

The Measurement of Levels of Drinking

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A study that deals with the drinking behaviour of a particular group, must cope with the problem of obtaining accurate measures of the alcohol consumed by the respondents. This paper is concerned with the literature and research findings relevant to the measurement of levels of drinking. It is divided into two sections. The first deals with the use of measures in general studies on drinking behaviour, and the second section concerns itself with the study of the young problem drinker and the methodology employed in studies of this nature.

I

MEASUREMENT OF LEVELS OF DRINKING

There appear to be three distinctive *per capita* rates of alcohol consumption:

- the "crude" *per capita* rate;
- the "age corrected" *per capita* rate, and
- the "effective" *per capita* rate [1].

The "crude" *per capita* rate is the total amount of units for a particular beverage type (for example, a beer unit would be standard barrels, divided by the total population in a given country). All "official" statistics are given in terms of crude rates. In using the "age corrected" *per capita* rate, the denominator is the "population of drinking age", i.e., the number of inhabitants whose age permits of

regarding them as "potential of sufficient quantities to offset the consumption statistics" [2].

The earliest measures used, the "crude" *per capita* rate and the "age corrected" *per capita* rate, both in North America [3], Europe, Britain and Ireland, were based upon gross figures, such as yearly consumption *per capita*. Such figures, when standardised, are shown as annual consumption of absolute alcohol *per capita* of the population, and have been used to compare drinking in different countries and within countries in different years [4]. But the interpretation of these two types of *per capita* rates of consumption must be made with care. As the World Health Organisation states:

Changes in per capita rates are frequently interpreted in such terms as people have been drinking more or less this year. . . . Such considerations are entirely unwarranted, as an increase in the per capita rate may be due to an increase in the percentage of users within the population of drinking age, or to increased individual consumption or both. But when changes in the percentage or number of users are not known, the meaning of changes in the consumption rates will be necessarily uncertain [5].

Thus, such comparisons are not really valid if one wants to know "how many people drink". Figures based on consumption per person are using an overall mean for heterogeneous populations—a measure of mean being only an average. As was mentioned above, one does not actually know the number of people who drink in the population. Such figures, then, are crude, and do not give a clear picture of the situation. As Knupfer [6] and others point out the national average consumption does not give one any indication of the proportion of the population that drink or indeed individual variance in drinking habits.¹

Such gross figures fail to convey the individual and group differences in alcohol consumption in any country. What needs to be known is, first, individual behaviour in regard to drinking patterns, and, second, the amount of drinking by individuals.

The "effective" per capita rate: methodological approaches

This leads then to the third category of *per capita* rates—"the effective" *per capita* rate. This refers to an estimate of the actual users, arrived at through sampling procedures, and survey methods. There have been various approaches to this problem. Ledermann [7] holds that the distribution of amount of drinking in any population follows a logarithmic normal curve. He bases this method on a number of surveys carried out on drinking. These include a study of alcohol buying in Finland, two surveys conducted in North America, and a study of the drinking habits of patients in a number of French hospitals. He estimates that 25 per cent of the alcohol consumed in France is taken by 7 per cent of the adult

¹ This point is discussed in more detail below.

population. He calculates that their average daily consumption is 20 centilitres. De Lint and Schmidt [8] applied Ledermann's method in their study. They used information on alcohol purchased in Ontario [9], to construct a measure for the distribution of alcohol consumption. They found that the distribution "approximated closely the logarithmic abnormal model proposed by S. Ledermann," [10] and suggest that Ledermann's model is applicable to North American drinking behaviour.

In the United States and Europe methods used in ascertaining the amount of alcohol intake have been more empirically orientated. These have tended to take two directions: studies asking respondents to list and describe all their drinking occasions in a given period; and studies emphasising respondents' reports of their usual drinking pattern.

The following is a discussion of the two approaches. What needs to be taken into account is that the purpose and scope of these studies vary. Thus, depending on the emphasis of the study, different methods of classification are used. The usual method employed in both types of study has been to carry out a survey on representative sections of the population and to ask the respondents how much they drink. Thus, problems have arisen in two areas: the type of categories used to classify people who drink, and what type of questions to ask.

1. *Categories used to classify people who drink:* studies asking respondents to list and describe all their drinking occasions in a given period.

Ideally it would be desirable to ascertain the exact amount of alcohol each individual took over a period of a year. This would prove difficult from two points of view. First, in the recording of such information, and second, the classification of varied patterns for a population, would create problems of categorisation. Short-term panel surveys or diary studies asking about the social context and the precise amounts of alcohol consumption over the course of a certain period, such as six months or a year, would, however, be fruitful. The former type of study was carried out by Ekholm [11] in Helsinki; the latter by Lolli *et al.* [12].

