MULTIVARIATE ANALYSIS OF DRINKING BEHAVIOUR IN A RURAL POPULATION

N. MATHRUBOOTHAM, V.S.P. BASHYAM & SHAHJAHAN

ABSTRACT

This study was carried out to find out the drinking pattern in a rural population, using multivariate techniques. 386 current users identified in a community were assessed with regard to their drinking behaviours using a structured interview. For purposes of the study the questions were condensed into 46 meaningful variables. In bivariate analysis, 14 variables including dependent variables such as dependence, MAST & CAGE (measuring alcoholic status), Q.F. Index and troubled drinking were found to be significant. Taking these variables and other multivariate techniques too such as ANOVA, correlation, regression analysis and factor analysis were done using both SPSS PC + and HCL magnum mainframe computer with FOCUS package and UNIX systems. Results revealed that number of factors such as drinking style, duration of drinking, pattern of abuse, Q.F. Index and various problems influenced drinking and some of them set up a vicious circle. Factor analysis revealed mainly 3 factors, abuse, dependence and social drinking factors. Dependence could be divided into low/moderate dependence. The implications and practical applications of these tests are also discussed.

Key words: Alcohol, drinking pattern, drinking behaviour, social drinking, drug dependence

Most of the studies on drinking behaviour of Indian and western population have been descriptive in nature and the same are summarised by Mathrubootham (1989). The data collected in such surveys will become more meaningful if they are subjected to multivariate statistical analysis. It has also been stressed by Skinner (1980) who also discussed the methodological aspects in such analytical studies. Edwards (1989) has utilised these techniques in his later studies. So that the validity of such a research work is maintained, one has to plan carefully at the start of the survey itself and follow the steps proposed by Smart (1980) in WHO publication.

We carried out a detailed multivariate statistical analysis keeping the above in mind, of the data collected in a survey conducted in a village near Chennai during 1988, to study the drinking patterns in a rural population using multivariate techniques.

MATERIAL & METHOD

386 current users (all males) as per the definition of Smart (1980) formed the subjects for our study. They were drawn from 790 alternate households at Padappai, a representative village in Tamil Nadu located 42 Kms from Chennai.

They were assessed using a questionnaire designed for the study and the steps suggested by Smart (1980) were methodically followed in the research.
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### TABLE I
ANALYSIS OF VARIANCE

| Source of variation | sum of squares | d.f. | mean square | f | Signif of f |
|---------------------|---------------|------|-------------|---|-------------|
| Main effects        | 18.182        | 3    | 6.061       | 49.698 | .005        |
| PYMF                | -973          | 1    | .973        | 7.979  | .002        |
| PAF                 | 2.029         | 1    | 2.029       | 16.639 | .000        |
| QFF                 | 1.136         | 1    | 1.136       | 9.314  | .000        |
| 2-way interactions  | .587          | 3    | .196        | 1.604  | .188        |
| PYMF PAF            | .392          | 1    | .392        | 3.210  | .074        |
| PYMF QFF            | .158          | 1    | .158        | 1.296  | .256        |
| PAF QFF             | .330          | 1    | .330        | 2.702  | .101        |
| 3-way interactions  | .535          | 1    | .535        | 4.388  | .037        |
| PYMF PAF QFF        | .535          | 1    | .535        | 4.388  | .037        |
| Explained           | 49.966        | 7    | .138        | 58.533 | .000        |
| Residual            | 46.096        | 378  | .122        |        |             |
| Total               | 96.062        | 385  | .250        |        |             |

DEF = Dependence  
PYMF = Psychological motivation  
PAF = Pathological pattern  
QFF = Q.F. index

Interview was conducted by the psychiatrists trained in this procedure. The questionnaire with 180 questions elicited information with regard to socio-demographic data, attitude to drinking, general drinking style, motivational factors to drink, quantity frequencies index (Q.F. Index) (Edwards et al., 1972a), MAST (Selzer et al., 1975), CAGE (Barchet et al., 1968), SADD (Duncan et al., 1983), troubled drinking (Edwards et al., 1972c) and complications (psychological and physical).

During the study the respondents were identified using a direct contact method. The data obtained were statistically analysed and the results discussed.

