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16. Abstract

This report summarizes the feasibility and advisability of basing state and local planning for alcohol problems on social cost estimates. It is concluded that alcohol-related problems, being not exclusively caused by alcohol abuse, require additional research before social cost estimation of such problem areas will be of high utility for the planning and evaluation of state and local intervention and prevention programs.

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1.0 INTRODUCTION

The research reported herein reflects project activities conducted by HSRI under contract with the Michigan Department of Public Health, Office of Substance Abuse Services. The project was initiated as a pilot effort for a proposed, ongoing policy research program by the Office of Substance Abuse Services. The contract period began in October, 1976.

In 1976 and early 1977 legislation was introduced in the Michigan legislature to raise the legal drinking age to 19 or 21 on the premise that the human toll under the 18-year-old drinking age was too great. The Office of Substance Abuse Services requested prospective contractors to investigate the lasting effects of the 1972 legislative change on young drivers. Phase I of the research reported herein is an analysis of the 48-month experience in Michigan of the effects of the lower legal drinking age on youth crash involvement.

Phase II of the project was an exploratory analysis of alcoholic beverage licensing and distribution dynamics in Michigan. The thrust of the research in Phase II was to detect whether the licensing system of alcoholic beverages interacted with the lowered legal drinking age in Michigan.

Phase III of the research is independent of Phases I and II. The Office of Substance Abuse Services hoped to develop objective techniques for setting priorities for policy attention among the range of social problems associated with alcohol abuse. A review of relevant literatures was conducted. Recommendations based upon that review reflect the current state-of-the-art regarding techniques of quantitatively assessing the public costs of alcohol abuse.

Volume I includes the methods and findings of Phase I and Phase II with a chapter integrating the findings. Research and Policy recommendations are

offered regarding the legal drinking age and closely aasociated issues revealed by this research. Volume II includes the summary findings of the literature review and an annotated bibliography on cost-accounting of alcohol-related problems.

2.0 INTRODUCTION AND SUMMARY OF PHASE III

The task in Phase III of this project was tangential to the major thrust of the research. It consisted of a literature review and development of recommendations that are quite distinct from Phases I and II. Thus this separate volume.

Considerable attention has recently been given to cost estimation of alcohol abuse and alcoholism. The National Institute of Alcohol Abuse and Alcoholism (NIAAA) has made a major investment in this area, as evidenced by the inclusion of such estimates in current planning and presentations to the Congress.* We agree with the need to assess the costs of alcohol abuse and alcoholism. However, we are also concerned with the accuracy of such estimates and the way they are used.

Our selective review should not be considered comprehensive. We are confident, however, that the most significant recent works in the field have been examined and that our conclusions and recommendations would not change substantially if a more extensive review were conducted at this date.

This volume reports work conducted to satisfy four objectives:

1. Review the social cost literature for appropriate models for estimating the social cost of alcohol abuse;

2. Identify the criteria and methodological issues for a valid social cost study;

3. Discuss the major economic theories and principles utilized in a social cost study;

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*National Institute on Alcohol Abuse and Alcoholism Forward Plan, FY 1979-1983. NIAAA, US DHEW, Washington, D.C. June, 1977.

4. Make recommendations regarding the feasibility of implementing a system for estimating the comparative social costs of alcoholism and alcohol abuse at the state level.

This volume is intended to be useful to planners and administrators who must make decisions regarding the priorities of alcohol-related problems as well as other social and health problems.

It is not very feasible now to calculate valid, reliable, and comparable cost estimates for various state-level alcohol-related health and social problems. National policymakers may find it useful to generate cost figures that assist in generating public and Congressional support for alcohol-related services and research. However, this utility rapidly diminishes at the state or local level. With few exceptions, notably traffic accidents, measures of social and health problems are poorly developed and inadequately applied. Moreover, research todate has not provided enough information to determine with confidence what proportions of various social or health problems are alcohol-related. The economic theory and methods employed are reasonably well-developed. However, in practice, the use of average costs rather than marginal costs, along with other difficulties, suggests that more theoretical work needs to be done. Finally, we question the practical utility of cost estimates of a range of problems at the state or local level. Beyond the use of such numbers to set priorities according to relative social cost, these estimates are of minimal importance for program planning or evaluation. Incidence data are generally more practical for such purposes.

On the basis of these observations we recommend that state agency personnel and policymakers not rely heavily now on cost estimates of alcohol-related social and health problems. We believe that the near future might well see the necessary research to provide missing information and quantitative data availability to properly estimate costs of various problems related to alcohol. It is in the best interest of the state to wait for valid comparative cost estimates and only to become invested in the process of computing them when the utility of the activity will serve a real purpose in planning and evaluating intervention and prevention programs.

3.0 TYPES OF ECONOMIC COSTS

Central to the study of the economic costs of alcohol is an understanding of the various concepts of "costs" that economists employ. While the economist has many definitions for the term "costs", the layman has only one. In general the layman's concept of costs refers to account costs, or out-of-pocket expenses. Thus the cost of a new car is the number of dollars the purchaser must spend to acquire one. With this definition, the cost of producing medical services is reflected in the accounting ledgers of the hospital's bookkeepers.

The shortcomings of such a definition are apparent when we look at what are commonly referred to as "free" goods or services--that is, goods or services that require no out-of-pocket expenses or money outlays. To the non-economist, free promotional give-aways (such as a bank's offering free toasters to customers opening a savings account) are without cost, since no money is paid out for the item. From an economic perspective free goods are non-existant, because productive resources are used in producing them. Thus, while the out-of-pocket cost to the consumer who receives the bank's toaster is zero, the bank does incur an accounting cost for the toaster. This is ultimately passed on to the consumer in the form of lower interest rates on savings.

