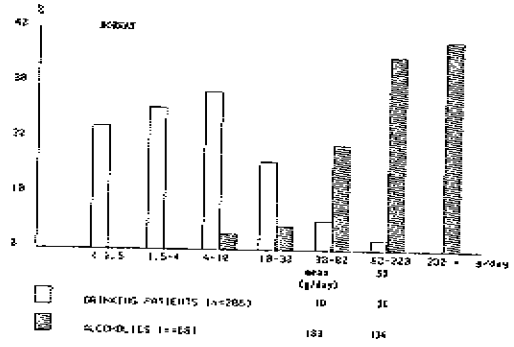
FIGURE 1

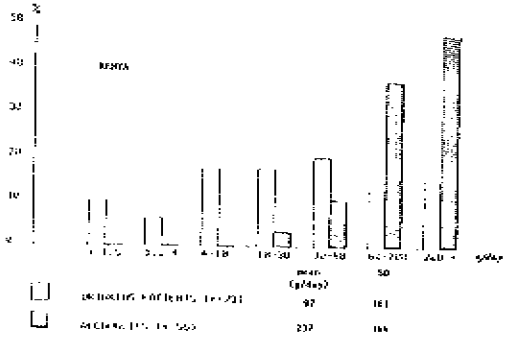
ALCOHOL CONSUMPTION IN A TYPICAL MONTH











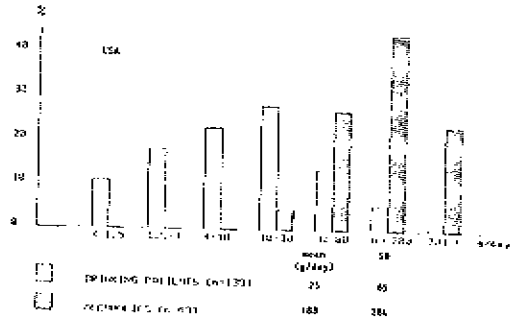


FIGURE 2

FREQUENCY OF DRINKING SIX DRINKS OR MORE (56g) ON ONE OCCASION

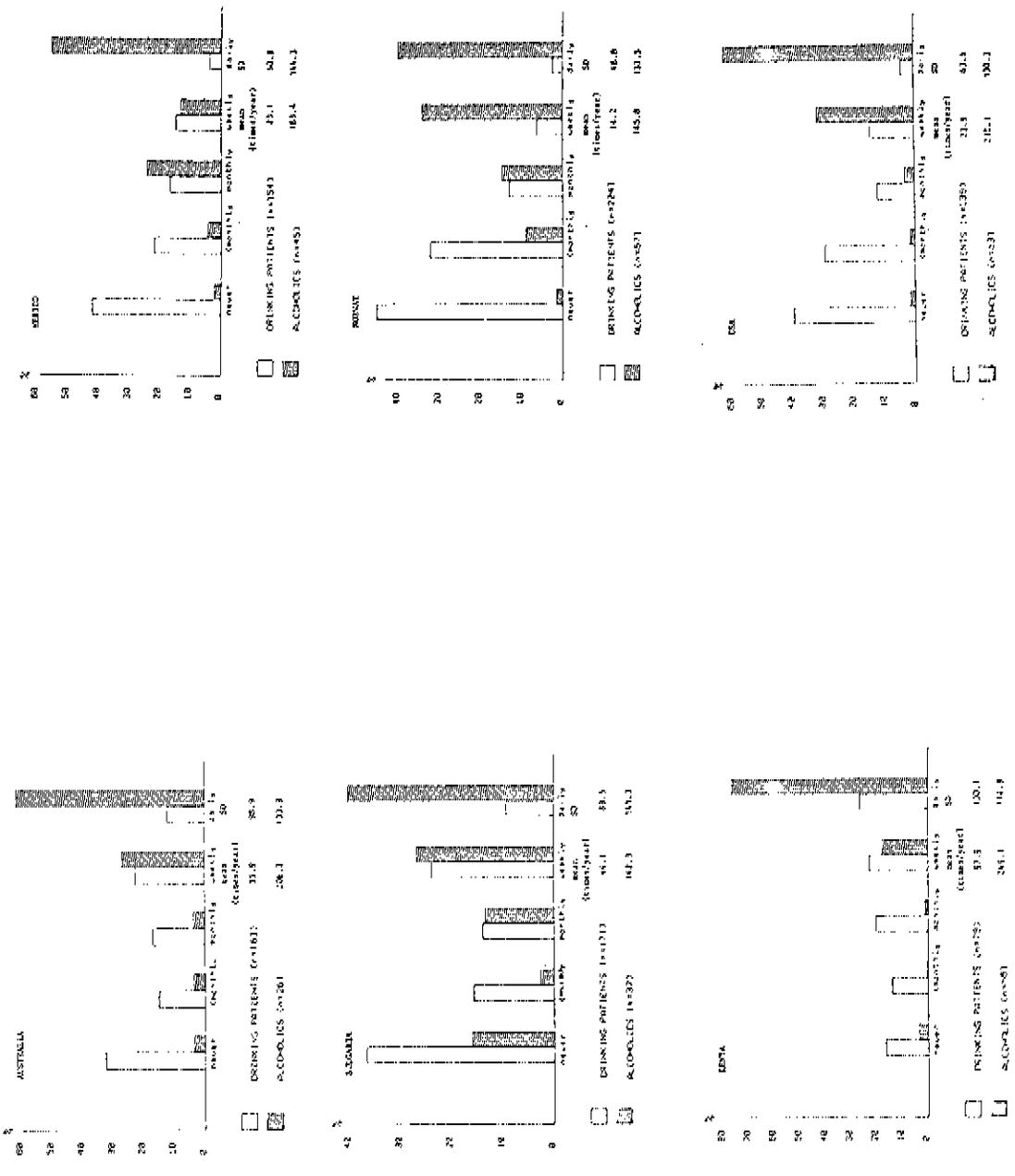


FIGURE 3

ALCOHOL DEPENDENCE

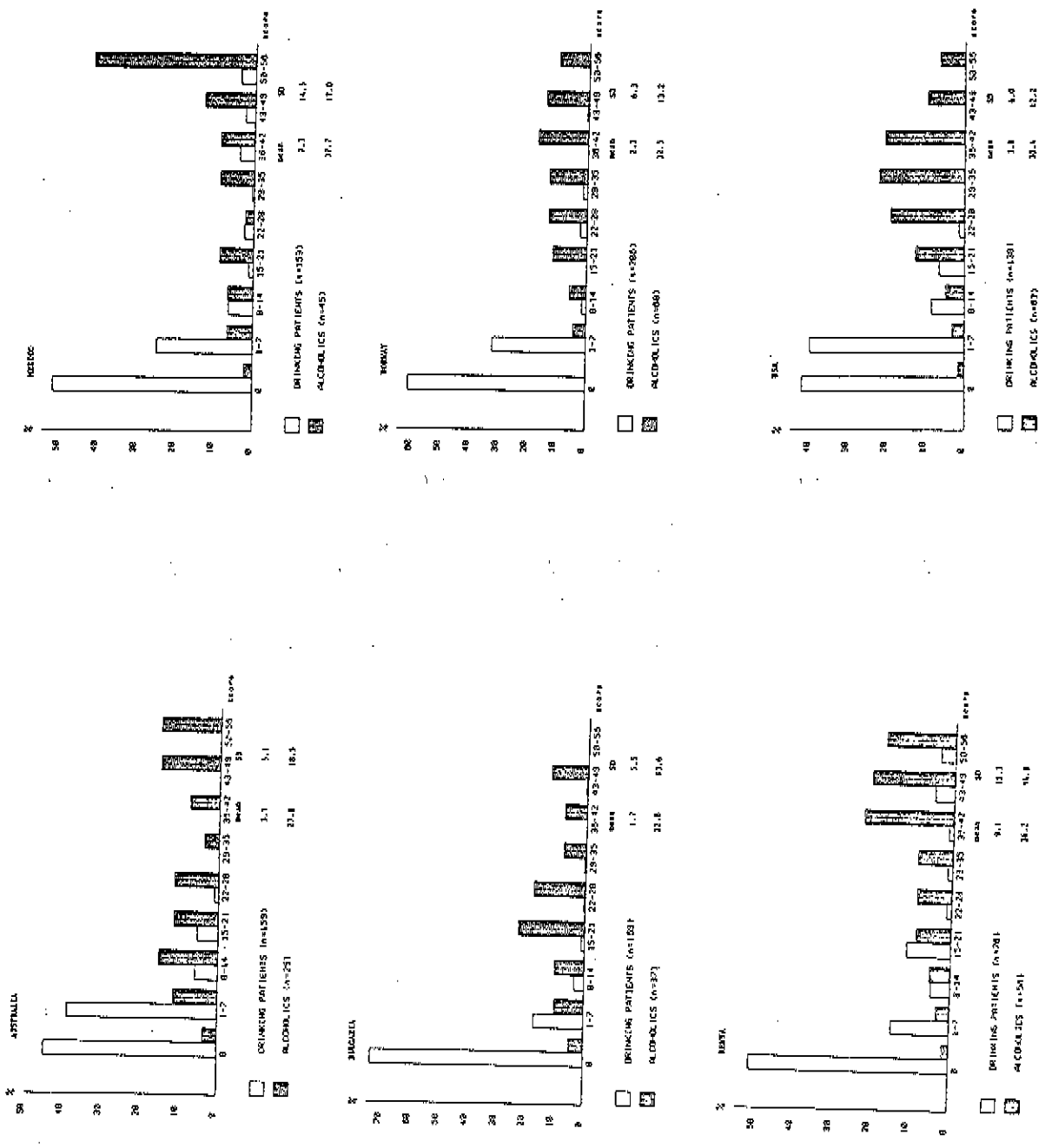


FIGURE 4

ALCOHOL PROBLEMS EVER

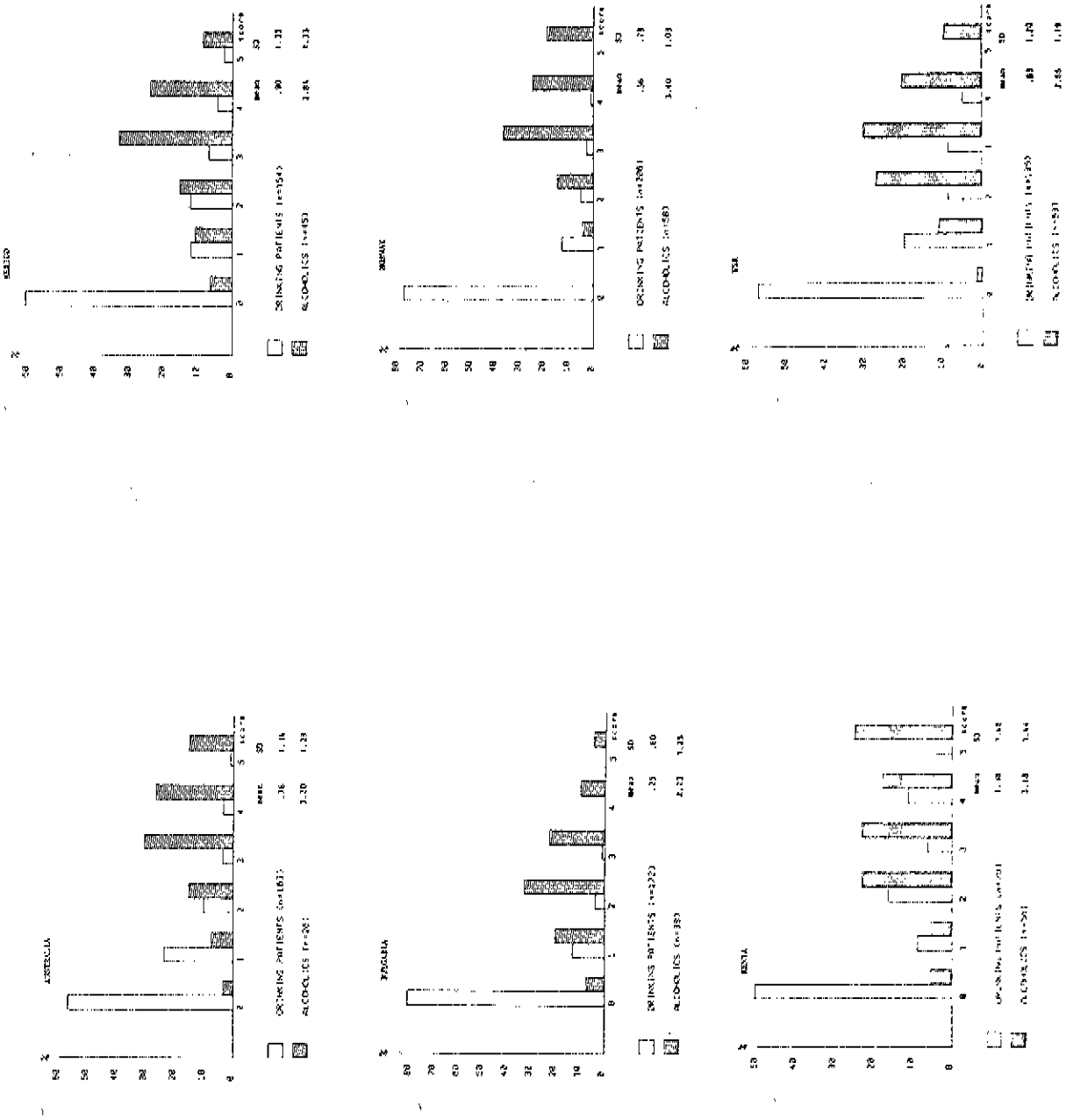


FIGURE 5

DEVIATION FROM CROSS-NATIONAL MEANS OF SCALES

(percent)

8. RESULTS II. DERIVATION OF THE SCREENING INSTRUMENT

8.1 NON-ALCOHOL-SPECIFIC ITEMS

8.1.1 Subjective complaints

There were three groups of symptoms within this scale - (a) gastrointestinal symptoms (e.g. vomiting, abdominal pain, diarrhoea and heartburn), (b) other physical complaints, including some that could be related to alcohol withdrawal (e.g. sleep disturbance, hand tremor) and (c) affective symptoms (e.g. anxiety, depression) which again could be related to alcohol. After some preliminary analyses four items were removed either because positive responses were very infrequent (fits, sexual problems) or because they had very poor or negative correlations with both the total score for the remaining items and with alcohol consumption in all samples (menstrual problems, other gynaecological problems). The item to total correlation coefficients for most of the remaining 19 items were modest (Table 14). Withdrawal-related symptoms and those of affective disturbance had a more consistently high correlation with the total score across the centres. Among the most consistent items were sleep disturbance (r=0.38 to 0.64 for different centres), hand tremor (r=0.35 to 0.55), heart palpitations (r=0.47 to 0.61), anxiety (r=0.45 to 0.71), feeling sad (r=0.45 to 0.66), and fatigue (r=0.41 to 0.46). Gastrointestinal symptoms correlated poorly with the total score.

The reliability (homogeneity) of this scale was thus somewhat lower than that of other scales, though acceptable Cronbach's alpha coefficients were obtained for the full 19-item scale for Bulgaria (0.84), Kenya (0.89), Mexico (0.91), Norway (0.86) and the USA (0.87); for Australia the alpha-coefficient was 0.79.

Individual items within this domain showed a generally low, and non-significant correlation with alcohol intake. Only hand tremor and muscle cramps had significant positive correlations with alcohol intake (consumption in a typical month and frequency of intoxication) in as many as three centres. Even then, the correlations were only of the order of 0.30 to 0.47. The correlation of the total score with alcohol intake was significant in only two countries and for only one measure in each (Table 14).

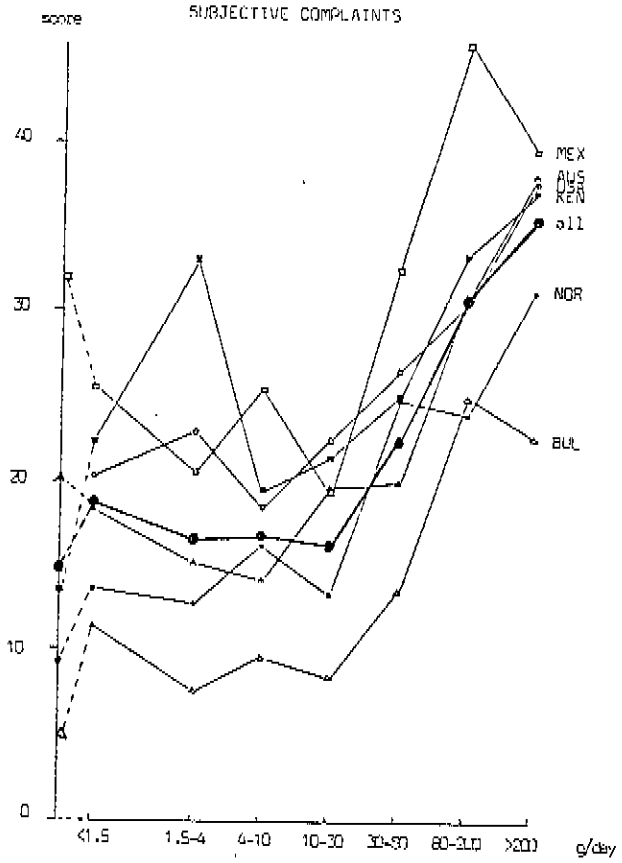
TABLE 14
CORRELATION OF TOTAL SCORE FOR
SUBJECTIVE COMPLAINTS WITH ALCOHOL CONSUMPTION

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol Consumption over a typical month (ln)	0.10	0.10	0.27	0.20	0.20*	0.12
Mean daily alcohol consumption over the last 30 days (ln)	0.03	-0.03	-0.03	-0.09	0.09	-0.01
Frequency of intoxication (quasi ln)	0.03	0.14	0.17	0.18	0.15	0.24*

* $p < 0.01$

The relationship between the score for subjective complaints in the drinking patients and mean daily alcohol consumption in a typical month is depicted in Figure 6. The relationship is non-linear and shows considerable centre-to-centre variation. From the aggregated data it would appear that there is a threshold of approximately 30g alcohol/day above which there is a progressive increase in symptomatology.