The data was fed into a computer (PC+) and studied using a SPSS-PS+ package. For this purpose the entire questionnaire was divided into 46 variables of which there were 5 (measuring) dependent variables namely alcoholic status as measured by MAST and CAGE, dependence measured by SADD, Q.F. index, and troubled drinking. When the other variables were cross tabulated with the above five variables, 9 of them showed significant association as per chi square test. They were age of onset, duration of drinking, general drinking style, psychological and physical motivation to drink, marital problems, financial problems, occupational problems, psychological (personal) problems and pathological pattern of abuse. Only above 14 variables (5+9) were included for analysis.

Similarly, the analysis was also done with HCL Computer Magnum miniframe using focus statistical package under UNIX operation system, here all the 46 variables were taken into consideration for analysis.

The multivariate statistical analysis carried out were ANOVA, factor analysis
(all using PC+) and correlation study, multiple regression analysis, and factor analysis (all using HCL miniframe computer).

The 14 variables taken into consideration, were the ones found out to be important by other authors also (Ray, 1982; Varma, 1980, Edwards, 1972a & Jean, 1972). We also wanted to see the relationship between the different other variables along with the significant 14 variables and hence we did separate analysis, with them.

RESULTS & DISCUSSION

Analysis of variance was done with representative dependent and independent variables to find the effects of pathological pattern of abuse, Q.F. index, and psychological pattern motivation to drink on dependence and troubled drinking (SPSS-PC+ allows only 5 variables to be included for this analysis).

The results show that Q.F. index, pathological pattern of abuse, and motivation to drink jointly influence dependence and individually troubled drinking.

The pattern of abuse followed by quantity seem to decide the severity of dependence and trouble. (Table I & II) In other words a man who gets into pathological pattern of abuse sooner or later becomes dependent and troublesome.

A symmetric correlation matrix was drawn with all the studied variables using HCL miniframe computer. A matrix with 'r' value more than 0.2 was drawn which showed the following results.

| TABLE 2 ANALYSIS OF VARIANCE |
|-------------------------------|
| Source of variation | Sum of squares | d.f. | Mean square | f | Sigif. of f |
|----------------------|----------------|-----|-------------|---|------------|
| Main effects         | 7.440          | 3   | 2.480       | .16.004 | .00         |
| PYMF                 | .037           | 1   | .037        | .236  | .627       |
| PAF                  | 1.776          | 1   | 1.776       | 11.463 | .001       |
| QFF                  | .110           | 1   | .110        | .712  | .399       |
| 2-way interactions   | .142           | 3   | .054        | .348  | .791       |
| PYMF PAF             | .054           | 1   | .054        | .350  | .555       |
| PYMF QFF             | .009           | 1   | .009        | .059  | .806       |
| PAF QFF              | .085           | 1   | .085        | .546  | .461       |
| 3-way interactions   | .033           | 1   | .033        | .019  | .891       |
| PYMF PAF QFF         | .003           | 1   | .003        | .019  | .891       |
| Explained            | 19.207         | 7   | 2.774       | 17.707 | 0.0       |
| Residual             | 58.576         | 378 | .155        | .202  |            |
| Total                | 77.782         | 385 | .202        |       |            |

TRF = Trouble
PYMF = Psychological motivation
PAF = Pathological pattern
QFF = Q.F. Index
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TABLE 3
REGRESSION ANALYSIS

| Cause effect                  | Effects cause                  | Effect = Cause                  |
|-------------------------------|-------------------------------|---------------------------------|
| Duration                      | Dependence                    | Pathological pattern            |
| Q.F. Index                    | CAGE                          | Personal & Psychological problems|
| Psychological motivation      | Trouble                       | Psychological effects           |
| Poor motivation to seek help  | MAST                          | Physical motivation             |
| Blackout and memory problems  | Marital and family problems   |                                 |
| Financial problems            |                               |                                 |

It is evident that the dependent variables namely dependence, CAGE & MAST (measuring alcoholic status), troubled drinking, and also pathological pattern of abuse, are mostly interrelated and correlated with the other important variables also.

The other variables were duration of drinking, psychological/physical motivation to drink, motivation to seek help, self-perception & assessment, black out and memory problems, personal and social problems, marital and family problems, occupational problems, financial problems & psychological effects and Q.F. index. This may mean that all these 12 variables are in some ways related to alcoholism and dependence, trouble and pathological pattern of abuse.

Even though "age of onset" of drinking is known to be an important variable, as among those who were studied, there were not many who had started drinking at an earlier age namely below 15 years of age and hence "age of onset" was not included in the analysis.