Ekholm carried out a one-year study on the drinking rhythm of a pre-selected group of Finnish males living in Helsinki. The aim of the study was to register every drinking occasion of the selected subjects during a period of one year. For every drinking occasion a separate schedule was completed, including the date and hour. An attempt was made to obtain information on the company and location whilst drinking. When the numbers of those drinking in informal groups were small, an effort was made to ascertain the names of those participating, so as to make possible the identification of drinking groups. The respondents' impression of the type and amount of alcohol they consumed was recorded by interviewers. While the study itself did not contain a representative sample of any group or area in Helsinki, the methodological approach is of interest and is one area that might be explored if the proper sampling procedures were adhered to strictly. A problem may arise in using this method, in that respondents might

begin to be very conscious of their drinking behaviour and thereby influence their pattern of drinking. Ekholm reported that "some subjects noted that they have come to reflect upon their drinking behaviour in a much more thorough way than before and some were rather surprised by their own frequency" [13]. However, this "observation effect" was not present in all subjects and Ekholm holds it was "hardly very important" [14].

Lolli *et al.* [15] carried out a study on Italians and Italian Americans who volunteered [16] to take part in the study. Each subject was given a weekly diary to complete. The weeks in which the diary was completed were spread equally over the seasons of the year. Each volunteer was also asked questions relating to certain physiological, psychological and socio-cultural topics. Whilst this method offers possibilities for further studies, the difficulty arises in getting a meaningful picture of drinking for a representative group of the population.

A variation of this method would be to get exact reports on each beverage type drunk for a brief period, as used by Sadoun, Lolli and Silverman [17], where each respondent was asked all the types of food and beverages—including alcoholic—they had taken during the 24 hour period prior to interview. This type of information, though useful in itself, might be found to be atypical, because of a certain time or social function, where the respondents would take more alcohol than usual. Because of this no conclusions can be made about usual behaviour and group averages might lead to incorrect assumptions.

Yet another method would be to obtain information on the week prior to interview. This information would have the same limitations as those referred to for the 24 hour period, but could prove useful if used in conjunction with other measures. This approach [18] has been used in several of the studies of high school students as an indication of the number of people who drink, with limited information on the amount of drinking carried out.

Other studies of high school students [19] have used frequency of drinking as an indication of respondents' drinking patterns. However, the emphasis here is not on "amount of drinking", but drinking as a pattern of behaviour, of which the amount drunk is only a part.

Sariola [20] carried out a study of the drinking patterns in Lapland. The method used here was to ask respondents about the most recent occasion when they used alcoholic beverages. Each respondent gave a detailed description of this drinking occasion. Sariola holds that this approach gives detailed information which would not be obtained by referring "to unspecified occasions of alcohol consumption" [21].

In *Drinking and Drinkers* [22] four particular questions are used to estimate the drinking of respondents; thus drinking behaviour is characterised with the aid of four variables:

- (1) Age at first drink.
- (2) Frequency of drinking—this is measured by the period since the occasion when the subject last took alcohol.

- (3) Amount of absolute alcohol consumed on the last drinking occasion.
- (4) Frequency of intoxication measured by the period since the subject was last intoxicated.

These four variables form a Guttman-type scale. On the basis of this "Drinking Behaviour Scale" the sample being studied was divided into two groups:

- (1) "Those who drank much",
- (2) "Those who drank little or not at all".

A Quantity-Frequency Index was constructed [23]. The aim of this study was to see the relationship between actual behaviour (drinking) and norms of behaviour (attitude to drinking). Thus, it was concerned more with descriptive categories rather than the quantification of amount of drinking.

Brunn and Hauge [24] employed three measures of alcohol consumption:

- (1) Frequency of drinking occasions prior to interview.
- (2) Quantity consumed on each occasion.
- (3) Type of drink taken.

Reference was made to the last and penultimate occasions the boys had taken beer, wine or spirits. Quantity of alcohol consumed was ascertained by asking the respondents to indicate on a 20 centilitre tumbler the amount they had taken. Frequency was calculated from the number of times respondents said they had taken a drink during the four weeks prior to interview. Calculations of the quantities given as absolute alcohol were made on the basis of the type of alcohol drunk.

The three measurements of alcohol consumption were used to see if there were any relationships between the three variables. They then constructed an index from these variables. This is referred to as an "index of drinking experience". The greater the experience, the more the index points. Here again emphasis is not on amount of drinking as such, but, on factors related to the frequency and amount of drinking in relation to other sociological variables.