FIGURE 6



In view of the only moderate reliability of this scale and the low correlations of both individual items and the total score with alcohol intake, the inclusion of subjective complaints in a "core" screening instrument would seem to be unwarranted. If a disguised questionnaire were considered necessary, the questions on anxiety, insomnia, hand tremor and muscle cramps would be the most promising ones to include.

8.1.2 History of Trauma

As there were only three items in this domain, its scale reliability was not analysed. Positive responses to these questions showed a more consistent relationship with heavy and frequent drinking than was found for subjective complaints, and significant correlations were found for four of the centres (Table 15). The questions on "head injury" and "broken bones" had a closer relationship to alcohol consumption than did the one on "road accidents".

TABLE 15
RELATION OF TRAUMA HISTORY TO ALCOHOL INTAKE

	Australia		Bulgaria		Kenya		Mexico		Norway		USA	
	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.
Road accident	0.14	0.13	0.17	0.21*	0.08	0.19	0.18	0.11	0.02	0.02	0.11	0.05
Head injury	0.23*	0.21*	-0.06	-0.04	0.02	-0.13	0.47*	0.40*	0.17	0.10	0.08	0.06
Broken bones	0.33*	0.36*	0.12	0.03	0.08	-0.07	0.22*	0.13	0.16	0.21*	0.04	0.05

Figures are the Pearson correlation coefficients;
"Int." = mean daily alcohol intake in a typical month
"Freq." = frequency of intoxication (six drinks or more on one occasion)
* $p < 0.01$

The correlation of the total score with alcohol use is presented in Table 16.

TABLE 16
CORRELATION OF TRAUMA SCALE SCORE WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.32*	0.11	0.09	0.37*	0.17	0.11
Mean daily alcohol consumption over the last 30 days (ln)	0.26*	0.12	0.13	0.19	0.07	0.09
Frequency of intoxication (quasi ln)	0.32*	0.09	0.02	0.29*	0.17	0.07

* $p < 0.01$

Because the relationship of the trauma questions with alcohol intake was weaker than for many of the alcohol-specific items, neither question has been included in the core screening instrument. However, for a disguised instrument (e.g. the "clinical" one, to be described in full later), inclusion of the questions

"Have you injured your head since your 18th birthday?" and/or
"Have you broken any bones since your 18th birthday?"

would be appropriate.

8.1.3 Clinical examination

In this scale were included the "cardinal signs" of Le Gô (1976) together with two of the "secondary signs" (liver enlargement and consistency) and six items not in the original Le Gô grid. Blood pressure, which is one of the secondary Le Gô signs, has not been included in the scale but is analysed separately. As discussed in Section 5 the method of scoring (by degree of severity) differed somewhat from that originally devised.

Preliminary analysis led to the exclusion of five items from further analysis due to the rarity of positive findings (parotid enlargement, abnormal liver consistency, icterus) or poor or negative correlation with the total score across all centres (adiposity, feminisation). None of these items correlated significantly with alcohol intake.

The item-to-total correlation coefficients for the remaining nine items are presented in Table 17.

TABLE 17
CORRELATION OF ITEM-TO-TOTAL SCORES FOR FINDINGS ON CLINICAL EXAMINATION

	Australia	Bulgaria	Kenya	Mexico	Norway	USA	Overall
	Pearson Correlation Coefficients						
21 Conjunctival injection	0.60	0.29	0.55	0.26	0.46	0.63	0.47
22 Abnormal skin vascularisation	0.57	0.32	0.25	0.10	0.15	0.05	0.24
23 Coating of tongue	0.45	0.17	0.40	0.58	0.22	0.37	0.37
24 Hand tremor	0.48	0.46	0.54	0.59	0.52	0.36	0.49
25 Lip tremor	0.55	0.49	0.60	0.42	0.40	0.29	0.46
26 Tongue tremor	0.56	0.29	0.48	0.45	0.46	0.29	0.42
27 Scars & bruises	0.16	-0.13	0.10	0.13	0.10	0.25	0.10
28 Hyper-reflexia	0.26	0.31	0.33	0.62	0.31	0.05	0.31
30 Hepatomegaly	0.53	0.23	0.21	0.35	0.34	0.12	0.30
Cronbach's alpha	0.76	0.44	0.70	0.74	0.63	0.52	

Most of the "cardinal" Le Gô signs showed fair item to total correlation. The correlations for hyperreflexia, hepatomegaly and particularly for scars and bruises, with the total score were weaker. The reliability (homogeneity) of the whole scale was only fair (Table 18): values for the alpha coefficient were appreciably lower than those for other scales of comparable size.

The results of the stepwise multiple regression analysis showed that the "best" item within the scale varied considerably from centre to centre. The highest partial correlations were for skin vascularisation in the Australian sample, hand tremor for the Bulgarian and Mexican ones, conjunctival injection for the Kenyan one, tongue tremor for the Norwegian one and coating of the tongue for the USA one.

The total score for this scale showed a significant correlation with at least one measure of alcohol use in five countries - Australia (where the relationship was the most consistent), Kenya, Mexico, Norway and the USA (Table 18).

TABLE 18

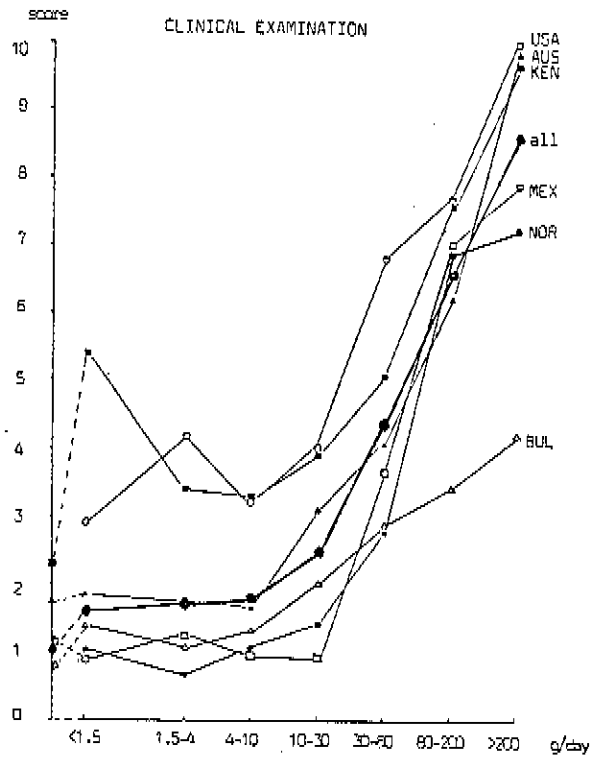
CORRELATION OF THE TOTAL SCORE FOR FINDINGS ON CLINICAL EXAMINATION WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.41*	0.09	0.30*	0.47*	0.29*	0.22+
Mean daily alcohol consumption over the last 30 days (ln)	0.35*	0.11	0.11	0.30*	0.19*	0.08
Frequency of intoxication (quasi ln)	0.37*	0.08	0.18	0.48*	0.30*	0.26*

* $p < 0.01$ + $p = 0.01$

The relationship between the clinical examination score and mean daily alcohol consumption in a typical month is depicted in Figure 7. A threshold of alcohol consumption of approximately 30g/day is suggested before clinical abnormalities are detected at a greater frequency than normal.

FIGURE 7



Of the individual items, hand tremor was the most consistently correlated with alcohol intake, having significant correlations of 0.25 to 0.41 in four countries (Table 19). Conjunctival injection and abnormal skin vascularisation correlated significantly in two centres. Hepatomegaly, which had a relatively low item-to-total coefficient, and was not selected as a representative item for any centre in the multiple regression analysis, correlated with at least one measure of alcohol intake in three countries (Australia, Norway and the USA).

TABLE 19
RELATION OF CLINICAL EXAMINATION FINDINGS TO ALCOHOL INTAKE

	AUSTRALIA		BULGARIA		KENYA		MEXICO		NORWAY		U.S.A.	
	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.	Int.	Freq.
Conjunctival injection	0.18	0.15	0.16	0.12	0.05	0.10	0.41*	0.49*	0.22*	0.16	0.05	0.04
Abnormal skin vascularisation	0.33*	0.29*	0.17	0.10	-0.08	-0.05	0.13	0.18	0.17	0.25*	-0.43	-0.16
Coating of tongue	0.24*	0.09	0.10	0.04	0.16	0.15	0.22*	0.29*	0.04	-0.02	0.17	0.25*
Hand tremor	0.27*	0.20	-0.04	-0.02	0.41*	0.31*	0.34*	0.35*	0.26*	0.25*	0.09	0.13
Lip tremor	0.20	0.16	-0.19	-0.08	0.30	0.15	0.14	0.20	0.09	0.19*	0.13	0.08
Tongue tremor	0.33*	0.26*	-0.04	0.02	0.21	0.11	0.28*	0.18	0.10	0.08	0.30*	0.27*
Hepatomegaly	0.22*	0.26*	0.12	0.11	0.25	0.18	0.20	0.16	0.23*	0.26*	0.16	0.24*

Figures are Pearson correlation coefficients
"Int." = means daily alcohol intake in a typical month
"Freq." = frequency of intoxication (six drinks or more on one occasion)
* $p < 0.01$

Selection of the most appropriate clinical examination items for a screening instrument is difficult in view of the relatively low reliability of this scale in individual centres, the limited representativeness of items across the centres and their variable correlation with alcohol intake. On the basis of their higher item-to-total correlations and generally significant correlation with alcohol intake, four of the original Le Gô signs would be the most eligible for inclusion in a cross-national instrument. They are conjunctival injection, skin vascularisation, hand tremor and tongue tremor. One of the secondary signs - hepatomegaly - is also suggested. It is, however, likely that different items will be selected in different countries.

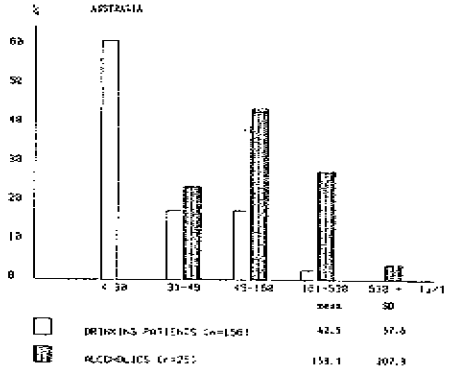
8.1.4 Laboratory tests

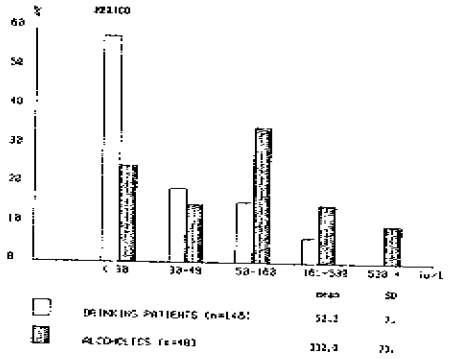
No attempt was made to form a scale from the five laboratory tests. Dichotomising the results into "normal" and "abnormal" and aggregating the scores in a scale was considered but rejected because of the doubtful conceptual basis for doing so. Four of the tests (the serum transaminases, GGT and mean cell volume) reflect different pathophysiological processes while the blood alcohol concentration reflects the amount of alcohol consumed in the few hours before the investigation.

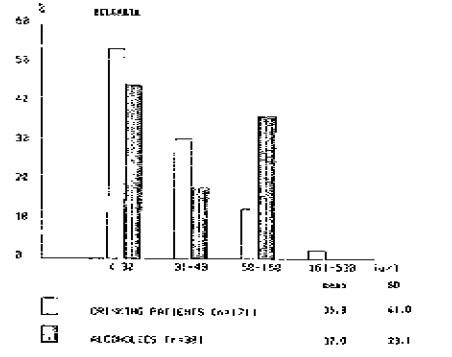
The serum transaminases, GGT and blood alcohol concentration showed relatively modest correlations with alcohol use. The most useful would appear to be serum GGT in that it showed significant positive correlations with daily alcohol intake in a typical month in four centres (Australia, Mexico, Norway and the USA) and a correlation approaching significance in one additional country (Kenya). The distribution of GGT values for both the drinking patient and the alcoholics from the six centres is illustrated in Figure 8 and the mean GGT values for both groups are also shown. The mean GGT level of the known heavy drinkers varied widely from 37.0 to IU/l in Bulgaria to 332.0 IU/l in Mexico. There was no correlation between GGT activity and the length of abstinence from from alcohol between admission and blood sampling.

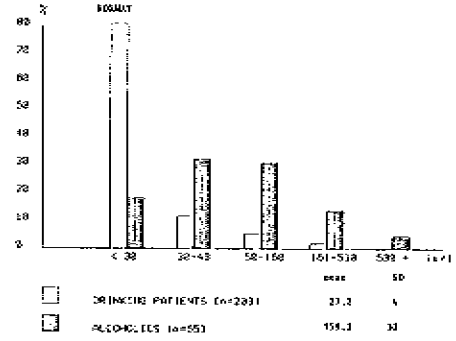
FIGURE 8

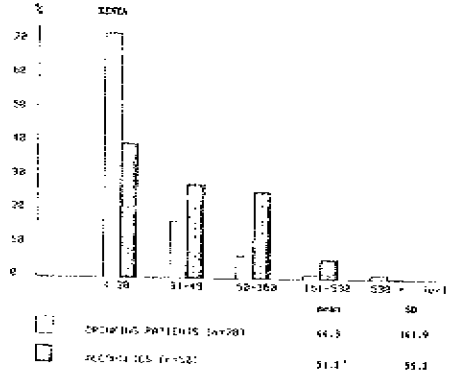
GAMMA-GLUTAMYL-TRANSPEPTIDASE
(adjusted to Norwegian standard)

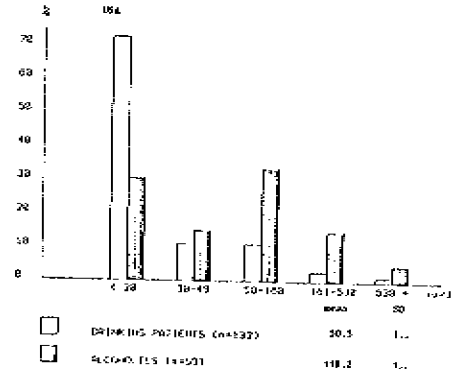












Serum ASAT also correlated significantly with daily alcohol intake in four countries (Kenya, Mexico, Norway and the USA) but the overall impression was not as favourable since negative (non-significant) correlations were found in the two remaining centres (Australia and Bulgaria).

Blood alcohol concentration was a disappointing marker. Its correlation with alcohol use was low or negative in three countries; only in the USA was it strongly related to alcohol use.

Mean cell volume (MCV) showed significant or nearly significant correlations in Australia, Norway and the USA but near zero or negative ones in Bulgaria and Kenya.

TABLE 20
CORRELATION OF LABORATORY TEST RESULTS WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
ASPARTATE AMINOTRANSFERASE (ASAT)						
Mean daily alcohol consumption over a typical month (ln)	-0.02	-0.10	0.31*	0.40*	0.27*	0.25*
Mean daily alcohol consumption over the last 30 days (ln)	-0.05	0.02	0.04	0.30*	0.23*	0.23*
Frequency of intoxication (quasi ln)	0.06	-0.08	0.28	0.33*	0.25*	0.25*
ALANINE AMINOTRANSFERASE (ALAT)						
Mean daily alcohol consumption over a typical month (ln)	-0.05	-0.12	0.36	0.33*	0.20*	0.14
Mean daily alcohol consumption over the last 30 days (ln)	-0.08	-0.03	0.13	0.16	0.19*	0.08
Frequency of intoxication (quasi ln)	-0.04	-0.07	0.27	0.31*	0.15	0.15
GAMMA GLUTAMYLTRANSFERASE (GGT)						
Mean daily alcohol consumption over a typical month (ln)	0.22*	-0.05	0.23	0.32*	0.36*	0.29*
Mean daily alcohol consumption over the last 30 days (ln)	0.20	0.01	-0.15	0.17	0.31*	0.24*
Frequency of intoxication (quasi ln)	0.27*	-0.04	0.18	0.33*	0.33*	0.25*
MEAN CELL VOLUME (MCV)						
Mean daily alcohol consumption over a typical month (ln)	0.23*	0.19	0.08	0.06	0.20	0.28*
Mean daily alcohol consumption over the last 30 days (ln)	0.20	-0.03	0.07	0.05	0.18	0.25*
Frequency of intoxication (quasi ln)	0.19	0.16	-0.02	-0.02	0.19	0.28*
BLOOD ALCOHOL CONCENTRATION (BAC)						
Mean daily alcohol consumption over a typical month (ln)	0.15	-0.03	0.31	0.19	0.28	0.31*
Mean daily alcohol consumption over the last 30 days (ln)	0.17	0.08	0.11	-0.02	0.25	0.26*
Frequency of intoxication (quasi ln)	0.18	0.11	0.37	0.05	0.35	0.27*

* $p < 0.01$

8.2 ALCOHOL-SPECIFIC ITEMS

The remaining questions in the assessment instrument all included a reference to alcohol. Both individually and collectively they showed a far higher correlation with the three measures of alcohol use than the questionnaire items described so far in which alcohol was not mentioned. Seven alcohol-specific questions have been selected for a "core" screening instrument.

8.2.1 Negative alcohol reactions

The three questions in this domain refer to feelings of depression, anger and guilt or remorse after drinking. Biserial correlation coefficients for the item to total scores were calculated and mostly exceeded 0.50 (Table 21), except for the Australian sample where there was less consistency within the scale.

TABLE 21
CORRELATION OF ITEM TO TOTAL SCORES FOR NEGATIVE ALCOHOL REACTIONS

	Australia	Bulgaria	Kenya	Mexico	Norway	USA	Overall
	Pearson Correlation Coefficients						
Depression	0.24	0.51	0.73	0.73	0.68	0.59	0.58
Anger	0.32	0.57	0.36	0.68	0.49	0.60	0.50
Guilt/remorse	0.40	0.63	0.51	0.82	0.74	0.44	0.59
Cronbach's alpha	0.50	0.74	0.70	0.86	0.78	0.72	

There was a good correlation with the level of alcohol consumption over a typical month in all centres and with the frequency of intoxication in all except Bulgaria (Table 22).