In the review of the economic cost of alcoholism and alcohol abuse we were primarily concerned with costs that accrue to society as a whole. "(Social costs) result from the social process of production wherein scarce resources or factors of production are employed to produce goods and services."* Scarcity arises because there are limited resources to meet the unlimited demands of society for goods and services.

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*Berry, R.E. and Boland, J.P. The Economic Costs of Alcohol Abuse and Alcoholism, 1971, Final Report. Springfield, Virginia: National Technical Information Service, 31 March, 1974, 171 p. PB 242 170. p. 15.

> "The economic cost of alcohol abuse and alcoholism, to the degree it can be accurately measured, is thus a measure of scarcity value. It is only a measure of foregone output that results from the consequences of the problem. Foregone output of goods and services resulting from alcoholism and alcohol abuse can take two basic forms. First, people, because of alcohol, may be less productive than they might have been if it were not for alcohol. Being less productive means that the economic value of their production is diminished; it may even fall to zero. A second form of foregone output attributable to alcohol abuse and alcoholism can result from the diversion of resources into the production of goods and services which are required because of the various consequences of the problem."*

As we have seen, the economic costs to a society of producing a good or service do not necessarily coincide with the accounting costs. Hidden costs (such as in the case of the free toaster), which tend to be overlooked, must somehow be taken into account in calculating the cost to society of alcoholism and alcohol abuse. Economists draw hidden costs into the calculation of social costs through the alternative cost principle, or what are commonly referred to as opportunity costs. "According to the alternative cost principle, the cost of producing a unit of any good or service is the value to the economy of the alternative good or service that must be foregone in order to produce it."** Thus the cost to society of having police officers patrol the streets for drunk drivers is the output which must be foregone as measured by the value of the next best alternative use to which these productive resources could be applied.

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*Berry, (op cit). p. 17-18.

**Leftwich, Richard H. and Sharp, Ansel M., Economics of Social Issues, Business Publications, Inc., Dallas, Texas, 1974, 316 p.

4.0 IDENTIFICATION OF SOCIAL COSTS

As stated earlier,the social cost of alcohol abuse is a measure of foregone output due to the consequences of alcoholism and abusive drinking. Foregone output results from the destruction or impairment of resources, in this case human resources (or persons) whose economic output is lost to society. Foregone output also results from the diversion of resources away from alternative uses (i.e., opportunity costs). Thus research, prevention and treatment programs, as well as medical and automobile repair services, etc. made necessary as a consequence of alcohol-related social problems entail social costs; they utilize productive resources which otherwise could be put to some alternative use.

Most studies of the economic cost of alcohol abuse and alcoholism have been concerned either with calculating the total cost of all alcohol problems to society, or the social cost of a specific alcohol-related problem. Our task in this study has been to selectively review the literature and determine the feasibility of calculating the economic costs of various alcohol-related problems, such that relative priorities among competing alcohol-related problems can be established.

In calculating the economic cost of any social problem, one must first identify the cost-incurring behaviors (or consequences) resulting from the social problem. This obviously requires the existence of some model of behavior that causally links the cost-incurring behavior to the social problem. Once the behavior(s) has been isolated, the task becomes one of identifying the various associated social costs incurred by the behavior(s). Thus, if the problem is chronic alcoholism, the costs would include medical expenditures that result from alcohol-related illness or accidents, lost productivity of various types (impaired work activity, alcohol-related sick

leave, and premature death), repair and replacement costs resulting from alcohol-related damage to or destruction of property. In the above example, alcoholism is the social problem; alcohol-related illness, accidents, impaired work, sick leave, and premature death are the cost-incurring behaviors; and lost productivity, medical costs, and repair and replacement costs of property are the social costs.

Obviously there is some overlap between what is commonly referred to as a social problem and what we are calling cost-incurring behaviors. Chronic alcoholism, which is a broad diagnostic term, usually includes several distinct social problems (i.e., domestic difficulties, medical complications, traffic accidents, etc.). In developing a framework for analysis our objective has been to select problem categories which, to the extent possible, are mutually exclusive (thus minimizing double counting), as well as meaningful in terms of addressing the questions posed by decision makers. As we have given attention to the relative costs of different alcohol-related problems, selection of problem categories has been based in part on differences in intervention strategies. Thus,while both cirrhosis of the liver and traffic accidents result in alcohol-related medical costs, the sites and strategies for intervention are very different.

Table 4.1 lists eleven categories of alcohol-related social problems. Across from each problem are listed possible categories of social cost that may be associated with the problem. Neither list is meant to be exhaustive, they are suggestive of both the problems and the types of costs associated with alcohol abuse and alcoholism. While each of the social costs identified for a particular alcohol-related problem have the potential of being associated with that problem, it is highly unlikely that all of the costs identified will be involved in all incidents of the problem. For example, in the case of domestic difficulties (#11) that result in divorce, there may or may not be police and/or social service involvement. Likewise, domestic difficulties may lead to police and/or social service involvement without resulting in a divorce. Once the potential social costs associated with a particular social problem have been identified, it is necessary to determine the proportion of cases in which each of the social costs is appropriate.