In the Finnish National Survey [25] carried out in 1968, detailed information was obtained about all drinking occasions during a certain period. Each respondent was asked the type of alcoholic beverage, and the amount consumed. Information regarding the pattern of drinking was obtained by asking what type of drink they started and ended up with, and who was present in the group, their sex, age and other socio-economic characteristics. The time involved in drinking was also obtained. Because of the difficulties referred to earlier about information acquired for a specific point in time, respondents were also asked if the period covered was typical. An "objective" measure of intoxication was devised by estimating, how often respondents reached a blood alcohol level of .10. This

information was calculated by using the detailed information acquired on drinking and computing it with respondent's weight [26].

Ewing [27] has proposed a somewhat more complicated method of estimating alcohol intake. He discussed "the possibility of developing some kind of annual matrix which would have a number of drinking days on one axis and annual consumption of absolute ethanol on the other axis". He has proposed the following method which he calls the AQ, or Alcohol Quotient. This proposed method is somewhat similar to that of Brunn. The formula is based on certain information [28]:

W = body weight in kilograms.

A = grams of alcohol per occasion.

H = hours duration of average duration.

N = number of occasions per annum.

F = 0.6 if drinks only when eating.

0.8 if usually eats (i.e., with full stomach) when drinking, but not always.

$$\text{The formula is } AQ = \left[F \left(\frac{A - 10H}{0.6W} \times 100 \right) \right] \times H \times N$$

He hopes to carry out a pilot study on this method of people in an alcoholic rehabilitation centre, as well as "normal drinkers" with varying socio-economic characteristics. Ewing's method is to use this AQ together with the self-acknowledged category respondents have placed themselves in, to see what ranges of AQ fall within any one of these groups. Respondents acknowledge their membership of any of the following groups:

- (1) Are you an alcoholic?
If No:
- (2) Are you an excessive drinker?
If No:
- (3) Do you drink too much?
If No:
- (4) Are you a heavy drinker?
If No:
- (5) Do you have problems with drinking?

Ewing aims at developing a method that might eventually define what "is safe and what is hazardous drinking" in terms of his AQ. As can be seen, his method is concerned with the problematic nature of drinking. Both Brunn's and Ewing's

methodology is of considerable value compared to the use of descriptive terms for describing, or indeed, predicating the extent of the problem of drinking. The fact that they take into account information on body weight of respondents, whether they have eaten before taking a drink and the length of the drinking occasion, increases the meaning of a given amount of drinking in the physiological sphere.

2. *Categories used to classify people who drink:* respondents' reportage of their usual drinking pattern.

Quantity and Frequency Index

The first attempt at classification of drinkers, in terms of how often they drank, in the United States appears to have been made in a 1946 survey carried out by the National Opinion Research Centre in America [29]. This first method viewed drinking behaviour in terms of frequency and this has led to the construction of indices of amount of drinking. These indices have been based primarily on Straus and Bacon's [30] Quantity-Frequency Index. Briefly, the Quantity-Frequency Index is the product of the usual amount drunk at an average sitting and the number of times a person drinks in a stated period of time. Historically this method was developed by Straus and Bacon [31] adapted by Maxwell [32] in his study of drinking behaviour in Washington State. Mulford and Miller [33] used it in their Iowa studies, and in the 1963 national quota sample by Mulford [34].

The Mulford-Miller Quantity-Frequency Index is shown as an example of the Quantity-Frequency Index that is being discussed.

Bacon-Straus, Mulford-Miller Quantity-Frequency Index: Drinking in Iowa [35]

Type of beverage usually drunk—

1. The "frequency" question was worded as follows: "How often during the past year did you have one or more drinks?" Response alternatives ranged from once per year to daily.

2. The "quantity" question was worded: "How much (kind of beverage) would you say you ordinarily consume at a sitting? That is, from the time you start drinking until you quit". The response alternatives to this question, classified as "small", "medium" and "large", are as follows: *Small amounts:* 1-3 glasses of beer, or 1-3 bottles of beer, or 1-2 drinks of liquor, or 1-3 glasses of wine. *Medium amount:* 6-9 glasses of beer, or 4-6 bottles of beer, or 1-3 drinks of liquor, or 4-5 glasses of wine. *Large amount:* 10 or more glasses of beer, or 7 or more bottles of beer, or 5 or more drinks of liquor, or 6 or more glasses of wine. This trichotomy is arrived at after converting standard "bottles", "glasses" and "drinks" to amounts of absolute alcohol. It seems reasonable to assume that at

least among drinkers there is considerable consensus concerning the meaning of a "bottle" or "glass" of beer, a "glass" of wine, and a "drink" of liquor.