TABLE 22
CORRELATION OF THE TOTAL SCORE FOR NEGATIVE ALCOHOL REACTIONS WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.33*	0.23*	0.61*	0.67*	0.48*	0.47*
Mean daily alcohol consumption over the last 30 days (ln)	0.35*	-0.08	0.02	0.43*	0.22*	0.38
Frequency of intoxication (quasi ln)	0.45*	0.12	0.51	0.73*	0.51*	0.50*

* $p < 0.01$

The item that correlated most consistently with the total score across the centres, "How often during the last year have you had a feeling of guilt or remorse after drinking?", was selected for inclusion in the core screening instrument.

8.2.2 Positive alcohol reactions

The two questions in this domain asked about feelings of happiness or friendliness after drinking. They showed broadly comparable intrascale correlations across the six centres (Table 23). The strength of the relationship with alcohol use (Table 24) was generally lower than for negative alcohol reactions.

TABLE 23
BISERIAL CORRELATION COEFFICIENTS FOR POSITIVE ALCOHOL REACTIONS

	Australia	Bulgaria	Kenya	Mexico	Norway	USA	Overall
Happy	0.58	0.91	0.84	0.60	0.63	0.42	0.66
Friendly	0.58	0.91	0.84	0.60	0.63	0.42	0.66
Cronbach's alpha	0.74	0.95	0.91	0.75	0.78	0.59	

TABLE 24
CORRELATION OF THE COMBINED SCORE FOR POSITIVE ALCOHOL REACTIONS WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.19	0.42*	0.43*	0.51*	0.40*	0.37*
Mean daily alcohol consumption over the last 30 days (ln)	0.18	0.17	0.25	0.34*	0.28*	0.25*
Frequency of intoxication (quasi ln)	0.28*	0.39*	0.48*	0.53*	0.26*	0.37*

* $p < 0.01$

In view of the lower overall correlation with alcohol use compared with the questions on negative emotional experiences, and also the relatively low face validity in a health care setting, neither question seemed to offer a major advantage as an item for a screening test. Therefore, neither was selected for inclusion in the core screening instrument.

8.2.3 Alcohol problems ever

The five questions in this domain referred to injuries sustained because of drinking, advice by family, people at work or health workers to cut down drinking and legal trouble because of drinking. The reliability (homogeneity) of this scale (Table 25) showed more variation from centre to centre than some other scales. The alpha coefficient was highest in Kenya and Mexico and lowest in Bulgaria.

TABLE 25
CORRELATION OF ITEM TO TOTAL SCORES FOR ALCOHOL PROBLEMS EVER

	Australia	Bulgaria	Kenya	Mexico	Norway	USA	Overall
	Pearson Correlation Coefficients						
You/other hurt	0.61	0.49	0.62	0.87	0.49	0.61	0.62
Family suggested cut down	0.52	0.45	0.90	0.90	0.84	0.73	0.72
Workplace concerned	0.95	0.52	0.95	0.79	0.68	0.65	0.76
Legal trouble	0.49	0.84	0.87	0.70	0.71	0.84	0.74
Doctor suggested cut down	0.77	0.48	0.78	0.77	0.99	0.47	0.71
Cronbach's alpha	0.65	0.41	0.82	0.77	0.60	0.67	

The mean correlation coefficient for all centres for four of the five items was very similar. However, on stepwise multiple regression analysis the question "Has anyone in your family or any friend ..... suggested you cut down on drinking?" had the highest partial correlation in all countries except the USA where the one on injuries as a result of drinking had the highest coefficient. The question on a doctor or health worker expressing concern about drinking had the next highest partial correlation coefficient.

In all countries there was a strong correlation of the total score with alcohol consumption, especially consumption in a typical month and frequency of intoxication (Table 26).

TABLE 26
CORRELATION OF THE TOTAL SCORE FOR ALCOHOL PROBLEMS EVER WITH ALCOHOL USE

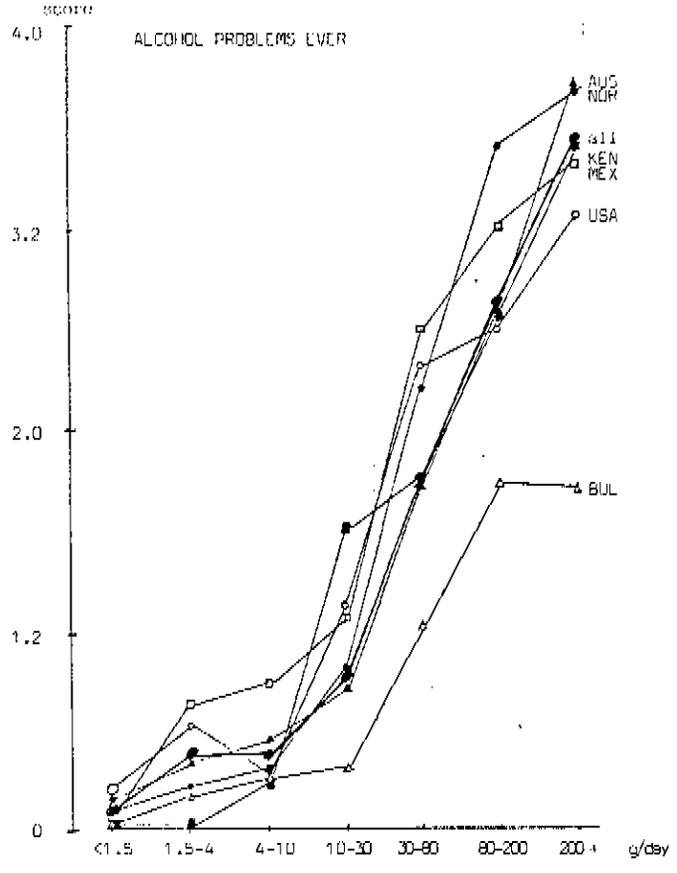
	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.49*	0.31*	0.70*	0.67*	0.47*	0.44*
Mean daily alcohol consumption over the last 30 days (ln)	0.37	0.09	0.04	0.47*	0.11	0.27*
Frequency of intoxication (quasi ln)	0.55*	0.27*	0.64*	0.72*	0.52*	0.46*

* $p < 0.01$

The relationship between the score for this scale and mean daily alcohol consumption in a typical month is further explored in Figure 9. The relationship is curvilinear with the mean score increasing at a level of 10-30g alcohol/day and more prominently when consumption exceeds 30g/day.

Based on the item-to-total correlations and the regression analysis, a composite question: "Has anyone in your family or any friend, or a doctor or other health worker, ever been concerned about your drinking or suggested that you cut down?" was included in the core screening instrument. The question on alcohol-related injuries has also been included.

FIGURE 9



8.2.4 Alcohol problems in the last year

More detailed questions about problems that had occurred in the previous year were asked. These items, fourteen in all, showed a generally good correlation with the total score with values for Cronbach's alpha ranging from 0.58 in Bulgaria, 0.68 in Australia, 0.72 in Norway, 0.73 in the USA to 0.89 in Kenya and Mexico respectively. These reliability coefficients were somewhat higher than for the "alcohol problems ever" scale.

However, the item-to-total correlation coefficients showed considerable variation from centre to centre and on multiple regression analysis, there was no consistency in the item selected as the most representative. In Bulgaria the intercorrelations were such that only one item fulfilled the inclusion criteria.

A generally strong relationship with alcohol use was found (Table 27) and the pattern of correlation was very similar to that for alcohol problems ever. Except in the USA the degree of correlation was slightly less than for alcohol problems ever.

Because of the degree of inconsistency in the multiple regression analysis from centre to centre and the generally lower correlation with alcohol intake compared with "alcohol problems ever", it was decided not to include a separate question in the screening instrument, but to subdivide a positive response to the questions selected from the scale "alcohol problems ever" into "Yes, but not in the last year" and "Yes, during the last year".

TABLE 27
CORRELATION OF TOTAL SCORE FOR ALCOHOL PROBLEMS IN LAST YEAR WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.42*	0.28*	0.69*	0.65*	0.43*	0.47*
Mean daily alcohol consumption over the last 30 days (ln)	0.35	-0.01	-0.03	0.46*	0.15	0.28*
Frequency of intoxication (quasi ln)	0.51*	0.25*	0.58*	0.65*	0.52*	0.52*

* $p < 0.01$

8.2.5 People showing concern

These items were derived from a series of subsidiary questions to the one "Has anyone in your family or any friend ever been concerned about your drinking ...?" The reliability of this scale (as judged by Cronbach's alpha) was modest or poor in three centres. This is not surprising as responses to these questions will depend to a large extent on the family composition and immediate social network of subjects.

There was a significant correlation of the total score with mean daily intake for a typical month and frequency of intoxication (Table 28). However, because responses to these questions are so dependent on the individual's domestic and social network, no questions from this domain have been included in the core screening instrument.

TABLE 28
CORRELATION OF THE TOTAL SCORE FOR "PEOPLE SHOWING CONCERN" WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.33*	0.28*	0.67*	0.61*	0.41*	0.39*
Mean daily alcohol consumption over the last 30 days (ln)	0.18	0.06	-0.02	0.45*	0.14	0.22*
Frequency of intoxication (quasi ln)	0.34*	0.33*	0.56*	0.64*	0.51*	0.39*

* $p < 0.01$

8.2.6 Alcohol dependence syndrome

The item-to-total score correlations were generally very high (Table 29) and the overall reliability was exceptionally high, more so than for any other scale. The two questions which showed the highest level of agreement with the total score were "... not able to stop drinking once you had started" and "... difficult to stop drinking before ... intoxication", which reflect one of the hallmarks of dependency - namely the subjective compulsion to drink. With the exception of "gulping drinks" and "tried to reduce alcohol consumption and failed", the other questions had very similar item-to-total score correlation coefficients.

TABLE 29
CORRELATION OF ITEM TO TOTAL SCORES FOR THE ALCOHOL DEPENDENCE SYNDROME

	Australia	Bulgaria	Kenya	Mexico	Norway	USA	Overall
	Pearson Correlation Coefficients						
Alcohol on mind	0.42	0.69	0.82	0.83	0.83	0.66	0.63
Skip meals	0.56	0.57	0.80	0.91	0.68	0.56	0.68
Not stop drinking	0.48	0.69	0.92	0.91	0.86	0.76	0.77
Get intoxicated	0.38	0.72	0.89	0.94	0.88	0.82	0.77
Morning drink	0.49	0.78	0.64	0.92	0.79	0.37	0.67
Blackouts	0.55	0.69	0.78	0.87	0.78	0.68	0.73
Drinking more than friends	0.28	0.67	0.87	0.83	0.61	0.63	0.65
Gulp drinks	0.28	0.42	0.76	0.56	0.67	0.55	0.54
Fail expectations	0.55	0.62	0.85	0.94	0.89	0.53	0.73
Drunk for days	0.42	0.79	0.85	0.96	0.84	0.37	0.71
Need more than before	0.23	0.74	0.88	0.87	0.50	0.57	0.63
Tried to reduce	0.24	0.46	0.82	0.91	0.64	0.45	0.59
Drinking at unusual times	0.39	0.76	0.82	0.91	0.64	0.45	0.66
Morning shakes	0.59	0.62	0.76	0.86	0.72	0.60	0.69
Cronbach's alpha	0.80	0.91	0.97	0.98	0.95	0.89	

On multiple regression analysis, no item was identified as the most representative for more than one country. Subjective compulsion to drink was represented by two questions ("unable to stop drinking" in Kenya and "not able to stop before intoxication" in USA) and possibly by a third ("staying drunk for days" in Mexico). Salience was represented by "skipping meals because of drinking" in Australia and by "failing expectations" in Norway. Relief of withdrawal symptoms by drinking ("morning drinking") was the most representative item in Bulgaria.

There was a high correlation of the total score with alcohol intake in all centres (Table 30).

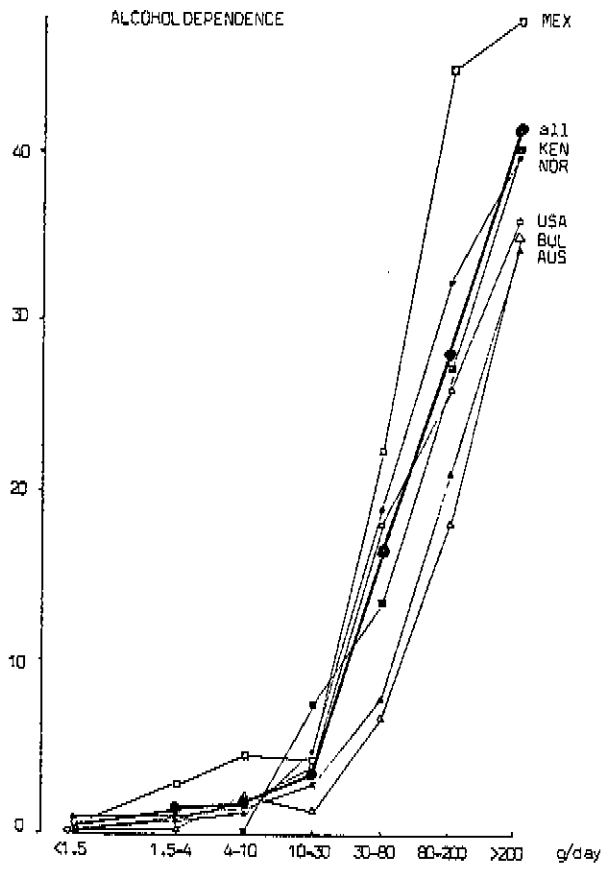
TABLE 30
CORRELATION OF THE TOTAL SCORE FOR THE ALCOHOL DEPENDENCE SYNDROME WITH ALCOHOL USE

	Australia	Bulgaria	Kenya	Mexico	Norway	USA
	Pearson correlation coefficients					
Mean daily alcohol consumption over a typical month (ln)	0.48*	0.42*	0.68*	0.72*	0.52*	0.61*
Mean daily alcohol consumption over the last 30 days (ln)	0.46*	0.13	0.13	0.49*	0.17	0.39*
Frequency of intoxication (quasi ln)	0.62*	0.31*	0.62*	0.70*	0.62*	0.68*

$p < 0.01$

The relationship between the level of alcohol dependence and mean daily alcohol consumption in a typical month is further explored in Figure 10. The relationship is non-linear, with evidence of a "threshold" of consumption of approximately 30g per day above which the score increases progressively. The relationship may reflect a primary association with another parameter of consumption, such as the frequency of hazardous drinking, rather than with the mean level as such.

FIGURE 10



Selection of the most appropriate items from this scale by statistical criteria is difficult. In view of the very high values for Cronbach's alpha and similar item-to-total correlation coefficients, many of the items can be regarded as interchangeable. Attention was also paid to the individual items which had the highest correlation with alcohol consumption. These were "alcohol on mind" and "blackouts". It was also considered advantageous if different elements of the dependence syndrome were represented.

Four questions were finally selected for the core screening instrument. They were:

"How often during the last year have you found it difficult to get the thought of alcohol out of your mind?"

"How often during the last year have you found that you were not able to stop drinking once you had started?"

"How often during the last year have you been unable to remember what happened the night before because you had been drinking?"

"How often during the last year have you needed a first drink in the morning to get yourself going after a drinking session?"

It should be noted that the third item enquires of "blackouts" which is not a central feature of dependence but is highly correlated with it.

8.3 CONSTRUCTION OF CORRELATION MATRIX

A correlation matrix (Table 31) was constructed of all the domains described so far, together with certain demographic variables and other items that have not been reported separately. The latter included (i) pulse rate, (ii) systolic blood pressure, (iii) diastolic blood pressure, (iv) cigarette consumption, (v) acknowledgement of an alcohol problem in the past and (vi) acknowledgement of one now. The correlation coefficients were calculated from the aggregated data of all the drinking patients drawn from the six centres.

The analyses demonstrated strong positive correlations between the various alcohol-specific scales and between them and alcohol intake. Consumption in a typical month was significantly correlated with alcohol dependence (r=0.51), negative alcohol reactions (r=0.44), alcohol problems ever (r=0.47), and alcohol problems in the last year (r=0.45). There was a similar pattern of correlation of the other intake variables (consumption on the previous 30 days and frequency of having six drinks or more on one occasion).

TABLE 31

CORRELATION MATRIX:
(all DP, n=818)

Pearsons r * 100

	sex	age	height	weight	subjective complaints	trauma history	clinical examination	alcohol dependence syndrome	negative alcohol reactions	positive alcohol reactions	alcohol problems ever	alcohol problems last year	pulse rate	systolic BP	diastolic BP	GGT	ASAT	ALAT	cigarettes per day	consumption typical month	consumption last month	six drinks or more	present alcohol problem
age	-09																						
height	-62	-04																					
weight	-37	14	53																				
subjective complaints	15	07	-22	-15																			
trauma history	-19	05	13	12	05																		
clinical examination	-15	18	04	01	34	20																	
dependence	-16	-04	00	-07	35	13	40																
negative alc. reactions	-12	-07	00	-06	41	10	38	71															
positive alc. reactions	-13	-13	07	01	13	07	23	33	31														
alcohol problems ever	-23	-05	10	-01	35	18	40	67	63	30													
alc.problems last year	-19	-05	02	-04	31	14	36	80	69	31	79												
pulse rate	03	08	-09	-06	13	-03	16	05	06	-07	01	00											
systolic BP	-16	26	22	26	-11	02	00	-01	-07	-08	-01	00	06										
diastolic BP	-11	30	11	21	-03	-06	02	01	-02	-08	-01	00	09	67									
GGT	-09	12	-01	06	14	09	26	22	17	-03	16	18	18	05	10								
ASAT	02	-02	11	05	-01	03	05	05	02	-01	03	03	04	-02	-05	23							
ALAT	01	-04	01	06	-03	03	01	00	-02	00	00	-01	02	-01	-03	14	96						
cigarettes per day	-12	05	10	02	11	18	20	12	13	04	24	12	10	-06	-02	07	-02	-03					
alc.cons. typical month	-35	04	24	12	09	24	35	51	44	42	47	45	02	-02	-03	21	04	-01	23				
alc.cons. last month	-11	-05	13	07	01	16	22	22	20	22	23	17	-10	00	-03	09	01	-01	11	50			
six drinks or more	-33	-07	21	12	10	18	31	50	44	42	50	48	04	00	-02	19	07	03	19	66	32		
present alc. problem	-06	00	-02	-04	26	11	29	63	53	19	53	57	06	01	00	22	05	00	14	34	21	33	
past alcohol problem	-09	-02	02	01	33	18	28	46	49	15	59	48	04	-02	02	16	02	-01	21	31	19	30	52

The alcohol dependence scale correlated highly with negative alcohol reactions (r=0.71), alcohol problems ever (r=0.67), and alcohol problems in the last year (r=0.80). It also showed a modest correlation with the clinical examination scale (r=0.40). "Alcohol problems ever" correlated with negative alcohol reactions (r=0.63), and dependence and consumption as described above. It also had a modest correlation with the clinical examination scale (r=0.40).