Table 4.1 Alcohol-Related Social Costs

Types of Alcohol-Related Problems	Types of Social Costs
1. Child abuse & neglect	Medical, police, social service
2. Suicide	Medical, lost productivity, police, social service
3. Traffic accidents	Medical, lost productivity, police, legal, court, insurance, repair and replace
4. Fire	Medical, lost productivity, repair and replace, insurance, police
5. Homocide and other violent crimes	Medical, lost productivity, police, courts, legal, detention, social services
6. Legal involvement -Drunk driving -Public intoxication -Drunk & disorderly	Police, court, legal, detention, social service, lost productivity
7. Medical complications -Cirrhosis of liver -Malabsorption Syndrome etc.	Medical, lost productivity
8. Work related problems -Absenteeism -Bad decision-making -Impaired productivity	Lost productivity, treatment and screening (when available)
9. Industrial accidents	Medical, lost productivity, insurance, repair and replace
10. Other accidents -Boating -Home, etc.	Medical, lost productivity, insurance, repair and replace
11. Domestic difficulties -Divorce -Alcoholic housewives -etc.	Lost productivity (in non-market sector), social service, police, legal, courts, increase personal maintenance (resulting from the split-up of households)

Cost estimates are produced by identifying the principal cost categories and weighting them by incidence and other factors. This process which we will call "cost tracking"is outlined in Figure 4.1. Figure 4.1 demonstrates the cost tracking of a particular alcohol-related problem, in this case,Drunk and Disorderly. Since by definition all cases of Drunk and Disorderly are alcohol-related, there is no problem in partitioning out the alcohol-involved cases from non-alcohol-involved cases. The various boxes in the flow chart represent social costs that may be incurred as a result of a Drunk and Disorderly incident. Depending on the decisions made at each decision juncture, the costs attributable to Drunk and Disorderly can be minimal (no charges filed by police), or very large (charges filed through detention and parole). This is not to suggest that the cost to society is less when a Drunk and Disorderly case is released from police custody. Such a person once released (without benefit of treatment) may go on to be involved in other alcohol-related problems (i.e., traffic accidents, medical complications, etc.). When these costs are incurred however, they will be attributable to the specific social problem, and not to Drunk and Disorderly. Thus from society's perspective, it may be less costly in the long run to detain the drunk and disorderly person than to release him without charges.

In determining the percentage of cases in which each social cost is present, as well as the specific dollar value of each of these costs, one can rely on either primary or secondary data. In the above example, primary data would be data collected for the specific purpose of computing alcohol-related social costs. This would involve tracing through the system each person picked up for Drunk and Disorderly. While the validity of such data may be high, the cost of obtaining it is prohibitive. As a result, most social cost studies rely on secondary data—that is, data originally intended for uses other than the calculation of social costs. Public health departments, law enforcement agencies, and social service agencies routinely collect data useful in estimating the number of persons with alcohol-related problems. By combining these aggregate numbers with average costs for the services performed by each agency dealing with the alcohol-abusing individual, estimates of the total social costs for each unit of service can be derived.

While average costs are the estimates most often used in social cost studies, they are not always the most appropriate. For instance, when a hospital estimates the charge for a one-day hospitalization, certain fixed costs are included in the calculation (e.g., salaries, electricity, building maintenance, etc). Fixed costs are those minimal costs incurred to perform one unit of a good or service. In a hospital, for example, the average cost of performing the first laboratory tests is quite high, because included in the estimation are the fixed costs of staff salaries and purchases of laboratory equipment. As the number of patients requiring laboratory tests increases, the average cost per test decreases, because the fixed costs remain constant, while an additional test increases costs only slightly with modest requirements for chemicals and disposable materials.

The costs associated with performing the additional laboratory tests are known as marginal costs, which are the increase in total costs associated with an additional unit of output. Because in a social cost study we are only interested in estimating the value of resources lost, or resources utilized as a result of the consequence of a social problem, marginal costs and not average costs are the most appropriate estimates for planning purposes. Stated another way, the investigator is asking what costs society would not incur in the absence of the alcohol-related social problem. In the hospital example, if alcoholism were eradicated, society would save the costs of performing additional alcohol-related laboratory tests, yet the fixed costs of maintaining the hospital laboratory would remain. If a social cost study is to accurately reflect the value of only foregone production resulting from a social problem, only marginal costs should be utilized.

Two additional points need to be made. First, while marginal costs can be estimated, a great deal of information is usually required and the calculation can be complex and expensive. Second, in a perfectly competitive market, which rarely if ever exists in reality, average costs do equal marginal costs. This explains in part why most social cost analysts make assumptions of perfect competition when formulating their estimations.*