From this, the drinkers are divided into five types:

Type I (light drinkers); Drinks infrequently (once a month at most) and consumes small amounts, not more than approximately 1.6 ounces of absolute alcohol.

Type II (light drinkers); Drinks infrequently (once a month at most) and consumes medium amounts, 1.6 to 2.88 ounces of absolute alcohol, or large amounts, more than 2.88 ounces of absolute alcohol.

Type III (moderate drinkers); Drinks more than once a month but consumes small amounts.

Type IV (moderate drinkers); Drinks 2-4 times a month consumes medium or large amounts.

Type V (heavy drinkers); Drinks more than once a week and consumes medium or large amounts.

Definition of terms

Small amount: 1-5 glasses of beer, 1 bottle of beer, 2 drinks of liquor, 1-3 glasses of wine.

Medium amount: 6-9 glasses of beer, 4-6 bottles of beer, 3-4 drinks of liquor or 4-5 glasses of wine.

Large amount: 10 or more glasses of beer, 7 or more bottles of beer, 5 or more drinks of liquor, or 6 or more glasses of wine [36].

This type of Quantity-Frequency Index may be suitable in a culture where the majority are supposed to drink in a steady manner ("spaced drinking"), but would appear to be unsuitable in a culture if there was a tendency to mass the drinking: For example, to the question "how much do you usually drink in one sitting", the answer could be one pint of stout four or more days a week, which in practice could be one pint per day but ten on Friday.

Beaubrun's approach was to classify drinkers in terms of annual quantity ranging from (1) no alcohol at all in the past year to type (6) over 1,333 drinks of spirit or 2,000 bottles of beer per annum: Frequency is defined in three ways:

- (1) Frequent—every day
most days
about once or twice per week.
- (2) Weekends—weekends only.
- (3) Infrequent—once or twice a month or less.

These frequency measures are computed with six quantity measures giving 19 categories. Ewing [37] points out that some of Beaubrun's categories are more theoretical than feasible since some of the categories would mean respondents would have to drink more than would be humanly possible. Beaubrun [38] himself points out that his types 4, 5 and 6 are all in excess of Mulford's category 5, which are described as heavy drinkers [39].

The Quantity-Frequency-Variability Index

The Quantity-Frequency-Variability Index was devised from the experience of the Quantity-Frequency Indices referred to and primarily from the work of Knupfer [40] and Cahalann and Cisin [41]. Knupfer introduced the fluctuation or variability factor by allowing for type of drink and variability in which there was a comparison of the usual amount of drink with the greatest amount ever taken. This factor was used in conjunction with the quantity and frequency of respondents' drinking; thus taking into account the quantity of alcohol consumed per drinking occasion, the number of occasions, and the variability in time and amount in the following manner:

- (1) Quantity—was measured for each occasion of drinking—this was done for all beverage types by asking how often the person had as many as 5-6, 3-4, 1-2 drinks.
- (2) Frequency with which each beverage was drunk.
- (3) Variability in which there was a comparison of the usual drinking with the highest ever taken. This was shown by a combination of the modal amount consumed and the highest amount drunk at least occasionally.

These variants of the Quantity-Frequency Index measure quantity in terms of the average amount of drink consumed per occasion, without taking into consideration the variability of their drinking in terms of "massing and spacing". It was quite possible for a person to be classified with the same weekly total but with different drinking styles as Knupfer points out:

... one could calculate an average intake per week, per month, or per year but this would not distinguish between high drinkers and light drinkers. The same weekly total could be obtained for the person who takes two drinks every day, and the one who takes 14 drinks every Saturday night and one who takes seven drinks twice a week. It is reasonable to assume that these 3 types represent different kinds of living and drinking patterns [42].

The quantity and variability components are then combined to form the following 11 classes.

FIGURE 1: Quantity-Variability Classifications [43]

Quantity-Variability Class	Modal Quantity (amount drunk "nearly every time" or "more than half the time")	Maximum Quantity (highest quantity drunk)
1	5-6	5-6
2	3-4	5-6 "less than $\frac{1}{2}$ time"
3	3-4	5-6 "once in a while"
4	no mode specified	5-6 "less than $\frac{1}{2}$ time"
5	3-4	3-4
6	1-2	5-6 "less than $\frac{1}{2}$ time"
7	no mode specified	5-6 "once in a while"
8	1-2	5-6 "once in a while"
9	1-2	3-4 "less than $\frac{1}{2}$ time"
10	1-2	3-3 "once in a while"
11	1-2	1-2

Each respondent is classified into one of the five general Quantity-Frequency-Variability groups by cross tabulating the frequency of drinking against the quantity-variability classification of the specific beverage used most frequently. The Quantity-Frequency-Variability classifications are shown in Figure 1.