In contrast, subjective complaints had relatively weaker, albeit significant, correlations with alcohol dependence (r=0.35), negative alcohol reactions (r=0.41) and alcohol problems ever (r=0.35). It also showed a modest correlation with the clinical examination scale (r=0.34). The other major non-alcohol-specific domain, clinical examination, showed a similar pattern of correlation with alcohol dependence (r=0.40), negative alcohol reactions (r=0.38), alcohol problems ever (r=0.40), alcohol problems in the last year (r=0.36), and with intake in a typical month (r=0.35).

Of the variables not previously considered, the score for "alcohol problem now" was highly correlated with alcohol dependence (r=0.63), negative alcohol reactions (r=0.53), alcohol problems ever (r=0.53), and alcohol problems in the last year (r=0.57). "Alcohol problem in the past" showed a similar pattern of correlation.

8.4 PRINCIPAL COMPONENTS ANALYSIS

The inter-relationships among the scales and certain individual variables were explored further by principal components analysis (Table 32). The three "reference" measures of alcohol consumption, all the alcohol-specific scales with the exception of that on "people

TABLE 32

RESULTS OF PRINCIPAL COMPONENT ANALYSIS OF AGGREGATED DATA
(after Varimax rotation, DP, n=818)

Trace = 24.00

65.6 percent of trace extracted by 7 roots

	I	II	III	IV	V	VI	VII
1 alcohol cons. typical month	.35	.23	.00	-.02	.18	.73	-.12
2 alcohol cons. last month	.07	-.03	.03	.08	.27	.71	.19
3 six drinks or more	.42	.28	.04	-.09	.01	.61	-.17
4 subjective complaints	.49	-.36	-.05	-.01	.19	-.07	-.24
5 trauma history	.10	.14	.06	.00	.68	.13	.13
6 clinical examination	.36	-.06	.01	.09	.34	.31	-.41
7 ALAT	-.01	.02	.97	-.05	-.02	-.01	-.02
8 ASAT	.03	.01	.98	-.05	.00	.01	-.08
9 GGT	.18	.00	.27	.15	.14	.11	-.51
13 negative alcohol reactions	.80	-.03	-.02	-.07	-.01	.22	-.10
14 positive alcohol reactions	.24	.03	-.04	-.14	-.18	.64	.02
15 alcohol problemse ever	.83	.11	-.01	-.06	.14	.19	-.02
16 alcohol problems last year	.86	.06	.00	-.03	-.04	.19	-.01
18 alcohol dependence syndrome	.83	.00	.02	-.01	-.04	.28	-.09
19 sex	-.13	-.79	.05	-.03	-.08	-.16	.10
20 age	-.09	-.08	-.04	.59	.31	-.02	-.23
21 body height	-.01	.87	-.01	.04	.06	.08	.06
22 body weight	-.06	.67	.09	.26	.12	.00	.05
23 pulse rate	.02	-.03	-.03	.-3	-.07	-.10	-.81
24 systolic blood pressure	.02	.23	.02	.83	-.13	-.03	.04
25 diastolic blood pressure	.06	.12	-.23	.85	-.15	-.05	-.05
28 cigarettes per day	.14	.13	-.09	-.12	.58	.01	-.21
30 present alcohol problem	.74	-.06	.04	.04	.09	.10	-.01
31 past alcohol problem	.71	.00	.01	.02	.29	-.02	.06
Percent of trace	19.2	9.3	8.4	8.0	5.9	9.2	5.7

showing concern", the three non-alcohol-specific scales, together with serum transaminase and GGT activities, self-perception of an alcohol problem, and possibly predictive variables such as cigarette smoking, sex and age were included. The analysis was first performed for the whole sample of drinking patients (Table 32) and then for the national samples independently (Table 33). The terminal solution was achieved after Varimax rotation.

8.4.1 Results of analysis of aggregated data

From the aggregated data one dominant component emerged which accounted for 19% of the total variance. This is composed of most of the scales where alcohol is mentioned specifically. It includes the alcohol dependence syndrome (factor coefficient = 0.83), alcohol problems ever (0.83), alcohol problems in the last year (0.86), negative alcohol reactions (0.80), alcohol problem now (0.74), and alcohol problem in the past (0.71). Using a cut-off point of 0.40, two other items are included in this factor, namely frequency of intoxication ("six drinks or more") (0.42) and subjective complaints (0.49).

The three measures of alcohol intake, including the frequency of having six drinks or more, are located in Factor 6. Included in this factor is the scale "positive alcohol reactions" (coefficient 0.64). No alcohol-specific scale or item is located in any other factor, using the cut-off level of 0.40.

Other factors show logical clusters of items which are not alcohol-specific, nor clearly related to alcohol consumption, at least not in this sample. They include factor 3 (serum transaminases), factor 4 (systolic and diastolic blood pressure), and factor 5 (trauma history).

8.4.2 Results of analysis of national samples

The robustness of the main factor (which contains the alcohol-specific items) across the centres is illustrated in Table 33. In every centre it includes the following scales - alcohol dependence, alcohol problems ever, alcohol problems in the last year, negative alcohol reactions, past alcohol problems, consumption in a typical month and frequency of having six drinks or more.

TABLE 33

PRINCIPAL COMPONENT ANALYSIS
Structure of main factor
(only variables with loadings over .40)

AUSTRALIA (n=146, 23.9 %)		BULGARIA (n=150, 19.0 %)		KENYA (n=59, 26.8 %)	
15 alcohol problems ever	.82	16 alcohol problems last year	.81	18 alcohol dependence	.86
3 six drinks or more	.78	15 alcohol problems ever	.78	1 consumption typical month	.83
18 alcohol dependence	.78	18 alcohol dependence	.77	15 alcohol problems ever	.81
16 alcohol problems last year	.76	31 past alcohol problem	.73	16 alcohol problems last year	.80
1 consumption typical monht	.75	13 negative alcohol reactions	.70	13 negative alcohol reactions	.80
13 negative alcohol reactions	.71	30 present alcohol problem	.63	3 six drinks or more	.69
2 consumption last month	.70	1 consumption typical month	.60	30 present alcohol problem	.67
30 present alcohol problem	.61	3 six drinks or more	.47	31 past alcohol problem	.64
31 past alcohol problem	.59	28 cigarettes per day	.44	9 GGT	.55
6 clinical examination	.53	4 subjective complaints	.42	8 ASAT	.52
5 trauma history	.42	14 positive alcohol reactions	.41	6 clinical examination	.51
				14 positive alcohol reactions	.45
				7 ALAT	.44
				4 subjective complaints	.41

TABLE 33 (continued)

MEXICO (n=138, 32.1 %)		NORWAY (n=195, 26.1 %)		USA (n=130, 24. %)	
15 alcohol problems ever	.90	18 alcohol dependence	.84	18 alcohol dependence	.81
18 alcohol dependence	.89	16 alcohol problems last year	.82	3 six drinks or more	.76
16 alcohol problems last year	.89	15 alcohol problems ever	.78	15 alcohol problems ever	.75
13 negative alcohol reactions	.87	3 six drinks or more	.70	16 alcohol problems last year	.75
3 six drinks or more	.80	13 negative alcohol reactions	.70	1 consumption typical month	.75
1 consumption typical month	.79	1 consumption typical month	.68	13 negative alcohol reactions	.68
30 present alcohol problem	.78	30 present alcohol problem	.65	31 past alcohol problem	.66
6 clinical examination	.70	31 past alcohol problem	.63	2 consumption last month	.52
31 past alcohol problem	.59	28 cigarettes per day	.55	30 present alcohol problem	.52
14 positive alcohol reactions	.57	6 clinical examination	.53	6 clinical examination	.48
8 ASAT	.53	9 GGT	.49		
2 consumption last month	.52	4 subjective complaints	.48		
19 sex	.47	14 positive alcohol reactions	.40		
5 trauma history	.48				

8.5 THE SCREENING INSTRUMENTS

8.5.1 Observations on the analysis

When analysis was commenced, it was hoped that it would be possible to devise a screening instrument of sufficient accuracy that contained no items that specifically related to alcohol consumption. A "disguised" questionnaire or a procedure that relied on physical findings or biochemical results alone would have the considerable advantage of identifying likely harmful drinkers without their denial mechanisms being activated in the early stages of the process. It was envisaged that specific questions on alcohol consumption, dependence and alcohol-related problems would be asked later, either during a second phase of screening or during a diagnostic interview.

As analysis proceeded it became clear that it would not be possible to devise any such instrument that had cross-national validity, although a country-specific one might be possible. The non-alcohol-specific scales had relatively low intrascale reliability, as judged by Cronbach's alpha, compared with the alcohol-specific ones, and showed an inconstant relationship to alcohol consumption.

8.5.2 The "core" screening instrument

It was therefore decided to construct a screening instrument consisting of questions that specifically referred to alcohol. It is termed the "core" screening instrument (Table 34 and Appendix 3) and comprises ten simple questions. Seven have been chosen as the most representative of the following domains: alcohol dependence and "blackouts" (four questions), negative alcohol reactions (one question) and alcohol problems (two questions). All these domains showed high intrascale reliability across all centres and correlated highly with alcohol consumption. The questions themselves were selected on the basis of their high item-to-total score correlations, selection as most representative items in the stepwise multiple regression analysis, individual high correlation with alcohol consumption and high face validity.

Three additional questions on alcohol consumption have been included. In view of the conceptual distinctions between the level of alcohol consumption, dependence and alcohol-related problems, this was considered appropriate. The decision is supported by the results of the principal components analysis which demonstrated lower coefficients for the three consumption measures in the first principal component compared with those for other alcohol-specific scales, and by the location of the consumption measures in a second principal component.

The first of the three questions is taken from the assessment instrument and enquires of the frequency of taking any alcoholic drink. The second question concerns the amount of alcohol consumed on a typical drinking day. This is a new question that did not appear in the assessment instrument. This decision has been taken in view of the need for a direct question on the level of consumption, which is a risk factor for many physical complications such as cirrhosis of the liver and malignancy. The questions in the assessment instrument (questions 49-55) were not adopted for the screening instrument as they were too cumbersome for a screening procedure and would not be adaptable to a self-administered format. The third question, on the frequency of having six or more drinks on one occasion, was taken from the assessment instrument.

The "core" instrument is sufficiently brief that it can be incorporated easily into questionnaires that contain items on other aspects of lifestyle such as diet, cigarette smoking and exercise. This will be discussed further in Section 9.

8.5.3 Scoring the "core" instrument

Whenever possible the procedure for scoring the responses to the questions in the assessment instrument has been retained. The six questions on frequency of 6+ drinks, dependence, blackouts and negative alcohol reactions are scored in an identical manner, where "never" = 0 and "daily or almost daily" = 4. The response categories for the first question or frequency of drinking have been modified. Those for the final two questions on alcohol-related problems have also been modified so that if such a problem has occurred at any time, it scores 2 and if in the previous year, it scores 4. The scoring is summarized below:

Item 1:

Never	=	0
Monthly or less	=	1
Two to four times a month	=	2
Two to three times a wwek	=	3
Four or more times a week	=	4

Item 2:

1-2 drinks	=	0
3-4 drinks	=	1
5-6 drinks	=	2
7-9 drinks	=	3
10+ drinks	=	4

Items 3-8:

Never	=	0
Less than monthly	=	1
Monthly	=	2
Weekly	=	3
Daily or almost daily	=	4

Items 9 & 10

No	=	0
Yes, but not in the last year	=	2
Yes, during the last year	=	4

The maximum possible score is 40.

TABLE 34
WHO "CORE" SCREENING INSTRUMENT

Please circle the answer that is correct for you.

1. How often do you have a drink* containing alcohol?

NEVER	MONTHLY OR LESS	TWO TO FOUR TIMES A MONTH	TWO TO THREE TIMES A WEEK	FOUR OR MORE TIMES A WEEK

2. How many drinks containing alcohol do you have a on a typical day when you are drinking?

1 OR 2	3 OR 4	5 OR 6	7 - 9	10 OR MORE

3. How often do you have six or more drinks on one occasion?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

4. How often during the last year have you found it difficult to get the thought of alcohol out of your mind?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

5. How often during the last year have you found that you were not able to stop drinking once you had started?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

6. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

7. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

8. How often during the last year have you had a feeling of guilt or remorse after drinking?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

9. Have you or someone else been injured as a result of your drinking?

NO	YES, BUT NOT IN THE LAST YEAR	YES, DURING THE LAST YEAR

10. Has a relative or friend or a doctor or other health worker, been concerned about your drinking or suggested you cut down?

NO	YES, BUT NOT IN THE LAST YEAR	YES, DURING THE LAST YEAR

* One drink is (give national examples).

8.5.4 The non-alcohol-specific "clinical" procedure

A procedure comprising two questions on the trauma history, five items from the clinical examination (four of the "cardinal" Le Gô signs together with hepatomegaly) and the serum GGT has been devised for situations where it is considered advisable for the initial screening process not to refer directly to problems with alcohol. It is particularly relevant for those centres where the non-alcohol-specific scales were more reliable and more related to alcohol intake. They would include Mexico and Norway in particular. The clinical procedure is outlined in Table 35 and Appendix 4.

8.5.5 Scoring the results of the "clinical" screening procedure

The following scoring procedure is suggested:

Items 1 & 2:	No	= 0
	Yes	= 3
Items 3-7:	Not present	= 0
	Mild	= 1
	Moderate	= 2
	Severe	= 3
Item 8:	Lower normal (0-30 IU/l)	= 0
	Upper normal (30-50 IU/l)	= 1
	Abnormal (50 IU/l)	= 3

The maximum possible score is 24.

TABLE 35
WHO "CLINICAL" SCREENING PROCEDURE
(To be administered by an interviewer)

Trauma History

1. Have you injured your head since your eighteenth birthday?
   YES NO
2. Have you broken any bones since your eighteenth birthday?
   YES NO

Clinical Examination

3. Conjunctival injection
   NOT PRESENT MILD MODERATE SEVERE
4. Abnormal skin vascularisation
   NOT PRESENT MILD MODERATE SEVERE
5. Hand tremor
   NOT PRESENT MILD MODERATE SEVERE
6. Tongue tremor
   NOT PRESENT MILD MODERATE SEVERE
7. Hepatomegaly
   NOT PRESENT MILD MODERATE SEVERE

Blood Tests

8. GGT
   LOWER NORMAL UPPER NORMAL ABNORMAL

8.6 TESTING THE INSTRUMENTS

8.6.1 Distribution of scores and determination of cut-off points for the "core" instrument

Figure 11 shows the distribution of scores for the "core" instrument for both the drinking patients and alcoholics from each centre. The distribution of scores in the alcoholics suggests that, for the "core" instrument, a cut-off point of between 10 and 11 would be appropriate for a preliminary assessment of its validity, in that all the known alcoholics in three countries and 96% or more in the other three had a score of 11 or more and would be classified as "positive" cases. In the assessment of validity, a shortened form of this questionnaire consisting only of questions 4-10 was constructed. A cut-off of between 4 and 5 is suggested for this.

8.6.2 Validity of "core" instrument

The sensitivity, specificity, predictive value of a positive result and a predictive value of a negative result for the "core" screening instrument were calculated for the drinking patients using a hazardous alcohol consumption as the criterion for a "positive" case. This was defined as a mean daily alcohol intake in a typical month of 40g or more for males or 20g or more for females.

The results are presented in Table 36. The sensitivity of the "core" instrument among all drinking patients ranged from 65% (in Bulgaria) to 95% (in Mexico) with a mean value of 80%. It was 80% or more in four countries. The overall sensitivity was higher in men than in women. The specificity in the whole group ranged from 83% to 94% with a mean value of 89%. It was higher in women than in men. The positive predictive value ranged from 42% to 81% with a mean value of 60% and the predictive value of a negative result from 91% to 97% with a mean value of 95%.

As the "core" instrument contains a question on the level of alcohol consumption, there is a problem of circularity and potential invalidity in that the reference standard is the same, although not measured on the same scale. Testing the validity of a subsection of the core instrument (questions 4-10) was undertaken to overcome this difficulty. The pattern of results was similar, although with the questions on consumption removed, the sensitivity, specificity and predictive capacity of the instrument were lower (Table 37). It should be emphasized that consumption and experience of dependence and/or problems are conceptually different entities, even though they may correlate with each other highly.

8.6.3 Distribution of scores and determination of cut-off points for the "clinical" procedure

The distribution of scores for the "clinical" procedure was more evenly distributed among the alcoholics than was evident for the "core" questionnaire (Figure 12); hence the greater difficulty in determining the appropriate cut-off point. From the distribution in the Australian, Norwegian and USA alcoholics, a cut-off level of between 4 and 5 is suggested.

8.6.4 Validity of the "clinical" procedure

Using a score of 5 or more as indicating a "positive" case, the sensitivity, specificity and positive and negative predictive values of the clinical procedure were examined, again using hazardous alcohol consumption as previously defined, in the drinking patients as the reference standard. The sensitivity varied from a low of 13% in Bulgaria to 67% in Norway with a mean value of 41%. The specificity was more acceptable, ranging from 81% to 97% with a mean of 92%. The overall predictive value of positive results was 49% and of negative results 89% (Table 38).

It performed poorly in comparison with the "core" instrument in all centres except Norway, where it was superior. The marked centre-to-centre variation in validity suggests that disguised screening procedures may be feasible but that country-specific ones may need to be devised, and furthermore that different ones may be required in different health care facilities.