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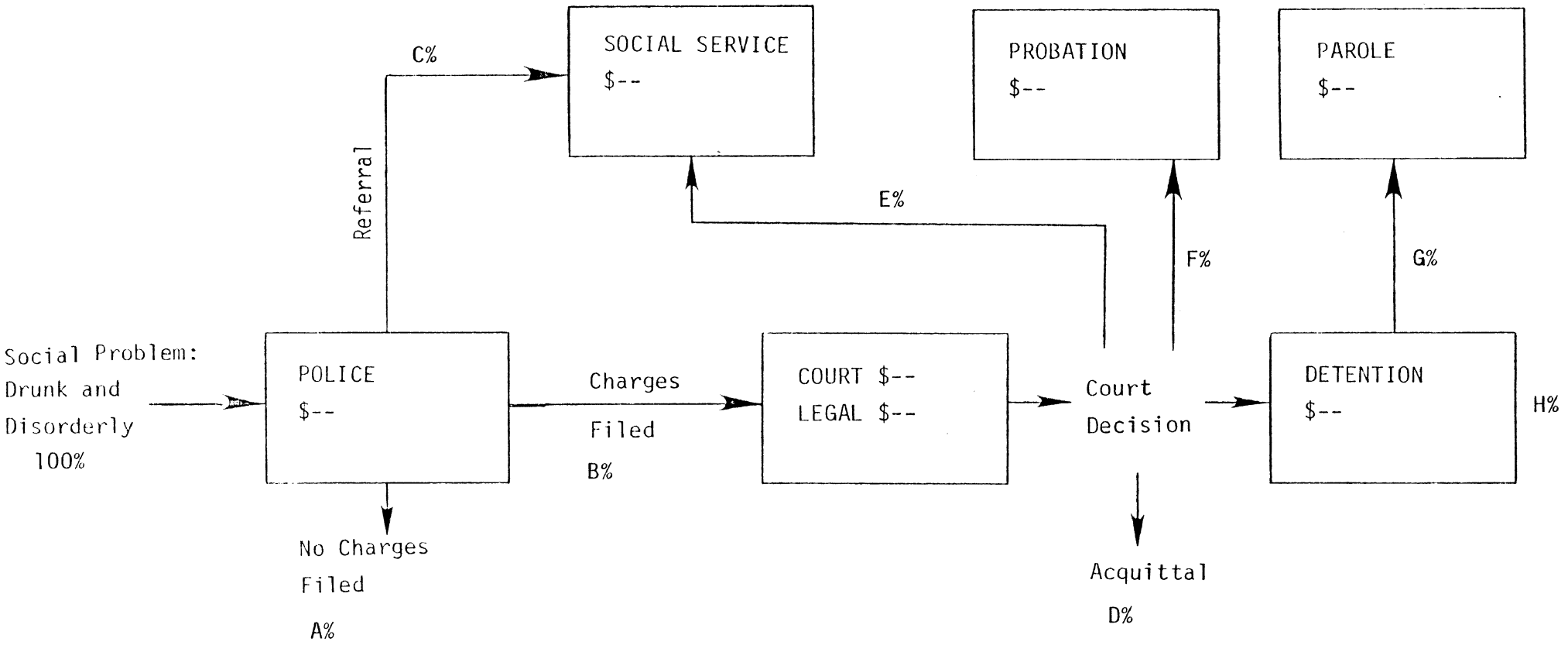
*Berry, op cit.; Hirshleifer, J. Price Theory and Applications. Prentice Hall, Inc., Englewood Cliffs, N.J. 1976. Chapter 2.

Figure 4.1

Cost Tracking of an Alcohol-Related Social Problem*



* Lost Productivity has not been included in this flow chart since it is an implicit cost in each of the cost incurring activities identified. That is, each activity has the potential of taking the Drunk and Disorderly person away from productive activity for either a short or prolonged period of time.

Depending on the quality of data available, (i.e., reliability, level of detail, see Section 5.4) these estimates can be further improved by partitioning the data set by age, race,and sex, and computing separate cost estimates for each group. The aggregate type of estimation procedure assumes that the particular social problem under study affects equally all socio-economic groups. Where research indicates otherwise, adjustments in average earnings can be made.

5.0 ISSUES OF MEASUREMENT

Eventually all methods of estimating the costs of alcohol-related social problems culminate in combinations of numbers that represent events, consequences of events, and dollar value equivalents. It is critical, therefore, to review the issues of measurement on which all cost estimation is based. This section will review the general issues relevant to measurement of alcohol-related problems and costs, and, by example, will identify the degree with which such measurement principles are observed in practice.

5.1 The Frequency of Alcohol-Related Events

Except perhaps for clinical alcoholism, alcohol-related problems are not typically caused exclusively by excessive drinking. Alcohol-related traffic accidents are caused by alcohol-impaired drivers operating vehicles in driving environments too complex for impaired psycho-motor functioning and judgment. Most alcohol-related accidents take place at night, when conditions are less than optimal for safe driving.* The presence of alcohol decreases a driver's ability to compensate for less-than optimal driving conditions and increases the probability of a crash.

Similarly, alcohol-related suicides, crimes of neglect, and "crimes of passion" are causally associated with alcohol only because excessive drinking was a contributing element among a set of causal factors. Alcohol acts to release inhibitions in persons who might not otherwise do the things that create social costs. Excessive or abusive alcohol consumption is related to accidents at work, absenteeism, poor family and domestic relations, and a wide range of social problems only to the extent that some proportion of these events would not occur if alcohol use was not present as a contributing factor.

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*Nighttime driving accidents and selective visual degradation." H.W. Leibowitz and D.A. Owens. Science, Vol. 197, No. 4302, 29 July, 1977, pp. 422-423.

Of all alcohol-related frequency data, the traffic crash statistics are generally among the most adequate. Police Departments, State departments of highways,and other governmental agencies routinely collect reports of traffic incidents with considerable detail, usually including some measurement of alcohol involvement. Yet, problems of measurement abound in traffic data. Douglass reported in 1974 that of seven states included in a comparative analysis of alcohol-related traffic crashes, none of the seven operational definitions of alcohol involvement were comparable.* Filkins and Carlson found that among Michigan counties, required blood alcohol concentration measurements for drivers involved in fatal accidents were woefully inconsistent, to the extent that the proportion of missing data approached that for data which were collected.** Douglass and Freedman (1977) have reported other inconsistencies in reported alcohol involvement in Michigan which limit the reliability of reported alcohol involvement (Had Been Drinking) between time periods.*** Still, alcohol-related crash involvements are better reported than other alcohol-related social problems.