FIGURE 2: Quantity-Variability Classification [44]

Quantity-Frequency-Variability Group	Frequency (of any alcoholic beverage)	Quantity-Variability Class (beverage drunk most often)
1. Heavy Drinkers	a. Three or more times a day	1-11
	b. Twice a day	1-9
	c. Every day or nearly every day	1-8
	d. Three or four times a week	1-5
	e. Once or twice a week	1-4
	f. Two or three times a month	1
2. Moderate Drinkers	a. Twice a day	10-11
	b. Every day or nearly every day	9-10
	c. Three or four times a week	6-9
	d. Once or twice a week	5-9
	e. Two or three times a month	2-8
	f. About once a month	1-6
3. Light Drinkers	a. Every day or nearly every day	11
	b. One or four times a week	10-11
	c. Two or three times a month	9-11
	d. About once a month	7-11
4. Infrequent Drinkers	Drank less than once a month but at least once a year (quantity questions not asked).	
5. Abstainers	Drank none of the three beverages as often as once a year (quantity questions not asked).	

Knupfer's [45] point that the Quantity-Frequency-Variability type of index does not differentiate between the various types of people who are quite different in their alcohol use was shown to be valid and has led to further refinement of the Quantity-Frequency-Variability method.

Volume-Variability Index

This Quantity-Frequency-Variability Index was modified to form the Volume-Variability Index "which permits holding constant quantity consumed, while studying differences in the massing and spacing of drinks" [46]. The use of such classifications such as Heavy, Moderate and Light are somewhat arbitrary in that the labels of necessity depend on the researcher's own definition of the terms.² Although this problem is perennial and is common to all methods, the use of terms such as heavy drinker also raises problems, because of the emotive connotation of the word. The other factor already referred to by Knupfer and Cahalann and Cisin is valid, as their research has shown, in that the Quantity-Frequency Index or Quantity-Frequency-Variability Index tends to mix the life-style of respondents which is quite dissimilar. Cahalann and Cisin point out that the "variability of drinking index was based on the principle that the spacing or bunching of drinks is more important than aggregate volume alone in characterising an individual's drinking patterns" [47].

The Volume-Variability Index divides respondents into 11 groups.

1. Abstainers—drinks less than once a year.
2. Infrequents (drink at least once a year but less than once a month).
3. Low volume (1.0–17.5 drinks/month). Low maximum (never 3–4 drinks) on an occasion.
4. Low volume (1.0–17.5 drinks/month). Medium maximum (never 5–6 drinks) on an occasion.
5. Low volume (1.0–17.5 drinks/month). High maximum 5–6 drinks at least once in a while.
6. Medium volume (17.6–44.9 drinks/month). Low maximum.
7. Medium volume (17.6–44.9 drinks/month). Medium maximum.
8. Medium volume (17.6–44.9 drinks/month). High maximum.

2. The question of definition of "moderate", "heavy", "light" drinking is one where confusion abounds and the use of such terms can often be misleading. In most studies, as is evidenced by the text of this paper, the researchers have tended to use their own definitions of these terms. The value of the Volume-Variability Index is that it does not use such terms and implicit in its use is the idea of the measurement of the general pattern of drinking as a descriptive tool. If one wants to look at "problem" drinking, the approach the author would suggest is that amount of drinking is only one facet of a very complicated behavioural phenomenon. The next section deals with this point in more detail.

9. High volume (45.0 or more drinks/month). Low maximum.
10. High volume (45.0 or more drinks/month). Medium maximum.
11. High volume (45.0 or more drinks/month). High maximum.

“Abstainers” and “Infrequent Drinkers” are classified according to their responses on the overall frequency question. The total volume of alcoholic beverages consumed per month is calculated for more than infrequent drinkers and assignment is made to Low, Medium or High Volume groups. The volume (or quantity) is classified according to whether or not 3-4, 5-6 drinks have been consumed at a sitting. This classification holds volume constant; and the respondents who tend to mass their drinks, i.e. those who take 5 or more drinks on at least some occasions, and those who “space” their drinking, i.e. never take as many as 5 drinks on any occasion.