FIGURE 11

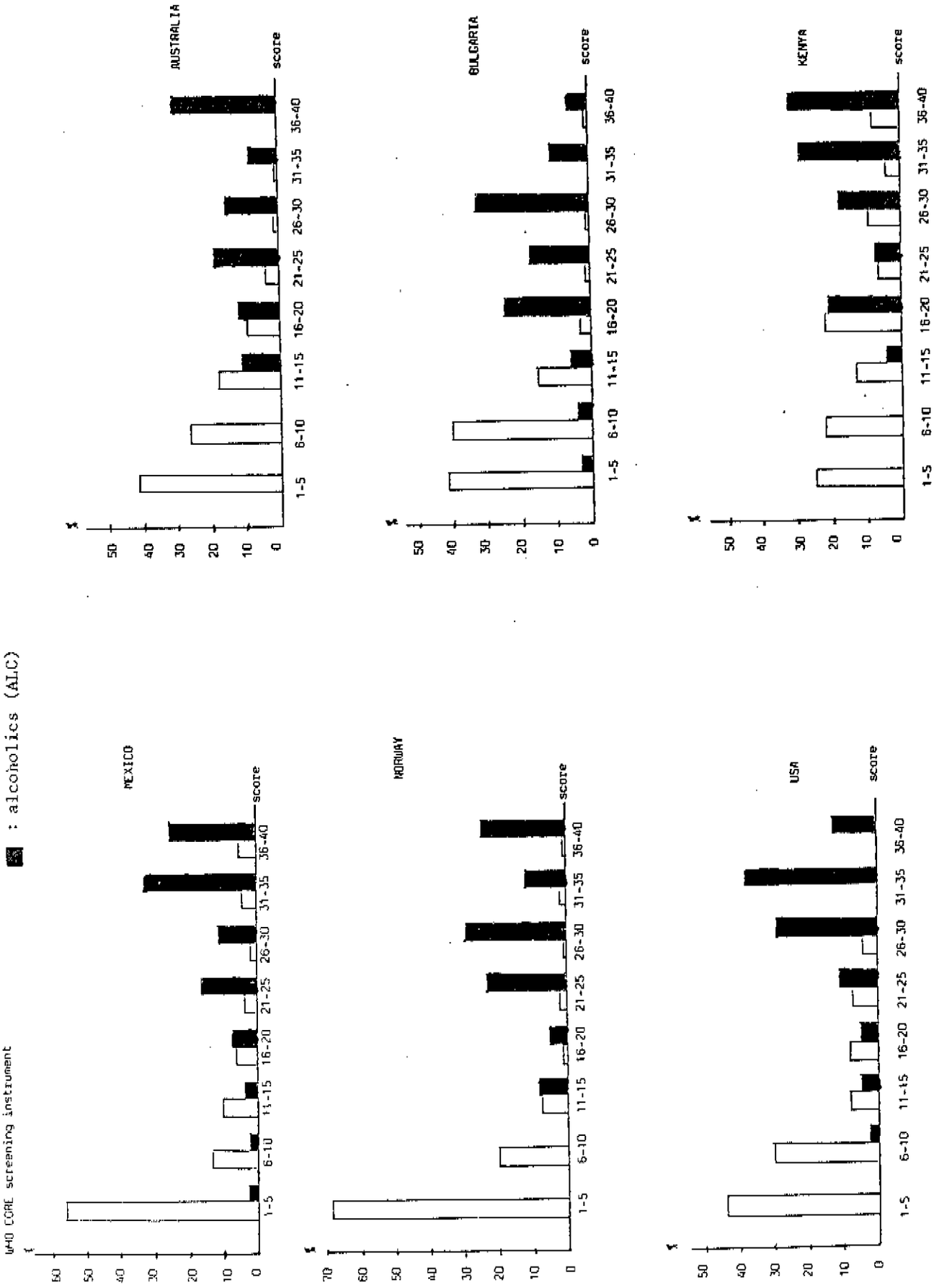

AUSTRALIA
BULGARIA
KENYA
MEXICO
NORWAY
USA
score
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
%
: drinking patients (DP)
: alcoholics (ALC)
WHO CORE screening instrument

TABLE 36
VALIDITY OF THE "CORE" SCREENING INSTRUMENT
AS AN INDICATOR OF HAZARDOUS* ALCOHOL CONSUMPTION

COUNTRY/ SAMPLE	VALIDITY IN DETECTION OF HAZARDOUS ALCOHOL CONSUMPTION IN DRINKING PATIENTS					
	SENSITIVITY (%)	SPECIFICITY (%)	[PREVALENCE] (%)	PREDICTIVE VALUE OF POSITIVE RESULT (%)	PREDICTIVE VALUE OF NEGATIVE RESULT (%)	SENSITIVITY IN SAMPLE OF ALCOHOLICS (%)
AUSTRALIA						
- BOTH SEXES	81	87	19	60	95	96
- MALES	81	81	25	58	93	
- FEMALES	80	96	9	67	98	
BULGARIA						
- BOTH SEXES	65	92	21	67	91	97
- MALES	63	90	22	63	90	
- FEMALES	-	-	-	-	-	
KENYA						
- BOTH SEXES	88	84	43	81	91	100
- MALES	100	83	40	80	100	
- FEMALES	60	89	53	86	67	
MEXICO						
- BOTH SEXES	95	83	13	46	99	96
- MALES	100	74	19	47	100	
- FEMALES	-	-	-	-	-	
NORWAY						
- BOTH SEXES	62	94	6	42	97	100
- MALES	64	89	11	41	95	
- FEMALES	-	-	-	-	-	
USA						
- BOTH SEXES	81	86	19	57	95	100
- MALES	88	78	21	52	96	
- FEMALES	70	94	16	70	94	
ALL CENTRES						
- BOTH SEXES	80	89	17	60	95	98
- MALES	82	83	22	58	94	
- FEMALES	69	96	10	69	96	

A "positive" result was defined as a score of 11 or more.
* For the purposes of constructing this table, hazardous alcohol consumption has been defined as a mean daily intake of 40g or more for males and 20g or more for females.
- indicates that the prevalence of hazardous alcohol consumption was too low for the sample size to be adequate.

TABLE 37
VALIDITY OF THE "CORE" SCREENING INSTRUMENT, EXCLUDING QUESTIONS ON QUANTITY AND FREQUENCY OF CONSUMPTION, AS AN INDICATOR OF HAZARDOUS* ALCOHOL CONSUMPTION

COUNTRY/ SAMPLE	VALIDITY IN DETECTION OF HAZARDOUS ALCOHOL CONSUMPTION IN DRINKING PATIENTS					
	SENSITIVITY (%)	SPECIFICITY (%)	[PREVALENCE] (%)	PREDICTIVE VALUE OF POSITIVE RESULT (%)	PREDICTIVE VALUE OF NEGATIVE RESULT (%)	SENSITIVITY IN SAMPLE OF ALCOHOLICS (%)
AUSTRALIA						
- BOTH SEXES	61	91	19	61	91	93
- MALES	65	87	26	63	89	
- FEMALES	40	96	8	50	94	
BULGARIA						
- BOTH SEXES	30	97	20	71	84	95
- MALES	33	96	21	71	84	
- FEMALES	-	-	-	-	-	
KENYA						
- BOTH SEXES	82	82	40	78	86	96
- MALES	96	81	40	77	97	
- FEMALES	50	89	40	83	62	
MEXICO						
- BOTH SEXES	95	80	10	42	99	93
- MALES	100	71	16	44	100	
- FEMALES	-	-	-	-	-	
NORWAY						
- BOTH SEXES	62	91	6	47	97	98
- MALES	64	86	11	37	95	
- FEMALES	-	-	-	-	-	
USA						
- BOTH SEXES	77	81	19	49	94	95
- MALES	88	77	21	50	96	
- FEMALES	60	87	16	46	92	
ALL CENTRES						
- BOTH SEXES	66	88	17	54	92	95
- MALES	71	85	21	57	91	
- FEMALES	49	93	10	45	94	

A "positive" result was defined as a score of 5 or more from questions 4-10 of the core instrument.

* For the purposes of constructing this table, hazardous alcohol consumption has been defined as a mean daily intake of 40g or more for males and 20g or more for females.

- indicates that the prevalence of hazardous alcohol consumption was too low for the sample size to be adequate.

FIGURE 12

WHO clinical screening procedure

[ ] : drinking patients (DP)

▪ : alcoholics (ALC)

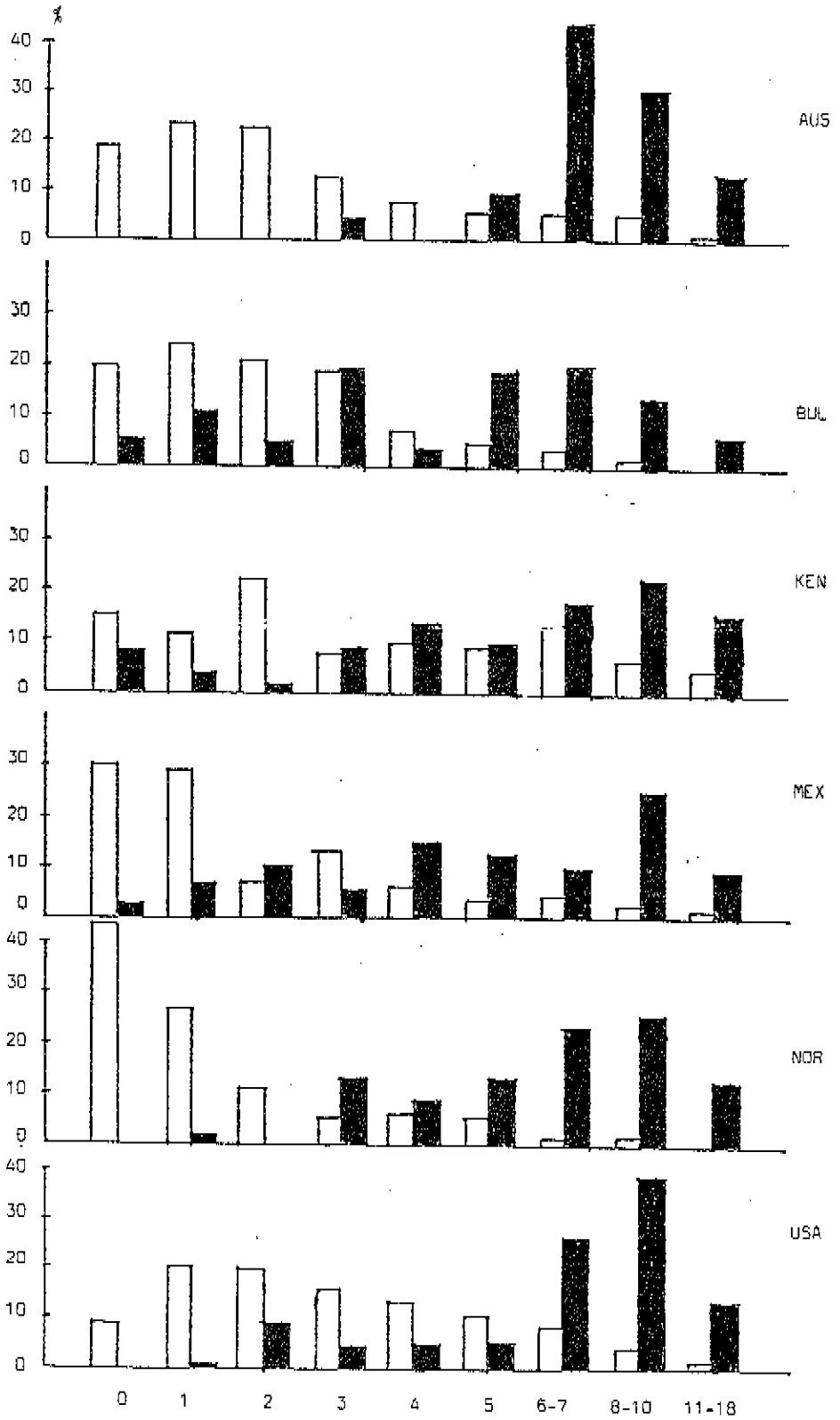


TABLE 38
VALIDITY OF THE NON-ALCOHOL-SPECIFIC "CLINICAL" SCREENING INSTRUMENT AS AN INDICATOR OF HAZARDOUS* ALCOHOL CONSUMPTION

COUNTRY/ SAMPLE	VALIDITY IN DETECTION OF HAZARDOUS ALCOHOL CONSUMPTION IN DRINKING PATIENTS					
	SENSITIVITY (%)	SPECIFICITY (%)	[PREVALENCE] (%)	PREDICTIVE VALUE OF POSITIVE RESULT (%)	PREDICTIVE VALUE OF NEGATIVE RESULT (%)	SENSITIVITY IN SAMPLE OF ALCOHOLICS (%)
AUSTRALIA						
- BOTH SEXES	41	93	20	55	87	96
- MALES	37	88	26	53	80	
- FEMALES	50	98	9	67	96	
BULGARIA						
- BOTH SEXES	13	93	21	31	82	60
- MALES	13	93	22	33	80	
- FEMALES	-	-	-	-	-	
KENYA						
- BOTH SEXES	56	81	41	65	73	66
- MALES	52	84	39	69	72	
- FEMALES	63	75	53	71	67	
MEXICO						
- BOTH SEXES	64	95	13	60	96	62
- MALES	69	91	18	60	94	
- FEMALES	-	-	-	-	-	
NORWAY						
- BOTH SEXES	67	97	6	57	98	78
- MALES	64	95	11	64	95	
- FEMALES	-	-	-	-	-	
USA						
- BOTH SEXES	38	82	17	29	88	82
- MALES	40	74	21	29	82	
- FEMALES	30	92	11	43	87	
ALL CENTRES						
- BOTH SEXES	41	92	17	49	89	
- MALES	40	89	22	50	85	
- FEMALES	39	97	10	57	94	

A "positive" result was defined as a score of 5 or more.
* For the purposes of constructing this table, hazardous alcohol consumption has been defined as a mean daily intake of 40g or more for males and 20g or more for females.
- indicates that the prevalence of hazardous alcohol consumption was too low for the sample size to be adequate.

9. DISCUSSION

9.1 CONCEPT OF THE STUDY

At the outset of this study, it was acknowledged that for the proposed screening instrument to be acceptable it must have four essential attributes:

(i) it must be valid in the identification of subjects with harmful or hazardous alcohol consumption and those who are at risk of developing problems because of their drinking habits;

(ii) it must be valid across different settings and cultures;

(iii) it must be simple enough to encourage its use by health professionals; and

(iv) it must be useful for the purposes of intervention.

The present study represents a major departure in many respects from previous ones that have been concerned with the development of screening instruments. Firstly, this is a truly cross-national investigation: the instruments were derived on the basis of samples drawn from very diverse countries and cultures and were not constrained by cultural preconceptions as to the nature of harmful alcohol consumption. Secondly, the samples were drawn from persons presenting to a variety of health care settings - general practice, emergency departments, psychiatric services and general hospitals. They thus represent a very broad spectrum of persons attending for health care. Thirdly, the focus was essentially on sub-clinical problems: patients who had presented for treatment of alcoholism or who had a history of such treatment were excluded from the sample. Following from this, items were selected not on their capacity to distinguish "alcoholics" from "normal drinkers", but on their representativeness for particular domains and their correlation with alcohol intake.

9.2 REFERENCE CRITERIA

9.2.1 Definitions of harmful and hazardous alcohol consumption

The concept of validity as applied to screening instruments for harmful alcohol consumption is a rather nebulous one in that there are no universally accepted criteria as to what constitutes a "case" by which the sensitivity and specificity of an instrument can be gauged. For the purposes of the present study, "harmful alcohol consumption" was defined as the use of alcohol that is currently causing harm to the mental health or physical well-being of the individual. "Hazardous alcohol consumption" is defined as a level of consumption or a pattern of drinking that is likely to result in harm and was employed in the present study as an interim reference standard. Although the definition of harmful alcohol consumption does not explicitly exclude established "alcoholics", there was agreement that the focus should be on detecting the early-stage rather than the late-stage problem drinker.

9.2.2 Contrasts in screening for categorical and continuous disorders

Screening is classically applied to diseases which are relatively discreet, capable of precise definition and for which the indications for treatment are reasonably well established. As was discussed in Section 2, alcohol-related disabilities do not fulfil these criteria. However, it can be argued that they are unnecessarily strict and many physical and psychiatric problems that are "screened" for do not fulfil them either. An appropriate analogy is hypertension which, like alcohol problems, exists as a continuum. The level of blood pressure above which treatment is necessary is still imperfectly defined, but nonetheless, screening has proved a cost-effective way of reducing morbidity.

Hazardous and harmful alcohol consumption exist as continua (Figures 1, 2, 4, 5). However, the physical problems (e.g. liver disease), psychological problems (e.g. anxiety) and social ones (e.g. marital disharmony) are so disparate, that there would seem no *a priori* justification for considering them as part of a whole, but rather a collection of separate

entities, with alcohol being only one of a number of aetiological factors. As discussed in Section 2, the past two decades has seen a movement away from unitary concepts of "alcoholism" to a "disaggregation" approach. In 1977, WHO endorsed the conceptual distinction between the alcohol dependence syndrome and alcohol-related disabilities, and this influenced the approach to analysis adopted in the present study.

9.2.3 Selection of the reference standards

At the start of the data analysis it seemed appropriate to seek items that were representative of a particular domain rather than to select ones that discriminated best between persons with harmful alcohol consumption and those with non-harmful and non-hazardous drinking habits. Thus, data reduction procedures rather than classification procedures, such as logistic regression or discriminant analysis, were adopted for initial data analysis. In deriving the representative items, the reference point was, therefore, the total score for that particular scale. As the analysis proceeded, it became clear that the scales comprising alcohol-specific questions, such as negative alcohol reactions, alcohol dependence and "alcohol problems ever" correlated highly with each other and were located in the first principal component in the samples from all six participating centres, and had coefficients that were nearly identical. In contrast, many of the items that did not contain any direct reference to alcohol (but were considered to be potentially useful indicators of harmful alcohol consumption) did not correlate significantly with alcohol use across the centres. The three measures of alcohol use, mean daily intake over a typical month, mean intake over the previous month and frequency of having six drinks or more on a single occasion, in effect formed the reference standards, and in the testing of the instruments (Section 8.6) the criterion of 40g alcohol per day in a typical month was selected for men and 20g per day for women.