Alcoholism, the most commonly mentioned problem related to drinking, is an example of a problem area that defies precise definition or measurement. Part of the measurement problem with alcoholism is that it is at the same time a medical, psychological,and social problem. Some "alcoholics" are identified because they lose their job, friends,and family and associate only with fellow drinkers. Other alcoholics are not identifed and measured until they have terminal alcoholic cirrhosis of the liver. Some alcoholics are identified by psychologists and social workers in public or private practice. Among the different professions that give aid to alcoholics there is no commonly accepted definition of the problem, between or even within the disciplines.

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*Douglass, R.L. The Effect of Lower Legal Drinking Ages on Youth Crash Involvement, Ph.D. Dissertation, Public Health Administration, Rackham School of Graduate Studies, The University of Michigan. August, 1974.

**Filkins, L.D. and Carlson, W.L. "Analysis and Reporting of Blood Alcohol Concentrations". HIT LAB Reports V. 3, No. 7, March 1973. pp. 1-6.

***Douglass, R.L. and Freedman, J.A. Alcohol-Related Casualties and Alcohol Beverage Market Response to Beverage Alcohol Availability Policies in Michigan, Volume I. Final Report, The University of Michigan. August 1977 Report No. UM-HSRI-77-37-1.

But how might we ascertain which among a number of socially pathologic events would not have occurred if alcohol were absent? How can we know the proportion of a given frequency of a certain category of events that is necessarily related to drinking? Because all calculations of the social costs of social problems causally related to alcohol require knowing the proportionate relationship to alcohol, it is necessary to assess the state of knowledge of each individual problem area vis-a-vis the role of alcohol consumption in its etiology. Unfortunately, the state of the art for most problem areas is currently less than ideal to provide meaningful proportions (weights) of alcohol involvement which can appropriately be applied to aggregate frequency-of-event statistics.

Two social problem areas will illustrate this point; child abuse and neglect, and suicide. Polansky, Holly and Polansky (1975) repeatedly introduce the role of alcohol in the social etiology of child abuse and neglect.

> Alcoholism in one or both parents has been recurrently associated with reports of child neglect. Both the dynamics of alcoholism and its biochemical aspects have been studied, of course. How these dynamics also relate to neglect has not been specified, although, once again, some shrewd guesses can be made, p. 16.

Thus there is a qualitative and affirmative relationship between alcohol abuse and the abuse and neglect of children by their parents, yet no proportion of all child abuse and neglect--a quantitative relationship--is proposed.*

Similarly,several authors have demonstrated the association of alcoholism and abusive drinking with suicide. Batchelor (1957) reported that suicide in old age is frequently precipitated by excessive drinking among individuals who may not have previously taken alcohol in excess. Also the author suggests

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*Polansky, N.A., Holly, C., and Polansky, N.F. Profile of Neglect, A Survey of the State of Knowledge of Child Neglect. USDHEW, Social and Rehabilitative Service, Community Services Administration, Washington, D.C., 1975.

that alcohol, while a major contributor to suicide attempts among the aged, is less often implicated than it is with younger people. Batchelor does not suggest which of all suicides among the aged involve abuse of alcohol.* Several authors have related traffic crashes with suicidal motivations, yet there are no serious attempts to identify a realistic proportion of total suicide incidence which is necessarily associated with drinking and driving.**

Even if proportions were known--as is the case for some problem areas --the enumeration of the events themselves, totally, can be as difficult as deciding how many are related to alcohol. For instance, some non-zero proportion of single-vehicle fatal traffic crashes is suicidal, but what proportion? No routinely collected crash data indicate the likelihood of a crash being a suicide attempt. Many events are unreported or underreported, including child abuse and neglect, marital disruption, absenteeism, and violent crimes. Unless a reasonably accurate estimate of the number of events within a period of time is known, it is not possible to estimate the subset of that frequency that is associated with abusive drinking. In general the problem is not one of over-reporting but of underreporting. Few social problems are satisfactorily counted--we know only of those which are brought to our attention. Most social problems are considerably larger in reality than the available statistics would lead us to believe.

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*Batchelor, I.R.C. "Suicide in Old Age" in Clues to Suicide Shneidman, E. and Fareberow, N.L. (Editors) New York, McGraw-Hill, 1957. pp. 147-148.

**Selzer, M.L. and Payne, C.E. "Automobile Accidents, Suicide, and Alcoholism" Proceedings of the third International Conference on Alcohol and Road Traffic, London, September, 1962.

McFarland, F.L. "Suicidal Impulses and Psychiatric Aspects of Highway Safety." Journal of the American Medical Association, Vol. 163, pp. 233-237. January, 1957.

Porterfield, A.L. "Traffic Fatalities, Suicide and Homocide" American Sociological Review, Vol. 25, pp. 897-901, 1960.

One significant difficulty that impedes the process of counting incidents of social problems is a lack of singular jurisdictional responsibility. For instance, are attempted suicides within the principal domain of police, social service, mental health, public health,or medical systems? The answer, at least for the present, is all of the above; the overlap of responsibility is part of the problem,because each system is mutually exclusive, sometimes duplicating counting and recording procedures.

David Zalkind et al. (1977) are only the most recent to propose a multi-problem patient (client) contact reporting form that would serve to relate alcohol and other etiologic factors to consequent social and health problems. The form, which includes presenting problems, auxiliary complaints, referral information,and more,is sufficiently complete to eliminate the difficulty in establishing proportions of alcohol involvement if it were universally adopted by all service systems and centralized to eliminate multiple counting.*

The facts are, however, that no reporting procedure or format is satisfactory for the task of counting incidence unless the overriding issues of double-counting, poor operationalization,and self-selection are overcome. Police, mental health, most social services,and most medical and public health systems rely on the clients and patients to make themselves known before an incident is recorded. Further, most people with the problems produced by abusive drinking fail to be identified, are not recipients of available services. They remain the bulk of the proverbial iceberg, of which reported cases are only the tip.