A multiple regression analysis was done to facilitate meaningful explanation of the cause and effect relationship. Out of 46 variables, 21 entered the regression equation of which 15 showed cause and/or effect relationship. The five variables namely CAGE, MAST, trouble dependence (SADD), and pathological pattern of abuse were kept as dependent variables with other variables being taken as independent ones. By a process of rotation of the independent variables on the dependent variables, the following picture emerged. Variables such as (longer) duration of drinking, (high) Q.F. index, psychological motivation to drink, (poor) motivation to seek help, black out and memory deficits and financial problems have greater causative roles than effect as far as drinking was concerned. Alcoholism (measured by MAST AND CAGE), dependence, trouble, marital and family problems were more than effects of drinking and variables such as pathological pattern of abuse, personal problems and psychological problems, psychological effects, and physical motivation to drink came out both as cause and effect of drinking. Thus the concept of the vicious circle of drinking aggravating problems and problems leading to more drinking could be explained (table III).

Finally a factor analysis was done first with the 14 significant variables and then also with all the 46 variables taking into account the requirements laid down by Skinner (1980) for such an analysis. Accordingly the analysis was done to find out if different grades of drinking could be sorted out. The model followed was 'Principal component image factoring analysis using SPSS-PC+ and HCL Magnum Miniframe computer, which sniffed out 3 factors (PC+) and 4 factors (HCL Computer) with Eigen value more than '1'. Varimax rotation was used and the output contained all items including the most important namely standard deviation and variable mean as suggested by Skinner (1980).
### Table 4
**Final Statistics**
*Factor Analysis (SPSS-PC+)*

| Variable                  | Communality | Factor | Eigen Value | % of var | CUM PCF |
|---------------------------|-------------|--------|-------------|----------|---------|
| Duration                  | DUF         | 1      | 5.37094     | 38.4     | 38.4    |
| Psychological motivation  | PYMF        | 2      | 1.41132     | 10.1     | 48.4    |
| Physical motivation       | PHMF        | 3      | 1.06565     | 7.6      | 56.1    |
| Marital problems          | MRF         |        |             |          |         |
| Personal problems         | PRF         |        |             |          |         |
| Occupational problems     | OGF         |        |             |          |         |
| Financial problems        | FIF         |        |             |          |         |
| Drinking behaviour        | DMF         |        |             |          |         |
| Pathological pattern      | PAF         |        |             |          |         |
| Q.F. Index                | QEF         |        |             |          |         |
| Dependence                | DEF         |        |             |          |         |
| CAGE                      | CAF         |        |             |          |         |
| Trouble                   | TRF         |        |             |          |         |
| MAST                      | MAR         |        |             |          |         |

For the purpose of analysis as mentioned earlier the entire questionnaire was condensed into 46 variables and all the variables were assigned values to enable categorisation of the responses according to severity.

For factor analysis the factor with Eigen value of more than 1 were considered as important. The factor loading of more than 0.3 (as it is ideal for the size of the sample studied) was taken to find out significant variables contributing to the factor.

Thus 3 factors emerged when the analysis was done with SPSS PC+ taking 14 variables already proved to be significant.

In this the 3 factors each with Eigen value of more than one were sniffed out accounting for 56% of the variance, (Tables IV & V). The factors I was named dependence factor and accounted for 38.4% of variance and contained pathological pattern of abuse, marital problems, dependence, psychological problems, drinking style, Q.F. index, psychological motivation, occupational problems and MAST in that order.

The factor II called 'abuse factor' accounted for 10% of the variable and contained financial problems, troubled drinking, CAGE, occupational problems, MAST, psychological motivation and pathological abuse.

The factor III called 'social drinking' factor comprised of MAST and duration accounting for 7.6% of cumulative percentage of variance.

Even though in a community more of social drinkers/abusers are to be expected, because of inclusion of only the significant variables in the analysis (using SPSS-PC+) the predominant factor came out as one resembling dependence. In fact the prevalence rate of moderate/severe dependent was only 4% of the current users in the community.

In order to get a clearer picture of the distribution of the drinkers another factor analysis was performed using HCL magnum mainframe computer keeping the same EIGEN
value and factor values as before but with all 46 variables. Based on the factor loading 19 different factors were sniffed out accounting for 96% of the variance. Of these, the first 4 factors accounted for 44% of the variance and were studied.

Based on the constituents of the factors isolated these 4 factors were assigned arbitrary names; they were:
1. Abuse - problem drinking factor accounting for 24% of the variance
2. Social drinking factor accounting for 8% of the variance
3. Low dependence factor accounting for 6% of the variance
4. Moderate dependence factor accounting for 6% of the variance. The individual components of the factors are given in Table VI & VII.