9.2.4 Considerations in using intake measures as reference criteria

By using these reference criteria, it could be argued that a screening instrument need consist only of questions on the amount and frequency of drinking, and indeed that it would be a diagnostic instrument rather than a screening tool. For a number of reasons the three measures of alcohol use can only be regarded as provisional reference standards:

1. Mean daily alcohol intake and the frequency of intoxication are not the sole determinants of harm. The coefficients for these variables in the first principal component (0.35 for the typical intake and 0.42 for having six drinks or more in one session) are substantially lower than for the other alcohol-specific scales (0.71 to 0.86) with the exception of "positive alcohol reactions" (0.24). Furthermore the intake variables were located in a second principal component, unlike the other items.

2. Although the validation study indicated that the patients' self-reports agreed with information from collateral informants to a satisfactory degree, the degree of approximation is greater than that for more discreet variables such as experience of blackouts or advice to reduce drinking.

3. The risk levels of alcohol intake have been established for only a limited number of physical disorders and the threshold level for the development of alcohol dependence is unknown.

9.3 ALTERNATIVE APPROACHES TO VALIDATION

Several existing screening and assessment instruments have gone through various stages in their development, depending on the type of information that is available to define reference criteria. With cross-sectional survey data available, the concurrent validity of proposed screening instruments can be assessed against the whole body of alcohol-related variables. A composite score for current alcohol-related morbidity is devised and the sensitivity and specificity of the instrument calculated using a cut-off point for that score based on a certain level of morbidity above which intervention is considered necessary. The sensitivity and specificity of different instruments in detecting various degrees of harm can be compared by taking different points on the scale as the reference criterion.

If an external assessment of alcohol-related disability, say by an experienced clinician, is available, an instrument can be selected on the basis of its diagnostic validity. Although this approach has been adopted in the derivation of the "MAST" (Selzer, 1971) and the "SADQ" (Stockwell et al., 1983) it is not feasible for a multicentre, international study such as the present one.

Of particular relevance to the detection of hazardous alcohol consumption is to compare the predictive validity of the instruments. Which is most accurate in defining those who develop significant alcohol-related harm? This more rigorous approach entails following up patients over a period of, say, two years to determine who experience significant alcohol-related morbidity as classified by pre-defined criteria or alternatively to construct an ordinal-level morbidity scale. The instrument would then be devised using logistic regression or ordinal regression techniques. The advantages of this approach are several:

(i) even though the overall validity of the data obtained at initial assessment may be acceptable, a minority of heavy drinkers may conceal their true intake or experience of problems;

(ii) some symptoms of dependency (e.g. skipping meals because of drinking) or problems are in themselves relatively insignificant and may be evanescent, not meriting any intervention;

(iii) different sources of information during a period of follow-up provide a more comprehensive picture of the person's experience of alcohol-related harm (Vaillant, 1983).

The experience in Malmö (Kristenson and Hood, 1984) points to the value of follow-up and having objective measures of alcohol-related morbidity (such as hospitalizations, offences and deaths) in assessing the value of a screening procedure. Patients from two of the centres in the present study are being followed up. The predictive validity of the provisional instruments presented in Tables 34 and 35 will be determined and any necessary revisions to the procedures will be made.

9.4 DERIVATION OF THE INSTRUMENTS

For the purposes of the present study it was decided that the most suitable approach was to identify representative items within a conceptual domain for inclusion in a screening instrument. To group items in the assessment instrument into conceptual domains was straightforward in some cases (e.g. symptoms of alcohol dependency). However, in others (e.g. subjective complaints) it was less easy to decide whether to aggregate all the items within one scale or whether to subdivide this into smaller groupings (such as physical withdrawal symptoms, affective symptoms) which might have greater construct validity and reliability. After preliminary analysis it was decided on the former approach. The next step was to calculate the correlations for the score for the item with the combined score for the remaining items. The Pearson product-moment correlation coefficient was computed. Strictly this requires interval-level data. However, it is a robust technique and is widely employed for ordinal-level data. Parallel analyses where the frequency of response was converted to a true interval-level frequency score indicated that the former method, which was simpler, did not result in spurious correlations. Indeed it can be argued that to convert the raw frequency scores to true ones (i.e. days per year) would confer a spurious accuracy on the data in that no frequency between weekly (52 times per year) and daily or nearly daily (approx. 300 times per year) was offered as a response. Another possible method is to weight items in a scale according to their perceived importance. Although superficially attractive this approach would lead to difficulty in agreement on the weightings to be used and of combining these with a measure of the frequency of occurrence. To calculate the item to total score coefficients for categorical variables the biserial correlation coefficient was calculated.

When a scale had acceptable alpha coefficients across the centres representative items from it were selected on the basis of multiple regression analysis. The correlation of these items with alcohol intake was also assessed. This was necessary in particular for the non-alcohol-specific scales whose reliability was generally lower and where the domain score had a weak or null relationship with alcohol use. Although the thrust of the initial

analysis was to reduce the vast body of data to a limited number of representative items the objective, to devise a screening instrument, demanded that individual items were positively correlated with the reference variables.

9.5 SELECTION OF ITEMS FOR THE INSTRUMENTS

9.5.1 The non-alcohol-specific items

The results of the analysis were different in many respects from what had been anticipated. Although the subjective complaints domain was moderately reliable in terms of its scale measurement properties, it had a disappointingly low correlation with alcohol intake in most centres. This is somewhat surprising as in clinical populations of heavy drinkers, nausea, vomiting, abdominal pain, sleep disturbance, anxiety and depression are common, indeed almost universal complaints (Holt, Skinner & Israel, 1981). This is one illustration of the inappropriateness of devising screening tests for harmful alcohol consumption on the basis of responses from established alcoholics. On inspection of a plot of the subjective complaints score against clinical examination, it is clear that a non-linear relationship exists such that the score increases only after a "threshold" intake of 30-80g/day is reached. It would be valuable to explore these relationships further using non-linear regression. For the present no items from this scale have been included in the screening instruments proposed though the four most suitable questions have been identified for possible inclusion in a disguised instrument.

The clinical examination scale showed moderate reliability and a positive correlation of the total score with at least one measure of alcohol use in five of the six centres. The lack of a significant correlation with alcohol use in the Bulgarian subjects may reflect the changes in physical findings that had occurred during hospitalization before subjects were examined. The reason why the correlations are weaker in the USA patients remains unexplained, as their alcohol intake was comparable with that of patients in most of the other countries and they had continued drinking up until the time of recruitment. There was evidence of a non-linear relationship with alcohol intake for this domain too, in that the score increased in the 30-80g/day range and progressively from 80g/day upwards. Other investigators have commented that abnormal clinical signs are seen predominantly in established heavy drinkers and are therefore late rather than early indicators of harmful alcohol consumption (Holt et al., 1981).

9.5.2 Laboratory tests

The results of the laboratory tests confirmed their limited usefulness in the diagnosis of harmful alcohol consumption in many health care settings. This is in contrast to their known sensitivity in patients with physical complications from long standing heavy alcohol consumption. Again, this may in part be due to the lengthy periods of abstinence from alcohol before patients were recruited in some centres and it could be argued that as a result they have been shown in a disadvantageous light. The blood alcohol concentration, a screening test that has been advocated increasingly after many years of neglect was significantly correlated with alcohol intake only in the USA patients. Again this may reflect the length of abstinence from alcohol.

It is of course quite possible that these markers together with the subjective complaints and clinical examination scales may prove to be useful predictors of alcohol-related morbidity when information on the outcome in the drinking patients is available. Subjects with a high blood alcohol concentration may especially give an inaccurate account of their alcohol use. At the present time none has been selected for the core screening instrument. For the "clinical" screening procedure, serum GGT was considered to be eligible for inclusion.

9.5.3 Alcohol-specific items

Those scales where alcohol was mentioned specifically correlated more highly with alcohol intake than did the non-specific ones. In addition the alpha coefficients were generally higher for scales of comparable size than for the non-specific scales. The reliability was similar to that of well-established alcoholism scales such as the MAST (Skinner and Sheu, 1982). Three questions - (i) guilt after drinking, (ii) concern about drinking and advice to cut down and (iii) injuries because of drinking - have been included as most representative

of these domains in the core screening instrument. An exceptionally consistent domain was the alcohol dependence syndrome, of which had alpha reliability coefficients of 0.89 or more in five of the six countries. It correlated highly with alcohol intake across all centres. This is further support for the dimensionality of the alcohol dependence syndrome, its existence in a broad spectrum of drinking patients before they come to clinical attention, and its essential robustness across different cultures. Of the fourteen items in this scale four were included in the provisional screening instrument.

When the relationship between scores for alcohol-specific scales and daily alcohol intake was examined, it was apparent that above an intake of 10g/day there was a linear relationship. At the risk of inferring causality it would seem that there is a lower threshold level of intake for dependence symptoms and alcohol-related social problems than for physical abnormalities.

Three further questions on quantitative alcohol intake were included in the ten-item core instrument. It can be debated whether this is justified from the present analysis as only one of these questions (on frequency of drinking six drinks or more) was included in the assessment instrument. It would, however, seem advisable to include them in that the quantity and frequency of alcohol consumed were used as the standards by which the relevance of the other domains could be gauged. The method by which alcohol intake was ascertained in the assessment instrument would be too complicated for a screening procedure. Accordingly, two relatively simple questions, one on frequency of drinking (How many days a week would you have a drink containing alcohol?) and one on the quantity of alcohol consumed (How many drinks containing alcohol would you have on a day when you were drinking?) were devised as the most inclusive questions that would be suitable for a screening instrument.

The number of questions selected from each domain was to some extent arbitrary. It was considered desirable to have approximately equal numbers of questions on dependence, problems and alcohol intake. An advantage of the items selected is that they have face validity and could be employed as the starting point for discussion of a patient's drinking behaviour.

9.5.4 Findings on principal components analysis

Examination of the correlation matrix and the principal components analysis provided further support for selecting alcohol-specific questions for the "core" screening instrument. Most of the alcohol-specific scales were highly correlated with each other and from the principal components analysis one dominant factor emerged which comprised nearly all the alcohol-specific scales - alcohol dependence, alcohol problems ever, alcohol problems in the last year, negative alcohol reactions, and alcohol problems in the past and present. All these scales had coefficients of 0.71 and above. Consumption in a typical month was also included but it had a lower coefficient (0.35). It was noteworthy that none of these scales, with the exception of consumption in a typical month, occurred in the other factors at the cut off level of 0.40 chosen. Positive alcohol reactions was the only alcohol-specific scale that was located in a separate factor. In view of the conceptual distinction between the alcohol dependence syndrome and alcohol-related disabilities (Edwards et al., 1977) it might have been anticipated that two major factors would have emerged from the analysis. Although principal components analysis is a procedure which mathematically favours the reduction of items to one major factor, nonetheless the similarities in the factor coefficients of alcohol dependence and the various alcohol-related problems in Factor 1 suggest a more unitary "alcohol use disorder". If not, at least the two domains co-vary to a greater extent in non-clinical populations than had been supposed hitherto.

9.6 COMPARISON WITH EXISTING INSTRUMENTS

9.6.1 The "core" instrument

The items selected for the "core" screening instrument are quite dissimilar from those in existing alcoholism questionnaires. Table 39 compares the items in the "core" instrument with the ten questions of the Brief MAST (Pokorny et al., 1972). Four of the MAST questions concern previous experience of intervention (A.A., sought help for drinking and hospitalization) or of severe withdrawal symptoms (D.T.'s). Persons who respond affirmatively to these can be considered to be a "clinical" population in that they have already availed themselves of health care facilities and self-help groups. Most would have been excluded from the "drinking patient" sample in the present study.

Four other questions in the Brief MAST concern social problems caused by drinking (lost friends, trouble at work, neglected obligations, drunken driving). However, with the exception of the question on neglect of obligations which reflects the salience of drinking, there are no questions on symptoms of the alcohol dependence syndrome. In contrast the "core" WHO instrument includes four questions from this domain which had the highest scale reliability and consistency across all centres of any section of the assessment instrument. Finally, the Brief MAST seeks to distinguish "normal" from "abnormal" drinkers emphasizing the disease concept that was prevalent at the time it was devised. It contains no quantitative items about alcohol use.

TABLE 39

	"Core" Instrument	Brief MAST
1.	How many days a week would you have a drink containing alcohol?	Do you feel you are a normal drinker?
2.	How many drinks containing alcohol do you have on a typical day when you are drinking?	Do friends or relatives think you are a normal drinker?
3.	How often do you have six or more drinks on one occasion?	Have you ever attended a meeting of Alcoholics Anonymous?
4.	How often during the last year have you found it difficult to get the thought of alcohol out of your mind?	Have you ever lost friends or girlfriends or boyfriends because of drinking?
5.	How often during the last year have you not been able to stop drinking once you had started?	Have you ever got into trouble at work because of drinking?
6.	How often during the last year have you found it difficult to stop drinking before you became intoxicated?	Have you ever neglected your obligations, your family or your work for two or more days in a row because you were drinking?
7.	How often have you needed a first drink in the morning during the last year?	Have you ever had delirium tremens (DTs), severe shaking, heard voices or seen things that were not there after heavy drinking?
8.	How often during the last year have you had a feeling of guilt or remorse after drinking?	Have you ever gone to anyone for help about your drinking?
9.	Have you or someone else ever been injured as a result of your drinking?	Have you ever been in a hospital because of drinking?
10.	Has a relative or friend ever been concerned about your drinking or suggested you cut down?	Have you ever been arrested for drunken driving or driving after drinking?

9.6.2 The non-alcohol-specific items

Other investigators have had more favourable experience with using physical complaints, the medical history and findings on clinical examination as indicators of harm from alcohol. Skinner et al., (1984) reported that 70% of problem drinkers could be identified from a trauma scale. The sensitivity of the "Le Gô" items was greater in the sample of railway workers studied by Le Gô than in the patients having an alcohol intake exceeding 40g per day in the present study. It would appear that most investigators have developed their instruments from responses of more severely dependent and symptomatic "alcoholics" than were included in the "drinking patient" sample.

9.7 ROLE OF THE INSTRUMENTS IN SCREENING

The ten-item "core" instrument is a simple instrument and therefore has many advantages as a screening tool. It takes only a few minutes to complete, it can be used as a self-administered instrument or administered by an interviewer with minimal training (not necessarily a health worker), it is cheap, transportable and can be scrutinized quickly. It is equally applicable to screening large populations or to aid case detection in a clinical setting where it can be incorporated in the normal consultation process.

In situations where it is thought desirable to avoid direct questions on alcohol in the initial screening process a two-stage procedure is proposed. The initial "clinical" procedure includes two questions on the trauma history, five items of clinical examination and the serum GGT. Given the present findings it is unlikely that this procedure would be considered suitable as the sole screening instrument except perhaps in Nordic countries. It would be most applicable as the first phase of a sequential screening procedure. In most countries we envisage that all persons undergoing screening would be asked to complete the "core" questionnaire irrespective of their scores for the non-specific items. Furthermore, the "clinical" procedure is not suitable for mass screening, where medical skills and laboratories are in short supply or are distant from the population being screened. Any procedure which incorporates clinical examination and biochemical studies is more appropriate as an aid to diagnosis during the course of a medical consultation.

The "core" screening instrument is sufficiently short that it can be incorporated in lifestyle assessment procedures such as those developed by Skinner et al. (1985a,b). The inclusion of other lifestyle issues has the advantage of making the screening procedure less confronting and having more general application by incorporating items on cigarette smoking, drug history, diet and exercise. The "core" screening instrument could also be adapted for presentation by microcomputer. A decision on intervention could be made while the subject is still present.

9.8 CONCLUDING REMARKS

The present study is closely linked to a WHO collaborative study on early intervention for alcohol problems. The ultimate aim is to combine a valid screening procedure, a brief diagnostic interview, and an intervention strategy that can be employed at the point of first contact with the subject, whether this be in a mass screening programme, in family practice, or an occupational health service. Delivery of the intervention at the point of first contact is preferable to referral to another agency because of the high rate of attrition that occurs in the referral process. The medical and psychological approach to therapy for alcohol problems emphasizes early detection and intervention, whilst health promotion emphasizes prevention rather than the treatment of established diseases. The last two or three years have seen a welcome convergence of these approaches. The WHO study described in this report represents the most comprehensive consolidation of cross-national experience in this area that has been achieved to date.

10. REFERENCES

Aasland, O.G., Bruusgaard, D. & Rutle, O. Alcohol problems in general practice. British Journal of Addiction, in press.

Amundsen, A. (1986) FOSS Veiledning for brukere (File-orientated-statistical system manual).

Babor, T.F., Treffardier, M., Weill, J., Fegeur, C. & Ferrant, J.P. (1983) The early detection and secondary prevention of alcoholism in France. Journal of Studies on Alcohol, 44, 600-616.

Barrison, I.G., Viola, L., Mumford, J., Murray, R.M., Gordon, M. & Murray-Lyon (1982) Detecting excessive drinking among admissions to a general hospital. Health Trends, 14, 80-83.

Bernadt M.W., Mumford, J., Murray, R.M. (1984) A discriminant-function analysis of screening tests for excessive drinking and alcoholism. Journal of Studies on Alcohol, 45, 81-86.

Bernadt, M.W., Mumford J., Taylor, C., Smith, B., Murray, R.M. (1982) Comparison of questionnaire and laboratory tests in the detection of excessive drinking and alcoholism. Lancet, I, 325-328.

Chick, J. (1980) Is there a unidimensional alcohol dependence syndrome? British Journal of Addiction, 75, 265-280.

Chick, J., Kreitman, N. & Plant, M. (1981) Mean cell volume and gamma-glutamyl-transpeptidase as markers of drinking in working men. Lancet, I, 1249-1251.

Chick, J., Lloyd, G. & Crombie, E. (1985) Counselling problem drinkers in medical wards: a controlled study. British Medical Journal, 290, 965-967.