5.2 Three Basic Elements

When calculating the cost of alcohol-related events, as suggested above, three essential elements must be arithmetically combined. These elements include the incidence of the problem, the proportion of the total incidence that is attributable to alcohol abuse, and the cost of each incident of the problem. If total costs of child abuse were calculated by enumerating reported cases of child abuse, the cost of alcohol-related child

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*Zalkind, D., Zedon, H., Moore, M., and Kaluzny, A. "A Practical Reporting and Evaluation System for Intervention Programs: Guiding Principles and Potential Uses". American Journal of Public Health, Vol. 67, No. 4., April, 1977. pp. 370-373.

abuse would be determined by multiplying the total cost by a fraction (such as .18 if 18% of reported child abuse were known to be alcohol-related). The resulting cost estimate would represent alcohol-related child abuse costs. Other configurations of incidence, proportion of alcohol-involvement and unit costs are necessary for all individual problems created by the abuse of alcohol.

5.3 The Requirements of Measurement

All measurements used in the calculation of costs, incidence and proportions of alcohol-involvement are, like other numbers for research or management, subject to variation and error. The sources of variation and error, and the specific types of these concerns,must be understood before meaningful cost estimates can be made. There are three types of variation and error to be considered here: validity, reliability,and operational consistency.

Validity is a term that has both lay and technical meanings. In the present case validity refers to the appropriateness of a number in a specific calculation. The question addressed by the concept of validity is, "Does the number mean what it is supposed to mean?" Many examples can be drawn from the literature of appropriate and inappropriate figures which, when used to calculate alcohol-related social costs, produce valid or invalid cost estimates. In Michigan about 47% of fatal traffic accidents are associated with alcohol abuse, which provides a .47 weight to apply in our calculations of the incidence of alcohol-related traffic crash incidence. This applies only to those crashes that resulted in one or more deaths, however,and the .47 weight would be inappropriate for similar calculations of non-fatal crashes.

Berry (1974) and Berry and Boland (1977) selected a weight representing excessive mortality related to alcoholism derived from a prospective study of Ontario, Canada alcoholics who selected treatment in Toronto between 1951 and 1963. This figure was then applied to total mortality data for

the United States in 1971 and 1975. The calculation of excessive male deaths in the United States associated with alcoholism by Berry et al. was based on an assumption of the validity of the estimate of excessive mortality among Ontario alcoholics. It is entirely possible that this assumption is appropriate, yet there is a real possibility that any statistic derived from a clinical population of alcoholics who self-selected treatment in Toronto may not be appropriate (or valid) for application to populations in California, Florida,or Illinois. There are some dramatic demographic distinctions between Ontario and parts of the United States which raise serious doubts regarding the validity of Berry et al use of a statistic derived from one population in applications to another population. Thus a figure can be valid in one application and potentially invalid in another, depending upon the similarities in the populations from which the estimates are derived and then applied.

Reliability refers to the consistency of a calculation or estimate among replicated measurements of, presumably, the same thing. For instance, if we derived an estimate of the size of the population of persons hospitalized as a result of alcoholism, based on hospital admissions data,it would be necessary to use the same medical conditions for each measurement. If the number of conditions associated with long-term abusive drinking were not the same for each measurement, the estimates would not be reliable. Similarly, if the association of alcohol to the medical conditions were not constant over time, the estimates would not reliably reflect hospitalized alcoholics between time periods.

Subjective estimates of the incidence and data collection procedures that tend to be variable lead us to the third source of error among measurements used in estimating incidence: operational consistency. Closely related to reliability, operational consistency specifically refers to the instrumentation, field data collection procedures and standards, and those usually human sources of error that affect measurement of social problems. The most obvious example of operationally inconsistent data are arrest records for alcohol-related offenses, including drunk driving. Driving while intoxicated (DWI) is a prevalent behavior in this society; it is also

tolerated by most people even though it is generally known to be a dangerous practice. Apprehension and conviction for DWI is generally unlikely in most parts of the United States,with the probability of apprehension in Southeastern Michigan less than once in two thousand.

When, however, an executive order is issued to increase the pursuit of DWI cases,the response is an increase in the incidence of reported DWI cases. Thus the inconsistency of data collection, related to enforcement, creates an inconsistency in the incidence figures for DWI. Simply stated, it becomes impossible to assume that the statistical estimate of the social problem in question is consistently represented between measurements.

When statistical estimates of the incidence of alcohol-related problems are required,it is essential that the validity, reliability,and operational consistency of all measurements are known to be adequate. This applies to all statistical weights that are adapted from one place and time and applied to incidence data from another place and time. The text of survey questions, the time, place,and circumstances of data collection, the amount of missing data,and the definitions of operationalized measures all directly affect the quality of the data on which estimates of alcohol-related social costs are based.

6.0 THE RESPONSIBILITY OF THE ANALYST

Throughout this report we have reviewed the minimum research requirements for a valid social cost study. We have also pointed out where various studies have failed to meet these requirements. In the majority of studies reviewed,the analytical methods employed, based on present economic theory, have been appropriate. Where problems have arisen it has most often been in the choice of inappropriate data sets or weighting factors for the calculation of social costs. In defense of these researchers it should be noted that while these data sets and weights are at times inappropriate, they are often the best available short of the costly collection of primary data.