Questionnaire responses as a source of data on drinking practices as compared with information obtained from sales data

Popham [48] commenting on the validity of survey questions on drinking, found discrepancies between data obtained in surveys and data from *per capita* sales estimates. In Finland estimates of *per capita* alcohol consumption based on survey data was less than half the *per capita* sales estimate. A somewhat similar conclusion was reached when estimates on household expenditures in a County of Ontario was carried out. Popham revealed that all respondents under-reported their alcohol purchases and were the heaviest buyers to a greater extent than the other respondents. He raises an interesting point, on the differences between the reporting of “civilised” (wine) beverages and spirits. He found that survey estimates for wine consumption came close or even exceeded sales estimates. Reports of survey based estimates on spirits were much lower than was indicated by the sales estimates. This information conflicts with other reports on these two methods. Swiecicki [49], reporting on studies carried out in Poland did not find such discrepancies in the two types of data. He points out “the difference between the estimates derived from representative survey of public opinion, and the ‘objective’ ones derived from the sales statistics, did not exceed 10 per cent”.

A problem commented upon by Popham [50] and Neter and Waksberg [51] is the effect on the validity of information by the lapse of time. Neter and Waksberg reported that there appeared to be a general tendency to condense events over a period of time. As Room points out “Ideally, relative validity should be measured with reference to some external ‘objective’ measure of drinking patterns” [52].

The subjective factors that affect respondents’ answers about their own drinking behaviour is worthy of note. Zucker, referring to the work of Goldstein and others suggests “that self-report drinking measures have, in fact, a substantial relationship to external criteria of drinking behaviour” [53].

II

THE PROBLEM DRINKER—YOUTH³

Maddox and Borinski [54] used the Quantity-Frequency Index developed by Straus and Bacon [55] and used in adapted form by Mulford and Miller [56] in their study of the drinking behaviour of Negro collegians. In a further study of Negro collegians, Maddox and Williams [57] and Maddox [58] used a Quantity-Frequency Index, based on respondents' reportage of the number of drinks connected to absolute alcohol, consumed at a sitting combined with the reported frequency of such sittings in a given period. Mulford and Miller's [59] five classifications are used with two modifications suggested by Jessor and Grossman [60] whose attention was given to the specification of the individuals' typical setting. The method used by Maddox employed the same type of questions as used in the Quantity-Frequency-Variability Index [61], together with Jessor and Grossman's absolute conversion table (which permits an estimate of the total quantity of each beverage consumed on each occasion respondents took a drink).

While it is possible with this procedure to estimate the average daily consumption of absolute alcohol for an individual, the purpose in Maddox's work was to determine the most often used beverage and to estimate the amount of that beverage consumed at a typical sitting. The Quantity-Frequency estimates of the beverage type, respondents usually drank, were then classified in one or other of the 5 types outlined by Mulford and Miller [62]. An interesting point that requires consideration is raised by Walsh and Walsh. They indicate that the seriousness of a given level of intake needs to be assessed with other data such as income levels and the proportion of money spent on alcohol at the expense of other areas of one's life. Maddox [63] used three groups, which were abstainers, light drinkers and heavier drinkers as suggested by Mulford's and his own research.

The measurements of Jessor *et al.* [64] were built directly upon the preceding Quantity-Frequency Indices referred to already, and were influenced by the work of Knupfer [65] and her co-workers in their Californian studies. Procedures were used for getting at frequency and amount of drinking for dealing with intake by major type of beverage (beer, wine etc.), and for dealing not only with average consumption but with the range of variation in consumption.

Frequency of drinking was obtained for the 3 beverage types the same as in the Knupfer [66], Cahalann and Cisin [67] and Cahalann, Cisin Crossley [68].

3. Reference in this article is confined mainly to survey type methodology and does not refer to crime and hospital admission, alcohol related illness statistics. These areas have been discussed widely and omission here does not constitute a devaluing of such indices but indicates that in general, sociological researchers in this area have tended to use the individual respondent as a source of information, in an effort to test the validity of certain measures of problem drinking other than the traditional ones. In practice, reference to general crime, hospital, and alcohol related illness, statistics have been given as background information to these studies. The shortcomings of these sources have been used as an impetus to use other methods to acquire information on general populations which would not be covered by their statistics.

The quantity of drinking was also ascertained by the same methods employed in the studies referred to above. This method was modified for High School students using a format similar to that employed by Mulford and Miller in Iowa [69] and then converted to average ounces of absolute alcohol.

Jessor's Quantity-Frequency Index: This measure is based on the average amount of absolute alcohol consumed per day. Jessor *et al.* approach has both the benefits and drawbacks of the Quantity-Frequency-Variability Index described previously. Like the Quantity-Frequency-Variability it breaks down the complex questions on amount of drinking into component parts and thus, respondents are able to recall their own behaviour with increased accuracy. Since the emphasis of the study was on deviant behaviour, alcohol use was viewed in this light; their table on absolute alcohol consumed per day is particularly helpful, as it is used with other indices of drinking behaviour [70]. This index which was extremely complicated to develop does summarise in a single figure, quantity, frequency and range of consumption of different types of alcoholic beverages which have various levels of alcohol content. The figure used is absolute alcohol content in fluid ounces, and, thus, facilitates translation into meaningful units, such as a pint of beer or a glass of whiskey.