Clark, P., Holder, R. Mullet, M. & Whitehead, T.P. (1983) Sensitivity and specificity of laboratory tests for alcohol abuse. Alcohol and Alcoholism, 18, 261-269.

Department of Health, New York (1979) New York City: Summary of Vital Statistics, 1979. New York, Bureau of Health Statistics and Analysis.

Edwards, G. & Gross, M.M. (1976) Alcohol dependence: provisional description of a clinical syndrome. British Medical Journal, 1, 1058-1061.

Edwards, G., Cross, M.M., Keller, M., Moser, J. & Room, R. (eds) (1977) Alcohol Related Disabilities. WHO Offset Publication No. 32. Geneva.

Edwards, G., Orford J., Egert, S., Guthrie, S., Hawker, A., Hensman, C., Mitcheson, M., Oppenheimer, E. & Taylor, C. (1977) Alcoholism: a controlled trial of "treatment" and "advice". Journal of Studies on Alcohol, 38, 1004-1031.

Ewing, J.A. (1984) Detecting alcoholism - the CAGE questionnaire. Journal of the American Medical Association, 252, 1905-1907.

Feuerlein, W., Ringer, C., Kufner, H. & Antons, K. (1979) The diagnosis of alcoholism - The Munich Alcoholism Test (MALT). Int. J. Rehab Research, 1979; 2(4): 533-34.

Fuller, R.K. (1984) A critical analysis of the efficacy and toxicity of the alcohol sensitizing drugs. In: Pharmacological Treatments for Alcoholism. Edwards, G. & Littleton, J. (eds), pp 559-571. London, Croom Helm.

Hamlyn, A.M., Brown, A.J., Sherlock, S. & Baron, D.N. (1975) Casual blood ethanol estimations in patients with liver disease. Lancet, II, 345-342.

Holt, S., Skinner, H., & Israel, Y. (1981) Early identification of alcohol abuse: 2: Clinical and laboratory indicators. Canadian Medical Association Journal. 124, 1279-1295.

Hurt, R.D., Morse, R.M. & Swanson, W.M. (1980) Diagnosis of alcoholism with a self-administered alcoholism screening test. Mayo Clinic Proceedings, 55, 365-370.

Israel, Y., Orrego, H., Holt, S., Macdonald, D.W. & Meena, H.E. (1980) Identification of alcohol abuse. thoracic fractures on routine chest Xrays as indicators of alcoholism. Alcoholism (NY), 4, 420-422.

Jacobson, G.R. (1983) Detection, assessment and diagnosis of alcoholism - current techniques. In: Recent Developments in Alcoholism. Galanter, M., ed. pp. 377-413. New York, Plenum Press.

Jariwalla, A.G., Adams, P.H. & Hore, B.D. (1979) Alcohol and acute general medical admissions to hospital. Health Trends, 11, 95-97.

Jellinek, E.M. (1946) Phases in drinking history of alcoholics: analysis of survey conducted by the official organ of Alcoholics Anonymous. Quarterly Journal of Studies on Alcohol, 7, 1-88.

Jellinek, E.M. (1952) Phases of alcohol addiction. Quarterly Journal of Studies on Alcohol, 13, 673-684.

Kapur, B.M., & Israel, Y. (1984) Alcohol dipstick - a rapid method for analysis of ethanol in body fluids. Toronto, Addiction Research Foundation.

Kristenson, H. & Hood, B. (1984) The impact of alcohol on health in the general population; a review with special reference to experience in Malmö. British Journal of Addiction, 79, 139-145.

Kristenson, H., Ohlin, H., Hulten-Nosslin, M-B., Trell, E., & Hood, B. (1983) Identification and intervention of heavy drinking in middle-aged men: results and follow-up of 24-60 months of long-term study with randomised controls. Alcoholism: Clinical and Experimental Research, 7, 203-209.

Ledermann, S. (1956) Alcool, Alcoolisme, Alcoolisation. Donnees Scientifiques de Caractere Physiologique, Economique et Social. Presses Universitaires de France.

Le Gô, P.M. (1976) Le Depistage Precoce et Systematique du Buveur Excessif. Departement d'alcoologie therapeutique de Rion-laboratoires, Paris.

Lindsell, D.R.M., Wilson, A.G. & Maxwell, J.D. (1982) Fractures in the chest radiograph in detection of alcoholic liver disease. British Medical Journal, 285, 597-599.

Mayfield, D.G., McLeod, G. & Hall, P. (1974) The CAGE questionnaire: Validation of a new alcoholism screening instrument. American Journal of Psychiatry, 131, 1121-1123.

Midanik, L. The validity of self-reported alcohol consumption and alcohol problems: a literature review. British Journal of Addiction, 77, 357-382.

Murray, R.M. (1977) Screening and early detection instruments for disabilities related to alcohol consumption. In :Alcohol-related Disabilities, Edwards, G. et al., eds. pp.89-105. Geneva, WHO (Offset publication no. 32).

Papoz, L., Warnet, J-M., Pequignot, G., Eschwege, E., Claude, J.R. & Schwartz, B. (1981) Alcohol consumption in a healthy population. Relationship to glutamyltransferase activity and mean corpuscular volume. Journal of the American Medical Association, 245, 1748-51.

Paton, A. & Saunders, J.B. (1981) ABC of alcohol: asking the right questions. British Medical Journal, 283, 1458-1459.

Pokorny, A.D., Miller, B.A. and Kaplan, H.B. The Brief MAST: a shortened version of the Michigan Alcoholism Screening Test. American Journal of Psychiatry, 129, 342-345.

Rootman, I. & Moser, J. eds. (1983) Community response to alcohol-related problems, Phase I. Final Report: Geneva, WHO (Document MNH/83.17).

Rootman, I. (ed) (1983) Community response to alcohol-related problems, Phase II: Final Report. Geneva, WHO (Document MNH/83.18).

Rosalki, S.G. & Rau, D. (1972) Serum glutamyl transpeptidase activity in alcoholism. Clinica Chemica Acta, 39, 41-47.

Ryback, R.S., Eckhardt, H.J., & Paulter (1980) Biochemical and haematological correlates of alcoholism. Research Communications in Chemical Pathology and Pharmacology, 27, 533-550.

Saunders, W.M. & Kershaw, P.W. (1980) Screening tests for alcoholism - findings from a community study. British Journal of Addiction, 75, 37-41.

Saunders, J.B., Walters, J.R.F., Davies, P. & Paton, A. (1981) A 20-year prospective study of cirrhosis. British Medical Journal, 282, 263-266.

Selzer, M.L. (1971) The Michigan Alcoholism Screening Test: The quest for a new diagnostic instrument. American Journal of Psychiatry, 127, 1653-1658.

Shaper, A.G., Pocock, S.J., Ashby, D., Walker, M. & Whitehead, T.P. (1985) Biochemical and haematological response to alcohol intake. Annals of Clinical Biochemistry, 22, 50-61.

Skinner, H.A., Allen, B.A., McIntosh, M.C. & Palmer, W.H. (1985a) Lifestyle assessment: applying microcomputers in family practice. British Medical Journal, 290, 212-214.

Skinner, H.A., Allen, B.A., McIntosh, M.C. & Palmer, W.H. (1985b) Lifestyle assessment: just asking makes a difference. British Medical Journal, 290, 214-216.

Skinner, H.A., Holt, S., Israel, Y. (1981) Early identification of alcohol abuse: 1. Critical issues and psychosocial indicators for a composite index. Canadian Medical Association Journal, 124, 1141-1152.

Skinner, H.A., Holt, S., Schuller, R., Roy, J. & Israel, Y. (1984) Identification of alcohol abuse using laboratory tests and a history of trauma. Annals of Internal Medicine, 101, 847-851.

Skinner, H. & Sheu, W-J. (1982) Reliability of Alcohol use indices: the lifetime drinking history and the MAST. Journal of Studies on Alcohol, 43, 1157-1170.

Skinner, H. & Allen, B.A. (1982) Alcohol dependence syndrome: measurement and validation. Journal of Abnormal Psychology, 91, 199-209.

Sobell, M.B. & Sobell, L.C. (1978) Behavioural Treatment of Alcohol Problems. New York, Plenum Press.

Stockwell, T. Hodgson, R., Edwards, G., Taylor, C., Rankin, H. (1979) The development of a questionnaire to measure severity of alcohol dependence. British Journal of Addiction, 74, 79-87.

Stockwell, T., Murphy, D., & Hodgson, R. (1983) The severity of alcohol dependence: Its use, reliability and validity. British Journal of Addiction, 78, 145-155.

Treiman, D.J. (1977) Occupational Prestige in Comparative Perspective. New York, Plenum Press.

Veillant, G. (1983) "The Natural History of Alcoholism". Cambridge, Mass., Harvard University Press.

Walsh, B. & Grant, M. (1985) Public health implications of alcohol production and trade. Geneva, World Health Organization, (WHO Offset Publication No. 88).

Whitehead, T.P., Clarke, C.A. & Whitfield, A.G.W. (1978) Biochemical and haematological markers of alcohol intake. Lancet, I, 978-981.

Whitfield, J.B., Hensley, W.J., Bryden, D. & Gallagher, H. (1978) Some laboratory correlates of drinking habits. Annals of Clinical Biochemistry, 15, 297-303.

Wilkins, R.H. (1974) The Hidden Alcoholic in General Practice: A method of detection using a questionnaire. London, Elek Science, 616.861075/2.

Williams, A.T., Burns, F.H. & Morey, S. (1978) Prevalence of alcoholism in a Sydney teaching hospital. Medical Journal of Australia, 2, 608-611.

Wilson, J.M.G. & Jungner, G. (1968) The Principles and Practice of Screening for Disease. (Public Health Papers No. 34), Geneva, World Health Organization.

Woeber, K. (1975) The skin in the diagnosis of alcoholism. Annals of the New York Academy of Science. 252, 292-295.

World Health Organization, (1980) Problems Related to Alcohol Consumption: report of a WHO Expert Committee. Geneva, WHO (Technical Report Series No. 650).

Wu, A., Chanarin, I. & Levi, A.J. (1974) Macrocytosis of chronic alcoholism. Lancet, I, 829-31.

Appendix 1

WORLD HEALTH ORGANIZATION
STUDY ON TREATMENT AND MANAGEMENT OF PERSONS
WITH POTENTIALLY HARMFUL ALCOHOL CONSUMPTION

NAME OF INVESTIGATOR: _____

A. GENERAL INFORMATION

1. COUNTRY 1: Australia 2: Bulgaria 3: Kenya 4: Mexico 5: Norway 6: USA [ ] 1

2. I.D. NUMBER [/ /] 2-4

CARD NUMBER [1] 5

3. SOURCE OF SUBJECT 1: abstainer group 2: patients 3: alcoholics [ ] 6

4. DATE OF INTERVIEW (dd-mm-yy) [/ / / / /] 7-12

5. SEX 1: Male 2: Female [ ] 13

6. AGE (No. of years) [/] 14-15

7. CLIENT STATUS 1: in-patient 2: out patient 3: routine medical examination 4: emergency room 5: other, specify _____ [ ] 16

8. PERSON WHO ACCOMPANIED CLIENT [ ] 17

1: client came alone 2: friend
3: spouse 4: son/daughter
5: parent 6: other relative, specify _____
7: other _____
9: not applicable

9. DIAGNOSIS
(write in the diagnosis and code first 3 digits of the ICD)

Primary _____ [/ /] 18-20
Secondary _____ [/ /] 21-23
Tertiary _____ [/ /] 24-26

10. MARITAL STATUS 1: single [__] 27
2: married
3: divorced
4: widowed

11. WHO DO YOU LIVE WITH? [__] 28

1: living alone (self-contained home)
2: living alone (hostel, lodgings, ect.)
3: with cohabitee or spouse
4: with family members
5: with friend/s, male/female (not sexual partners)
6: other, specify _____

12. HOUSEHOLD COMPOSITION

a: number of persons 18 years and older living in client's household (code number of persons not including client) — If more than 9, code 9 [__] 29

b: number of persons under 18 years old living in client's household [__] 30

c: number of rooms [__] 31

13. CURRENT OCCUPATIONAL STATUS [__] 32

1: working full-time
2: working part-time
3: student (code occupation of head of household, Q.15)
4: housewife (code occupation of head of household, Q.15)
5: not employed
6: other, specify _____

14. IF NOT EMPLOYED, MAIN REASON [__] 33
(code 9 if patient employed)

1: retired
2: permanently disabled (but not hospitalized)
3: temporarily disabled (but not hospitalized)
4: temporarily laid off
5: looking for a job but none available
6: doesn't want to work
7: hospitalized
8: other, specify _____

15. OCCUPATION

a: Who is the main earner in the household?

_____

(if client doesn't work skip to c,
if client works but is not main earner
fill in both occupations in b and c).

b: What kind of work are you doing now or have you done most recently?
(Give specific information regarding the nature of the client's work: level of responsibility, kind of work, etc.)

_____ [/] 34-35

(Please code - using Annex 4 of manual)

c: What is the occupation of the main earner?
(Give specific information regarding the nature of the client's work: level of responsibility, kind of work, etc.)

_____ [/] 36-37

(Please code - using Annex 4 of manual)

16. LEVEL OF EDUCATION

a) What is the highest level of education you have completed? [ ] 38

1: primary school 2: secondary school
3: technical school, specify _____
4: college or university
5: none (if this is coded, go to c.)

b) Number of years education [/] 39-40

c) Are you able to read? 0: no 1: yes [ ] 41

B. MEDICAL SYMPTOMS

17. "Now I am going to ask you some questions about how you have been feeling during the last year. Please refer to the card (give card to client) to describe how often you have had the following problems in the last year:"

Code: (CARD)

0: never during the last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily

GASTROINTESTINAL SYMPTOMS	gas/flatulance	[__]	42
	nausea	[__]	43
	vomiting	[__]	44
	abdominal pains	[__]	45
	diarrhea	[__]	46
	heart burn, cardialgia	[__]	47
OTHER PHYSICAL COMPLAINTS	difficult breathing	[__]	48
	heart palpitations	[__]	49
	back pains	[__]	50
	muscle cramps	[__]	51
	headaches	[__]	52
	difficulty concentrating	[__]	53
	difficulty falling asleep or waking up	[__]	54
	hands shake, tremor	[__]	55
	fits (convulsion, syncopes)	[__]	56
	sexual problems	[__]	57
(women only)	menstrual problems	[__]	58
(women only)	other gynecological problems	[__]	59
SUBJECTIVE COMPLAINTS	irritability	[__]	60
	nervousness, anxiety	[__]	61
	feeling sad	[__]	62
	poor appetite	[__]	63
	fatigue	[__]	64

HISTORY (code No=0, Yes=1)

Have you ever had	liver disease?	[__]	65
	GI bleeding?	[__]	66
	blood transfusions?	[__]	67

Since your 18th birthday have you:

a)	been injured in a road accident?	[__]	68
b)	injured your head?	[__]	69
c)	broken any bones?	[__]	70

C. LEVEL OF CONSUMPTION

1. TOBACCO, DRUGS, AND FOOD

"Now I am going to ask you some questions about your use of cigarettes, and prescription medications."

18. HOW MANY CIGARETTES DO YOU SMOKE PER DAY? [__/__] 71-72

19. HAVE YOU TAKEN ANY MEDICATION IN THE LAST WEEK? [__] 73

0: not taking
1: yes (please indicate generic name and give daily dose and duration plus your evaluation of the patient's drug use)

EVALUATION:

1: sub-therapeutic dose
2: therapeutic dose
3: supra-therapeutic dose

	GENERIC NAME	/ DAILY DOSE	/ NO OF DAYS IN LAST WEEK	/ EVALUATION	
Antiepileptics	_____	___	_____	[__]	74
Minor tranquilizers	_____	___	_____	[__]	75
Sedatives/Hypnotics	_____	___	_____	[__]	76
Anti-inflammatory	_____	___	_____	[__]	77
Other	_____	___	_____	[__]	78
	_____	___	_____	[__]	79
	_____	___	_____	[__]	80

[__/__/__] 1-4

CARD NUMBER [2] 5

20. HAVE YOU GAINED OR LOST WEIGHT DURING THE PAST YEAR?

1: lost weight
2: gained weight
3: same

[__] 6

D. CLINICAL EXAMINATION

"Before proceeding with the questionnaire, I would like to give you a brief check-up."

Code: 0: not present
1: mild
2: moderate
3: severe

21.	conjunctival injection	[__]	7
22.	abnormal skin vascularisation	[__]	8
23.	coating of tongue	[__]	9
24.	hand tremor	[__]	10
25.	lip tremor	[__]	11
26.	tongue tremor	[__]	12
27.	scars amd bruises	[__]	13
28.	hyperreflexia	[__]	14
29.	parotid enlargement	[__]	15
30.	liver enlargement	[__]	16
31.	abnormal liver consistency	[__]	17
32.	feminization (men only)	[__]	18
33.	adipositas	[__]	19
34.	icterus	[__]	20
35.	pulse rate	[__/__/__]	21-23
36.	systolic blood pressure	[__/__/__]	24-26
37.	diastolic blood pressure	[__/__/__]	27-29
38.	height (centimeters)	[__/__/__]	30-32
39.	weight (kilos)	[__/__/__]	33-35

EXAMINER'S IMPRESSION (Refer to preceding section)

40. Was the respondent intoxicated?
0: no, 1: possibly, 2: definitely [__] 36

41. Did the respondent understand the questions?
0: minimal understanding, 1: some difficulties,
2: clear understanding [__] 37

42. Did the respondent give evidence of insincerity, lack of cooperation or defensiveness?
0: no, 1: yes [__] 38

43. Profession of examiner [__] 39

1: medical doctor
2: nurse
3: other health worker, specify _____
4: other

C. LEVEL OF CONSUMPTION (continued)

2. ALCOHOLIC BEVERAGES

"Now we are going to estimate approximately how much alcohol you drank last year. First, I would like to ask some general questions about your level of alcohol consumption."