We find ourselves, therefore, in a situation where a well developed and precise set of economic tools for the calculation of social costs is necessarily applied to poorly developed and often inappropriate measurements. The problem is aggravated because the product of the social cost study is most often a singular total cost figure, which lends an air of precision to the cost calculations unwarranted by the quality of the original data or weighting functions.

In the absence of more precise data the analyst minimally has the responsibility to point out to the reader the shortcomings in the data utilized, as well as the probable impact that such shortcomings have on the calculations. In addition the investigator has the responsibility to identify the direction of bias (i.e., whether the estimate is high or low) and if possible suggest a range of minimum and maximum costs that encompasses the single cost estimate.

Given the interdisciplinary nature of social cost studies which require at minimum a working knowledge of both economic theory as well as the social,

psychological, and political dynamics of the problem for which cost estimates are desired, we are surprised by the lack of collaborative research efforts which draw together economists,other social scientists, and practitioners familiar with the social problems. We have most frequently found elaborate economic components of research reports combined with simplistic applications from the alcohol literature, or carefully constructed clinical and epidemiologic models matched with elementary economic theory. Neither combination is of great value.

7.0 SUMMARY FINDINGS AND CONCLUSIONS

This study had four objectives:

1. Review the social cost literature for appropriate models for estimating the social cost of alcohol;

2. Identify the criteria and methodological issues for a valid social cost study;

3. Discuss the major economic theories and principles utilized in a social cost study;

4. Make recommendations regarding the feasibility of implementing a system for estimating the comparative social costs of alcoholism and alcohol abuse at the State level.

In reviewing selected documents we were repeatedly convinced that theoretical, conceptual, and practical difficulties now prevent valid assignment of dollar values to alcohol-related problems. Our findings can be summarized in four categories: (1) Poor incidence and cost data; (2) Lack of agreement regarding alcohol-related proportions of various health and social problem incidence; (3) The use of average cost estimates instead of marginal cost estimates; and (4) Lack of practical utility of total average cost figures.

7.1 Poor Incidence and Cost Data.

In calculating the cost of a social problem, the analyst must identify the population at risk, determine the problem-related behaviors which lead to the incurring of social costs, and calculate the economic value of goods and services rendered or foregone as a result of the problem-related behaviors. While national, state,and local data exist for a number of social and health

related problems (i.e., traffic accidents, suicides, homocides, etc.) data that indicate the percentage of these problems which can be attributable to alcohol are often lacking. In an effort to develop weights such that the incidence data can be utilized, researchers have relied heavily on special purpose samples collected for or by alcohol treatment programs. The self-selecting bias of these clinical data, as well as their parochial nature makes the use of such weights in the development of national or state incidence rates questionable. Equally questionable is the use of these biased samples to derive social cost indices since these samples are not an accurate reflection of the at-risk populations.

7.2 Lack of Agreement Regarding Alcohol-Related Proportions of Health and Social Problems

There is a lack of agreement among analysts as to what constitutes an alcohol-related social problem. Except in the case of alcohol-related traffic accidents (where BAC levels are widely used to determine alcohol involvement) and clinical alcoholism, each individual must develop, independently, the criteria on which judgments will be made of alcohol involvement in other health and problem areas. Since incidence levels will be directly affected by the definition of alcohol-involved social dysfunction utilized by the analyst, care must be taken in using these frequencies to derive incidence rates or in using these data to measure social costs.

7.3 Use of Average Cost instead of Marginal Costs

Average costs which are commonly utilized in the calculation of total cost figures are not the most appropriate for decision-making purposes. In the calculation of the social cost of alcohol abuse we are interested only in those costs incurred by society as a result of alcohol abuse. Stated differently, we are asking what cost would society not incur in the absence of alcohol-involved problems. Average costs, because they include fixed costs which must still be paid by society in the absence of the social problem, do not accurately reflect the economic cost of the problem (i.e., the cost to

society of apprehending a drunk and disorderly individual does not include the cost of purchasing and maintaining a police car, because in the absence of D & D individuals, the car would still be required to attend to society's non-alcohol-involved problems). Much more appropriate to cost studies for planning purposes are marginal costs. These are, however, more difficult to calculate.

7.4 Lack of Practical Utility of Total Average Cost Figures

Even if accurate total cost figures could be calculated, the utility of such figures must be questioned. Knowledge of the relative cost to society of various alcohol related problems is of little value to policy makers in determining the level of resources to be utilized in combatting each problem,since these figures alone do not indicate the dollar return per dollar invested in each of the problem areas. Thus it is conceivable that while the cost to society of alcohol-involved traffic accidents is greater than the cost to society of drunk and disorderly conduct, the effectiveness of our intervention and treatment strategies is not usually equal. It may be that the social benefits resulting from expenditure of additional resources on drunk and disorderly individuals would result in greater economic savings to society than would additional resources invested in the prevension of a more obviously costly problem.

7.5 Conclusions

On the basis of these observations we recommend that state agency personnel and policy-makers refrain from relying heavily on estimates of the total cost of alcohol-related social and health problems at this time. The necessary research to provide missing information may soon be conducted so that accurate costs of various problems related to alcohol can be estimated. It is in the best interest of the state to wait for valid comparative cost estimates. Even when the practical and theoretical obstacles have been overcome, the state should only become invested in the process when the utility of the activity will serve a real purpose in planning and evaluating intervention and prevention programs.

8.0 TECHNICAL ISSUES

There are several theoretical-technical issues which researchers must resolve before initiating a social cost study. These issues are important because there is a diversity of opinion regarding how they should be resolved and because the decisions made can greatly affect the social cost totals generated by the analysis. The issues include discounting and discount rates, productivity increases, allowance for consumption, and the value of non-market production. These issues will be discussed separately below.