A close scrutiny reveals that factor 1 contains cage denoting alcoholic status, problem drinking, pathological abuse, financial and marital problems, increased psychological effects, blackouts and memory problems and poor self perception. Since this accounts for the majority of the variance it is probable that in a community sample there are more abusers than dependent and this population will benefit by counselling and treatment.

Factor II has low dependence, less personal/social problems, single status, healthy overall attitude about drinking, high religiosity, less marital, family and financial problems, less severe drinking (Q.F. index) and less depressive features and better motivation to seek help. This factor encompasses both protective and handicap factors with regard to drinking. It may mean that one can prevent these people graduating into pathological drinking by strengthening the protective factors.

Factor III encompasses low religiosity, married status, moderate marital and family problems, physical motivation to drink, low dependence, social class of high order, significant psychological motivation to drink, low Q.F. index, lesser duration of drinking, less financial problems and pathological abuse. Compared to factor II it can be seen that this group have stepped into the dependence profile. This group requires treatment by specialist on an out patient basis.

| TABLE 6 | ROTATED FACTOR MATRIX | FACTOR ANALYSIS (SPSS - PC+) |
|---------|-----------------------|-----------------------------|
| Variable | I         | II         | III         |
| DUR     | .4994  | .05150    | .58368    |
| PYSMF   | .26020 | .41701    | .48494    |
| PHMF    | .64716 | .01634    | .22881    |
| MRF     | .74786 | .15524    | .29655    |
| PRF     | .72890 | .16748    | .18199    |
| OCF     | .53721 | .46410    | .01462    |
| FIF     | .09928 | .77784    | .13110    |
| DHF     | .65498 | .07416    | .07985    |
| PAF     | .77851 | .31483    | .15374    |
| OQF     | .54935 | .24853    | .09945    |
| DEE     | .73599 | .26225    | .15034    |
| CAF     | .14729 | .75313    | .16800    |
| TRF     | .27773 | .77108    | .16292    |
| MAR     | .31431 | .43879    | .49538    |
TABLE 6
FACTOR ANALYSIS (HCL MAGNEM)

| Factor - I (Abuse)                          | Factor - II (Social drinking)                      |
|-------------------------------------------|---------------------------------------------------|
| Alcoholic status (CAGE)                   | (Low) dependence                                  |
| Problem drinking (Trouble)                | (Less) personal social                            |
| Financial problem                         | problems                                          |
| Marital problem                           | single status                                     |
| Increased psychological effects           | healthy overall attitude                           |
| Blackouts & memory defects                | (High) religiosity                                |
| Poor self perceptions                     | (Less) marital problems                           |
|                                          | (Less) family problems                            |
|                                          | (Less) financial problems                         |
|                                          | (Less) severe drinking (Q.F index)                |
|                                          | (Less) depressive features                        |
|                                          | (High) motivation to seek help                    |
|                                          | (No) suicidal attempts                            |

Factor IV accounts for 6% of variance and consist of moderate dependence, unhealthy overall attitude, suicidal attempt, marital status, hazardous drinking behaviour, less motivation to seek help, family history of alcoholism, more personal and social problems, more attempts at abstinence and more problem drinking. This is obviously a dependent group who require treatment and rehabilitation. This means that this group requires the help of a deaddiction unit.

It was also noted that in social drinking, the handicap factors were high dependence, severe pathological pattern of abuse, alcoholic status (CAGE), marital problems and financial problems and protective factors were High religiosity, single status, low dependence; less of marital problems, less of social problems, less of financial problems, less trouble drinking, motivation to seek help, healthy attitude to drinking, less harmful drinking behaviour and negative family history of alcoholism.

In conclusion it can be said that, apart from collecting descriptive data, if the same is subjected to careful and systematic statistical analysis, could help infer about the spread of different grades/pattern of abuse, dependence and alcoholism with regard to the drinking behaviour. One could also get reasonable idea about the causative factors and the ill effects. All these will help the psychiatrists to organise preventive, therapeutic and rehabilitative measures so that the victims of this malady called "alcoholism" can be helped to a large extent. One should however remember that the various steps suggested by WHO should be followed in such surveys as in this study and the analysis carried out as per the methods recommended by the researchers in this field, to make research on alcoholism a fruitful one.

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