44. a. Have you drank any alcohol in the last year? [ ] 40
1: yes 2: no (if no, skip to Q.75)

b. How many days since you last had a drink containing alcohol? (No. of days) [/ /] 41-43
(for abstainers skip to Q.75)

45. How often do you have a drink containing alcohol? [ ] 44

0: never during last year (Skip to Q.75)
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily

46. How often do you have 6 or more drinks on one occasion [ ] 45

NOTE: 6 drinks equal about 6 bottles of beer, or a bottle of table wine, or about 1/4 litre of spirits or brandy, or 1/2 bottle of sherry or other fortified wine.

code as above

47. How often do you have 12 or more drinks on one occasion? [ ] 46

NOTE: 12 drinks equal about 12 bottles of beer, or 2 bottles of table wine, or 1/2 bottle of spirits or brandy, or about a bottle of sherry or other fortified wine.

code as above

48. On how many days did you not drink any alcohol at all during last 30 days?(If 0 skip to Q.55) [/] 47-48

"Now I would like to ask you more detailed questions about the amount of alcohol you drink."

---

1 Abstainers, for the purpose of the study, can include persons who take alcohol no more than one or two times per year, but who have never been treated for alcohol problems. Note, however, that abstainers who present as patients who have a medical diagnosis, should be kept in the patient group.

"When people use alcohol, they often drink different amounts depending on the time, place or occasion. For example, on some days people drink only small amounts, say one or two drinks, as a cocktail before dinner, a glass of beer or wine with lunch or dinner, or a drink in the evening or when invited to a friend's house. On other occasions people drink medium amounts at a bar or with friends, at parties, or on week-ends.

"Finally, there are occasions when people consume large amounts of alcohol, for example at weddings or other special celebrations, festivals etc.

"Think of the occasions you have used alcohol during the past month, and try to estimate the number of times you have drunk in what for you are small amounts, medium amounts and large amounts.

"Let us start with the lowest level:

"What types of alcoholic beverages do you usually drink, and how much? (Remember to include both alcohol consumed with meals and between meals, for all hours)."

49. LOW-LEVEL DRINKING, TYPE AND AMOUNT

TYPE OF BEVERAGE	VOL. % ALC.	AMOUNT	VOL.(cl)	
.....	[/ .]	.....	[/ /]	49-54
.....	[/ .]	.....	[/ /]	55-60
.....	[/ .]	.....	[/ /]	61-66
.....	[/ .]	.....	[/ /]	67-72

On how many days during last month did you drink this much?

50. LOW-LEVEL DRINKING, NUMBER OF DAYS [/] 73-74

[/ / /] 1-4

CARD NUMBER [3] 5

"Let us now go on to the next level of consumption: medium level. What types of alcoholic beverages do you use on such occasions, and how much?"

51. MEDIUM-LEVEL DRINKING, TYPE AND AMOUNT

TYPE OF BEVERAGE	VOL. % ALC.	AMOUNT	VOL.(cl)	
.....	[/ .]	.....	[/ /]	6-11
.....	[/ .]	.....	[/ /]	12-17
.....	[/ .]	.....	[/ /]	18-23
.....	[/ .]	.....	[/ /]	24-29

On how many days during last month did you drink this much?

52. MEDIUM-LEVEL DRINKING, NUMBER OF DAYS [/] 30-31

"Finally, let us look at the special occasions where you drink maximum of what you allow yourself, e.g. at special celebrations, holidays etc. What types of alcoholic beverages do you drink on these occasions, and how much?"

53. HIGH-LEVEL DRINKING, TYPE AND AMOUNT

TYPE OF BEVERAGE	VOL. % ALC.	AMOUNT	VOL.(cl)	
.....	[/ .]	.....	[/ /]	32-37
.....	[/ .]	.....	[/ /]	38-43
.....	[/ .]	.....	[/ /]	44-49
.....	[/ .]	.....	[/ /]	50-55

On how many days during last month did you drink this much?

54. HIGH-LEVEL DRINKING, NUMBER OF DAYS [/] 56-57

If the month you just described is not typical for you in terms of drinking, on what occasions and how often do you drink this way?

.....

55. Now, please describe a typical (average) month

a)	days without drinking	[/] 58-59
b)	low-level drinking days	[/] 60-61
c)	medium-level drinking days	[/] 62-63
d)	high-level drinking days	[/] 64-65

E. DRINKING HABITS

"Now I am going to ask you some questions about the way you drink. Please use the card to describe how often you have experienced each of the following during the past 12 months:

Code: (CARD)

0: never during the last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily

56.	Found it difficult to get the thought of alcohol out of your mind	[__]	66
57.	Skipped meals because you were drinking	[__]	67
58.	Experienced that you were not able to stop drinking once you had started	[__]	68
59.	Found it difficult to stop drinking before you became completely intoxicated	[__]	69
60.	Needed a first drink to get yourself going the morning after a heavy drinking session	[__]	70
61.	Been unable to remember what happened the night before because you had been drinking	[__]	71
62.	Been in a situation where you drank more than your friends	[__]	72
63.	Been gulping drinks in order to speed up the effect of alcohol	[__]	73
64.	Failed to do what was normally expected from you because of drinking	[__]	74
65.	Stayed drunk for several days at a time	[__]	75
66.	Needed more alcohol than you previously did in order to get the desired effect	[__]	76
67.	Tried to reduce your alcohol consumption and failed	[__]	77
68.	Needed to drink alcohol at times of the day when you normally do not drink	[__]	78
69.	Have had your hands shake a lot in the morning after drinking	[__]	79

F. SOCIAL CONSEQUENCES

"Sometimes people act differently or experience problems because of their drinking."

Code: (CARD)

0: never during the last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily

[/ / / /] 1-4

CARD NUMBER [4] 5

70. How often have you become depressed after drinking in the last year? [ ] 6

71. How often have you become happy after drinking in the last year? [ ] 7

72. How often have you become more friendly after drinking in the last year? [ ] 8

73. How often have you become angry after drinking in the last year? [ ] 9

74. How often have you got a feeling of guilt or remorse after drinking in the last year? [ ] 10

(Codes for Q.75-Q.84:

0: no 1: yes
8: no answer 9: inapplicable

(Abstainers to be questioned also)

75. a) Have you or someone else ever been injured as a result of your drinking? (If no go to Q.76) [ ] 11

b) Did this happen at all in the last year? (If no go to Q.76) [ ] 12

c) Concerning the most serious injury in the last year, was it life threatening? [ ] 13

d) Did it involve broken bones or other incapacities? [ ] 14

76. a) Has anyone in your family or any friend ever been concerned about your drinking or suggested that you cut down? (If no, go to Q.77) [__] 15

b) Did this happen at all in the last year? (If no, go to Q.77) [__] 16

c) In the last year, who has shown concern?

your spouse	[__]	17
one of your parents	[__]	18
one of your children	[__]	19
someone else you live with	[__]	20
another family member	[__]	21
a friend	[__]	22

d) In the last year, has your drinking resulted in any relationship being broken or threatened? [__] 23

e) .... or in someone getting really angry? [__] 24

77. a) Has anyone at work ever been concerned about your drinking or suggested that you cut down? (If no, go to Q.78) [__] 25

b) Did this happen at all in the last year? (If no, go to Q.78) [__] 26

c) In the last year, has your drinking resulted in your losing or quitting a job? [__] 27

d) .... or in your being warned or penalized or denied a promotion? [__] 28

78. a) Have you ever been stopped by the police or been in legal trouble in connexion with your drinking? (If no, go to Q.79) [__] 29

b) Has this happened at all in the last year? (If no, go to Q.79) [__] 30

c) In the last year have you been arrested for drunk driving? [__] 31

d) .... or any other charge in connexion with your drinking? [__] 32

79. a) Has a doctor or other health worker ever shown concern about your drinking or suggested that you cut down? (If no, go to Q.80) [__] 33

b) Did this happen in the last year? (If no, go to Q.80) [__] 34

c) In the last year, did a doctor or health worker say that your drinking might be harming your health? [__] 35

80. Has anyone in your family ever had a serious problem with drinking?

father	[__]	36
mother	[__]	37
spouse	[__]	38
grandparent	[__]	39
brother	[__]	40
sister	[__]	41
other: _____	[__]	42

81. Has anyone in your family ever suffered from cirrhosis of the liver?

father	[__]	43
mother	[__]	44
spouse	[__]	45
grandparent	[__]	46
brother	[__]	47
sister	[__]	48
other: _____	[__]	49

82. Do you think you have an alcohol problem? [__] 50

83. Do you think you have had any alcohol problems in the past? [__] 51

84. (If patient currently drinks at all:) Do you think you may have an alcohol problem in the future if you keep on drinking as you are now? [__] 52
0: definitely not 1: probably not 2: may be 3: yes

85. Profession of person doing the interview? (If same as clinical exam, code 9 and be sure to answer Q.43) [__] 53

1: medical doctor
2: nurse
3: psychologist
4: social worker
5: other health worker, specify _____
6: other, _____

G. BIOCHEMICAL TESTS

[/ / /] 1-4

CARD NUMBER [5] 5

86. GGT (gamma glutamyl transpeptidase) [/ / /] 6-9
87. ASAT (asparate aminotransferase) [/ / /] 10-13
88. ALAT (alanine aminotransferase) [/ / /] 14-17

89. Date of drawing of enzyme tests (dd-mm-yy) [/ / / / /] 18-23

90. HDL-cholesterol, mmol/l result [. /] 24-26

91. Date of drawing, HDL-chol. (code as above) [/ / / / /] 27-32

92. MCV, fentoliter result [/ /] 33-35

93. Date of drawing, MCV (code as above) [/ / / / /] 36-41

94. BAC, mg/dl result [/ /] 42-44

95. Date of drawing, BAC (code as above) [/ / / / /] 45-50

WORLD HEALTH ORGANIZATION
STUDY ON TREATMENT AND MANAGEMENT OF PERSONS
WITH POTENTIALLY HARMFUL ALCOHOL CONSUMPTION

ANNEX TO MAIN SCHEDULE: FOLLOW-UP

1. COUNTRY 1: Australia 2: Bulgaria 3: Kenya 4: Mexico 5: Norway 6: USA [ ] 1

2. I.D. NUMBER [/ /] 2-4

CARD NUMBER [6] 5

3. SOURCE OF SUBJECT 1: abstainer group 2: patients 3: alcoholics [ ] 6

4. DATE OF INTERVIEW (dd-mm-yy) [/ / / / /] 7-12

5. IS SUBJECT WILLING TO BE RE-INTERVIEWED AND RE-EXAMINED IN ABOUT ONE YEAR'S TIME?
0: no 1: yes [ ] 13

6. SUBJECT'S NAME [/]

7. ADDRESS [/]

8. NAME OF CONTACT PERSON [/]

9. ADDRESS OF CONTACT PERSON [/]

10. IF NEW APPOINTMENT HAS BEEN MADE, WRITE DATE OF APPOINTMENT (yy-mm-dd) [/ / / / / /] 14-19

11. DID THE SUBJECT SHOW UP FOR RE-EXAMINATION?
0: no 1: yes [ ] 20

NOTE: This form should be kept by the national collaborator of the project. A copy does not need to be sent to Norway. It is meant exclusively as an aid for performing a follow-up of the original cohort.

DO NOT FORGET TO DETACH BEFORE SENDING COMPLETE SCHEDULE.

Appendix 2

WORLD HEALTH ORGANIZATION
STUDY ON TREATMENT AND MANAGEMENT OF PERSONS
WITH POTENTIALLY HARMFUL ALCOHOL CONSUMPTION

VALIDATION INSTRUMENT

Patient ID Information [| | | | 1 |] 1-6
copy cols. 1-6

Informant ID No. [| |] 7-8
Assign ID number

1. What is your relationship to the patient? [ ] 9

1: spouse
2: parent
3: son/daughter
4: other relative _____
5: friend
6: other _____

2. Degree of contact with the patient during the last year? [ ] 10

1: daily
2: weekly
3: monthly
4: occasionally

3. What is the patient's current occupational status? [ ] 11

1: working full-time
2: working part-time
3: student
4: housewife
5: not employed
6: other, specify _____
9: do not know

4. If not employed, main reason? [ ] 12

1: retired
2: permanently disabled (but not hospitalized)
3: temporarily disabled (but not hospitalized)
4: temporarily laid off
5: looking for a job but none available
6: doesn't want to work
7: hospitalized
8: other, specify _____
9: do not know

5. Now we are going to ask some questions about how the patient has been feeling during the last year. Please describe how often the patient has had the following problems in the last year by drawing a circle around the number under the best answer.

	NEVER	ONE OR TWO TIMES	FREQUENTLY	DAILY	DO NOT KNOW		
Nausea	0	1	2	3	9		13
Vomiting	0	1	2	3	9		14
Headaches	0	1	2	3	9		15
Difficulty falling asleep or waking up	0	1	2	3	9		16
Hands shake, tremor	0	1	2	3	9		17
Irritability	0	1	2	3	9		18
Nervousness, anxiety	0	1	2	3	9		19
Feeling sad	0	1	2	3	9		20
Poor appetite	0	1	2	3	9		21
Fatigue	0	1	2	3	9		22

6. How many cigarettes does the patient smoke per day? ☐ 23

0: None, does not smoke
1: 1 to 10 cigarettes
2: 11 to 20 cigarettes
3: more than 20
4: do not know

7. Has the patient gained or lost weight during the last year? ☐ 24

0: stayed the same
1: lost weight
2: gained weight

Now we are going to estimate approximately how much alcohol the patient drank last year.

8. How often did the patient have a drink containing alcohol? ☐ 25

0: never during last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily
9: do not know

9. How often did the patient have 6 or more drinks on one occasion? ☐ 26

NOTE: 6 drinks equal about 6 bottles of beer, or a bottle of table wine, or about 1/4 litre of spirits or brandy, or 1/2 bottle of sherry or other fortified wine.

0: never during last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily
9: do not know

10. How often did the patient have 12 or more drinks on one occasion? ☐ 27

NOTE: 12 drinks equal about 12 bottles of beer, or 2 bottles of table wine, or 1/2 bottle of spirits or brandy, or about a bottle of sherry or other fortified wine.

0: never during last year
1: less than monthly
2: monthly
3: weekly
4: daily or almost daily
9: do not know

-4-

12. Now we are going to ask some questions about the way the patient drinks. Please describe below how often he/she has experienced each of the following during the past 12 months.

	NEVER	ONE OR TWO TIMES	OFTEN	DO NOT KNOW		
Became depressed after drinking	0	1	2	9	☐	28
Became happy after drinking	0	1	2	9	☐	29
Became more friendly after drinking	0	1	2	9	☐	30
Became angry after drinking	0	1	2	9	☐	31
Found it difficult to stop drinking before he/she became completely intoxicated	0	1	2	9	☐	32
Needed a first drink to get going the morning after a heavy drinking session	0	1	2	9	☐	33
Was unable to remember what happened the night before because of heavy drinking	0	1	2	9	☐	34
Failed to do what was normally expected because of heavy drinking	0	1	2	9	☐	35
Stayed drunk for several days at a time	0	1	2	9	☐	36

	NO	YES	NOT SURE or DO NOT KNOW		
Has the patient or someone else ever been injured as a result of his/her drinking?	0	1	9	☐	37
Has anyone in the patient's family ever been concerned about his/her drinking or suggested that he/she cut down?	0	1	9	☐	38
Has anyone ever been concerned about the patient's drinking or suggested that he/she cut down?	0	1	9	☐	39
Has the patient ever been stopped by the police or been in legal trouble in connexion with his/her drinking?	0	1	9	☐	40
Has anyone in the patient's family ever had a serious problem with drinking?	0	1	9	☐	41
father:	0	1	9	☐	41
mother:	0	1	9	☐	42
spouse:	0	1	9	☐	43
grandparent:	0	1	9	☐	44
brother:	0	1	9	☐	45
sister:	0	1	9	☐	46
other: _____	0	1	9	☐	47
Has anyone in the patient's family ever suffered from cirrhosis of the liver?					
father:	0	1	9	☐	48
mother:	0	1	9	☐	49
spouse:	0	1	9	☐	50
grandparent:	0	1	9	☐	51
brother:	0	1	9	☐	52
sister:	0	1	9	☐	53
other: _____	0	1	9	☐	54

Appendix 3

WHO "CORE" SCREENING INSTRUMENT

Please circle the answer that is correct for you.

1. How often do you have a drink* containing alcohol?

NEVER	MONTHLY OR LESS	TWO TO FOUR TIMES A MONTH	TWO TO THREE TIMES A WEEK	FOUR OR MORE TIMES A WEEK

2. How many drinks containing alcohol do you have a on a typical day when you are drinking?

1 OR 2	3 OR 4	5 OR 6	7 - 9	10 OR MORE

3. How often do you have six or more drinks on one occasion?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

4. How often during the last year have you found it difficult to get the thought of alcohol out of your mind?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

5. How often during the last year have you found that you were not able to stop drinking once you had started?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

6. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

7. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

8. How often during the last year have you had a feeling of guilt or remorse after drinking?

NEVER	LESS THAN MONTHLY	MONTHLY	WEEKLY	DAILY OR ALMOST DAILY

9. Have you or someone else been injured as a result of your drinking?

NO		YES, BUT NOT IN THE LAST YEAR		YES, DURING THE LAST YEAR

10. Has a relative or friend or a doctor or other health worker, been concerned about your drinking or suggested you cut down?

NO		YES, BUT NOT IN THE LAST YEAR		YES, DURING THE LAST YEAR

* One drink is (give national examples).

Appendix 4

W.H.O. TWO-PHASE SCREENING PROCEDURE

(To be administered by an interviewer)

Trauma History

1. Have you injured your head since your eighteenth birthday ?

   YES NO

2. Have you broken any bones since your eighteenth birthday ?

   YES NO

Clinical Examination

3. Conjunctival injection.

   NOT PRESENT MILD MODERATE SEVERE

4. Abnormal skin vascularisation.

   NOT PRESENT MILD MODERATE SEVERE

5. Hand tremor.

   NOT PRESENT MILD MODERATE SEVERE

6. Tongue tremor.

   NOT PRESENT MILD MODERATE SEVERE

7. Hepatomegaly.

   NOT PRESENT MILD MODERATE SEVERE

Blood Tests

8. GGT.

   LOWER NORMAL UPPER NORMAL ABNORMAL

The core screening instrument should then be administered.