8.1 Discounting and Discount Rates

When an individual ceases to be productive as a result of the consequence of a social problem (either as a result of pre-mature death, or disability), social costs are incurred in the form of foregone productivity. Economists generally use foregone earnings as a measure of foregone output. Using life tables the economist can then estimate the number of additional years the individual would be expected to be involved in productive activity in the absence of the social problem. The number of foregone years of activity multiplied by the individuals expected earnings,adjusted at some rate to reflect increases in productivity, and adjusted to reflect allowances for consumption (if appropriate - see next two sections),gives the economist an estimate of the value of production lost as a result of the problem. Since the economic value of lost future earnings is accounted for in the present, they must be discounted to reflect the fact that the present value of money to be received (or would have received in the absence of the problem) in the future is always worth less. Rice and Cooper explain discounting and the selection of a discount rate in the following way:

> The value of money changes with time, so that in order to calculate the present monetary value of man, his future expected earnings must be converted to their present worth today. Banks and Kotz state that 'a given sum is normally

> worth more today than an equal sum at some future date, because the money (or resources) can be profitably invested (or consumed) in the interval between today and the future. Interest is the premium paid to reflect the fact that any given sum or resources could be profitable used over a period of time...It follows that the value of money which is not currently available, but which will become available (or spent) some years hence must be discounted for the interest which could be earned in the interim, which is why the present value of a dollar to be received in the future is always less than 100 cents.
>
> Although there is general agreement among economists that discounting should be employed, there is no agreement on which discount rate, i.e., rate of interest, to use. Yet the selection of the discount rate is most important since its effect is considerable. The higher the discount rate, the lower the present value of future earnings. With a high rate of discount, earnings for in the future yield only a small present value. Conversely, lowering the discount rate increases the present value of these earnings far in the future.*

8.2 Productivity Increases

Dorothy Rice and Barbra Cooper in writing about the issue of productivity increases have stated:

> While future earnings must be discounted to reflect lost interest, average annual earnings must be increased to reflect gains in productivity. It is an understatement of lifetime earnings to assume that a person ten years from now will earn the same amount as a person of the same age, sex, color, and educational level earns today. In order to adjust for the gain in productivity, an average annual gain can be projected and applied to the annual earnings. This rate of increase may be incorporated into the discounting calculations to obtain a net effective discount rate. For example, assuming a rise in productivity of 3 per cent a year, a discount rate of approximately 7 percent will be reduced to a rate of approximately 4 percent (1.07/1.03=1.039)...**

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*Source: Rice, Dorothy, P., and Cooper, Barbra S. "The Economic Value of Human Life," American Journal of Public Health, vol. 57, no. 11, November, 1967, 1954-1966; p. 1958.

Rice and Cooper refer to: Banks, Robert L., and Kotz, Arnold. "The Program Budget and Interest Rate for Public Investment," Public Administration Rev. XXVI:283-292, 4 (Dec.), 1966.

**Ibid, p. 1958-59.

8.3 Allowance for Consumption

Dorthy Rice and Barbra Cooper also write about the issue of consumption:

> There is a diversity of opinion regarding the treatemnt of consumption. Insurance companies treat consumption as a deduction from a person's contribution to output. Dublin and Lotka and Weisbrod deduct consumption from total output in their calculations of the earning losses.
>
> Fein and Klarman, on the other hand, make no such adjustment. Fein summarizes his views as follows:
>
> > 'Certainly the net figure (gross value less consumption) derived by Dublin and Lotka to indicate the money value of a man to his family is correct for their purposes. It is not at all apparent, however, that the net concept is the correct one when we deal with the economic value of a man to society. It is true that man consumes partly in order to maintain himself, and in this sense some of his consumption may be considered as a gross investment to take care of depreciation; it is also true, however, that consumption is an end in itself and can be viewed as a final, rather than an intermediate, step in the creation of other products. The question involved concerns the purposes for which an economy exists. On an individual's income, the individual enjoys life, and it is for this purpose that the social economy exists.*

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*Ibid, p. 1959.

Rice and Cooper refer to:

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8.4 Estimation of the Economic Value of Production in the Non-Market Sector.

One of two basic approaches can be employed:

Opportunity Cost Approach:

> Roughly speaking, the opportunity cost approach assumes that the unit value of a person's time used for production in the non-market sector is equal to the wage rate of that person in the market place. Under this assumption, the economic value of unpaid work is equal to or greater than the wage rate that the same person would command in the market place, regardless of the comparability of two jobs performed.*

Market Cost Approach:

> The market cost approach assumes that the wage rate for tasks performed in the market place can be applied to the same work performed outside the market place...When using the market cost approach, real goods and services produced by persons whose productive activities are not in the market sector are valued the same as production in the market sector. The economic value of (persons) keeping house in our society would depend on the average market value of the work they perform and would represent an estimate of the cost of replacing (the individual) with man-hours from the labor force to do the same work.**

Economists generally rely on market prices in estimating the economic value of foregone production resulting from the consequences of a social problem. Difficulty arises when the researcher wishes to estimate the economic value of housework and other non-market production, where market prices are not available. Consequently, many social cost studies ignor completely the economic value of non-market production. Brody describes the two major

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*Source: Economic Value of Housewife. W.H. Brody. Research and Statistics Note, No. 9, August, 1975.

**Ibid.

approaches which researchers use in dealing with this problem. Neither approach is wholly acceptable, and most economists would agree that the economic value of non-market production is generally underestimated in most social cost studies.

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