Blacker, Demone and Freeman [71] concerned themselves with the study of delinquent boys and tried to collect the type of information gathered by studies in the "normal" population. Their study was designed to obtain information, on the effects of the use of alcohol, attitudes toward drinking, parental drinking behaviour and demographic characteristics.

They developed the following measures of drinking:

- Frequency rating [72].
- The "effect measure".
- Pathological behaviour.
- Pathological attitude.

They developed a typological model of drinking behaviour, taking into account the frequency [73] and the effects of alcohol use and the "pathological" behaviour related to the use of alcohol. They do not take into account the quantity of alcohol consumed, but feel that their typology of drinking behaviour could be extended to include the measure of quantity of alcohol consumed. The goal of the study was to identify a syndrome of behaviour that might indicate pathological drinking.

Robins, Murphy and Breckinbridge [74] in their study of the young urban negro used the following descriptive categories:

- Heavy Drinkers*: 7+ drinks per week and 7 or more per occasion or 4 daily.
- Distributive Drinkers*: 7+ drinks per week but less than 7 per occasion.
- Light Drinkers*: less than 7 drinks per week.
- Non-Drinkers*:

Here again the emphasis is on the problematic aspect of drinking behaviour.

Park [75] in his study of male college students concentrated on problem drinking in an effort to identify ("potential alcoholism") details which would facilitate description of potential alcoholism. He used Straus and Bacon [76] Indices, (1) Social Complications Scale, (2) Frequencies of Intoxication. Problem drinking was most often associated with week-end spree drinking, morning drinking, getting drunk alone, social complications, aggressive behaviour, blackouts as well as quantity and frequency. Reasons for drinking were also ascertained. This score gives a "problem drinking dimension" and it was felt that it could provide a useful means of investigating conditions preceding the onset of alcoholism.

Zucker [77] investigated the validity of the sex-role identifications as being an indication of potential alcoholism. His study focused on adolescents at the beginning of their drinking careers and personality measures of masculinity-femininity were used to assess the respondents, sex-role identification and awareness. The aim of the study was to emphasise the importance of developing a meaningful theory of the psychology of drinking behaviour in terms of sex differences and differences in levels of behaviour. Since the study had this particular focus, it did not concentrate on amount of drinking, but used a quantity index and frequency index separately. The "drinking behaviour measures" were (1) highest average drinking quantity and (2) the highest average drinking frequency. Zucker points out:

There was justification for treating them (Q.F.) on theoretical grounds. A high quantity score (i.e. average quantity consumed in a given occasion) indicates a potential for uncontrolled drinking while a high frequency score—may or may not indicate this, depending on the context. The Q.F. Index obscures these differences [78].

The researchers referred to in this sub-section have focused on the origin and development of problem drinking behaviour. This has meant that they have not used Quantity-Frequency of drinking in "unusual" experiences, like getting drunk, or social complications due to drinking, as isolated variables. Thus, the emphasis has been on a "syndrome" of behaviour whose parts might indicate the development of a problem or the development of a pathological pattern of drinking behaviour. Therefore, amount of drinking, measured in one form or another, is only one index of a very complicated behavioural pattern.⁴

It would appear from the review of the literature that the measures employed to classify the amount of drinking of respondents need to be evaluated in terms of the purpose for which they were designed. With this in mind a brief examina-

4. Here the question of the definition of excessive and problem drinker is of vital importance. In most studies the researcher has tended to use his own definition/s of the above term/s. As with the definition of alcoholism, the problem remains that there is not general agreement on what one is referring to precisely, so that researchers appear to define their own terms of reference and work within these limits. For the purposes of cross-cultural comparison such terms need to be specified precisely, otherwise the collection of useful information becomes limited and the general development of studies in this area retarded.

tion of the Volume-Variability Index will follow. This index is very useful when comparing different groups' drinking behaviour. Emphasis is placed not only on volume in terms of drinks taken but also on the variability of respondents' drinking in terms of whether they tend to "mass" or "space" their drinking. It is a useful tool for sociological studies, where the emphasis is placed not on drinking as such, but drinking as a pattern of behaviour, thus taking into account the how, when, where and why, as well as the quantity of drinking. It is also useful when attitudes are being discussed, as the classification of drinking is in descriptive rather than quantitative terms.

In using such descriptive terms as low volume, low maximum etc., it avoids the classification of drinkers in such emotive terms as heavy, light and moderate. Whilst the indices which use these terms have tended to focus on problem drinking, the Volume-Variability Index helps in describing drinking in a social context without emphasising the problematic nature of the subject.

Those involved in the San Francisco drinking studies [79] have now come to the same conclusion, but point out that if data is required for comparative use it was more appropriate to use the original Volume-Variability Index. As it was the concern of this study to "test" a method of quantifying the amount of drinking carried out by respondents, it was decided to adhere to the original format. But as Room [80] points out "it would be simpler and less approximate to ask respondents" how often "they drank particular levels of quantity of alcohol". He also indicates that the method adopted in this study of estimating how much alcohol is included in what respondents drink might be of more value. However, in the 1967-'68 survey of San Francisco, men aged 21-59, respondents were asked questions on their frequency of drinking, the greatest amount drunk in the last year and the "usual" amounts of drinking, and then "about how many times since this time last year would you say you had at least 12 drinks—that's about a pint of whiskey, about 5 quarts of beer, over 1/5th of sherry, 2/5th of ordinary table wine or some other combination that's roughly equal to that amount of alcohol". This type of question was also asked for 8-11, 4-7 drinks or their equivalents. Thus, these methods as Room [81] points out avoid the shortcomings of the studies, using "usual amount" and "quantity" and "frequency" as classificatory measures to indicate the extent of problem drinking. The listing of occasions method facilitates analysis and re-analysis, although this amount of data raises problems, in that the researcher might settle for the last few occasions of drinking. In the study in South County Dublin [82] the Volume-Variability Index was used for occasions of drinking in the week prior to interview, which was a useful indicator of the value of the overall Volume-Variability Index for the usual amount of drinking.

What needs to be emphasised again is that the Volume-Variability is summary and, therefore, short and easy to manage for purposes of group comparisons. It has the limitation common to all Quantity-Frequency Indices in that it is a summary rather than a detailed account of respondents' drinking.

Secondly, for use in the Irish situation, it appears to be necessary to modify the

category of abstainers. Because of the cultural and historical context of abstinence in both Ireland and England it is desirable to include the distinction between:

- People who drink less than once a year;
- Pioneers, Confirmation pledge holders, total abstainers;
- Non-drinkers who never took a drink;
- Ex-drinkers.

The category of ex-drinker is also included because, as Maddox [83] pointed out in the study of adolescents, there is a logical possibility of their changing their pattern of drinking to one of abstinence. Thus, the Volume-Variability Index might be adapted to include this particular category.

It would appear that this Index by itself would not be useful in the analysis of problem drinking. However, used with other variables it might help to highlight particular patterns of drinking that lead to problem drinking.

SUMMARY

It has been shown in this paper that "crude" and "age corrected" *per capita* rates of alcohol consumption are based on a mean of a heterogeneous population, and that their use is of limited value if one wants to know "how much people drink".

The discussion of the "effective" *per capita* rate referred to the estimate of the number of drinkers in a country or region, which was arrived at through sampling procedures and survey methods. This sub-section dealt with the categories used to classify people who drink. It was pointed out that these studies have tended to take two directions:

- (i) Those studies asking respondents to list and describe all their drinking occasions in a given period;

the main emphasis in these studies was not on the amount of drinking as such, but on factors related to the frequency and amount of drinking in relation to other sociological variables. Two of the studies mentioned were concerned with the extent of problem drinking.

- (ii) The studies where emphasis has been on respondents' reportage of their usual drinking pattern;

this section dealt with the development of the Quantity-Frequency Index and as was shown the original Quantity-Frequency Index has been adapted and refined through the years. Each adaptation has led to further refinement of method and to a more detailed analysis of the amount of drinking in terms of quantity and frequency. Thus, each method has contributed to research methodology in this

area and is one example of the value of research which uses methods already established and modifies aspects of the original to facilitate more meaningful analysis of data. The Quantity-Frequency Index, although modified, has not been superseded but rather supplemented. The use of a questionnaire schedule in studies on drinking practices was discussed. Reports of the differences between using a questionnaire schedule and sales estimates were stated. There appeared to be conflicting reports when the use of these two methods was examined. The effect on the validity of information by the lapse of time and the subjective factors that affect respondents' answers was examined.

It was pointed out also that the use of measurements on the amount of drinking of respondents needs to be evaluated in terms of the purpose for which they were designed. With this in mind, the use of the Volume-Variability Index in sociological studies is advocated. It was suggested that this Index facilitates the analysis of studies of drinking, where the emphasis is not on drinking as such but drinking as a pattern of behaviour. Certain modifications of this Index were suggested, with specific modifications for use in both the Irish and English context.

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